

Markets and Companies

How level is the playing field in the Chinese chemical market?

Page 6

THE NEWSPAPER FOR THE
CHEMICAL AND
LIFE SCIENCE MARKETS

IT

Time to take the end of Windows XP support seriously

Page 7



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NEWSFLOW

Markets and Companies:

CHEManager Europe becomes CHEManager International.

Solvay wins Chinese patent fight.

Tata restructures UK soda ash assets.

KIK closes purchase of Chemtura Consumer Products.

BASF wins Frost & Sullivan award.

ICIG buys Clariant's detergents and intermediates business unit.

Carlyle close to buying J&J's diagnostics unit.

More on pages 2-8

People:

Marcel Lubben appointed president of Reverdia.

Kemal Malik appointed to Bayer's board of management.

Dr. Jürgen Köhler takes over as CEO of SGL Group.

Nick Hyde joins Results Healthcare as managing director.

More on page 15

Brand New

With An Architecture Overhaul, Celanese Aims at Increasing Value for Customers

Strategy — When Mark Rohr became chairman and CEO of Celanese in 2012, he proclaimed that he wanted the company to get closer to its customers and better respond to their needs. A year and a half later, the Dallas, Texas-based specialty chemicals and materials manufacturer announced a remake of its brand architecture in order to represent the company's multiple businesses and capabilities in a single brand. Celanese has a rich tradition as the world's largest producer of acetyl intermediate chemicals. The company, which was founded in New York in 1918, was taken over by former German chemical giant Hoechst in 1987, spun off in a 1999 initial public offering (IPO), taken private by the Blackstone Group in 2004, only to be spun back out in another IPO the next year. Today, being only four years shy of its centennial, Celanese employs approximately 7,600 employees worldwide and had net sales of \$6.4 billion in 2012. Michael Reubold spoke with Mark Rohr about his strategy of creating "One Celanese" and his vision for the company's future.

CHEManager International: Mr. Rohr, before joining Celanese in 2012 you served as CEO of Albemarle and had an acknowledged track record of generating strong financial results. What did you identify as your foremost tasks when you took the helm at Celanese?

M. Rohr: Well, if you look at Celanese, you see a corporation with a great history. Over time, there was a lot of evolution of the business model. What I saw as the biggest opportunity was to refocus our efforts around the foundational technologies and lever these technologies to really serve our customers around the world. I think we had lost that a little bit through all the changes that had gone on; and there was a tremendous interest on the part of the employees to get to that point.

What has changed since then?

M. Rohr: We put in place single objectives for the corporation. In the past, we had a number of individual businesses like Ticona, Acetate Products, Acetyl Intermediates, Emulsion Polymers and Nutrinova. They were operating on their own with their own commercial organizations, their own manufacturing organizations, and with individual business goals. Today, we don't have individual business objectives any longer. Our commercial organization is all one team now satisfying all the businesses of Celanese around the globe. Our manufacturing organization and our technology organization are structured the same way today. This change is what might best describe that "One Celanese" approach we followed.

And that approach also implied the re-branding?

M. Rohr: Yes, if you look back we had many pockets of brands within the corporation, and we treated those brands as an individual entity. Launching a unified brand has been an essential element of our strategy. Each of the former entity names will fade and be replaced by Celanese. Going forward, everyone in Celanese, our products, our process technologies and our solutions from historical businesses will now be represented by one name.

In the past, Celanese was more like a conglomerate?

M. Rohr: That is right. As we outlined the new strategy, we identified things that we had to tackle to be really successful. And we just tackled them, function by function, starting initially with the people processes and rolling that all the way through. And so the "One Celanese" brand and this vision that we describe with the phrase "The chemistry inside innovation" all surfaced out of that process as the large goal extension — and sort of the icing on the cake, if you will.

Did you feel that there was a hidden value in all those entities that you could extract by creating one brand and one vision?

M. Rohr: Absolutely, no question. Our vision today represents Celanese's depth and breadth of industry and chemistry knowledge, the capabilities to innovate for our customers, the dedication to creating value, and a commitment to partnerships to help our customers succeed. These changes we are making are aimed at supporting this vision and openly communicating its value proposition to our customers. The brand also speaks to the strength of our talented employees who collaborate with our customers to develop fresh solutions that solve their most critical needs.

Celanese owns well-known brands like Ticona. How do your customers feel of seeing them vanish?

M. Rohr: These brands were part of the old structure. Ticona, since you

mentioned it, was an entity within the corporation, but it was just a legal entity. Within Ticona there are product brands like Hostaform that have been around for a long time. So, we are actually maintaining the familiarity with individual customers on product brands, and we are replacing the legal entity brand that we had with the Celanese brand. The new Celanese brand reinforces the power of our global organization and reflects who we really are. And, so far, the receptivity of the market and of our customers for the re-branding has been very good.

Normally, before you do a re-branding, you look at your portfolio.

M. Rohr: Yes, but we are approaching this process as Celanese and not as a portfolio of saying 'good or bad'. Each group has the same objectives to get where they need to be to be seen as top decile. Now each business has plans to go do that. Out of that planning process may evolve some consolidations, but it is not our intent to start out by jiggling the portfolio.

Speaking of objectives, what progress have you made in terms of profitability and what are your goals to grow the company?

M. Rohr: If you look across all industry, the best performing companies have compounded earnings growth that presses the low teens, so 12% to 14%. So, last year I set as an objective that this is where we wanted to



Celanese is moving to higher degrees of differentiation.

be. We want to be able to compound grow our corporation at that kind of pace. And then we asked ourselves: "What prevents us from doing that?" And it got into these issues that we have just talked about: it was just self-constraints on how we conduct ourselves right.

I am very comfortable as we take these steps and lever our capability that we will be able to create that kind of momentum in our corporation. This year we have that kind of momentum on the way and I don't



Mark Rohr, Chairman and Chief Executive Officer, Celanese Corporation

see any reason why that shouldn't be on the way going forward.

Will acquisitions be a part of your growth strategy?

M. Rohr: The approach that I put in place was one of starting with that foundation technology and exploring ways we can supplement that foundation technology. So, initially we are technology, and then it goes

to customers. We have been actively monitoring possible acquisition targets. We haven't produced any results to share with you yet, but I am confident it will happen.

You mentioned the claim "The chemistry inside innovation," ... Do you think that a company like Celanese gets rewarded by the market for being innovative?

M. Rohr: Well, it depends. In some cases absolutely; in other cases you feel like you do a lot of work and deliver a lot of value and don't get much return. Celanese as a corporation is moving to higher degrees of differentiation. So, over time you are going to see us move all of our products to that kind of spot. And I think, to be honest, if the products can't get to that kind of differentiation, it is very hard to get a true return on capital. I am pleased with the progress we have made and there are many examples where we are getting the proper reward and recognition for the value we bring our customers. There are also plenty of examples where we are not. And

we plan to work on all those to try and bring them to that same valuation spot.

What is your vision for Celanese for the near future?

M. Rohr: This year, our global teams have done a tremendous job of driving earnings growth through Celanese-specific initiatives. As we take our initial view of 2014, we expect earnings growth will continue to be driven by the actions we are taking, not by depending upon increases from the global economy. Celanese-specific initiatives that translate innovation from new products and drive efficiencies through productivity will fuel earnings growth in 2014 at levels consistent with our long-term growth objective.

In the longer term, we would like to be able to double our profitability corporately over a five-to-six-year period in order to be on that 12% compounded growth rate. The first several years we have said that it is going to occur solely from things we control. At some point, we will have to get some M&A in there to help shore that up a bit.

So the expectation you should have in a three-to-four-year period is that you will see organic changes to the portfolio in those areas where we can face the customers and innovate. That is our vision.

What the Celanese employees feel is that they really want to be part of a broader solution for society. So we are very engaged both at work and outside of work in making that difference. And as part of achieving our financial objective, the corporation is going to evolve dramatically with that.



DECISIVE INFORMATION

THE PORTAL AND NEWSPAPER FOR THE EUROPEAN CHEMICALS AND PHARMACEUTICAL MARKETS



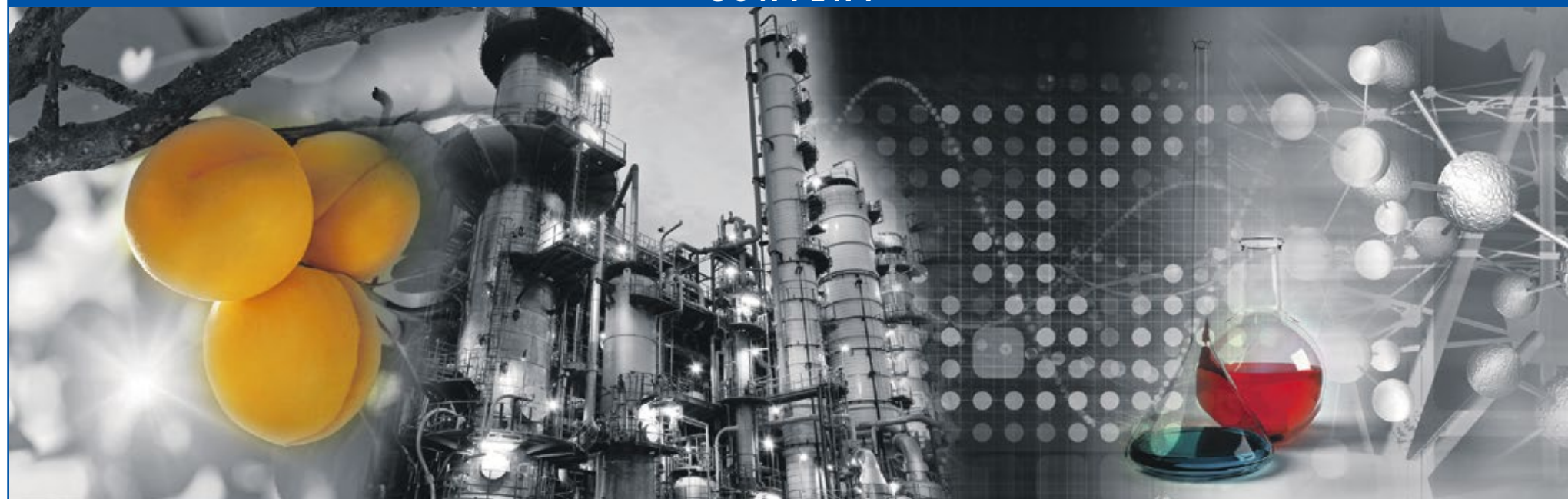
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CONTENT



Front Page			
Brand New	1	The Clock Is Ticking	7
With An Architecture Overhaul, Celanese Aims at Increasing Value for Customers		Why the Chemical Industry Should Take the End of Support of Windows XP Seriously	
Interview with Mark Rohr, Chairman and Chief Executive Officer, Celanese Corporation, Celanese Headquarters in Las Colinas (Dallas, Texas)		Oliver Gürtler, Director Windows, Microsoft Germany, Unterschleißheim (Germany) / CHEManager Europe Interview with Axel Oppermann, Senior Advisor, Experton Group, Ismaning (Germany)	
Markets & Companies	2-5	Product Stewardship in the Cloud	8
Editorial	2	SAP PSN — Product Safety Portal Covers Entire Supply Chain	
New Name, Same Quality, Extended Range		CHEManager International staff	
Dr. Michael Reubold, CHEManager International		Chemicals	9-12
Back in the Game	4	Global Shale and the GCC	9
American Chemistry Reemerges as a Growth Industry		The End of Low-Hanging Fruits and High Margins	
Emily Sanchez, Director - Surveys and Statistics, American Chemistry Council		Oliver Gawad, Partner, Stratley and Dr. Sven Bugarski, Consultant, Stratley	
U.S. API Manufacturing and Sustainability	5	Under Construction	10
Region Narrows Focus on Specialty Niche Areas		Shale Gas — A Bumpy Road Ahead	10
Joshua Gilpatrick, Pharmaceutical Research Analyst, Thomson Reuters		Shifting Global Energy Mix Will Realign Geopolitics	
IT-Solutions	6-8	Dr. Michael Mbogoro; consulting analyst; Chemicals, Materials and Food, Frost & Sullivan	
Western Players and the Chinese Chemical Market	6	U.S. Markets Drive Global Reallocation and Growth	11
Is the Playing Field Level?		Shale Gas in the U.S. Has Created a Competitive Advantage for Chemical Manufacturers	
Dr. Kai Pflug, CEO, Management Consulting		Vir Lakshman and Rita Duran, KPMG	
		Repercussions of the U.S. Shale Story	12
		Shale Changing the Face of Petroleum and Petrochemical Markets	
		David Wech, managing director, JBC Energy	
		Pharma	13-14
		Outsourcing Biopharmaceutical Manufacturing	13
		CMOs, CROs Must Take on Risks	
		Jan Gunnar Gustafsson, Bio Evaluation BO AB	
		Helsinn Reaps Benefits of Cytotoxic Molecule Demand	14
		New Facility Up and Running Successfully	
		Interview with Waldo Mossi, Senior Director of Business Development, Helsinn Advanced Synthesis	
		PCRAMS: A Booming Business	14
		Outsourcing Enhances Flexibility and Efficiency of Pharma Research and Manufacturing Processes	
		Giuseppe Tamburini, Studio Tamburini	
		People • Events • Publications	15
		At A Glance	16
		Index	
		Imprint	

EDITORIAL

CHEManager International

New Name, Same Quality, Extended Range

If you have been following our newspaper for a while you probably realize the name change: CHEManager Europe has become CHEManager International.

Since our news coverage of the chemical and pharmaceutical industry has been international pretty much from the beginning, this step was quite logical and only a matter of time. Although European-based, growing up to become a publication with a global footprint has been in our unique chemical and pharmaceutical business newspaper's genes from its birth in 2005.

For years we have been seeing you — our readers as well as our authors and advertisers — at conferences and trade shows all over the world. And we have increased our geographical distribution incessantly from its Europe-centered early phase to a more international scope today. Now, almost a teenager with a passport full of immigration stamps from over 50 countries, CHEManager Europe has become a true globetrotter and will from now on go by the name CHEManager International.

Not only do we ship 20,000 print copies of every CHEManager International issue to readers at locations on five continents, but our e-paper edition and our online news and b2b portal www.CHEManager.com attracts visitors from even more places all over the world. Thus, the time has come to express this international reach in our name.

What's next?

CHEManager International is a brand of Wiley, a leading global chemistry publisher headquartered in Hoboken near New York that operates a \$ 2 billion business from locations around the world such as San Francisco, Rio de Janeiro, Dubai, Tokyo, Beijing, Shanghai, Singapore, New Delhi, Oxford, Berlin, Madrid and Copenhagen. We will use this network of experts to further our globalization strategy.

While refining our internationalization, we are also working on advancing our digitalization. Scanning hundreds of business news every workday, our editorial team evaluates their relevance and provides executives and experts in the global chemical and pharmaceutical industry with the essential information they need to manage their businesses and back their strategic decisions.

Bundling this information into logically focused content that gives every user their individual information advantage is now on the top of our agenda. From personalized news clippings and e-newsletters to topical microsites and special subject content services, CHEManager International is the industry's print and digital one-stop shop for business information, market developments and company strategies.



Dr. Michael Reubold,
Publishing Manager and Editor,
CHEManager brand

Solvay Wins Chinese Patent Fight, Denies Indupa Snag

LEGAL Belgium Company Awarded over Half a Million Euros in Damages

In two patent cases brought against China's HySci (Tianjin) Specialty Materials, Solvay has been awarded damages of €670,000 and won a court order mandating that HySci immediately cease producing and selling certain rare earth mixed oxides used in automotive catalysts.

China — The court of first instance in Tianjin ruled in December that the Chinese company had infringed Solvay's patents since 2004. In consequence, it ordered HySci to immediately discontinue production and sale of seven mixed oxides grades. The damage award was based on the profits made from the 189 tons of mixed oxides sold from 2004 onwards. The company also was ordered to cover most of Solvay's legal expenses.

In a separate case, in which the ruling is final, the high court in Beijing, China, confirmed the validity of Solvay's patent, upholding an earlier



Rare Earths, mixed oxides and aluminas

ruling by the country's State Intellectual Property Office. HySci had claimed the patent was invalid.

Du Hua, president Solvay Rare Earth Systems, said he is pleased about the two "landmark rulings" in China, as they will strengthen the Belgian chemical producer's intellectual property rights (IP) position in one of the world's main growth markets for rare earth mixed oxides.

"IP enforcement is essential to support Solvay's long-term research and development for higher performance and value-added mixed oxides, the manager said, adding that "it also helps to ensure a level playing field for our customers." Solvay is the world leader in rare earth

performance materials for automotive catalysts, of which rare earths mixed oxides are among the main building blocks.

In other news, Solvay has denied that its sale of its 70.59% stake in Solvay Indupa to Brazilian petrochemical giant Braskem has hit a snag, as reported by some media. The remaining shares in the Argentina-based PVC producer are publicly traded, which obliges Braskem to launch a tender offer.

However, Solvay said the success of the share offer will have no effect on its divestment plans.

Subject to regulatory approval, Solvay plans to merge its PVC activities with those of Switzerland-based Ineos. (dw)

Tata Chemicals Restructures UK Soda Ash Assets

India — India's Tata Chemicals is restructuring the soda ash and sodium bicarbonate business of its UK-based subsidiary Tata Chemicals Europe (TCE). The former Brunner Mond business acquired by Tata in 2005 is the UK's only manufacturer and supplier of the two products.

As part of the plans, a soda ash and calcium chloride plant in North-

wich, Cheshire, will be closed, while a sodium bicarbonate production facility at the same site will be expanded, and a soda ash and bicarbonate plant at Listock, Cheshire, will be retained. Altogether, some 220 jobs will be lost in the realignment.

The plant closures are planned to take place during the first quarter. The company cited problems of

energy-intensive companies in international competition. Other observers pointed to the need to reduce overcapacity in the market.

Solvay already has announced that it will end soda ash production at its 230,000 t/y plant in Povoba, Portugal during January, as well as cutting capacity at its plant in Rosignano, Italy. (dw)

To The Last Drop

Emerging Trends for Enhanced Oil Recovery Chemicals Market in the U.S. and Europe

Maximizing Oil Fields' Output

Oil producers have resorted to innovative techniques to retrieve trapped oil from rock, sandstone and other formations. In most cases, stimulation techniques are used to recover oil in commercially viable quantities, and this is achieved by pumping in stimulation fluids along with various chemical additives.

The development and exploitation of an oil field typically consist of three stages: primary, secondary and tertiary recovery. In primary recovery, the oil is forced out by pressure generated from gas present in the oil. In secondary recovery, the reservoir is subjected to water flooding or gas injection to maintain a pressure that continues to move oil to the surface. In tertiary recovery, also known as Enhanced Oil Recovery (EOR), external fluids are introduced to reduce viscosity and improve overall flow and ultimately increase the recoverable reserves of oil.

Gases that are miscible with oil are extensively used for EOR as well as steam, air or oxygen, polymer solutions, gels and chemicals, or microorganism formulations. The most common method is steam injection in the crude oil reservoir. In general, gas injection is quite economical and is typically used when gas is part of the oil production. The gas is re-injected into the reservoir to maintain pressure. Alternatively, nitrogen is also used for EOR. In 2012, the chemical injection market share accounted for only 5% of the tertiary oil recovery, and the remaining 60% was thermal processes including steam stimulation and flooding. It is expected that chemical injection market share will increase to 20% by 2019. The most beneficial attribute of chemical injection (or chemical flooding) is its ability to reduce the interfacial tension (IFT) between the crude oil and the injected water, allowing the oil to be produced. Moreover, various highly innovative chemical-based solutions are being developed and used — for example, micellar fluids, which are composed largely of chemically advanced surfactants mixed with water.

There are three chemical flooding processes including polymer flooding, surfactant-polymer (SP) flooding and alkaline-surfactant-polymer (ASP) flooding. In the polymer flooding method, which was the most popular in 2012 with 55.3% of the chemical-flooding market (fig.1), water-soluble polymers, usually polyacrylamides and biopolymers, such as xanthan, guar gum and cellulose polymers, are injected together with water to increase the viscosity of injected water. This leads to a more efficient displacement of moderately viscous oil. In the surfactant-polymer flooding method, under very specific circumstances, the oil-water IFT can be reduced to almost zero resulting in the displacement of trapped residual oil. In most cases the types of surfactants used in SP flooding were petroleum sulfonates and synthetic alkyl sulfonates, which usually require the use of co-surfactants (non-ionic surfactants) or co-solvents, mostly alcohols. In the alkaline-surfactant-polymer formulation, alkaline may convert some acids within the oil to surfactants that aid the oil recovery.

Overview of the EOR Chemicals Market

The maturity of domestic oil fields supports the demand for EOR chemicals as oil companies aim at recovering the maximum quantities possible from their wells. In addition, the growth of EOR chemicals will be further influenced by

energy conservation and policies, technology development and high fuel prices. The U.S. and Europe are promising markets for the increased use of EOR chemicals. Despite the long presence in the market of EOR chemical solutions, the usage has not been as extensive as might be expected, especially when the size of the proven crude oil reserves and crude oil production (fig. 2) is considered. Moreover, many projects are still at their pilot stage. The major reason is that in most cases, advanced EOR techniques are highly demanding, challenging and expensive. Additionally, the profitability of EOR techniques depends directly on the crude oil prices and energy costs.

The pricing strategy of EOR chemical manufacturers takes into consideration the large volumes shipped. Therefore, it is not expected that EOR chemicals will experience a significant decrease in price until the economic conditions transform in order to justify a change in pricing strategy. In addition to the increase of raw chemicals costs, energy, warehousing and transport costs have a strong influence on EOR chemicals prices. Furthermore, many customers prefer value-added and multifunctional solutions that come with additional technical and after-sales support service.

In 2012, the EOR chemicals market in the U.S. and Europe was valued at \$409.3 million with a high annual growth rate of 17.7%. When compared with 2009, where the EOR chemicals market generated revenues equal to \$284.8 million, it is clear that the market experienced an explosive annual growth of almost 50%. The demand for EOR chemicals is expected to continue to grow during the forecast period up to 2018. The main reason is the anticipated continuous increase in oil prices and the systematic aging of oil-field resources. The main factor driving the market in the long term beyond 2018 is related to further technical advances as well as better understanding of EOR technology.

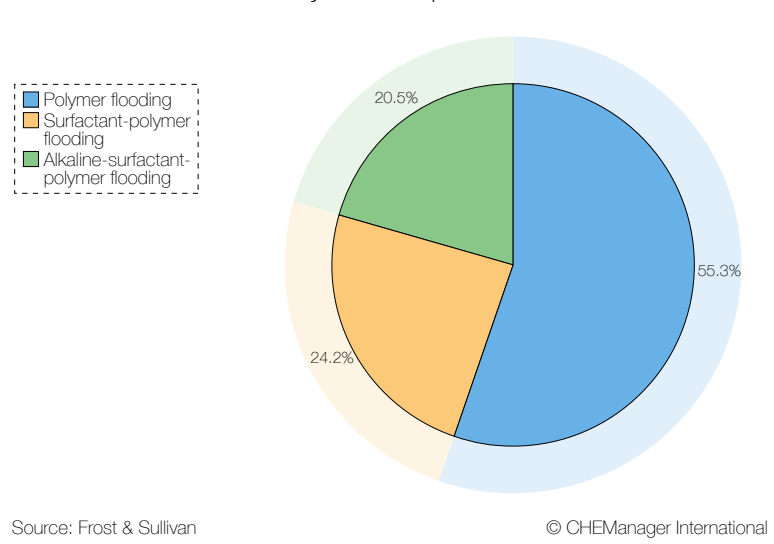
EOR Trends

There is a strong focus on the end-user market and further expansion on regions that have mature oil fields; as a result, it is crucial for chemical manufacturers to offer highly customized EOR chemicals or solutions. Chemical manufacturers that specialize in polymers, surfactants and formulations containing alkaline chemicals can benefit from this market growth by offering a broad range of chemicals at various concentrations. In addition, the service and oil companies require highly innovative technologies and equipment. Key leading EOR chemical manufacturers, such as SNF Group, Tiorco, Kemira and BASF combined the most required properties to create highly effective EOR products. Strategic partnerships between key oil producers as well as EOR technology providers create better opportunities for EOR chemicals. Although investing in innovative, advanced and highly effective EOR chemicals and other chemical-based injection solutions is quite challenging, such investments are crucial for enhancing the overall crude oil extraction efficiency and thereby increasing oil production to meet the growing market needs, while maintaining high environmental, quality and health-care standards. In addition, there is a strong trend to employ bio-based chemicals, for example, biopolymers that are biodegradable, safe to humans and more environmentally friendly.

Growing Demand For EOR

The continuous increase in crude oil production dictated by high de-

Enhanced Oil Recovery Techniques



mand and depleting oil reservoirs is expected to maintain and further advance the need for various EOR technologies, including the chemical injection method. The growing demand for a broad range of EOR chemicals such as polymers, sur-

factants, alkali chemicals and their formulations as well as advanced crude oil extraction technologies are helping to tap more oil from the rapidly maturing reserves that cannot be reached using traditional technology.

Rank	Country/Region	Crude Oil Proved Reserves (Million bbl)	Crude oil production (bbl/day)
1	United States	20,680.0	9,023 million
2	Nordic countries	6,220.0	2,219 million
3	UK	2,827.0	1,099 million
4	Balkan countries	972.0	141,226
5	Italy	523.0	111,800
6	Benelux countries	287.4	41,990
7	Germany	276.0	100,300
8	Poland	155.0	19,730
9	Iberian countries	150.0	14,016
10	France	90.0	49,530
11	Austria	50.0	25,750
12	Hungary	31.7	22,560
13	Czech and Slovak Republic	24.0	14,943
14	Baltic countries	12.0	9,700

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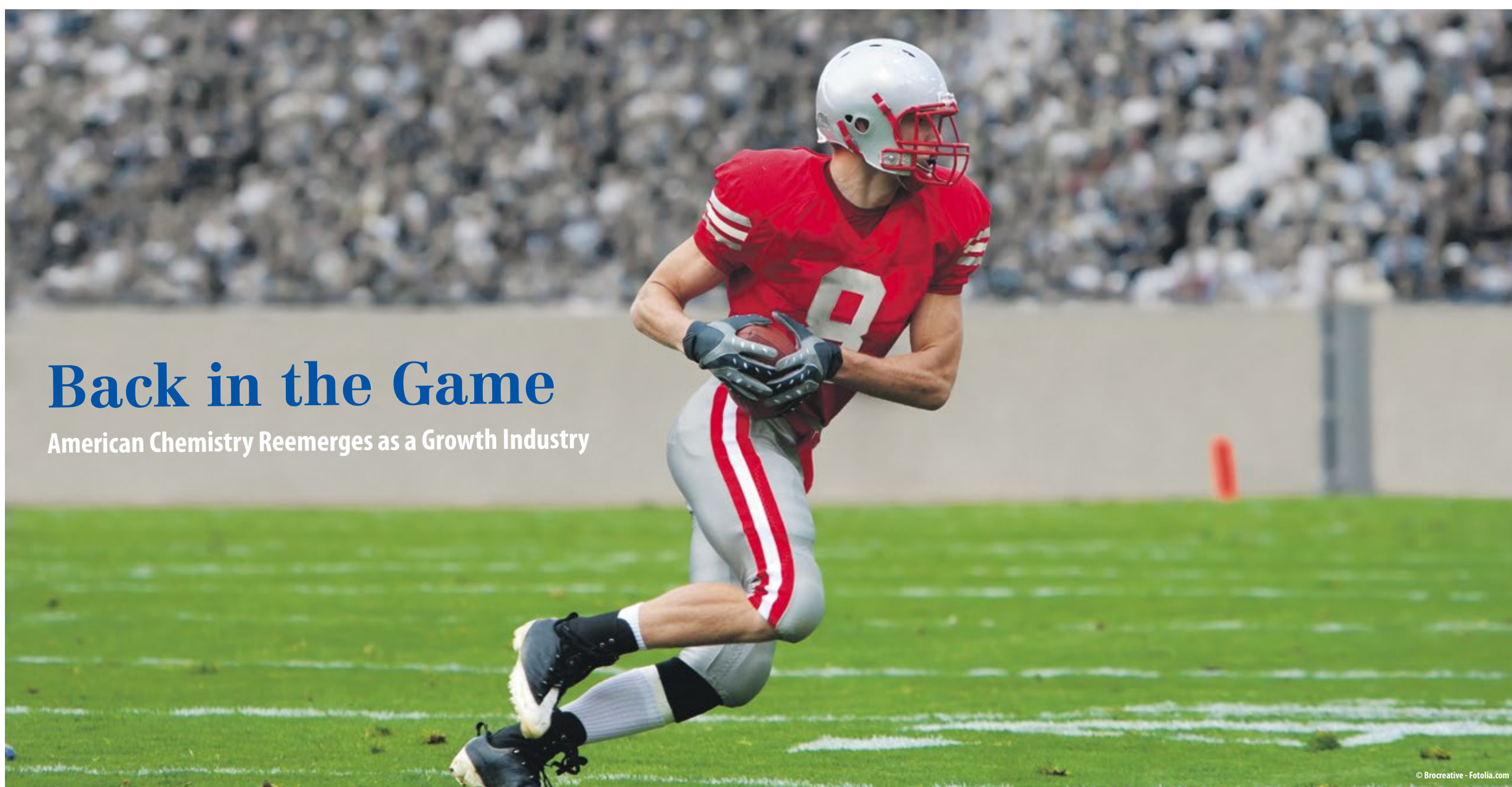
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Back in the Game

American Chemistry Reemerges as a Growth Industry



Poised For Growth — American Chemistry rang in the New Year with some cheer. Despite the challenges, the industry managed to post gains in 2013. American Chemistry is now poised for growth and the outlook for 2014 and beyond is bright due in large part to a major shift in competitiveness for American producers (thank you, shale gas).

Of course, this optimism is against the backdrop of the U.S. economy which has been stuck in a slow growth pattern. It's been hard to gain any momentum with so many speed bumps along the way: weakness in manufacturing, cuts in government spending and periods of tense uncertainty, a cautious consumer, and softness in demand at home and externally. As Americans



Emily Sanchez
Director - Surveys and Statistics, American Chemistry Council

put another rough year behind them maybe now it's time to consider some of the hopeful signs moving into 2014.

Improved Prospects

Many of the key end-use markets for chemistry have recovered. The housing market looks like it's finally gearing up — housing prices have begun to appreciate, credit conditions are easing and though mortgage rates rose, they remain historically low and the sticker shock seems to have already worn off. The employment situation is getting better and expected to continue im-

proving over the next several years. Improved employment (and income) prospects, better availability of credit, and pent-up demand will foster growth in light vehicle sales and they are expected to rise in 2014.

After a strong post-recession rebound, the U.S. manufacturing sector, which represents the primary customer base for chemistry, is pulling out of a soft patch. Growth slowed in 2013 largely due to the sequester and to weakness in major export markets. Forward momentum will depend upon demand for consumer goods, which ultimately drives factory output. In addition, the surge in unconventional oil and gas development is creating both demand-side (e.g., pipe mills, oilfield machinery) and supply-side (e.g., chemicals, fertilizers, direct iron reduction) opportunities. The latest consensus is that the U.S. GDP grew between 1.7-1.9% in 2013 and will further expand 2.5% in 2014.

Accelerated Growth

The lackluster recovery in the U.S. and a slowdown in global manufacturing have clearly been a drag on U.S. chemistry, but the industry managed to end 2013 on an upswing. U.S. chemical production grew 1.6% in 2013 and is expected to accelerate to 2.5% growth in 2014. Improvements in customer industries and in emerging markets and an enhanced competitive position with regard to feedstock costs will support U.S. chemical industry production going forward.

Strength is expected in plastic resins and organic chemistry as export markets revive. Production of specialty chemicals will be driven

by strong demand from end-use markets; most notably light vehicles and housing. Strong 2013 gains are expected in consumer products as well, but these gains will moderate in 2014 and 2015. Demand for agricultural chemicals (and their supply from the U.S.) will revive. During the second half of the decade, U.S. chemistry growth is expected to expand at a pace (over 4% per year on average) exceeding that of the overall U.S. economy. Pharmaceuticals will eventually emerge as a growth segment in 2015. Gains in chemical industry production volumes and stable capacity suggest that improving operating rates will have improved in 2013. And, with strengthening production volumes, capacity utilization could improve even further in 2014 and beyond.

Chemical Investment

Much of the optimism for American Chemistry relates to the fact that the U.S. has emerged as the venue for chemical investment. With the development of shale gas and the surge in natural gas liquids supply, the U.S. has moved from being a high-cost producer of key petrochemicals and resins to among the lowest-cost producers globally. This shift in competitiveness is boosting export demand and driving significant flows of new capital investment toward the U.S. We anticipate that recently announced new capacity for chemicals will significantly expand production when those investments come online beginning in 2015. As a result, the recent pattern of smaller payrolls is reversing. The industry is expected to add high-paying jobs through the end of the decade.

The pattern of trade deficits in the chemistry is reversing as well. U.S. chemicals trade expanded in 2013 with exports growing faster than imports. The U.S. will lock into a position as a net exporter of chemicals in 2014 and the trend will only accelerate over the coming years as the advantage from shale gas boosts U.S. chemical exports. We're expecting to have posted a modest trade surplus in 2013 and to see it grow to a \$7.7 billion surplus by the end of 2014. Looking at chemicals excluding pharmaceuticals trade, the U.S. net exports will grow to \$46.6 billion in 2014 and a record \$67.5 billion by 2018. With this type of momentum in both imports and exports of chemicals, there's no better time than now to make headway on important trade agreements such as TTIP. Eliminating costly barriers to free trade is particularly beneficial between regions such as the U.S. and E.U. where a significant portion of chemicals trade is between related parties.

Bright Outlook

Together, American chemical producers and their partners have a bright outlook. Global chemistry is set to expand with the largest gains occurring in developing nations. Though global production likely only

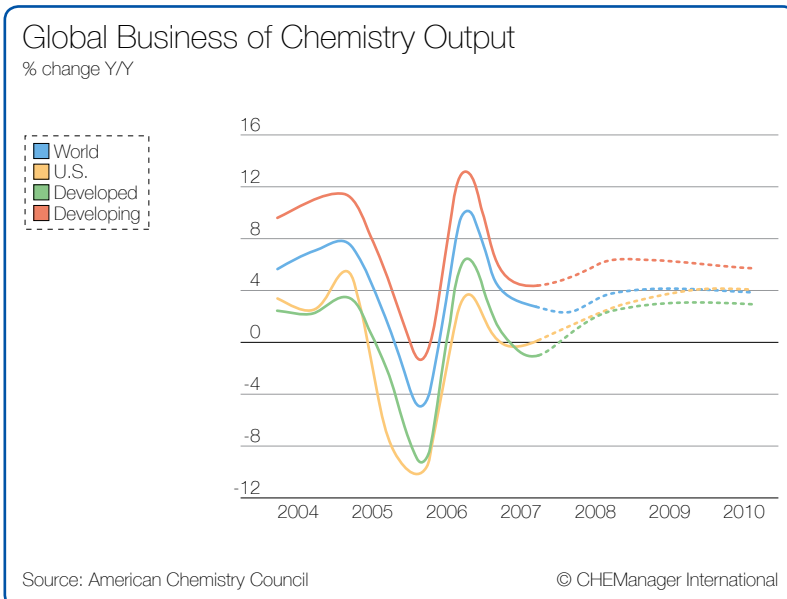
advanced 2.4% in 2013, as economic prospects improve, we expect to see 3.8% growth in 2014 and 4.1% in 2015. The most dynamic achievements will occur in the developing nations of Asia-Pacific, Africa & the Middle East, and Latin America. Due to competitive advantages from shale gas, growth will be strong in North America as well. Western Europe and Japan will lag. With strengthening production volumes, global capacity utilization will improve in the years to come.

Persistence through the slow recovery, innovation, and new advantages from access to shale gas leaves no question about it: American Chemistry is back in the game. In 2014 and beyond, watch to see production volumes growing, jobs returning, and net exports rising as American Chemistry reemerges as a growth industry.

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KIK Wraps Up Buy of Chemtura Consumer Products

PORTFOLIO Canadian Company Pays \$300 Million

Canada's KIK Custom Products has completed its acquisition of the consumer products division of U.S. specialty chemicals producer Chemtura for an adjusted price of \$300 million. Initially a price of \$315 million had been agreed. Chemtura's board of directors had approved the sale in September 2013.

Canada/U.S. — The companies said the price adjustment in the deal that included assets in manufactur-

ing plants in the U.S. and South Africa, was related to a post-closing agreement that reflected working capital parameters and assumed pension liabilities.

Chemtura CEO Craig A. Rogerson said his company is now better positioned to deliver growth in the faster-growing regions, and in a stronger position to meet its commitment to achieve adjusted EBITDA margins approaching 20%. He said Chemtura expects to return a "substantial portion" of the proceeds to shareholders, as well as

paying down sufficient debt to preserve its leverage ratios prior to the sale.

One of North America's largest contract and private label manufacturers of consumer, institutional and industrial products, following the acquisition KIK has 16 integrated plants in North America as well as the South African unit. Products include bleach, household cleaners and sanitizers, pool and spa water treatment, personal care, over-the-counter medications and pharmaceutical products. (dw)

BASF Wins F&S Awards for Coatings Portfolio

AWARDS Chemical Giant Demonstrates 'Strong Growth'

BASF has won the 2013 Product Line Strategy Leadership Award of Frost & Sullivan for its coatings raw material portfolio.

Germany — The international consultancy said the Ludwigshafen, Germany-based group — world's largest chemical producer — "has demonstrated strong growth by improving portfolio breadth, formulation expertise and customer value to enhance brand recognition while at the same time restructuring to

enhance R&D and project management."

Frost & Sullivan added that BASF's strategic acquisitions have "dramatically improved" its coatings raw materials portfolio and allowed it to position itself as a provider of complete coatings solutions rather than pure raw-material chemistry. Although the German player's rivals offer a broad range of products, they do not provide equivalent formulation expertise and also lack a presence in the downstream market, the consultants said.

Noting also that the market "continues to shift away from using high-solvent coatings," Frost & Sullivan analyst Roland Heinze said BASF is leading the conversion by replacing alkyds with acrylic dispersions.

The group's coatings portfolio now includes polyurethane, acrylic, melamine and UV-convertible resins, along with light stabilizers, photo initiators, grinding resins, formulation additives and pigments. (dw)



U.S. API Manufacturing and Sustainability

Region Narrows Focus on Specialty Niche Areas

Moving Away — Many would argue that the future of pharmaceutical growth in the coming years will come from emerging markets; U.S. pharma sales have been sluggish recently with a slight 1-4% CAGR expected this year. The pharmaceutical spending in the U.S. however continues to surpass \$325 billion per year and although the U.S. is a major consumer of pharmaceuticals, much of the manufacturing industry producing these active pharmaceutical ingredients (APIs) has drifted away from the U.S.

As costs start to rise in the regions that once could offer significantly lower manufacturing costs, the U.S. might once again be an attractive base for pharmaceutical ingredient production. This is especially true for the generic medicines industry that is expected to expand its presence in the U.S. by 2015 to make up 87% of prescriptions and could see

increased volume from the Patient Protection and Affordable Care Act.

Eastbound

The API and fine chemical industry along with other sectors tied to U.S. pharmaceutical manufacturing have been continually offshored to take advantage of savings on foreign production and labor costs. Most companies from regulated markets (such as U.S. and EU) have some form of manufacturing production based abroad.

In China, the government continues to invest strongly in the local manufacturing industry, and the scale of production is immense for capacity. There is also available an untapped portion of the population for under diagnosed or under prescribed patients. China also has easier access to base chemicals and intermediates, as well as better infrastructure than India. The Chinese market is set to grow at a rapid pace and is estimated to become the world's second largest market by 2014. The country sees continued investment not only from within but

from other neighboring countries. For example Taiwan-based Scinopharm just announced completion of an API facility in Changshu with plans to manufacture API for domestic and international markets in accordance with CFDA regulations.

Similarly, savings can be found in India, where R&D costs half of what it does in the U.S. and there exists an immense amount of local labor and chemical manufacturing talent. The number of FDA approved facilities is large and continually growing.

Although there are a myriad factors for relocation of API production to India and China, there are also obstacles in these regions. Foreign project management is still necessary which can negate a component of cost savings and lead to delays. Additionally, there have been infrastructure issues in India and increasing environmental compliance costs in China. The skilled labor force, which is still considerably cheaper is seeing salaries rise, increasing faster than those in regulated markets. Finally, many companies in India and China see high turnover rates that add to labor costs and pose a possible threat to IP information security.

Thomson Reuters assesses the capabilities and experience of API manufacturers according to a proprietary scheme based on objective regulatory data. Companies range from those focused on supplying their local market to companies with years of experience supplying highly regulated markets. Although India and China lead in the number of total API manufacturers, there is almost an equal amount of companies that have years of experience supplying API to regulated markets. As companies in India and China invest in upgrading their facilities and gain more experience supplying regulated markets these companies could move into the other categories (fig. 1).

U.S. Based Investments and Partnerships

The investments into API facilities and capabilities in India and China might seem to overshadow upgrades or investments in the U.S. However, U.S. company investment is focused on specialty niche areas or progressive medicines. Small to midsize U.S. contract research or manufacturing organizations (CROs/CMOs) are likely going to see increased business for bringing new investigational drugs through clinicals, to scale up, and commercialization that will likely be picked up by larger pharma companies looking to insulate their pipelines.

There are a number of agreements between foreign MNCs partnering with companies in the U.S. for the supply and manufacture of API, access to biotech pipelines, and even U.S. companies looking to increase the vigor of their manufacturing capacity in certain technologies. Some of these include Aspen's acquisition of Merck's API facilities in the U.S., Otsuka's acquisition of Astex, and AstraZeneca's acquisition of Pearl Therapeutics.

U.S. facilities are also investing and upgrading their facilities in response to an increased demand. Cambridge Major merged with AAI Pharma Services to boost capacity, while Cedarburg Hauser has upgraded facilities to increase production capacity. Albemarle, Almac, and Sigma-Aldrich have all invested to grow their custom and high potency manufacturing capabilities within the U.S. U.S. based companies can also continue to leverage their knowledge with well defined and heartily backed R&D companies



U.S. Vitality

Innovation is where the strength lies for the U.S. companies manufacturing in the U.S. can find new facets of growth by increasing focus in areas such as continuous processing as opposed to traditional batch processing to increase efficiency. Biologics, biosimilars, and the pairing of high potency APIs for personalized medicine regimens that are more difficult to reproduce should also see continued investments in the U.S. Even reducing the number of steps needed to get to the final form of API before its reaction can promote better sustainability of the U.S. API manufacturing industry.

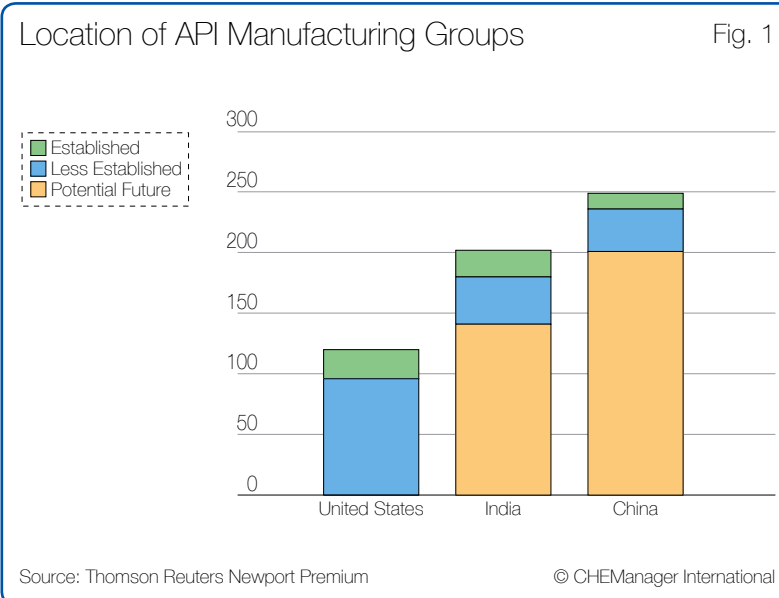
As patented drugs become subject to generic challenges and companies look to increase the integrity of their pipelines, larger companies backed by strong R&D budgets will continue to seek out innovative new therapies that will be harder to replicate. This can be seen with increased focus and investments

into biologics, oncologics, and antibody drug conjugate (ADC) based medicines. The U.S. API market will sustain growth from the manufacturing of specialty drugs, increased focus on the biologic medicines sector, startup biotech companies, and the established regulatory system that promotes quality medicines.

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Bayer's Eylea AMD Drug Hits Cost Evaluation Hurdle

PHARMA German Healthcare Cost Watchdog Unsure If Drug Is More Effective Than Rival Products

Bayer HealthCare has hit a stumbling block in the sales campaign for its new drug Eylea (afibercept), or VEGF Trap-Eye, recommended for the treatment of age-related wet macular degeneration (AMD).

Germany — The German Institute for Quality and Efficiency in Health Care (IQWiG), a healthcare cost watchdog, said it could not assess whether the drug was more effective than a rival product.

Developed in partnership with Regeneron Pharmaceuticals, Eylea is one of the most promising drugs to emerge from the German chemi-

cals and pharmaceuticals group's pipeline in recent years. It has been projected by Bayer to return peak sales of more than €1 billion. Regeneron holds exclusive rights in the U.S. Eylea was approved in the U.S. in late 2011. Japan, Australia and Europe followed in 2012.

IQWiG compared trial data on Eylea and the Novartis preparation for treatment of macular edema, Lucentis. However, the institute said it was not able to draw conclusions for cost effectiveness because, in the trial, neither drug was being administered in the way specified by regulators when it was approved by German health authorities.

When approving the drug for U.S. consumption, the Food and Drug Ad-

ministration (FDA) said Eylea and Lucentis performed equally well in clinical trials. Treatment with Lucentis can cost as much as \$2,000 per once-a-month dose. Eylea was priced at \$1,850 per dose at its U.S. launch.

Germany's medical cost-benefit agency, Gemeinsame Bundesausschuss (G-BA), is due to publish an assessment of Eylea's cost-effectiveness within the next three months, and will take into account IQWiG's opinions as a guide for reimbursement by the country public health insurance companies.

Bayer said it planned to respond to IQWiG's statement within three weeks. (dw)

Clariant Detergents & Intermediates Unit Sold to ICI

Switzerland — Swiss specialty chemicals producer Clariant has completed the sale of its sale of its Detergents & Intermediates business to private equity group International Chemical Investors Group (ICIG) for 58 million Swiss francs.

The business located in the Höchst chemical park in Frankfurt

trades as WeylChem. The new owners plan to merge the company with another Frankfurt-based chemical producer, Allessa, formerly known as Cassella. Both were part of the defunct chemical giant Hoechst.

"The successful sale promotes the repositioning of the company's portfolio," said Clariant CEO Hariolf

Kottmann. The Swiss group, which divested its Textile Chemicals, Paper Specialties Emulsions businesses in September 2013, plans to complete the sale of its Leather Services business unit to Stahl Holdings of The Netherlands in the next few months, Kottmann said. (dw)

Carlyle Said Close to Buying J&J Diagnostics Unit

U.S. — Private equity investor Carlyle is in exclusive talks to buy Johnson & Johnson's ortho clinical diagnostics unit for around \$4 billion, after knocking Blackstone out of the race, financial market reports said shortly before Christmas. A deal was expected to be concluded in the first half of January.

The unit, described as a small player in a market dominated by larger companies such as Roche, Siemens, Abbott and Danaher, manufactures blood-screening equipment and laboratory blood tests as well as tests capable of identifying blood types and screening for viruses such as HIV and hepatitis C.

At the beginning of 2013, Johnson & Johnson had said it was exploring strategic alternatives for business, a process that could take 12-24 months. Blackstone was reportedly bidding in cooperation with Danaher. (dw)



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Western Players and the Chinese Chemical Market

Is the Playing Field Level?

Ideals vs. Reality – Obviously, given the importance of the Chinese chemical industry, multinational companies are highly interested in participating in the future growth of the industry. However, executives of Western chemical companies active in China sometimes question whether the playing field for Western and domestic companies really is level or tilted in favor of local players. What this means is that domestic companies are given preferential treatment by means of both formal, written regulation and unwritten rules and practices.

How Serious Is This Issue?

Most CEOs of multinational companies (MNCs) in China feel that the issue does not make it impossible to have profitable domestic operations. On the other hand, they feel it is the most difficult issue that is exclusive to the MNCs – other issues also affect private and state-owned chemical companies. In addition, it is an issue that is hard to deal with proactively.

What Are Formal Differences in the Regulations?

Some of the regulations applicable to the chemical industry differ for foreign and domestic companies. For example, in an implementation measure of the 12th Five-Year Plan, the 2011 Foreign Enterprise Invest-



Dr. Kai Pflug
CEO,
Management Consulting

ment Catalogue, foreign-owned and domestic companies are treated differently. It is one of the suggestions of the Petrochemicals, Chemicals and Refining (PCR) Working Group of the European Union Chamber of Commerce in China (European Chamber) to change these to equal investment rules. In addition, the Chinese government provides substantial R&D funding for domestic chemical companies but not all of these are also accessible or even known to foreign companies. Also, for hazardous chemicals, MNCs importing toxic chemicals to China must register these at cost of \$10,000 per certificate, while domestic importers do not have to do this.

In particular, state-owned entities (SOEs) get preferential treatment over both foreign companies and domestic privately owned companies in a number of ways. Some of these are direct subsidies paid by the state and local governments, e.g., for refining losses. Others work indirectly via state-owned banks which provide preferential financing to SOEs at the expense of other companies or by SOEs getting land at preferential prices. There are also some areas (particularly petrochemicals) in which multinational companies are not allowed to do business independently, restricting their stake

to 50% of mandatory JVs with state-owned entities.

What Are Informal Disadvantages of MNCs?

Most of the perceived preferential treatment of domestic companies is in more grey areas, taking the shape of unwritten rules and practices and thus both more difficult to prove and easier to defend despite China being a member of the World Trade Organization:

- For state-run projects, multinational companies are usually not selected as suppliers. "Indigenous innovation" considerations favor government procurement of products with Chinese IP.
- For the oil import and wholesale market, the grant of import licenses of some important raw materials for the chemical industry is intransparent. Generally, access to raw materials can be a bigger issue for MNCs than for SOEs.
- Existing environmental laws, e.g., regarding environmental protection and transportation safety, are often applied inconsistently, favoring domestic companies. While both MNCs and local companies are subject to the same (sometimes very strict) regulation, almost all managers of Western chemical companies feel that the enforcement is much stricter for foreign companies.
- According to the Chemicals working group of the European Chamber, the evaluation criteria applicable to chemical projects are often not clearly communicated, often changed on short notice

and the selection of experts for the reviews is not transparent. There are examples of local direct competitors of a foreign applicant being requested to join the advisory panel, thus giving the competitor direct access to proprietary information.

Altogether, these different practices certainly represent a disadvantage for foreign chemical companies doing business in China. To quote Martin Kraemer, the chairman of the PCR working group of the European Chamber, "China is in principle on a good way in terms of regulatory issues. On the other hand, readily available international standards and best practices are often not adopted which leads to distortions in the competitive landscape of the chemical industry in China and generally favor domestic companies."

Are All Areas Equally Affected?

Generally, the playing field is tilted primarily in favor of SOEs rather than toward domestic companies in general. This means that the chemical industry is one of the more affected industries as it has a number of strong state-owned companies. However, it also means that areas such as petrochemicals with established SOEs are much more affected than specialty chemicals, where there is no substantial SOE presence. It remains to be seen whether this will change if state-owned enterprises can enlarge their presence in specialties. As for the regional impact, again provinces with strong SOE presence seem to more

strongly favor SOEs. And in general, the higher level of education and experience of government staff in the Eastern provinces compared to Central and Western China allows MNCs to deal with them more pragmatically, though on the other hand some Western provinces are in principle very open to foreign investment.

What Do MNCs Do About This Issue?

Multinational companies engage in a variety of activities to level the playing field, both on an individual level (e.g., via governmental affairs departments of the companies) and via associations such as the AICM and the European Chamber. Their focus is on pointing out the damage some of the local regulation does to Chinese consumers and to the Chinese environment, e.g., by demonstrating the advantages of environmental protection measures utilized in MNC production plants. According to industry participants, these activities have some gradual success, though some of the major disadvantages (e.g., regarding complete foreign ownership of petrochemical assets) are probably too much based on Chinese principles of self-sufficiency to be changed.

When discussing this issue, it is worth noting that China is by far not the only country favoring local companies despite paying lip service to free markets and free trade agreements. It is hard to imagine for example the police force of a German city buying Chinese or Japanese cars for fear of political fall-out. "Buy American" campaigns such as the one started a few months ago



by Wal-Mart also cater to similar sentiments. In addition, while SOEs certainly benefit from government support, the government expects the SOEs to also support government goals such as preventing unemployment, even if these goals have been a reason for the extremely low profitability of the SOEs in the past. In total, it is therefore far from certain that SOEs really gain a competitive advantage from their close connections to the Chinese government.

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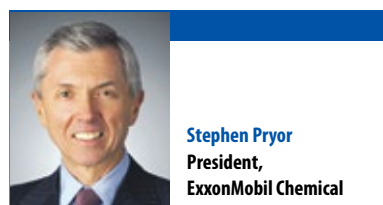
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Exxon Starts World's 1st Crude-Cracking Petrochemical Unit

PETROCHEMICALS New Technology to Reduce Raw Material Costs, Carbon Emissions

ExxonMobil officially launched the world's first chemical unit that processes crude oil in Singapore, aiming to lower costs to better compete with rivals in a market saddled with excess capacity.



Stephen Pryor
President,
ExxonMobil Chemical

Singapore — Exxon's new cracker allows the company to bypass the refining process by processing crude directly into petrochemicals.

"This is the right place to do crude cracking because it gives us an advantage over the predominant feedstock in the region," ExxonMobil Chemical's president Stephen Pryor told Reuters.

"The cracker we've built is by far the most feed flexible cracker we've ever built. It can crack anything

from light gases to heavy liquids, including crude oil."

The new technology helps reduce raw material costs, energy consumption and carbon emissions, Pryor said, while the cracker also produces fuel components.

He declined to detail the extent of Exxon's savings or specify which crude grades are processed at the cracker.

Crackers in Asia typically use naphtha as a feedstock, while those

in the Middle East enjoy a cost advantage as they process cheaper ethane and propane gases into petrochemicals.

The multi-billion dollar complex on Singapore's Jurong Island includes the 1 million ton per year (tpy) steam cracker as well as production of at least 1.4 million tpy of polymers and elastomers. The cracker was brought online in the middle of last year, but Exxon has not previously confirmed the use of crude as a feedstock.

The project had been delayed for two years due to its complexity and a weak economic outlook which has pared the use of petrochemicals in automobile parts, electrical appliances and consumables, despite excess capacity.

Chemical Demand Rising

An improved economic outlook in the United States and better demand in China is expected to raise global chemical demand growth in coming years, according to the American Chemistry Council.

The Council sees headline global petrochemicals growth of 4.1% in 2014 and 4.5% in 2015, up from 2.1% last year, said Thomas Kevin Swift, its chief economist and managing director.

"After a couple of very slow years, we saw good demand growth in China last year," said Pryor. "With China's export sector picking up, we would expect that to continue."

Global chemical demand for primary petrochemicals was expected

to grow by about 50% over the next decade, with China accounting for half of the growth, he added.

To meet this demand, Exxon also planned to raise ethylene capacity at its joint venture with Saudi Aramco and Sinopec in southern China Fujian by 200,000 tons per year in 2015. At the Singapore plant, Exxon could also produce specialty petrochemicals such as butyl rubber for tires and premium resins for adhesives, Pryor said.

Yet, supply from the United States could jump as petrochemical producers, including Exxon, launch projects to take advantage of cheap ethane gas from the shale resources boom. Exxon plans to build a 1.5 million tpy ethylene complex at Baytown, Texas by 2016.

"Demand will grow but it will be a competitive marketplace from a standpoint of capacity and that means that marginal liquid crackers are going to be under a lot of pressure," Pryor said.

"You already see that in Europe, you see that in Japan and you're going to see it throughout the region."

French oil major Total and Ineos have said they will shut loss-making petrochemical plants in France and Scotland as Europe readies for a competitive assault from U.S. rivals armed with cheap feedstock.

The Clock Is Ticking

Why the Chemical Industry Should Take the End of Support of Windows XP Seriously

End of the Road — Microsoft will discontinue support for the Windows XP operating system April 8. As there will be no more security updates provided from that time, the end of support entails substantial risks and costs for businesses in the chemical and pharmaceutical industries.

now. Businesses relying on Windows XP after April 8 need to be aware of associated risks.

Risking the Security of Data

Windows XP is based on long-outdated security architectures not complying with modern requirements. Attacks by viruses, spyware and malware are almost inevitable.

Windows 8, with an upward tendency.

High Costs And Downtime

Businesses relying on outdated operating systems do not only risk the security of their data, but they will also have to accept higher spending. Increasing costs of maintenance and lost productive time due to more malware attacks, increased support requests and repeatedly necessary reboots lead to substantially higher operating costs. According to an IDC study, combined IT labor costs and user productivity costs per PC build up to a total of 73% from the second to the fifth year.

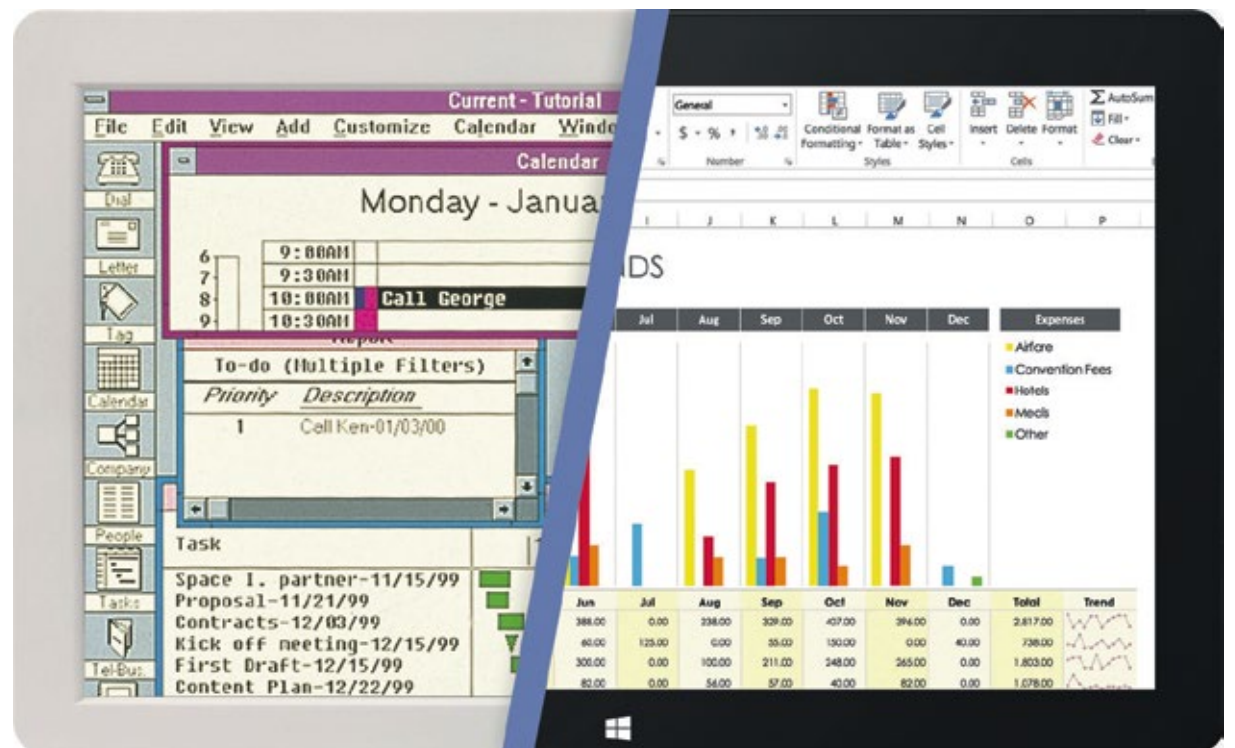
Another critical issue for businesses with XP machines is the fact that third-party providers of software applications will discontinue their support for these products or provide them on a cost basis. And, there will no new programs be written for Windows XP at all any longer. Many key applications, for example, for personnel planning or product control will only be programmed for newer Windows versions. In addition, hardware manufacturers will no longer provide any drivers for Windows XP so that Windows XP machines will no longer identify

Windows XP is based on long-outdated security architectures not complying with modern requirements.

Oliver Gürtler, Director Windows, Microsoft Germany

It's been almost 13 years since Windows XP was launched on the market. To this very day though, many businesses rely on the evergreen operating system without being aware of the risks and increased costs associated with it. Windows XP has long been a phase-out model with support for it being extended several times, but finally coming to an end April 8. As a result, users will no longer be provided security updates, updates or technical support for Windows XP a few months from

This may, in turn, result in loss of private and business documents. Businesses not only risk the security of their own data, but the security of their customers' and partners' data. Windows XP is not only the most insecure of all of Microsoft's operating systems, using it is becoming increasingly risky as well. A recent security report shows that Windows XP machines are 56 times more likely to become the victims of malware and malicious software compared to the 64-bit version of



Short-lived: Once heralded as the innovation in the IT world, Windows XP is now merely interesting from a historical point of view.

modern printer models. After all, Windows XP is a child of the turn of the century and neither meets user requirements to modern technology, nor the demanding security requirements of IT departments.

Smooth Transition

To help businesses migrate from Windows XP to modern Windows versions and smoothly replace outdated Windows versions, Microsoft offers various online tools, trainings and materials. Over the next six months, specifically small and midmarket businesses will perform transitions as they are often plan-

ning and implementing their migration processes short term. These businesses specifically benefit from the "Get2Modern Campaign" for smaller and midmarket businesses as Microsoft supports them with a variety of Windows and Office offerings.

Investments Kept Within Limits

For many smaller and midmarket businesses like medical practices, major investments in hardware are not necessary straight away — depending on the computer power available in companies, they may simply replace Windows XP by a

modern Windows version. The easiest way of migrating is, of course, replacing or modernizing machines as new hardware usually includes full versions of the latest operating system.

Oliver Gürtler, Director Windows, Microsoft Germany

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The Opportunities and Risks of Standard IT

Two Sides — There are plenty of advantages to be had from standard IT tools and operating systems in the area of production as well as in the lab. However, there are two sides to every coin. In addition to cybersecurity standards, short life cycles also present a problem. CHEManager International spoke to Axel Oppermann, Senior Adviser, Experton Group, about Windows XP's support side.

CHEManager International: In which sectors of process technology, and specifically where are Windows operating systems, in particular Windows XP, currently applied?

A. Oppermann: There are still implementations of XP in almost all sectors of process technology, in smaller and midmarket businesses as well as in a number of corporations. However, small midmarket businesses are obviously facing greater challenges. This is associated with the fact that they have ignored the issue for a relatively long time.

Isolated systems specifically used for testing or measuring are creating problems. Their number is relatively small compared to the absolute figure. But, their significance is incredibly large. The challenge of migrating these systems is on the application level.



Axel Oppermann, Senior Adviser, Experton Group

IT cycles are many times shorter than they are in process control engineering. So how should Microsoft customers deal with this discrepancy?

IT cycles will continue to shorten even more in the future.

A. Oppermann: IT cycles are indeed much shorter than process control engineering cycles. Intervals will get even longer in the years to come, with information technology cycles continuing to shorten even more. Identifying problems

and obstacles early on — nipping them in the bud, so to speak — requires the creation of a roadmap of products and solutions for process control engineering and IT which is adapted to and integrated in the company. This roadmap will be supplemented by information about the current situation and defined objectives. Collected data need to be transferred into reliable systems and tangible models. That way, different scenarios — and defined objectives — can be addressed.

But, reality is still different: a study proves that more than 60 percent of all decision-makers in companies with more than 500 employees do not review the product roadmap of their software provider. Even more striking is the situation in deployment planning. Three-quarters of all IT decision-makers say they never validate different scenarios based on the roadmaps of their providers as part of their deployment projects. This is why businesses frequently fail to seize operational and strategic opportunities. In an integrated world — for example, the world of process control engineering and IT — this does not work.

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AkzoNobel Completes Sale of Primary Amides to PMC

South Korea/U.S. — AkzoNobel sold its Primary Amides business and a manufacturing facility at Kyungju, South Korea, for an undisclosed sum to PMC Group, based at Mount Laurel, New Jersey, U.S.

The activities, employing 37 people — all of which will transfer to PMC — encompass euramide, oleamide and other primary and secondary amides sold under the Armoslip

trademark. The products are used in production of plastic bags and plastic packaging films. AkzoNobel said the business no longer was a good fit with its Functional Chemicals portfolio, where it was operated as a standalone activity. "Our focus is on extending our leading market position in organic peroxide and metal alkyls, as evidenced by our recent expansion investments in China, the

U.S. and Mexico," said Werner Furhmann, executive committee member for the specialty chemicals business. In February 2013, PMC acquired the global methyl tin stabilizers and solid lubricants business of compatriot Dow Chemical and in October 2012 the global organotin and organophosphine-based polymer stabilizers, catalysts and fine chemicals business of France's Arkema. (dw)

Good to know.

With a reactor volume of 135 m³ for manufacturing on a ton scale, 35 m³ for small and development quantities and an Occupational Exposure Level < 0.1 µg/m³ Evonik can ramp up for lab or bulk quantities under best in class conditions. And do it fast. That is why leading pharma companies trust in our experts and Highly Potent API custom manufacturing capabilities.

If you'd like to know more good reasons for a long-term partnership with us, go to www.evonik.com/oncology-drugs

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Product Stewardship in the Cloud

SAP PSN — Product Safety Portal Covers Entire Supply Chain

Up In The Clouds — Product safety specifications are increasing sharply around the world, and industrial enterprises must list the material composition of their products precisely as value chains also grow in complexity. To incorporate all partners securely in communications, cross-enterprise data interchange platforms are required. SAP's Product Stewardship Network (PSN) has since the end of 2012 provided an easily accessible cloud solution that confirms REACH and RoHS compliance by industrial products of all kinds.

More and more industrial enterprises are declaring all of the substances that make up their products. International original equipment manufacturers (OEMs) have set the trend. By declaring components in full they are preparing for a further range of legislation and industry standards that will specify which substances a product may not contain—standards such as the European regulation on Registration, Evaluation, Authorization and Restriction of Chemicals (REACH) or the RoHS directive for the electronics industry. In their wake come many non-European regulations that are geared to EU guidelines while also going their own way.

What all this regulation has in common is that its pace of development is extremely dynamic. Take REACH, for example. In 2013, 60 entries were added to its list of substances of very high concern (SVHC), equivalent to a 71% increase. The EU's European Chemicals Agency (ECHA) is currently looking into listing a further 30 candidates. At the same time, the pressure of investigation is on the increase as more and more supervisory authorities set up in operation across Europe. So it is no coincidence that RAPEX, the EU's early warning system for consumer protection, is triggering measures against dangerous products with increasing frequency. In 2012 alone, the latest year for which figures are available, the number of sanctions rose by 26% to 2,278.

To ensure that their products are marketable, more and more companies are deciding to collect all substance information. Their aim is to give their employees a maximum ability to provide information. Sales, Product Development, Procurement, and Service Management especially

require a full view in order to rule out marketing risks reliably. But the validation process leads to substantial expenditure along the entire value chain. From chemical industry substance suppliers via manufacturing industry parts and components suppliers to the middlemen, OEMs need to incorporate an abundance of partners in their communications.

As most data suppliers and data users run totally different IT systems, value creation partners need a cross-system information interchange platform. That was why, at the end of 2012, the software provider SAP launched the SAP Product Stewardship Network (PSN) Internet portal. SAP PSN provides suppliers with a freely accessible cloud solution on which to make the latest substance information available to their principals at low cost. From the suppliers' viewpoint the portal serves as a knowledge base for their product safety. At the same time OEMs have at their disposal a Web-based communication platform from which they can retrieve missing information at minimal effort and expense.

Access Rights

"In the first year, 114 companies from Europe, North America, and Asia joined the network," says Randolph Hager, Product Manager Product Compliance at SAP. "They are a representative cross-section of the entire industry landscape, ranging from SMB parts suppliers via system suppliers and wholesalers to large chemicals, manufacturing and electronics industry corporations."

Companies can opt to make substance information for their products freely accessible for all portal users. Alternatively, the user group can be limited company-specifically. Data suppliers can thus choose exactly who is to be allowed to access their product information. As a consequence, other network participants can see neither the supplier nor his data. For data protection reasons not even SAP as the platform operator can read the encrypted data. "That," Hager says, "is why we have no figures for the total number of products listed on the portal. In view of the storage requirements, however, we can assume that the overwhelming majority of use cases is intended to provide information exclusively."

Data Interchange In Practice

Subject to their position in the value chain, users differ in the ex-



tent to which they make use of the platform. To cater for all requirement profiles, SAP PSN offers three access modules. For smaller data suppliers with a manageable product portfolio there is a free basic access offer. It enables users to declare their products' REACH and RoHS compliance manually. The portal assists with the declaration by showing users all substances that the two directives regulate. SAP adjusts the lists, which can be used interactively, as soon as the European Union makes regulatory provision for new substances. In addition to the declaration process, the basic access provides a number of messaging functions to enable network partners to communicate with each other.

Users who would like to automate substance-related data interchange can purchase a professional license for €1,500 a year. This paid access offers industrial users the additional opportunity to process mass data from their production control and supplier management systems. Excel lists serve as the interface. SAP PSN can extract automatically from them all of the basic data about their products, suppliers, and customers. The actual declaration consists of linking the basic data and details of which RoHS or REACH substances the product contains and their percentage by weight.

Clients who use SAP systems already can access automatically the data available in the cloud solution. SAP offers an enterprise license that enables them to do so. In combination with SAP EHS Management data interchange via the cloud can be controlled directly and entirely from the SAP backend. "Thanks to this integration, SAP users can communicate comfortably and securely with their supply chain partners without needing to change system. They stay in their accustomed work environment and can rely on the SAP PSN portal solution to control data interchange for them in the background."

Networking

The Product Stewardship Network notifies users by e-mail about transactions relating to them that take place in the network. While basic access users control communication manually, enterprise license holders have ways to automate the process. Messages accompany all milestones in the declaration process. Suppliers, for example, are prompted to input data. OEMs, in contrast, are informed as soon as new declarations are received. For this purpose every participant has a personal inbox. That is where a message is also sent when SAP has updated a substance list.

At the same time the PSN informs network users looking for information how up to date the listed

declarations are. So users can see whether data suppliers have reacted to REACH and RoHS list updates by revising a previous declaration. That makes declaration history clear. SAP PSN maintains audit-proof data records.

Future Portal Development

"In the year since it was launched the Product Stewardship Network has already met with an extremely positive response," Hager says by way of an initial conclusion. SAP has taken the positive market response as an occasion to expand the cloud solution step by step. For one, additional mandatory substance lists are to be included. The first new addition planned for 2014 is the

China RoHS, China's counterpart to the European RoHS directive. Companies will later be able to integrate customer-specific substance lists. There are further plans for the Product Stewardship Network to support the exchange of safety data sheets. With this service the portal will again be expressly targeting chemical industry companies. They will have a secure storage place from which to offer authorized customers comfortable access to the latest safety data sheets. "By expanding the information offering we aim to make SAP PSN the central hub of substance-related product communication," Hager emphasizes. "Industrial enterprises will have a constantly available secure platform on which to network their supply chain partners. The Product Stewardship Network will open up all of the information that users need to prove that their products are safe."

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Secure Cloud Made in Germany

SAP runs the Product Stewardship Network at its own data center in St. Leon-Rot, Germany. An intrusion detection system monitors incoming data and identifies suspicious activities, while firewalls made by different manufacturers protect the data at the data center. Data files are exchanged with customers in an encrypted format. Data from cloud customers falls under the jurisdiction selected by the customer and is not forwarded to third parties. SAP's support services ensure that data protection is also maintained during required maintenance operations. At regular intervals, TÜV, KPMG, and SAP itself test whether the technology and infrastructure are operating smoothly. More information: www.sapdatacenter.com

La Seda Requests Opening of Liquidation Proceedings

LEGAL Insolvent PET Producer Wants 'Orderly Sales Process'

Spanish PET producer La Seda de Barcelona, in insolvency proceedings since June 2013, has filed a request with the Barcelona commercial court overseeing the proceedings to liquidate the company and all of its subsidiaries. This includes PET polymerization activities and feedstock production as well as processing and recycling.

Spain — Le Seda's board of directors said the decision to begin liquidation was adopted to facilitate an orderly sales process. Liquidation

proceedings of some of La Seda's subsidiaries began in autumn of last year.

Interested parties, including Spanish rival Cepsa and PET world market leader Indorama of Thailand, reportedly have lined up to look at the businesses. Thus far, however, the only asset sale known to take place was the takeover of the 100,000 t/y PET plant at Volos, Greece, by Turkey's Polisan Holding.

La Seda's liquidation proceedings were preceded by a report of the company's receivers analyzing the financial condition of the group. Pinpointing the cause of the PET producer's insolvency, the receivers

cited the inability to meet syndicated debt maturities, given the group's level of cash flow.

The receivers calculated the entire value of La Seda's assets, including real property, and concluded that its liabilities of €736.1 million exceeded its assets worth €624.2 million. At the same time, however, it warned that these may not be the final figures.

According to the estimate, the PET and feedstock production activities are the deepest in the red, with liabilities of individual subsidiaries — principally in Spain and Greece — in the range of nearly €500 million each. (dw)

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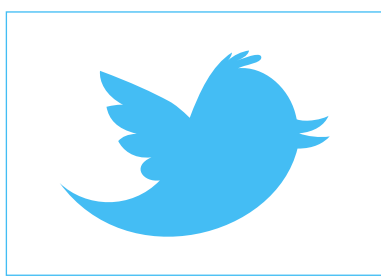
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Chemicals

The shale gas revolution is changing the face of the petro industry.

Page 10



Chemicals

The advent of shale gas in the U.S. has been a game changer for the industry.

Page 11



Pharma

Taking on the risks of biopharma outsourcing

Page 13

Global Shale and the GCC

The End of Low-Hanging Fruits and High Margins

Under the Surface of the U.S. Boom

— Innumerable articles have been published around the world on the U.S. shale boom. In addition, its immediate consequences for Gulf Cooperation Council (GCC) countries — such as reductions in liquefied natural gas (LNG) exports from the GCC to the U.S. — have been discussed frequently in the Middle East. This article highlights analyses of less-obvious interdependencies between the U.S. shale boom, GCC oil and gas businesses, and implications on chemical sites in the GCC, including an assessment of possible risk factors.



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A Threat to Chemical Players in the GCC?

Attendees at recent oil and gas conferences in GCC countries were generally well aware of developments in the U.S., but they voiced diverse opinions on this rather new phenomenon. Some experts tended to be rather relaxed, seeing their business affected but not seriously threatened. Others were more alert to the topic and mentioned various risk factors that could have considerable negative effects on GCC countries' oil, gas and chemical businesses. We believe there is no need to panic. Taking interdependencies between the U.S. shale boom and other risk factors into account does, however, reveal possible consequences such as growth obstacles and margin squeezes in GCC countries (fig. 1).

Risk Factor: LNG Exports

Ethane is commonly a byproduct in many gas fields and is consequently extracted at a higher rate if methane production is high. For example, the ethane feedstock used in the Ras Laffan cracker (Qatar) with a capacity of 1.3 million tons of ethylene per year is extracted from the North Field, one of the world's largest conventional gas fields. Only five to 10 years ago, Qatar had planned to export large amounts of LNG to the U.S. and to eastern Asia, and constructed LNG export terminals as well as large vessels to do so.

Then the U.S. shale gas boom started, and the forecasted U.S. methane self-sufficiency by 2020 forced Qatar to change export plans. Qatar's new plan is to increase export volumes to Asia accordingly, mainly to China and Japan, where demand increases are considered high enough to absorb the additional LNG supplies. While China's and Japan's demand extrapolations based on 2013 economic figures might sustain this plan, risk factors remain.

China featured impressive economic growth — until recently, when

first signs of a fading dynamic hit the headlines. This effect might be temporary and does not allow conclusions for future development, because China is large, complex and features a unique political and economic system that is difficult to predict.

One risk factor is that mid- to long-term economic development

may turn out to be below expectations. Another risk factor is that political decisions limit LNG imports from Qatar — for instance, by import supplier diversification (gas from far eastern Russia, LNG from Australia or U.S.), by domestic shale gas production, and by driving or even subsidizing other forms of energy production.



Oliver Gawad
Partner, Stratley



Dr. Sven Bugarski
Consultant, Stratley

Post-Fukushima Japan has presumably left an energy gap that Qatar might fill by supplying additional LNG. One of the main risk factors concerning Japan is that Japan might operate its nuclear power plants longer than planned. Furthermore, Japan is actively evaluating methane hydrate extraction off its shores. As yet, commercial production is a distant prospect, but it could become one option of hydrocarbon supply in the future.

Risk Factor: Oil Production

Large amounts of gas, especially in Saudi Arabia, are produced as associated gas in oil production. As byproducts, ethane and other gases are produced in volumes tightly correlated to the oil volumes produced. This also means that constraints in

oil production limit the ethane gas supply.

The shale/tight oil boom in the U.S. has reduced, and will further reduce, the demand for light oil imports. Upstream companies in the GCC are well aware of this. They argue that, firstly, they can still supply heavy crude to the U.S. (shale/tight oil is mainly light oil) and that, secondly, east Asian demand will grow fast enough to more than compensate for reduced U.S. demand. The degree of the first argument is uncertain, because Canada has abundant heavy crude resources and can, under favorable oil price conditions, at least partly supply the U.S. with cost-competitive heavy crude. Similar to the LNG scenario described above, the second point appears reasonable, but bears risks. For the oil, however, the risks are currently more on the supply than on the demand side.

In addition to the revolutionary shale/tight oil production increase in the U.S., Iraq has increased its oil production from 110 million tons per year (2.2 million barrels per day) in 2009 to around 170 million tons per year (3.3 million barrels per day) in 2013. The 2013 Iraqi production value is more than 4% of total global oil production. Forecasts for 2015 range from 200 million tons per year to 300 million tons per year. Furthermore, potential political changes in the wake of the recent elections in Iran might lead

to mid- and long-term sanction deregulations and enable Iran to push much larger oil volumes into global markets.

Such large additional volumes, which are not balanced with demand dynamics and OPEC guidelines, either drive global oil prices down or require Organization of Petroleum Exporting Countries including Saudi Arabia to further limit production.

Implications For Chemical Companies

GCC countries, and most notably Qatar and Saudi Arabia, are differently affected by the gas and oil risk factors described above. These risks have the capability of accelerating the regional ethane shortage, which might lead to or worsen underutilization of production assets. Underutilization has already been observed, for example, in 2010 at around 80% for ethane crackers in Saudi Arabia. It is not surprising that there is a tendency in the region to base new crackers on naphtha.

In the light of cheap ethane in the U.S. as well as more naphtha-based ethylene in GCC countries, the cost advantage of these countries' derivatives will shrink significantly compared with the U.S. Shale developments in the U.S. have triggered new technology (e.g., on-purpose dehydrogenation of propane) as well as investments in additives and comonomers capacities, which further strengthen the U.S. ethylene downstream position compared with GCC countries.

As of today, GCC downstream players have felt hardly any serious effects from the shale boom, while Europe has started to bear the heavy burden and will continue to do so; industry experts forecast a closure of approximately 10% of total European ethylene capacity. In the longer term, GCC countries will most likely keep their position as the lowest-cost producer — despite a new shale-age market equilibrium, albeit with much less margin differential to the U.S.

Remember that in the foreseeable future, GCC downstream players will still have favorable raw material conditions and will most likely be able to maneuver their businesses reasonably around shale gas-induced market changes in the U.S. and elsewhere. However, the time of abundant low-hanging fruits and extraordinarily high margins in GCC countries is set to end.

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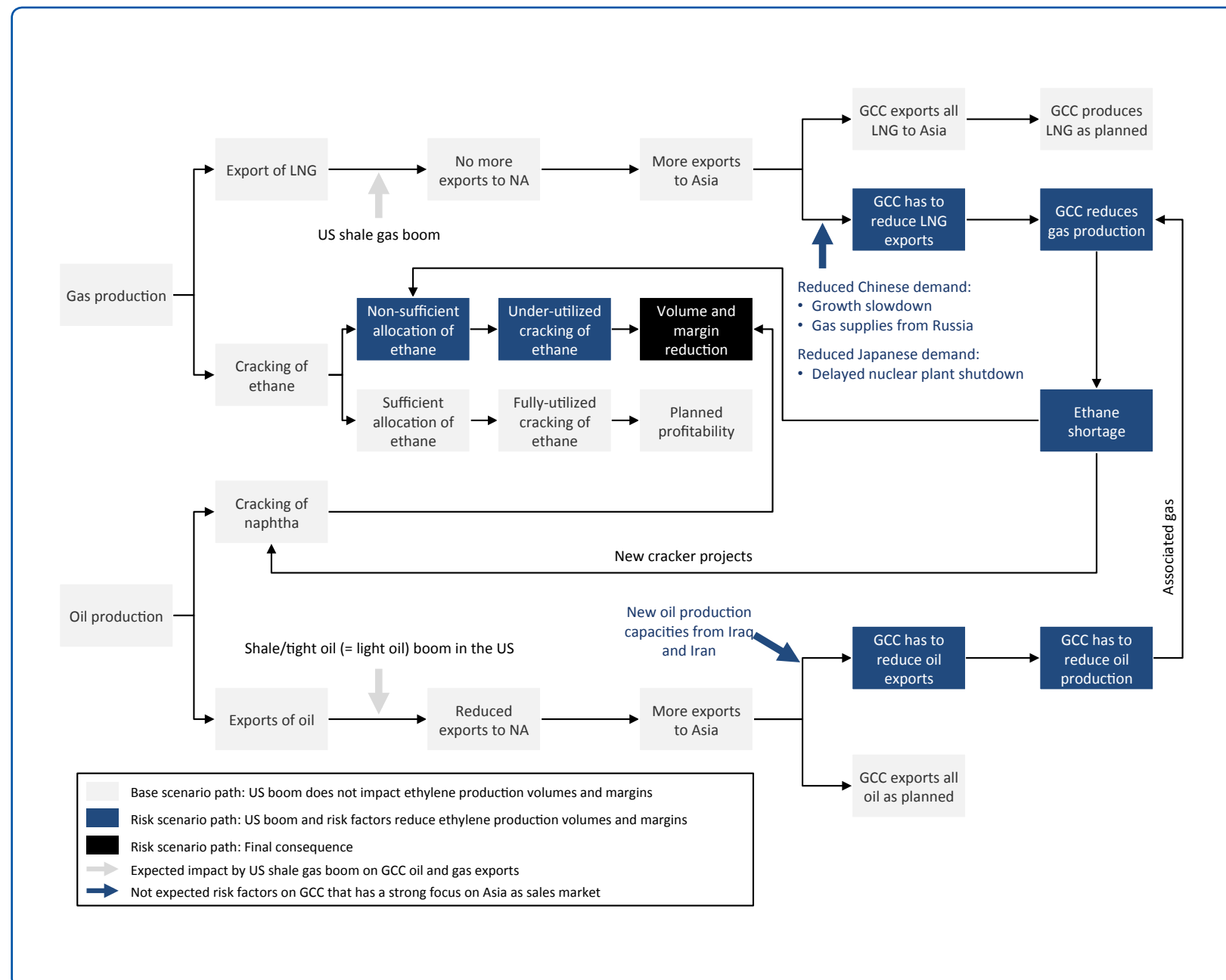


Fig. 1: Visualization of how the U.S. shale boom and subsequent risk factors influence GCC gas and oil operations. Gas production refers predominantly to Qatar and oil production to Saudi Arabia, although some factors might also affect other oil- and gas-producing countries in the region. The chart does not contain all possible scenarios, risk factors and path options, but rather those paths and consequences that are the focus topics of this article.



Shale Gas — A Bumpy Road Ahead

Shifting Global Energy Mix Will Realign Geopolitics



U.S. Takes The Lead — The shale gas revolution has the potential to transform not only global energy distribution, but also the petrochemicals landscape. The U.S. has been the most successful country at exploiting its reserves and is five to 10 years ahead of other regions. Consequently, it is expected to take a more dominant role in the global energy mix.

As other regions aim to replicate this success, they face a number of challenges. Geological assessments are needed to determine the potential of available resources, and a skilled workforce is required to apply and improve current extraction technologies. From a regulatory perspective, there are land ownership laws to contend with, and how they relate to subsurface resources. Pricing controls, taxation and environmental laws also need to be considered. Many of these issues remain unresolved, even in the more developed U.S. shale gas market.

New Petrochemical Landscape

Petrochemical production is shifting to the U.S., where, for the first time, production costs have dipped below those in the Middle East. Other regions remain significantly more expensive. As a result of shale gas production, there has been a shift to natural gas (NG) from naphtha, because of the wide price difference between the two feedstocks. Ethylene production has been a major beneficiary, with many companies reviving defunct crackers and others relocating operations from the Middle East.

These effects are not limited to ethylene production. Approximately 90% of propylene is made as a byproduct of cracking naphtha to make ethylene and gasoline. However, because of the higher price of naphtha, more crackers are using NG as a feedstock and reviving propane dehydrogenation (PDH) to make propylene. Naphtha-based crackers in Europe and Asia may have to focus on higher value product lines such as butadiene and aromatics.

The juxtaposition of low NG prices and high crude oil prices has encouraged supplier companies to adopt gas-to-liquids (GTL) technology to escape low NG prices in the U.S., and access the high value oil prices. Innovations in this area include setting up small-scale GTL plants to serve a number of shale gas producers, thereby sharing risks and cutting costs.

Caveat

While the future seems bright, there have been many sobering developments. Shale gas resource valuations are consistently revised downward. The twin issues of low recovery efficiencies and high rates of decline have not been satisfactorily addressed. In addition, the cost of shale gas production is much higher than conventional oil and gas, particularly outside the U.S., suggesting that the regional NG price disparity will continue. Consequently, a number of companies have dramatically written down their shale assets. There is clearly much to be done to prove the long-term viability of this resource.

Geopolitical Realignment

Shale gas proliferation will undoubtedly influence global geopolitics, particularly with regard to the relationships among the U.S., China, Russia and the Middle East.

Europe

Shale gas developments in Europe have thus far been stifled by restrictive legislative policies, and environmental and human health concerns. The situation is exacerbated by ambitious regional targets for the adoption of renewable resources, and a powerful anti-shale gas lobbying body, which strongly influences public opinion.

Strong competition from Asia, the Middle East and North America is due to availability of cheap feedstocks, adequate funding for investments and low cost production factors. In addition, Europe is still reeling from a protracted recession and the dominant feedstock is naphtha, which is inextricably linked to high crude oil prices. Producers are therefore susceptible to a decrease

in global commodity prices of ethylene and propylene and have to consider focusing on higher value product lines. European chemical companies have a key advantage, which will be vital to addressing these challenges. They have amassed a significant amount of intellectual property through technological innovation. This is particularly the case with regard to product lines and solutions, which address increasingly important factors such as health and wellness, sustainability, functionality and performance. They can leverage this against cash-rich, technology-poor regions.

Additionally, Europe maintains a difficult relationship with Russia, which has been known to leverage its dominant position as an NG supplier. Shale gas production in the U.S. will result in Middle Eastern and African NG exports being rerouted to Europe, thereby diversifying the region's supply.

Latin America

NG and naphtha prices in Latin America are approximately 20% higher than in North America. Consequently, primary chemical production costs are high and increasingly uncompetitive. The bio-based chemical industry has been affected for similar reasons. As a result, various international chemicals companies in the region are reassessing their investments, with raw material costs a major factor.

Argentina is estimated to hold more than 60% of the region's technically recoverable shale gas resources and boasts a government willing to exploit this fully. However, the government has imposed low domestic prices, which undermine investment uptake. Essentially, a rise in NG prices is needed to reflect the high production costs. In addition, the investment climate in the region has soured because of nationalization of some international energy and petrochemical subsidiaries.

Asia

To sustain continued growth, China needs viable solutions for its energy and feedstock needs, and is aggressively pursuing a number of options. Currently, extraction of Chinese shale gas is nascent and more

expensive than in the U.S. Even accounting for a proliferation of NG supplies, prices in Asia will remain higher than in other regions.

National oil companies such as Sinopec have invested heavily in North American shale gas assets as a way of acquiring the necessary technology to develop domestic resources. In addition, the government has encouraged a revival of coal-to-liquids (CTL) technologies to capitalize on vast domestic reserves. This allows China to reduce imports and address emissions targets since CTL is cleaner than simply burning coal.

Middle East

As NG supplies diversify, the dominance of the Middle East will weaken and the region's chemical producers will have to expand down the value chain to produce high value chemicals and counter losses in the upstream primary chemicals sector. In addition, state-backed cash-rich companies are in a strong position to invest in developments elsewhere.

Conclusion

Global shale gas proliferation will signal a significant shift in the energy and chemical feedstock markets. Countries looking to exploit their shale gas resources, as well as current oil and gas suppliers, are investing heavily in joint ventures and acquisitions to secure knowledge and hedge against losses in their conventional markets. European companies have an opportunity to leverage their strong technological knowhow against cash-rich, technology-poor regions in order to survive this turbulent market.

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UNDER CONSTRUCTION



LyondellBasell Restarts Idled Texas Methanol Plant

As part of its drive to take advantage of the shale gas boom, LyondellBasell has restarted a methanol plant at its Channelview site in Texas. The polyolefins giant closed the U.S. facility with capacity of 780,000 t/y in 2004, when natural gas prices were at a peak.

"The methanol plant re-start is the first in a series of U.S. Gulf Coast projects to take advantage of the natural gas price advantage that we enjoy from shale gas," said Patrick Quarles, senior vice president of intermediates and derivatives. He added that the methanol plant and "other significant debottleneck projects" will bring capacity into the system earlier and at "substantially lower cost" than building entirely new facilities.

LyondellBasell said earlier that restarting the Channelview methanol plant would cost around \$150 million.

Early in 2013, the U.S. group said its refinery at Houston, Texas, would be retrofitted to accommodate a greater percentage of light domestic and heavy Canadian crude oil.

Other projects being implemented in Texas, to cash in on the cheap gas trend, include expansion of ethylene capacity at La Porte, Channelview and Corpus Christi — adding 816,000 t of annual capacity — as well as expansion of a polyethylene plant in Matagorda County. (dw)

Indorama and ChemaWEyaat Team up on PET Precursors

Indorama of Thailand, world's largest PET producer, and Abu Dhabi Chemicals Company (ChemaWEyaat) have agreed to form a 49:51 joint venture to produce aromatics at Al Gharbia in western Abu Dhabi.

No timeline has been revealed for the project first announced three years ago. One of a number of PET-related plants expected to come on stream within the next few months or years, the facility — Indorama's first in the Gulf region — will be designed with a capacity for around 1.4 million t/y of the PET feedstock paraxylene, along with 500,000 t/y of benzene.

More than four years ago, Abu Dhabi-based International Petroleum Investment (IPIC), said it was seeking joint venture partners for ChemaWEyaat. This is the first project to be announced. (dw)

BASF to Build Engineering Plastics Compounding Plant In Yesan, Korea

BASF will build a compounding plant for engineering plastics Ultramid (polyamide) and Ultradur (polybutylene terephthalate, PET) compounds in Yesan, Chung Nam Province, Korea. The new plant is expected to begin construction by first half of 2014 and operations from the end of 2015, and will create more than 30 new jobs.

With an initial annual capacity of 36,000 mt, the new plant will more than double the total compounding capacity of BASF's engineering plastics in Korea. With this project and the capacity expansion of BASF's compounding plant in Pudong/Shanghai (China), which has already been announced, BASF's overall compounding capacities in Asia will increase from the current 130,000 to a total of 225,000 mt.

Similar to the compounding plant in Ansan, Korea and other Asian locations, the new plant in Yesan will produce Ultramid and Ultradur compounds. Ultramid and Ultradur are used, for example, in automotive parts as well as the electrical and electronics industry.

Evonik to Start Up Large-Scale Production Facilities This Year

Evonik Industries is to start up new facilities and production capacities, representing an investment volume of close to €1 billion, in high-growth emerging markets in 2014. Evonik's investment and growth program will comprise over €6 billion in the period from 2012 to 2016. Two thirds are slated for growth investments, while another third will be spent on existing facilities. Evonik aims to achieve sales of around €18 billion and adjusted EBITDA of over €3 billion in 2018.

Four large-scale production facilities, among others, will become operational in 2014: Evonik is completing a world-scale plant for the production of the amino acid MetAmino (DL-methionine) for animal feed in Singapore. The specialty chemicals company invested over €500 million in the construction of the new facility, which is scheduled to start producing in the third quarter of 2014 with an annual capacity of 150,000 metric tons. Evonik is also currently ramping up its global annual capacities of the feed amino acid Biolys (source of L-lysine) to almost 500,000 metric tons by 2015.

In China, Evonik will start up new production facilities for isophorone and isophorone diamine in Shanghai in 2014. The total investment volume is over €100 million.

Evonik is also expanding its global production network with construction in Brazil, where a new plant for the production of substances used in the cosmetics and household consumer goods market will open in 2014. Evonik's investment in the mid double-digit million-euro range will create a production capacity of about 50,000 mt/y per year. The company started up a similar plant in China in 2013.

In Germany, a new facility for the production of functionalized polybutadienes is projected to open in the spring of 2014. The investment volume is in the mid double-digit million-Euro range. Evonik distributes functionalized polybutadiene under the name Polyvest HT.

Ineos to Expand Norway Petchem Plant Capacity, Build Furnace

Ineos is building a new furnace at its petrochemical plant in Rafnes, Norway as it expands capacity to use ethane made from U.S. shale gas it will store in a tank under construction at the site, the chemicals and refinery company said. Swiss-based Ineos is building an ethane storage tank that will enable the plant to produce 570,000 tons per year of ethylene, a key substance in making plastics. The extra furnace will enable it to produce 620,000 tons per year.

The Norwegian plant currently houses 11 furnaces which process ethane gas and some oil-based liquids into ethylene. By the end of 2015 it will have built a 12th, Geir Tuft, the commercial director, told journalists at the site. Tuft said that the company was spending around \$160 million on building the tank, the furnace and import facilities. The move, taking advantage of the availability of cheap shale gas now being produced in the United States, will enable Ineos to stop buying more costly propane and make it more profitable on a long-term basis. The Norwegian tank will be joined by one around twice the size at the plant owned by Ineos in Grangemouth, Scotland, the company said.

U.S. Markets Drive Global Reallocation and Growth

Shale Gas in the U.S. Has Created a Competitive Advantage for Chemical Manufacturers

Changing The Industry — The global chemical industry is in a state of flux. The Asian economies, which have been the growth engines of the chemical industry for the last decade, have recently seen some slowing down; meanwhile, the U.S. chemical industry is coming out of its slumber.

The advent of shale gas in the U.S. has been a game changer for the industry. Huge availability of cheap shale gas, used both as feedstock and fuel in the chemical industry, has created a competitive advantage for U.S. manufacturers.

Natural gas prices in the U.S. decreased by 64%, from about \$11 per million British thermal units in 2008 to less than \$4/mmBtu in 2013. The sharp decline was largely due to in-



Vir Lakshman
KPMG

creased supply from the discovery of vast shale gas reserves in the U.S. It is estimated that the increased supply can fulfill gas demand at current levels for about 200 years.

Abundant availability and consequently significantly lower gas prices have led players in the chemical industry to fundamentally reshape their long-term growth strategy.

Increasing Investment in U.S. Chemical Industry

Improved production costs for chemical companies have driven



Rita Duran
KPMG

the reallocation of funds and resources to the U.S. A large number of greenfield and expansion projects have been announced. From 2010 through the first quarter of 2013, almost 100 chemical projects based on shale gas and valued at \$71.7 billion were announced; about half of these investments are made by foreign companies, according to the American Chemistry Council.

The majority of investments are being made around bulk petrochemicals, mainly ethylene and its derivatives — the major beneficiaries of the shale boom. Since 2005, the U.S. ethylene industry significantly improved its competitive position compared with China, Northeast Asia and Western Europe. From 2005 to 2012, U.S. production costs were halved and are now far below production costs in China, Western Europe and Northeast Asia.

The abundant supply of cheap shale gas is expected to enable the U.S. to maintain its production cost advantage for the foreseeable future. This has resulted in a large number of foreign companies entering the U.S. for shale-advantaged manufacturing. Nine new steam crackers in the U.S. have been announced with several more under consideration.

Focus On Sustainable Growth

To ensure a transition toward a robust product and service mix, some



companies have made mergers and acquisitions (M&A) while others are pursuing restructuring plans and have shed non-core assets.

The U.S. growth trend evident in the number of acquisitions and non-core disposals is in stark contrast to Western Europe and Japan, where companies are in a more challenging phase focused on cost reduction.

M&A Activity in U.S. Chemical Industry

Domestic and international chemical companies increasingly focus on achieving a disciplined product portfolio and streamlining operations in the U.S., which has led to renewed interest in M&A activity in the country.

However, deal activity in the past few quarters has been limited — as a result of economic slowdown in Asia, continued weakness in Europe and uncertainty surrounding U.S. economic policies.

Shale-based M&A activity has started to pick up. Early in 2013, Georgia Gulf Corp. completed its merger with PPG's commodity chemicals business, creating Axiall Corp. — a company that integrates chemicals and building products. Axiall Corp. benefits from North America's natural gas cost advantage as well as the recovery of the U.S. housing market. In addition, opportunities in fracking services are driving interest in the gas extraction market. Chemical producers, active in this area, plan to strengthen their position in the energy services market. Solvay's \$1.3 billion acquisition of Chemlogics and Ecolab's \$2.3 bil-

lion acquisition of Champion Technologies are recent examples.

While large chemical producers in the U.S. focus on domestic investments for attractive returns due to low-cost raw material, foreign players are inclined to acquire specialty chemical assets to boost their growth in the U.S. During the last few months, Altana, a European specialty chemicals company, has made several acquisitions of U.S. chemical companies — for instance, the \$635 million acquisition of Rockwood's Performance Additive segment and the acquisition of Henkel's Specialty Coatings business.

Moreover, the revival of the U.S. construction market is expected to support M&A activity in the building and construction space of the chemical industry — coatings, adhesives and sealants. The U.S. construction industry is expected to grow 9% in 2014, compared to an estimated 5% in 2013.

Private Equity Buyers Will Also Be Active

In the U.S., private equity (PE) investors have been active in the commodity chemical industry as evidenced by some recent large purchases, including Carlyle Group's \$4.9 billion acquisition of DuPont's powder-coating business. There is limited activity in the specialty chemicals area; given the high-deal multiples, strategic buyers can better price and leverage synergies. Recent examples in the specialty chemicals space include Platform Acquisition Holdings' \$1.8 billion acquisition of MacDermid Inc.

Conclusion

The U.S. economy has yet to overcome its difficulties, and regulatory uncertainty persists. Recent signs of slowing growth in Asian economies, particularly China, and a subdued economic environment in Europe may affect the revival in global chemicals demand.

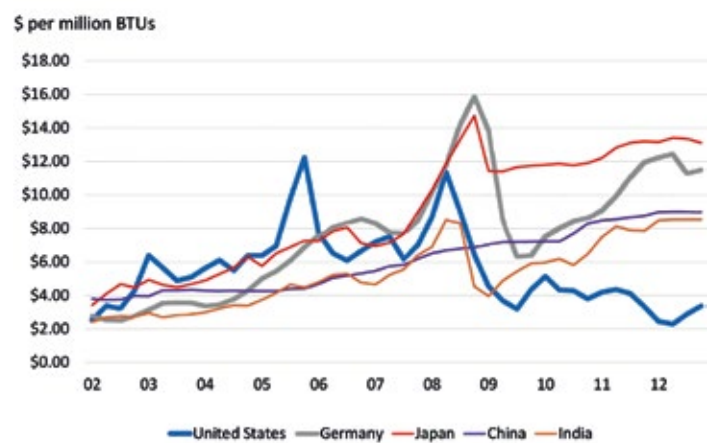
However, on the back of significant cost advantage in fuel and early signs of economic revival, the U.S. chemical industry is witnessing a vibrant phase. The low cost of manufacturing and abundant supply of raw material has resulted in global companies shifting their manufacturing bases to the U.S. This has led to both organic and inorganic growth opportunities for the chemical companies and has driven M&A activity in the industry.

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TRENDS IN NATURAL GAS PRICES ACROSS THE WORLD



Sources: IEA, Petrobas, I&E, World Bank, November 2013
"Shale Gas, Competitiveness and New US Chemical Industry Investment: An Analysis Based on Announced Projects",
American Chemistry Council, May 2013

Fig. 1: Trends in natural gas prices around the world

Managing global growth is challenging

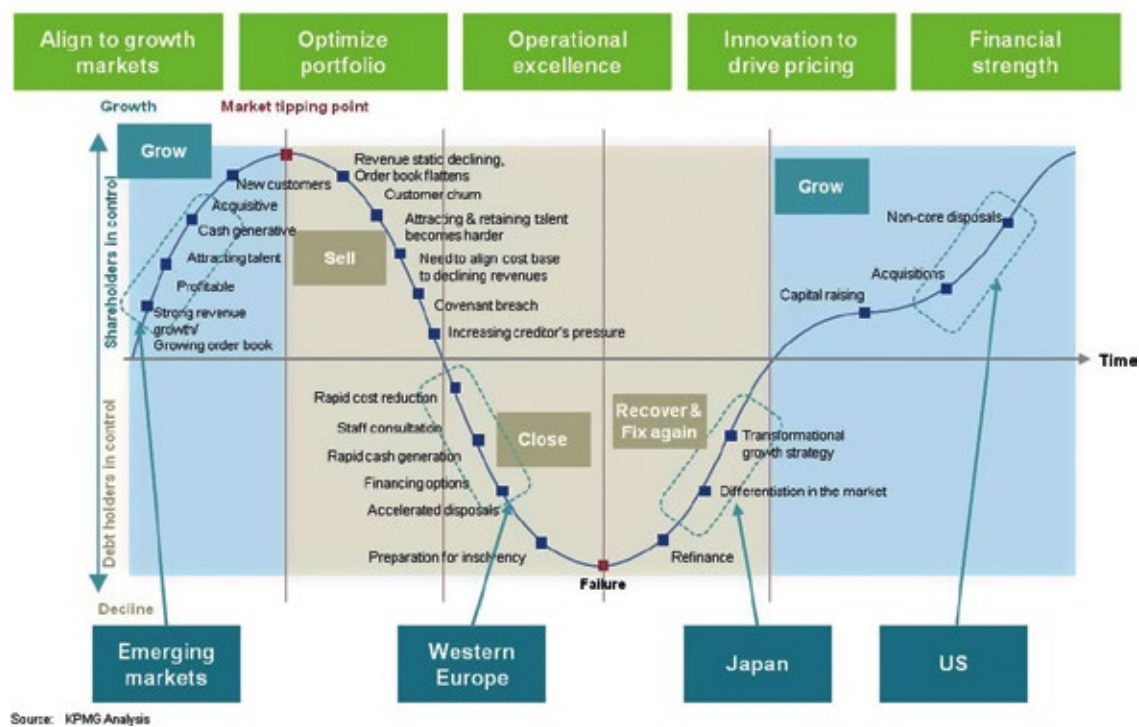


Fig. 2: Managing global growth is challenging

DuPont Taps Vergnano to Head Spin-off

DuPont has named Mark Vergnano, head of the Performance chemicals division since 2008, as CEO of the independent company it is creating through the carve-out of the division. The \$7 billion division, including the titanium dioxide and the chemicals and fluoroproducts businesses is being spun off to shareholders by the second quarter of 2015.

In announcing the move in October 2013, DuPont CEO Ellen Kullman said that after the carve-out 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



Mark Vergnano
DuPont

attractive markets. Shortly before announcing the spin-off plans, the group had said the business was improving. In the third quarter, volume sales increased by 25%. The fluoroproducts business, one of the traditional pillars of DuPont's portfolio, includes the well-known polytetrafluoroethylene, the heat-resistant coating sold under the brand name Teflon (dw)

Petrobras: Refineries Operating At 97% Capacity

PETROLEUM Brazilian Giant Trying to Reduce Gas, Diesel Imports

Brazil's state-run oil company Petrobras refined an average 2.03 million barrels a day of crude in the first 11 months of 2013, an amount equivalent to about 97% of its capacity. That was an 8% increase over the same period of 2012 when Petrobras refineries averaged 1.9 million barrels a day.

Brazil — Petrobras has been running its refineries at near capacity in an effort to reduce imports of gasoline and diesel fuel that are sold at a loss due to the government's fuel-price controls.

The company's 13 refineries are not able to keep up with rising domestic demand for gasoline and other products, forcing the world's sixth-largest economy to buy fuel supplies from as far away as the United States and India.

Union officials and oil industry experts say that pushing refineries so close to capacity is unsustainable over the medium and long term, raising the risk of accidents because of delays in maintenance.

Workers at a Petrobras refinery warned the company in October that a key unit now shut after a fire was "dangerously" above capacity, union officials told Reuters on Monday.

The blaze shut down the coking unit at the 242,000 barrel-a-day REDUC refinery in suburban Rio de Janeiro on Saturday. Petrobras said it expects to restart the unit on Friday and that the rest of the refinery was operating normally.

Industry experts say the unit is responsible for 30% of the refinery's gasoline and diesel output.

The incident at REDUC follows a November fire that put Petrobras' 200,000-barrel-a-day REPAR refinery near Curitiba, Brazil out of service for nearly a month and forced the company to hire a fleet of tankers to import emergency fuel supplies from as far away as India.

Petrobras rebuffed union criticism, saying in a statement that it maintains the highest maintenance standards. It said increased refinery processing was due to new units that came on stream in 2012, along with improved efficiency and the elimination of bottlenecks.

Petrobras announced that it has completed plans to introduce diesel and gasoline with sharply reduced sulfur content in service stations throughout the country.

As of Jan.1 all regular gasoline deliveries from Petrobras refineries have no more than 50 parts per million of sulfur, a corrosive pollutant that can seriously harm human health, the environment and property.

Repercussions of the U.S. Shale Story

Shale Changing the Face of Petroleum and Petrochemical Markets

What Follows The Boom? —

The two words on everyone's lips in recent years in the energy industry have been "shale boom." This article will lay out JBC Energy's view of the future of the U.S. shale boom and its effect on the petrochemical industry.

Cheap and Abundant NGLs

The emergence of hydraulic fracturing in the early years of the 21st century changed the face of the U.S. energy industry. U.S. total liquids production began to increase rapidly from 2008, with crude and NGL production growing by 31% and 33% respectively in the period until 2012.

Although both crude and NGL (ethane, LPG and pentanes plus) output has expanded tremendously, the fact that producers strongly prefer drilling in "wet plays" — which contain a high proportion of NGLs — to maximize returns has led to a collapse in ethane and liquefied petroleum gas (LPG) prices. U.S. ethane prices are currently only a little more than 10% of crude prices, while LPG is around 40%.

The shale boom has not only supported the energy and petrochemical sectors but has also reduced operating costs for steel producers and manufacturers. In terms of feedstock, the competitiveness of ethane and LPG has heavily affected the use of naphtha. According to the Alternative Motor Fuels Act (AMFA), the proportion of naphtha in the U.S. feedstock slate has declined from more than 25%-30% in 2007 to just more than 10% last year (see Figure 1 for our assessment of the U.S. feedstock mix).

Now Or Never

This deluge in NGL supplies and the cost advantage of running ethane-over naphtha-based crackers has resulted in a flurry of ethane cracker expansions and projects as well as several planned propane dehydrogenation (PDH) plants. The list of expansion and greenfield sites stretches to 20, while there are plans for five or more PDH facilities.



One thing is clear: Despite the expected growth in U.S. NGL output, the construction of all these plants would curtail the U.S. ethane and LPG surpluses and with that its current cost advantage. Therefore, we expect that this year and next will see the list whittled down. We expect that of the 10 million tons per year (tpy) of ethane-cracker additions planned by 2018, only 5 million to 6 million tpy will come online while only two of the PDH plants are currently firm. Therefore, with additional capacity and the continuation of feedstock switching, we expect U.S. ethane consumption to grow from 955,000 barrels per day (bpd) last year to 1.38 million bpd in 2020 (fig. 1).

Overbuilding is a Real Danger

Several global petrochemical players have taken a proactive approach

to the emergence of shale and are considering building world-scale crackers on the U.S. Gulf Coast. However, even within North America, competition is emerging, with several companies planning to expand their operations as well as developing new greenfield sites.

Most U.S. ethylene exports head to Canada, South America and increasingly Asia. We would expect U.S. petchem players to continue to tap the South American market, especially considering that Brazilian projects remain bogged down in financial- and construction-management issues. However, one potential issue is that plans for polyethylene capacity lag behind ethylene capacities. Converting ethylene to polyethylene and other derivatives reduces freight costs, as polymers are cheaper and easier to transport.

Wet Shale Plays to Power NGL Output

In terms of crude, despite recent impressive growth, we are more conservative in our outlook than other industry agencies. We believe that the concentration of the shale oil boom to mostly two plays (Bakken and Eagle Ford) and the high decline rates associated with shale wells will temper supply increases. Production from fracked wells deteriorates rapidly with output declining by up to 60% in the first six months.

However, we remain bullish in terms of NGL production. Firstly, we expect natural gas prices to climb throughout the rest of the decade because of increasing domestic consumption and growing liquefied natural gas (LNG) exports, although prices should remain at below half of international prices. We expect

this uptick in prices to incentivize producers to boost investment and production.

Secondly, we expect existing shale wells to continue exhibiting growing output of NGLs, while the recent trend of producers exploiting wetter plays is set to continue.

Together, we see these factors lifting U.S. natural gas production to almost 13 million barrels of oil equivalent in 2020 (see Figure 2). As a byproduct of this natural gas production, we expect NGL output to grow impressively for the remainder of the decade, with output expected to hit 2.92 million bpd in 2020 from 2.37 million bpd last year, which will help to drive ethane, LPG and naphtha's share in total U.S. product supply to close to 20% in 2020.

Additionally, we anticipate U.S. LPG supplies to grow from 1.34 million bpd last year to around 1.88 million bpd in 2020. Over the same time period, we see LPG demand growing by 180,000 bpd mainly due to the start-up of at least two PDH plants along the Gulf Coast in 2015 and 2016. Therefore, we predict that U.S. LPG exports will grow from 200,000 bpd last year to around 530,000 bpd in 2020 — with the majority of this growth by 2015 — while prices should trend upward from current levels, closer to parity with crude. Looking ahead, by the middle of the decade we would expect that some additional terminal capacity such as that planned by Sunoco, Vitol/Itochu and Occidental in addition to current firm projects would need to come online to provide relief to the U.S.'s supply overhang.

Ethane Exports Limited by Infrastructure

Still, the future of the well-developed U.S. LPG market differs markedly from that of ethane. Although ethane can be shipped, it is very expensive and requires special, pressurized ships. Any substantial growth in ethane exports will be constrained by a lack of infrastructure and designated cargo ships. INEOS is the only firm to have signed an agreement to secure ethane from the U.S. so far. Despite the costs of shipping, alteration to cracking units and the construction of import terminals as well as related infrastructure, the cost advantage currently is still sufficient to incentivize such deals.

However, one important aspect to note here is that increasing natural

gas-linked ethane prices may reduce the attractiveness of ethane exports, although we would still expect that ethane will remain at a sizeable discount to international crude prices. Nevertheless, it is safe to say that fellow European petrochemical players as well as U.S. ethane producers will be monitoring these developments with great attention.

Naphtha Exports Set to Grow

In terms of naphtha, we expect that U.S. petchem players may further reduce the use of the product, but in order to prevent tightness in the aromatics and propylene markets, we expect its use not to fall much lower than its current 10%-12% level. However, as light shale oil output — which is naphtha-rich — continues to grow and refiners alter their set-ups to boost runs of light crude, naphtha production is set for a period of growth.

Along with the addition of several condensate splitters — that produce between 50%-70% naphtha — we expect U.S. naphtha production to reach 425,000 bpd by 2020, up from 240,000 bpd seen last year. This rise would make the U.S. one of the world's largest naphtha exporters along with Algeria, Russia and the Middle East. Although this abundance of supplies may weigh on U.S. naphtha prices, we would expect prices to remain only slightly discounted to international crude prices.

The Race Is On

In conclusion, in recent years the U.S. has become a net exporter of total refined products — mostly because of transportation fuels such as gasoline and diesel — while in the coming years we expect that growth will be driven by petrochemical feedstock exports such as LPG and naphtha (fig. 4 4).

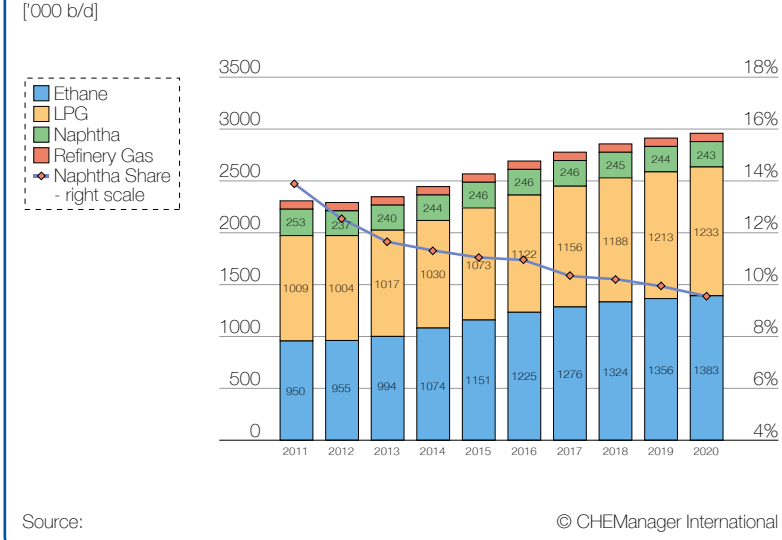
Nevertheless, it should be noted that from 2014 onward we do not see much growth in LPG exports based on rising domestic demand and less dynamic supply, which will disappoint quite a lot of hopes in Asia and Europe for cheap and abundant LPG supplies. Meanwhile, the expansion of the U.S. ethane cracker fleet will increase pressure on European and Asian naphtha-based crackers, especially Japan, and will have Middle Eastern players — who may see higher ethane prices in the coming years — looking over their shoulders.

However, the bonanza will surely not last long if all the planned projects are completed. Thus we would expect that the sprint to capitalize on the unique cost advantage of the U.S. will see a thinning field as players drop away. Additionally, the capacity of the U.S. downstream petrochemical industry to absorb a flood of ethylene may not be sufficient while a lack of polyethylene capacity may limit the country's ability to tap export markets.

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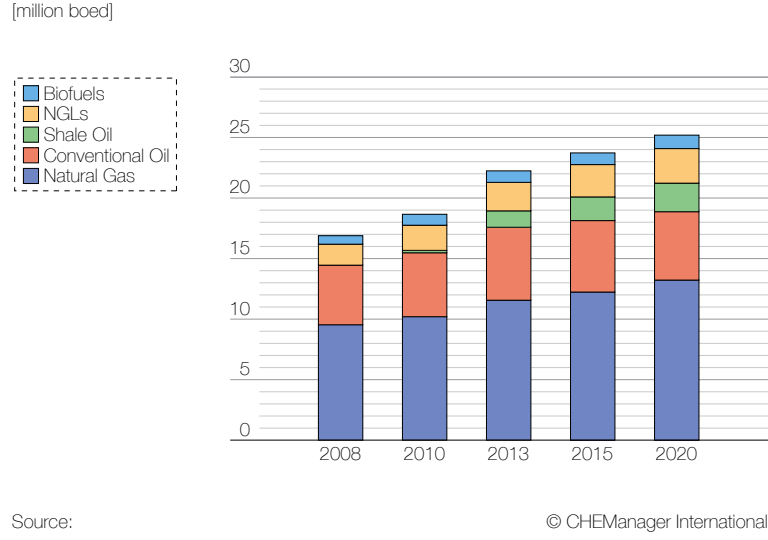
US Petrochemical Feedstock Demand by Product Fig. 1



Source:

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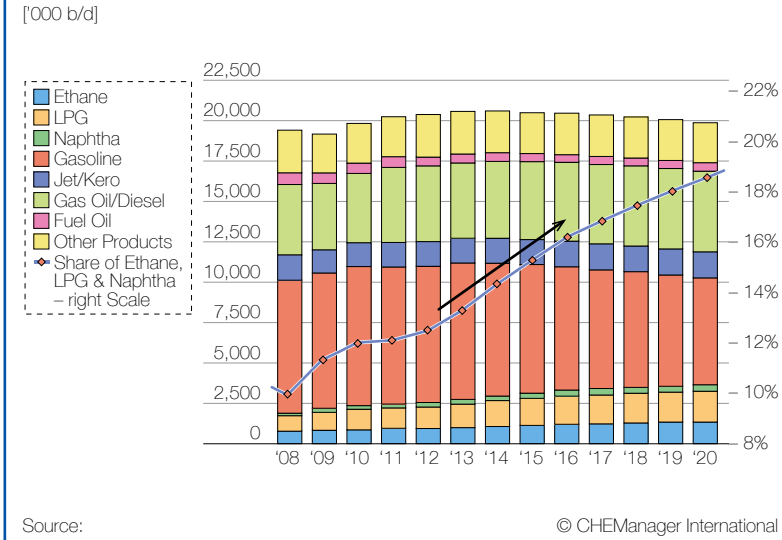
United States – Oil & Gas Supply Fig. 2



Source:

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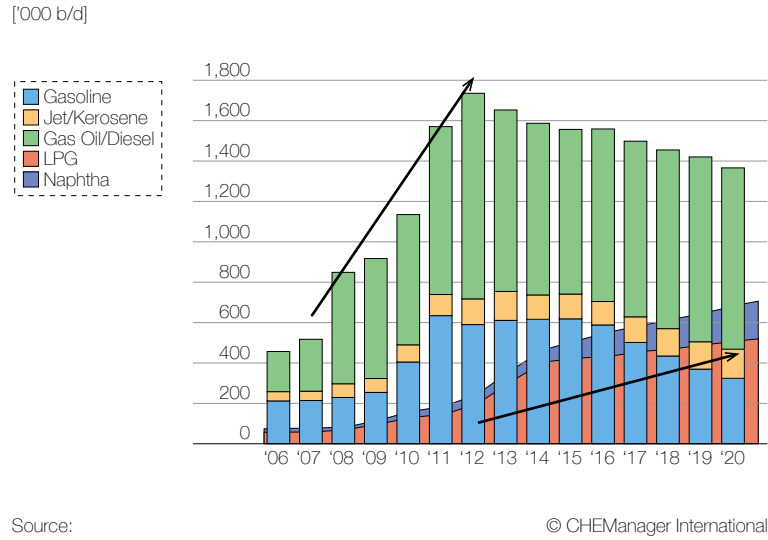
United States – Product Supply Fig. 3



Source:

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United States – Product Exports Fig. 4



Source:

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bit.ly/us-shale-gas

Outsourcing Biopharmaceutical Manufacturing

CMOs, CROs Must Take on Risks

Development On Trial

— The number of biopharmaceutical projects in clinical trials and products is increasing, playing an important role in new treatments. Many of these projects start in small and startup biopharmaceutical companies. They depend on contract manufacturing organizations (CMOs) and contract research organizations (CROs) to develop potential pharmaceutical products. These biopharmaceutical companies are crucial to Big Pharma because they supply new projects, often after phase II or proof of concept (POC). Society needs new drugs that solve medical problems and reduce costs. Patients need drugs that cure their illnesses and maintain their quality of life.

The Development Chain

The small and young biopharmaceutical companies are an important starting point for development of new drugs. They play a crucial role in the development chain of new biopharmaceuticals. These projects are important for Big Pharma companies: After POC in humans, the projects are candidates for insourcing, thereby supporting their project portfolio.

Big Pharma has the resources and capability required for the costly phase III and commercialization. Therefore it is important that biopharmaceutical companies have an environment that fulfills their requirements.

Know-how and financial levels vary among these companies. Small ones do not have their own good manufacturing practice (GMP) facilities or development organization, and some companies are virtual. They require strong support from the CMO. However, it can be difficult for the CMO to get a good profit margin, and in some cases it's a financial risk.

Virtual Company

Ideas for new biopharmaceuticals generated outside Big Pharma must be developed by virtual companies. The investments required to set up a complete biopharmaceutical company are high — too high to be an acceptable risk.

The success rate for development is too low to sustain investment in that range. It's a gigantic step from a virtual company to a company with its own facilities and organization for research and GMP, marketing and sales. Most of these virtual companies will continue with that business model; they are strong in the early discovery phases.

Requirements For Success

A big requirement for success is financial support, but this article doesn't cover that. The companies have limited experience in the development



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of biopharmaceuticals. Physicians or scientists often start these companies without experience in development, process development, manufacturing, or regulatory and authority requirements. They do not have and will not have their own GMP facilities. They depend on service providers, CMOs and CROs. Since they do not have the know-how to define what they need to purchase, they depend on the service providers' support.

They need the active pharmaceutical ingredients (API), drug product (DP) for the next clinical trial, an application for the clinical trial and design of the clinical. They do not need to understand the manufacturing or the process chemistry. But it is a requirement from authorities, so the service providers must supply this know-how concerning the process chemistry.

Process Development, Manufacturing

The project has to fulfill requirements regarding the manufacturing of API and DP. For commercial manufacturing, the process must be industrial and robust, fulfilling requirements for regulatory registration as a commercial product. During clinical trials, the costs of goods sold (COGs) are not important; however, for a product on the market they are crucial. The process used to produce the drug for clinical phases I and II must have been designed in such a way that after modification it has a COGs level within market requirements. That requires planning from the project's start.

So the virtual company has to develop a manufacturing process fulfilling these requirements, and that is done by the CMO.

General Problem

Small companies face two significant problems: low bargaining power

and insufficient know-how. They lack expertise in several areas:

- Defining what to purchase
- Designing the agreement
- Industrial process know-how
- Analytical and characterization skill
- GMP
- Setting specifications
- Regulatory knowledge
- Quality assurance/quality control (QA/QC)

The traditional way to handle process development for a drug project is to use the process that has been developed for creating substance for POC in animals. It starts with a general method that might give the answers you think you need for the moment. But the only thing that is true is that both the specification and several analytical methods will need to be modified.

The methods used during early development are not suited for market, so there are always huge demands for modifications. The process development is often driven by the accelerated quality demands, and the development is done stepwise without a proper plan and with no control of either the cost or the goals. It is an expensive way of doing process development, and it is reacting, not acting.

It will not give an optimal process and will not take into account:

- COGs
- Quality
- Reproducibility
- Comparability
- Authorities' requirements

The same tradition is also true for analytical methods development. After POC in humans (phase II), the focus is on fine-tuning and validation of the process. If the analytical method development is done with the Quality by Design (QbD) concept,

the knowledge of both accuracy and precision are much more secure than if an older method is used. Focusing on both methods and specifications early in development makes the knowledge about both methods and substance much more reliable than when trying to solve the problems as they come up.

More reliable knowledge about both substance and impurities is an essential tool for process development. The process development could never be better than the analytical knowledge.

Knowing the substance early on reduces the chance of nasty surprises. Focusing on a well-designed process as early as possible during project development naturally produces a risk of losing time and money invested in a project that could fail in a later stage. But the benefits outweigh the risk. Be careful and critical in your choice of projects to develop further. After deciding to develop a project, plan for success.

Characterize MCB/WCB, API and DP from each clinical phase to secure that comparability is maintained during the clinical phases and different manufacturing sites. If the manufacturing has to be moved after POC, the characterizing data are required. The characterization shall include potency measurements; preferably buy a bioassay/cell line. Development, manufacturing and characterization have to be well-documented.

QbD: Quality by Design

Quality by Design (QbD) is often seen as an expensive way to develop an early project.

However, in the long run, it is the other way around. The smart design of the process for API and DP will secure the quality of the product. Ana-

lyzing the final product, for sterility for example, does not create quality. Quality shall be planned — designed — that's QbD.

Start to think QbD as soon as you decide to get involved in a project. You should have a structured way of doing development. That makes it possible to avoid expensive and time-consuming surprises. The possibilities for success are improved. Invest in a stable and reliable production process from the beginning.

- Create a strategy for:
 - Specifications
 - Regulatory requirements
 - Clinical trials
 - Stability and shelf life
 - Process development
 - Manufacturing

It will secure delivery of API and DP, fulfilling specifications for the clinical trials and fulfilling your timelines.

Regulatory

You have to understand the chemistry in your process. Describe the chemistry in regulatory documentations, and explain your process design and regulatory requirements. Quality cannot be analyzed — the quality in the process has to be based on process design, that is, QbD. The regulatory knowledge required for a project has to be part of the company or performed by the CMO or consultant. Regulatory shall be part of the project from the start. The regulatory person or department shall have the knowledge to take an active part in the development, including knowledge of the chemistry in the process. If the knowledge is not part of the company, get external help.

The CMO or a consultant can create the regulatory documentation regarding the process:

- Chemistry
- Rationale for the process design
- Rationale for the specifications

But the project owner is responsible for the documentation.

Specifications, in-process, API and DP must reflect the use of the drug, dose, one-time use, lifelong use and so on. The specifications per clinical phase should be decided at the project's start; it is an important goal for the process development.

Read and understand the International Conference on Harmonization guidelines as a start.

Collaboration: Win-Win

For the customer:

- API and DP for the next clinical trials or market
- At a reasonable cost

For the CMO:

- Successfully perform the project and build know-how
- At a reasonable profit

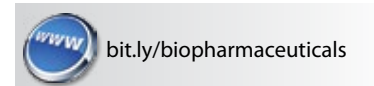
For a successful collaboration, the involved companies have to understand each other and what is important to each company. The CMO has to understand what the customer really needs; the customer must understand what it needs and what it will get. If this isn't happening, get help from external consultants. Both parties have to receive what they need from the assignment: delivery of the drug, specifications fulfilled, timeline and cost.

If the expectations from the CMO and the customer are not the same, one or both parties will regard the assignment as a failure, even if it has been performed according to the plan.

Conclusions

CMOs and CROs have to take on the risk by delivering a defined process, manufacturing of API and DP, not activities. At a fixed amount, price and timeline. It is important for the companies using their service. There are CMOs offering manufacturing of an antibody, from gen to a fixed amount of API for phase III. At a fixed price and timeline. They do an evaluation of the project before accepting the assignment. The biopharmaceutical industry needs more of this kind of offer. It is also important for the investors: They will know what they get for their investment, and funding a project will be easier. It will generate development of more projects, which Big Pharma can commercialize for the benefit of patients and society.

Jan Gunnar Gustafsson,
Bio Evaluation BO AB



J&J Petitions FDA to Require 'Similar' Names for Biosimilars, Biologics

PHARMACEUTICALS Novartis, Mylan Pushing for Same Names

Johnson & Johnson said it submitted a citizen petition asking that U.S. health regulators require copies of biological products to bear names that are similar and not identical to those of their reference products.

J.S. — J&J's view on naming of biosimilars contrasts that of Mylan and Novartis over the past few months, as the U.S. Food and Drug Administration continues to work on drafting regulations for the approval of biosimilars.

"Assigning names that are similar but not the same will appropriately reflect the legal and scientific reality that biosimilars are similar to but not the same as their reference products or other biosimilars," J&J's Chief Biotechnology Officer Jay Siegel said in a statement.

Creating copies of biologics is complicated as these products are produced in living cells, bringing inevitable unpredictability. As a result, their copies can only ever be "similar," not exact replicas.

Names of biosimilars are also bound to impact their sales and

adoption as substitutes to the original products.

Novartis and Mylan have both previously expressed support for a system that requires that a biosimilar share the same international non-proprietary name (INN) as the biologic products to which it refers, saying that same names would avoid frivolous brand tactics and confusion in the marketplace.

Mylan in September said it supported a petition filed by the Washington, DC-based Generic Pharmaceutical Association that recommended biosimilars have the same

Assigning names that are similar but not the same will appropriately reflect the legal and scientific reality that biosimilars are similar to but not the same as their reference products or other biosimilars.

Jay Siegel, Chief Biotechnology Officer, Johnson & Johnson

names because by definition they are highly similar to their reference products and have no meaningful differences that require a unique name.

Novartis advocated for the same by filing its own petition in October.

Biologic medicines, typically administered via an injection, and are used to treat cancers, immunological diseases like rheumatoid arthritis and multiple sclerosis and other chronic illnesses, but their high

price tag can keep them out of reach for many patients.

The FDA in February 2012 issued draft guidance on approval pathways for biosimilars, but is yet to finalize that guidance, while European regulators have already cleared cheaper copies of some biotech medicines.

The global biosimilars market is expected to be worth about \$11 billion to \$25 billion in 2020, equivalent to a modest 4 to 10% of total biotech drug sales by that time, according to healthcare information firm IMS Health.

Helsinn Reaps Benefits of Cytotoxic Molecule Demand

New Facility Up and Running Successfully

Strong Start — After beginning its investment in a brand-new cytotoxic molecule facility in Biasca, Switzerland, in 2011, Helsinn started production in July 2012. Now one and a half years later, Brandi Schuster spoke with Waldo Mossi, Senior Director of Business Development, Helsinn Advanced Synthesis, about developments in demand for cytotoxic molecules and upcoming trends.

CHEManager International: Helsinn opened up a new plant for cytotoxic molecules in 2012. How has the demand been for cytotoxic molecules since the plant began manufacturing?

W. Mossi: We have been very fortunate to see a steady and consistent demand for the cytotoxic facility

since the first project kicked off in July 2012. The cytotoxic plant is segmented into three levels of production, a small, mid and large-scale. We have seen the highest demand in our large-scale facility where we manufacture tens of kilograms. Each production area was designed using state of the art closed system equipment with variable air pressure and engineering controls designed to protect HAS employees, the environment and our client's product integrity. The specific design and equipment can work with cytotoxic compounds meeting stringent OEL Limits down to 50 ng/m³.

What regions do you serve with this plant? In general, what parts of the world are of interest for Helsinn?

W. Mossi: As of now, all of our cytotoxic projects have come from the U.S.



Waldo Mossi, Senior Director of Business Development, Helsinn Advanced Synthesis

and Europe. However, we are seeing a lot of interest from Asia, so we anticipate future projects to come

from that region as well. In general, we work with companies based in the U.S., Europe and Japan with the majority of projects coming from the US. Our main clientele consists of small to medium sized pharma where we provide the full CMC support for projects Phase II through commercialization. Our cGMP facilities in Biasca, Switzerland have been successfully approved by the Swiss and European authorities and US FDA (No 483s), as well as by the PMDA.

How has the demand for HPAPIs developed over the last few years? Where do you see the trend going?

W. Mossi: Helsinn started manufacturing HPAPIs in 1999. The HPAPI facility can handle selective anti-cancers with OELs down to 1 µg/m³. In the first facility, we were able to pro-

duce up to 10 kg of HPAPI. A few years later we expanded our offering to include production ranges up to about 150 kg. Similarly to what we are seeing in our cytotoxic facility, we are seeing a trend towards a growing demand of the large scale facility. As we anticipated when we built the cytotoxic facility, we are seeing a pharmaceutical trend of production segregation between cytotoxic compounds and HPAPIs with anticipation of future regulatory restrictions.

What challenges do you face as an API/HPAPI producer in Switzerland in terms of cost? How interesting are lower-cost areas for the company?

W. Mossi: We find that for the later-stage programs, our clients are looking for high quality material from a company with an exceptional regu-

latory inspection history over price. With that said, of course cost is something that still comes into play. In order to mitigate costs where we can, we optimize the use of our reactors with batch size so we can decrease the cost per kilo. Additionally, from a logistics perspective we have partnered with select companies in China, so we can bring down the cost of goods where it makes sense to source starting materials and earlier non-GMP steps where applicable.



PCRAMS: A Booming Business

Outsourcing Enhances Flexibility and Efficiency of Pharma Research and Manufacturing Processes

Global Growth — Milan-based Chemical Pharmaceutical Association (CPA) recently published the report "The World Pharmaceutical Contract Research and Manufacturing Services Industry," or "The World PCRAMS Industry."

The report analyzes this industry in detail by geographical area or country, business segment, market trends, industry structure, strategies for competing, and major players.

Overall the pharmaceutical contract research and manufacturing services industry — including both contract research organizations

(CROs) and contract manufacturing organizations (CMOs) — has seen revenues rise at an average 10.8% yearly rate in the past 12 years to reach more than \$70 billion by 2012, with peaks up to 26% year over year in China and even more in India. The substantial growth of the global PCRAMS industry is re-

lated to a series of factors: sanitary cost containment policies adopted by health authorities in most countries, increasing competition in the pharmaceutical industry and rising R&D costs that have pushed many pharmaceutical companies to seek low-cost alternatives for research and manufacturing. The greatest advantage of outsourcing is the positive effect it has on both flexibility and efficiency of the manufacturing process, turning fixed costs into variable ones.

Breaking Down The Market

The anti-cancer segment has registered the fastest growth in recent years within the global pharmaceutical contract research and manufacturing business.

Of the global pharmaceutical contract research and manufacturing accounts for the largest share; clinical trials account for nearly 50% of global pharmaceutical contract research.

Of the global pharmaceutical contract manufacturing business, active pharmaceutical ingredients (APIs) and advanced intermediates account for nearly 65%.

Though pharmaceutical contract manufacturing in the next years will be driven mainly by manufacturing and development of finished dosage forms (mainly in Asia, particularly in India), contract manufacturing of APIs and advanced intermediates will remain the dominant sector. The contract manufacturing of APIs and intermediates is divided in two sub-segments: toll manufacturing and custom synthesis. Custom synthesis is expected to rise faster than APIs toll manufacturing, albeit from a lower basis, since it is a high-value and more innovative business. APIs custom synthesis requires multi-year expertise and knowledge.

The West Dominates

Currently North America and Western Europe dominate the PCRAMS market, accounting for around 60% of the global business; Japan accounts for 5.7%.

The share of North America and Western Europe in the global pharmaceutical contract research business is even larger: around 68%. Japan accounts for 9%.

North America and Western Europe together account for around 56% of pharmaceutical contract manufacturing, and Japan accounts for 4%.

In the sub-segment of APIs custom synthesis, the U.S., Western Europe, Japan and Australia account for around 65%; India and China have the largest share of the remaining 35%.

In the U.S., pharmaceutical contract research and manufacturing is characterized by:

- High focus on innovative R&D, new chemical entities (NCEs), nondisclosure agreements and abbreviated new drug applications (ANDA).
- High focus on clinical trials: It is estimated that around 50% of all recently conducted Phase I clinical trials in the world have been conducted in the U.S., and about 46% of all Phase III clinical trials conducted in the world have been conducted in the U.S.
- Custom synthesis of complex molecules and innovative molecules or molecules requiring hazardous reactions to be manufactured.
- Increasing focus on niche fields such as targeted therapeutics.

In Western Europe around 63% of recently conducted Phase I clinical trials have been conducted in five countries: England, Germany, France, Belgium and the Netherlands. The main strength of the Western European PCRAMS industry is its high productivity coupled with high flexibility. That makes the qualitative difference with the Eastern European and Asian PCRAMS industry.

Emerging Markets

In Eastern Europe, Poland and the Czech Republic are major emerging countries in pharmaceutical contract manufacturing. The PCRAMS business in these countries is in the hands of a limited number of players; the products' portfolio of Eastern European CMOs, however, is generally more limited than their Western European competitors. In their specific competence segments, Polish and Czech CMOs are sometimes preferred over Asian competitors (particularly Chinese competitors) in spite of their higher manufacturing costs, because of their better compliance with EU standards.

India and China dominate the Asian PCRAMS industry. There are some differences between the Chinese and the Indian PCRAMS framework. Whereas new drug discovery accounts for only 5%-6% of total

Chinese CROs revenues, in India, though this activity is still in its infancy, the incidence is almost triple: 15%-20%. In addition, the share of Indian CMO revenues deriving from custom synthesis of APIs and advanced intermediates (the most qualified business within pharmaceutical contract manufacturing) is double if compared with Chinese CMOs.

India is becoming one of the most favored destinations for pharmaceutical outsourcing by both drug innovators and drug manufacturers overseas, because of its product mix, improved process engineering, development of new chemical processes and low labor costs — among the lowest and most slowly increasing ones in Asia. Custom synthesis, medicinal chemistry and clinical studies are emerging areas in which Indian companies are attractive for new business development.

Pharmaceutical contract research and manufacturing as a whole is shifting away from Western to emerging and Asian countries. However, the specific segment of API custom synthesis, mainly focusing on new APIs, in the medium term will remain a prerogative of the West, especially regarding the synthesis of niche value products (such as high-potency APIs) or those active ingredients with an uncertain development future and sure challenges.

The emerging areas, however (with India at the top followed by China) will show the fastest growth rates: By 2017, the U.S. and Western Europe will account for around 53% of the global API custom synthesis market, compared with 61% in 2012; India will account for 18.8% up from 13.1% in 2012 and China for 13.2% up from 10% in 2012.

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EVENTS

World Economic Forum Annual Meeting 2014, Jan. 22-25, Davos, Switzerland

"The Reshaping of the World: Consequences for Society, Politics and Business" is the thematic focus of the World Economic Forum Annual Meeting 2014. Profound political, economic, social and, above all, technological forces are transforming our lives, communities and institutions. Rapidly crossing geographic, gender and generational boundaries, they are shifting power from traditional hierarchies to networked heterarchies. Yet the international community remains focused on crisis rather than strategically driven in the face of the trends, drivers and opportunities pushing global, regional and industry transformation. The meeting's aim is to develop the insights, initiatives and actions necessary to respond to current and emerging challenges.

► www.weforum.org

E-World Energy & Water, Feb. 11-13, Essen, Germany

The future development of the energy market in Europe will be one of the central topics to be discussed at the E-World Congress 2014, which will take place parallel to the E-World Energy & Water trade show. In 25 conferences, international experts from the political and economic fields will discuss solutions relating to the energy industry and provide information about topical questions in the sector. Representatives of the European Commission will also examine the future of supply grids within the framework of the congress. Moreover, the congress will provide the housing industry with its own conference for the first time. The main subjects will be energy-related building renovation as well as energy procurement.

► www.e-world-essen.com/en

DCAT Week 2014, March 10-13, New York, USA

The Drug, Chemical & Associated Technologies Association (DCAT) is a not-for-profit business development association for the global pharmaceutical manufacturing and related industries. DCAT Week is one of the largest gatherings in the world for these industries and brings industry CEO's, presidents, global sales managers and directors of supply chain management from around the globe together for high-level meetings, strategy sessions, education programs and networking events. The keynote speaker at the 88th DCAT Annual Dinner on March 13 will be Hillary Rodham Clinton, former Secretary of State and former U.S. Senator from New York.

► www.dcat.org

Interphex 2014, March 18-20, New York, USA

Interphex is North America's premier annual trade show and conference dedicated to the biopharmaceutical & pharmaceutical manufacturing industry. The event is also a forum for leading-edge technology, education and sourcing of products and services that improve manufacturing and supply chain performance for pharmaceutical, biologic, generic and service provider professionals. It brings pharmaceutical and biotechnology professionals together with suppliers through a combination of conference, exhibition, workshops, partnering opportunities, and networking events and provides the latest information on tools, methodologies and regulatory knowledge.

► www.interphex.com

Plastics in Automotive Engineering 2014, April 2-3, Mannheim, Germany

The international congress Plastics in Automotive Engineering organized by the Association of German Engineers (VDI) is widely recognized as a premium meeting place where automotive and plastics industry experts discuss latest developments and future technologies. With strategic overview lectures from research and the market, topical technical reports from the passenger car and commercial vehicles sectors concerning plastics innovations and practical examples from plastics processing the conference serves as a source of detailed information about the state of the art in plastics technology and automotive applications. A technical exhibition by plastics producers and machine manufacturers as also an accompanying auto show with the latest cars and commercial vehicles allow attendees to discuss technical points at the physical object itself.

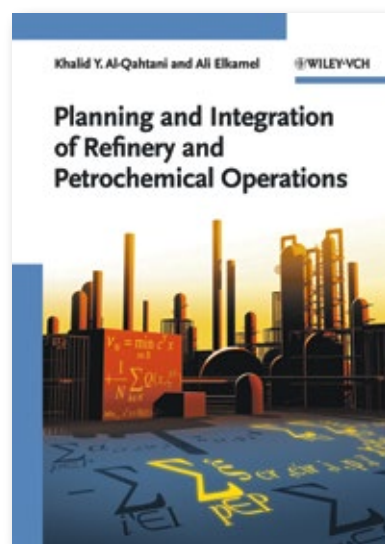
► www.kunststoffe-im-auto.de/en

Biorefineries — Industrial Processes and Products

This book is devoted to biorefineries and biobased industrial technologies, and, as such, is directed towards the technological principles of biorefineries, green processes, plants, concepts, current and forthcoming biobased product lines, as well as the economic aspects. Since the hot topics of green chemistry and green processes are of a multidisciplinary interest, this book will benefit the whole spectrum of the process industry, including chemical engineers, process engineers, apparatus construction engineers, chemical industry, chemists in industry, and biotechnologists.

The editors and authors are all internationally recognized experts from industry and academia, including Dr. Patrick Gruber, the former vice president and chief technology officer at Cargill Dow, winner of the U.S. Presidential Green Chemistry Award and holder of more than 40 patents.

► **Biorefineries - Industrial Processes and Products**
Birgit Kamm, Patrick R. Gruber, Michael Kamm
Wiley-VCH
Price: € 135
ISBN 13: 978-3527329533

Planning and Integration of Refinery and Petrochemical Operations

Divided into three main sections, this practical book familiarizes readers with the area of planning in petroleum refining and petrochemical industry, while introducing several planning and modeling strategies encompassing single site refinery

plants, multiple refinery networks, petrochemical networks, and refinery and petrochemical planning systems. It equally provides an insight into possible research directions and recommendations for the area of refinery and petrochemical planning.

Furthermore, several appendices are included to explain the general background necessary, including stochastic programming, chance constraint programming, and robust optimization.

For engineers and managers working in the petroleum industry as well as academic researchers in production, logistics and supply chain management.

► **Planning and Integration of Refinery and Petrochemical Operations**
Khalid Y. Al-Qahtani, Ali Elkamel
Wiley-VCH
Price: €79.90
ISBN 13: 978-3527326945

Green Chemistry in the Pharmaceutical Industry

Edited by three of the world's leading pharmaceutical scientists, this is the first book on this important and hot topic, containing much previous-

ly unpublished information. As such, it covers all aspects of green chemistry in the pharmaceutical industry, from simple molecules to complex proteins, and from drug discovery to the fate of pharmaceuticals in the environment. Furthermore, this ready reference contains several convincing case studies from industry, such as Taxol, Pregabalin and Crestor, illustrating how this multidisciplinary approach has yielded efficient and environmentally-friendly processes. Finally, a section on technology and tools highlights the advantages of green chemistry.

► **Green Chemistry in the Pharmaceutical Industry**
Peter J. Dunn, Andrew Wells, Michael T. Williams
Wiley-VCH
Price: € 132
ISBN 13: 978-3527324187

PEOPLE



Marcel Lubben

Marcel Lubben has been appointed president of Reverdia. He replaces General Manager Will van den Tweel, who led the start-up of Reverdia, a joint venture between DSM and Roquette on sustainable succinic acid (Bio-succinum). Lubben holds a PhD in Organic Chemistry from the University of Groningen (the Netherlands). He joined DSM in 1994 and held positions in Research, Business Development and Marketing & Sales in DSM Pharma Chemicals and DSM Biologics. He became managing director Licensing for DSM in 2009 and Venturing & Licensing in 2011. In 2012, he was named vice president Bio-based Chemicals & Materials and from mid-2012 served as a member of the Reverdia board.



Jürgen Köhler

Dr. Jürgen Köhler has assumed the role of CEO at SGL Group, succeeding Robert Koehler, who is retiring at the age of 65. Robert Koehler played a key role in the company's foundation in 1992 and the spin-off of SGL Carbon from Hoechst AG and has shaped the German carbon specialist as CEO for over 20 years. Dr. Jürgen Köhler has been working for SGL Group in various management positions since 2002 and has been a full member of the Board of Management since June 1, 2013. He has a PhD in process engineering, began his career in 1992 at Hoechst AG and worked there and at Celanese for more than 10 years in total.



Kemal Malik

Kemal Malik has been appointed to the board of management of Bayer effective Feb. 1. Malik has been a member of the Bayer HealthCare executive committee, head of Global Development and chief medical officer since July 1, 2007. He is to succeed Prof. Wolfgang Plischke effective April 30, upon Plischke's retirement. Malik will be responsible for Innovation and take over responsibility for the North America region. Malik studied medicine at the University of London, graduating as a Bachelor of Medicine, Bachelor of Surgery in 1987. Before he joined Bayer in 1995 he held various positions of increasing responsibility in medical affairs and clinical development at Bristol-Myers Squibb.



Nick Hyde

Nick Hyde has joined Results Healthcare as managing director. Hyde, a graduate in engineering from Cambridge University and a life sciences industry veteran supports the dedicated team of healthcare corporate finance professionals servicing the practice's growing client base. Hyde stated his career spending 15 years at ICI and became director of operations for Zeneca's Life Science Molecules business as the ICI business transitioned. He then spent two years as vice president of Avecia Pharmaceuticals before joining Dow Chemical as the global business leader of the Dowpharma business unit. Since leaving Dow in 2008, Hyde worked on a number of major asset divestments for pharmaceutical clients in addition to his work with Med Tech start-up companies in the Cambridge area and as a director of Inotec AMD.



Patrick Thomas

Patrick Thomas, CEO of Bayer MaterialScience and president of PlasticsEurope, chairs the interim executive committee of the recently launched World Plastics Council (WPC). The WPC will be the voice of global plastics manufacturers facilitating a united approach to address global opportunities and issues facing the industry. The following executives are regional co-chairs of the committee: Li Shousheng, executive vice chairman, Chinese Petroleum and Chemical Industry Federation; Mosaed Al-Ohali, executive vice president Polymers, SABIC; David Morgan, vice president, Polyethylene, Chevron Phillips Chemical; Fernando Musa, CEO, Braskem America; Bob Patel, executive vice president, Olefins & Polyolefins, Europe, Asia, International and Technology, LyondellBasell.

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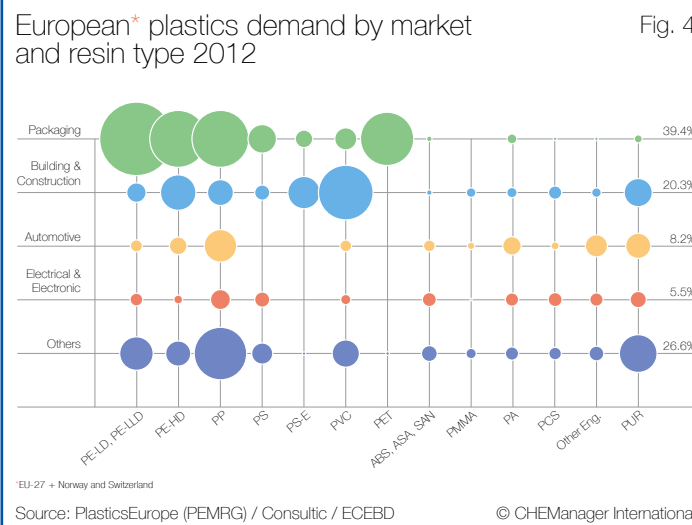
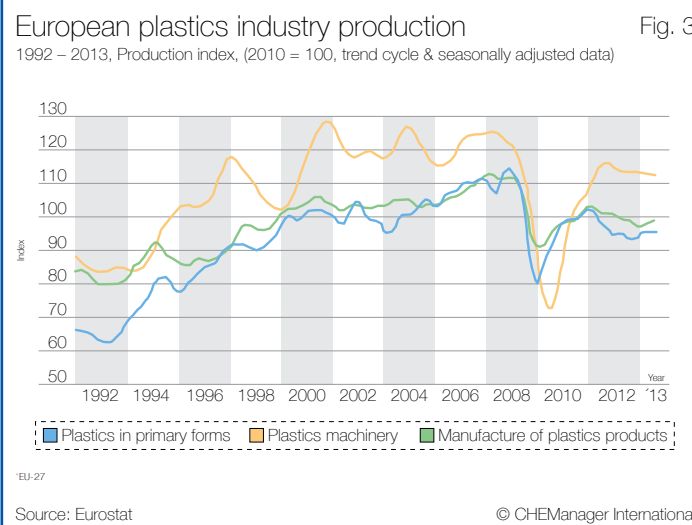
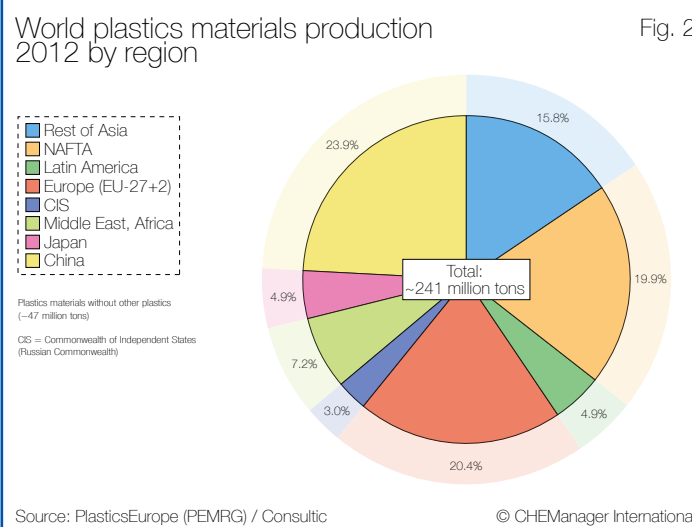
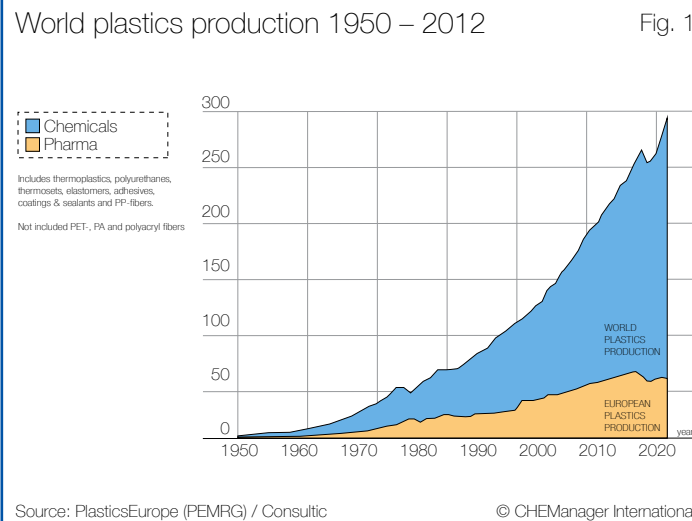
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Chemicals Industry Sales Excellence Study

Registration is now open for chemical industry executives to participate in an exclusive study titled "Sales excellence – Boost your sales power". In the chemical industry as in other sectors business success largely depends on the quality of sales. The vast majority of companies rightly regard their sales power as their key to success in international competition. CHEManager International and the strategy and marketing consultancy Simon-Kucher & Partners are conducting this exclusive study, which aims to create a benchmarking comparison between companies and to determine the importance of sales for companies in a constantly changing environment.

If you are a board member, managing director or sales manager in the chemicals industry, just visit the link below to take part in the study



Lord of the Board – Winter sports enthusiasts tend to be more environmentally aware—which is not surprising given the outdoor nature of their activities. Winter sports brand owners are keenly aware of this. They are looking for ways to make their products must-buys for each new season, with improved performance and better green credentials. Salomon debuts a new range of high-end bindings for snowboards that for the first time are made from DSM's EcoPaXX bio-based polyamide 410. The new series has improved sustainability and equal or better performance. EcoPaXX is 70% derived from renewable resources and it is certified 100% carbon neutral from cradle to gate.

Coming Up in the March issue of CHEManager International

- Green Chemistry Metrics in the Fine Chemical and Related Industries by Will Watson, Scientific Update
- Commoditization or the Aging of the Chemical Industry by Kai Pflug, Management Consultants — Chemicals
- Effective Planning Of Chemical Plants Through Optimized Engineering by Ingo Kaiser, Siemens
- Interview with Achim Riemann, managing Director, ICI by Brandi Schuster, CHEManager International
- An Economic Outlook and a Discussion of Challenges for the European Plastics Industry by Patrick Thomas, PlasticsEurope
- And much more!

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Index

Albemarle	1	Dow Chemical	7, 15	Plastics Europe 15,	16
Aesica	1	Drug, Chemical & Associated		PMC Group	7
AkzoNobel	7	Technologies Association (DCAT)	15	Results Healthcare	15
Allessa	1	DSM	15, 16	Reverdia	15
American Chemistry Council	4	DuPont	11	Roquette	15
Arkema	7	Evonik	10	SABIC	15
Association of German Engineers (VDI)	15	ExxonMobil	6	SAP	8
Avecia Pharmaceuticals	15	Frost & Sullivan	3, 4, 10	Salomon	16
BASF	4, 10	Helsinn Chemicals	14	SGL Group	15
Bayer HealthCare	5	Hoechst AG	15	Simon-Kucher & Partners	16
Bayer	15	ICI	15	SOCMA Society of	
Bio Evaluation BO AB	13	ICIG	5	Chemical Manufactures & Affiliates	1
Braskem	15	Indorama	10	Solvay	2
Bristol-Myers Squibb	15	Ineos	10	Stratley	9
Cambridge University	15	Inotec AMD.	15	Tata Chemicals	2
Carbogen Amcis	1	IQWiQ	5	Thomson Reuters Generics & API	
Carlyle	5	JBC Energy	12	Intelligence Business	5
Celanese	1, 15	Johnson & Johnson	5, 13	Umco Umwelt Consult	5
ChemawEyaat	10	KIK Custom Products	4	University of Groningen	15
Chemtura	4	KPMG	11	University of London	15
Chevron Phillips	15	LyondellBasell	10, 15	Wiley-VCH	15
Chinese Petroleum and		Managm. Consult. Chemicals	6	World Economic Forum	15
Chemical Industry Federation	15	Microsoft Deutschland	7	World Plastics Council	15
Clariant	5	Petrobas	11	WeylChem	3
CPA Chemical Pharm. Ass.	14				