

# CHEM Manager

## EUROPE



### Markets and Companies

The impact of the shale gas game on the chemical industry

Pages 6, 7

THE NEWSPAPER FOR THE  
CHEMICAL AND  
LIFE SCIENCE MARKETS

### Pharma

A look into the future of pharma and the effect of supergenerics

Page 14



### NEWSFLOW

#### Companies:

PVC producer **KemOne** has filed for bankruptcy in France. Some 1,300 French jobs are on the line. The privately owned Swiss company, which bought **Arkema's** vinyls assets in July 2012, employs 1,800 in the country. Its owner, the US-based **Klesch** family, is seeking €310 million in damages from Arkema for allegedly misrepresenting the business's finances, a charge the chemical producer categorically denies.

Continues on Page 9 ▶

#### Companies:

European players **BASF**, **Bayer**, **Lanxess**, **Solvay**, **Rhodia**, **DSM**, **LyondellBasell**, **Arkema**, **Clariant**, **Ineos**, as well as US firms **Dow**, **DuPont** and **Eastman** reported numbers and give statements on current market situation.

More on Page 1-8 ▶

#### M&A-News:

**A. Schulman** hires investment bank **Moelis & Co** as a financial advisor on the hostile takeover bid for specialty chemicals producer **Ferro**.

More on Page 2 ▶

#### Pharma:

**GlaxoSmithKline** CEO says new drugs can be cheaper in the future by passing on R&D efficiencies to its customers. The French drug market is still on the decline.

More on Page 12-13 ▶

#### Japan:

The Japanese economy expects a big boost to FY13 growth from new policy effects. The pharmaceutical industry is also on the move, realigning supply chains to compensate changes in the market.

More on Page 7-8 ▶

#### Collaborations:

**Atotech** and **Case Western Reserve University** have signed R&D agreements on research in metallization chemistry and material science characterization of electro-less metallization of advanced semiconductor applications.

More on Page 2 ▶

## Cautious EU Chemical Industry

For Many Players, 2012 Forecasts Were Too Optimistic



**Weal and Woe** – Despite pressure from the currency crisis, volatile markets and weak demand in some countries, the performance of the European chemical industry in 2012 was better than generally expected. In its trend report published at the end of February, the federation of chemical industry associations, Cefic, said EU-wide production contracted by 1.5% in last year's first 11 months, less than the 2% predicted in its December 2012 forecast.

Industry-wide trade data shows a trade surplus of €45.9 billion for the period, €9.4 billion higher than in 2011. Presenting another encouraging figure, Cefic said that late in the third quarter production began to rebound slightly from its earlier slump. With selling prices 2.7% higher, chemical sales made good strides in January to November 2012, and months of 2012 and were nearly 5% higher than the full-year record set in crisis year 2008. However, revenue was down 1% against 2011.

Across Europe, chemical producers' confidence about 2013

In Germany, the EU's largest chemicals economy, the industry association VCI struck a less dissonant chord. In its report on the 2012 fourth quarter and the outlook for 2013, the industry association VCI said that, after an "encouraging" finish to 2012, it now sees "light at the end of the tunnel."

VCI general manager Utz Tillmann said member companies, which include both chemical and pharmaceutical producers, "assume that upswing forces will prevail." Expectations are higher outside Europe, but "so far our industry is

confident about domestic business, too." Altogether, the association forecasts a 1.5% rise in output and a 2% increase in sales to around €190 billion this year.

#### European Multinationals Cautious about 2013

Reporting on 2012, most of Europe's multinational chemical pro-

ducers said that, amidst a volatile and contrast-rich macro-economy, positive currency effects cosmetically enhanced 2012 figures, which were also touched up by the consolidation of new acquisitions and internal efficiency measures.

Extreme caution was perhaps the common thread running through the companies' guidance for 2013. Several CEOs – some indirectly – acknowledged that they may not have been cautious enough in the outlook for 2012. With visibility for the next 9 to 12 months murky, many preferred to focus their forecasts on 2016 or even 2018.

At Germany's **BASF**, the world's largest chemical producer, booming business in oil & gas following the end of the Libya crisis as well as a thriving agriculture business padded the bottom line in 2012, CEO Kurt Bock said at the annual press conference in Ludwigshafen. The performance of chemicals and plastics businesses was weaker, reflecting slower growth in global economy.

BASF's group sales increased by 7% to EUR 78.7 billion. However, EBIT before special items grew by only 5% to €9 billion. Net income sank, due partly to higher taxes on oil and gas earnings balanced against a tax-free divestment in

2011. Bock said the group expects to top its 2012 results in 2013. However, after last year's somewhat disappointing development, he declined to be precise.

Bayer, Germany's second largest chemical producer, lifted its 2012 group sales by 5% to a record €39.8 billion, but EBIT declined by 4% to €4 billion, due to legal expenditure for US lawsuits surrounding an oral contraceptive. Group EBITDA before special items rose 8.8% to

higher sales for 2013, with operating income at last year's "very good" level.

Belgium's **Solvay**, now incorporating French chemical producer **Rhodia**, increased its recurring EBITDA (REBITDA) 2% in 2012 to just over €2 billion, on net sales up 2% to €12.4 billion. Despite the difficult trading conditions in its more cyclical businesses, cost efficiencies resulting from the integration of **Rhodia** allowed the group to meet

profitability goals and exceed cash generation expectations, said CEO Jean-Pierre Clamadiou. Toward its commitment to achieve its €3 billion REBITDA target in 2016, Clamadiou said **Solvay** will continue reshaping its portfolio, thereby optimizing its industrial footprint and enhancing the implementation of operational excellence initiatives.

In view of macroeconomic conditions last year, Dutch chemical producer **DSM** delivered a "solid operational performance," with growth across the portfolio except in the merchant caprolactam business," said CEO Feike Sijbesma. This was one of the reasons why sales were flat at €9.1 billion and EBITDA down 16% to €1.1 billion. For 2013, management expects slight improvement in EBITDA to around €1.4 billion. Sijbesma said **DSM** will focus on operational performance and integration of last year's acquisitions.

Based in Rotterdam, although its management operates largely from the US, **LyondellBasell** reported record EBITDA of \$5.9 billion for 2012, a rise of 5%, as sales revenue eroded by 6% to \$45.3 billion. CEO Jim Gallogly said business was driven by the olefins and polyolefins businesses in North America, while operations in Europe and Asia were beset by lower volumes and margins. The benefits of **LyondellBasell's** "focused back-to-basics strategy" were "clearly demonstrated", Gallogly said, with reliable manufacturing operations allowing the group to take advantage of favourable market conditions. With business off to a good start in 2013, the CEO said the fundamentals in place during 2012 will continue, suggesting that this will be "another strong year."



The booming business in oil & gas and agriculture padded the bottom line in 2012.

Kurt Bock, CEO BASF

EUR 8.3 billion, in line with the 8% rise in HealthCare earnings. Crop-Science profited from a portfolio realignment and a favourable market environment, while earnings of **MaterialScience** rose, thanks to a strong polyurethanes economy and efficiency measures.

For 2013, the **Leverkusen** group expects EBITDA before special items to improve by a "mid-single-digit percentage and core earnings per share by high single-digit percentage figure." "Our optimism lies mainly in our life science businesses," said CEO Marijn Dekkers, stressing at the same time that **Bayer** benefits from dividing its assets between three distinct markets.

#### Lanxess Predicts Lower Earnings in 2013

In its preliminary report on 2012, **Lanxess** – split from **Bayer** in 2004 – said it achieved EBITDA pre-exceptionals of €1.2 million, a rise of



Our optimism lies mainly in our life science businesses.

Marijn Dekkers, CEO Bayer



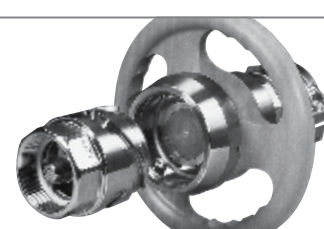
After an encouraging finish to 2012, we now see light at the end of the tunnel.

Utz Tillmann, general manager VCI

now appears to be waning. Cefic's EU chemical industry confidence indicator (CCI) was lower in January 2013 than in December 2012. Based on data from the European Commission's business and consumer survey published in January, the organization said underlying data point to worsening in assessment of order book levels from European customers.

confident about domestic business, too." Altogether, the association forecasts a 1.5% rise in output and a 2% increase in sales to around €190 billion this year.

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Continues Page 3 ▶



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## CONTENT



## Front Page

**Cautious EU Chemical Industry** 1  
For Many Players, 2012 Forecasts Were Too Optimistic  
*Dede Williams, freelance journalist*

## Markets &amp; Companies 2-8

**U.S. Chemicals Pressured by Volatility** 2

**EU Chemicals Sector Output Down 1.5% for 2012** 3  
Full-year Numbers Slightly Better than Cefic Forecast  
Due to Stronger-than-expected Q4  
*Dr Moncef Hadhri, Chief Economist, Cefic*

**Chains Of Change** 4  
Effective Supply Chain Management Crafts Challenges into Commercial Strategy  
*Interviews with Peter Devos, Monsanto, and Sukumar Narasimhan, Reliance Industries*

**Business Agility Is Paramount** 5  
Chemical Companies must Ensure their Value Chains are Agile in Volatile Times  
*Dr. Sven Mandewirth, partner and head of industry segment chemicals & petrochemicals, Camelot Management Consultants; Dr. Jörg Schmid, Principal, Camelot Management Consultants*

**The Shale Gas Game** 6, 7  
Part 1: Shale Gas Resources and Development Trends in Major Economies  
*Dr. Sven Bugarski, Stratley*

**The Japanese Expects a Big Boost to FY13 Growth from Policy Effects** 7

**Safe and Secure** 8  
Realignment of the Pharmaceutical Supply Chain in Japan  
*Geetika Munjal, Analyst, GBI Research*

## Production 9-11

**The Lean Revolution** 9  
Why the Capital Plant Industry is About to Undergo its Own Lean Manufacturing Transformation  
*Simon Bennett, Senior Product Business Manager, Aveva*

**Managing A Moving Target** 10  
An International Study Analyzes Organizational Structures of Chemical Companies in the Area of Operations  
*Dr. Andreas Gabriel, Head of Operations China, Merck Chemicals (Shanghai); and Daniel Peter Frick, Student "Technology and Management", Technical University Munich*

**Drying, Heating or Cooling** 11  
Versatile drying units can do it all – and even more

## Pharmaceuticals 12-14

**Insight into the Cosmeceutical Market** 12

**Big R&D Investment Trend as Mid-Cap Biotech Push to Get Drugs to Market** 12

**Less Pain, More Gain** 13  
Developments of Drug Delivery Devices are Increasingly Focused on Patients' Needs  
*Dr. Jérôme Freissmuth, Bosch Packaging Technology*

**The Future of Pharma** 14  
The Deconstruction of the Pharma Value Chain May Not Be a One-Size-Fits-All Recipe for Big Pharma  
*Andrew Badrot, CEO, CMS Pharma*

## People • Events • Publications 15

**At A Glance** 16

**Index** 16

**Imprint** 16

## U.S. Chemicals Pressured by Volatility

Despite challenging conditions that pressured companies' earnings in 2012, the U.S. chemicals economy is continuing to improve, says the American Chemistry Council (ACC). The Chemical Activity Barometer (CAB), a monthly index developed by the organization rose in January for the seventh consecutive month, showing a "slowly expanding U.S. economy," it said.

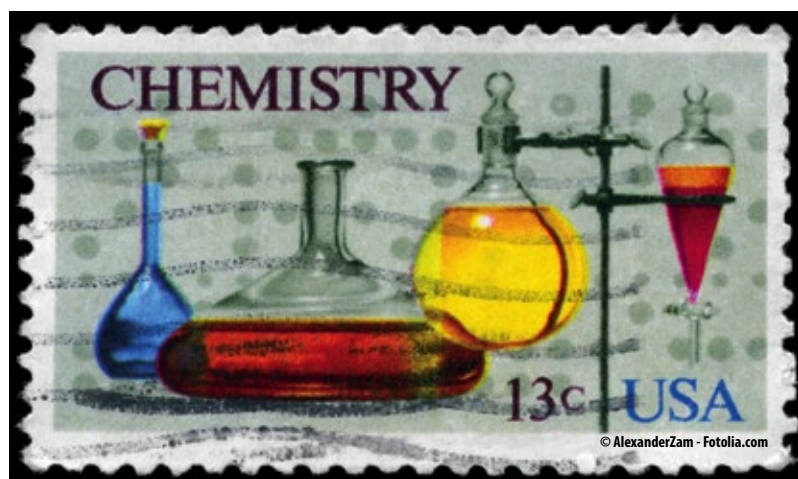
"The increase in chemical activity continues to be a good sign for the overall health of the economy," said Kevin Swift, the ACC's chief economist. However, he stressed that "uncertainty is still present," in particular because of the U.S. budget crisis. Bright spots, Swift said, continue to be building coatings, pigments and plastic resins.

One of the most encouraging recent developments for U.S. chemical companies is the competitive advantage provided by shale gas, Cal Dooley, CEO of ACC, said at a meeting in New York earlier this year.

"Because we will have a technological and infrastructure-based advantage for at least a decade, it is important for the U.S. to capitalize on this once-in-a-lifetime opportunity quickly," he urged. Figures show that about 85% of U.S. chemical production is now based on natural gas feedstocks such as ethane and propane, Dooley noted. Already, seven new world-scale crackers, amounting to 38% of existing ethylene capacity already have been announced.

## Dow Fights Sluggish Growth with Investment

Dow Chemical, the U.S. industry's largest multinational player, is staking its plastics and petrochemical



business's future on shale-gas derived feedstocks. The group recently announced a series of related ethylene and downstream investments in new gas-fed capacity.\*

For the present, Dow is having to contend with a number of challenges reflecting a weak global economy. In 2012, adjusted EBITDA fell 11% to \$7.5 billion and adjusted sales by 3% to \$56.8 billion, as the group saw "significant deterioration" in its markets, especially in China, in the year's second half.

In the year as a whole, CEO Andrew Liveris said revenue decreased in all operating segments except agriculture – where sales rose 13% – and in all geographies, led by Western Europe. Volumes in North America were flat, due mainly to plant shutdowns, but higher in Asia Pacific and Europe.

Negative factors affecting 2012 business included a decline in selling prices – down 4% on an adjusted basis and due mostly to currency depreciation – along with lower profits on equity participations. To address

the challenges of a volatile but slow-growth economy, Liveris said management has taken action to reduce structural costs, prioritize growth investments and close unprofitable production facilities.

For 2013, Dow is "squarely focused on driving earnings growth." Without macroeconomic tailwinds, Liveris said the group will exploit its feedstock advantage, continue to commercialize its technology pipeline and integrate its investments on the U.S. Gulf Coast and Saudi Arabia.

DuPont also faced "significant challenges" in 2012, CEO Ellen Kullman said in presenting results for the fourth quarter and the full year. Like Michigan-based Dow, the U.S. multinational headquartered in Wilmington, Delaware, has adjusted its plans "to meet the challenging market environment and slow-growth world economy."

Figures for full-year 2012 show group pretax operating income down 1% to \$5.7 billion with sales up 3% to \$34.8 billion, thanks to 4% higher local prices. The Industrial Bi-

osciences and Nutrition and Health segments saw the strongest growth, while business in Electronics & Communications deteriorated sharply.

Even with economic headwinds battering the group's fundaments, "DuPont stands stronger today than it did a year ago" said Kullman, thanks to innovation, improvements in productivity and integration cost synergies, in addition to the launch of new products.

In 2013, DuPont expects operating income to improve by 2-7% against 2012, despite an expected "modest" setback in the first half. Full year sales of around \$36 billion are targeted.

## Eastman Pads Sales with Solutia Takeover

At Eastman in Kingsport, Tennessee, 2012 operating profit declined by nearly 15% to \$800 million, as sales strengthened by the consolidation of newly acquired Solutia climbed by 13% to \$8.1 billion. Income adjusted for market-to-market losses, impairments and restructuring charges and gains, as well as costs related to the Solutia acquisition, the U.S. group reported operating income was \$1.3 billion.

CEO Jim Rogers forecast higher operating profit in 2013 across all of Eastman's core businesses, including additives and functional products, adhesives and plasticizers, advanced materials, fibres, specialty fluids and intermediates. The group, which reorganized its divisional structure to incorporate assets taken over with Solutia, said earlier it is on track to achieve more than \$100 million of cost synergies from the brands merger.

## A. Schulman Hires Investment Bank to Advise on Hostile Ferro Bid

US plastics resins and compounds manufacturer A. Schulman has hired investment bank Moelis & Co as a financial adviser on the Akron, Ohio-based company's hostile takeover bid for specialty chemicals producer Ferro. On March 4, Schulman made a proposal to Ferro's board to acquire all of the outstanding shares of common stock of the company based in Mayfield Heights, Ohio, for \$6.50 each, to be paid half in cash and half in Schulman's common stock.

The takeover bid was "hastily dismissed" by Ferro's board without further discussion or the opportunity for due diligence, Schulman said, despite the fact that it had expressed its willingness to adjust its offer if warranted by the due dili-

gence process. In a statement, Ferro's board said the offer, a premium of 32% above the volume-weighted trading price over the previous 60 days and valuing the company at \$855 million was not in the best interest of its shareholders.

In announcing the bid, Schulman CEO Joseph Gingo said Ferro's business units align with Schulman's core competencies except pharmaceuticals, "which is not strategic to us." He added that "we see substantial synergies and both geographical and market growth opportunities resulting from this compelling combination."

Meanwhile, Ferro has reported a full year 2012 net loss of \$374 million, compared with a profit of \$4 million in 2011.

## Atotech and Case Western Reserve University Sign R&amp;D Agreement

R&D agreements have been signed by Atotech, Berlin, Germany and Case Western Reserve University, Cleveland, OH, USA. Atotech and CWRU will jointly enter the metallization chemistry research and material science characterization for electro-less metallization of advanced semiconductor applications. Both agreements address the continuation of copper chemistry development for Damascene structures to 22 nm node size but also address the potential electrical limitations associated with the smaller geometries and electrolytic deposition technologies.

The established agreements with CWRU's departments of Chemical Engineering and of Material Science and Engineering will further strengthen Atotech's chemistry and analytical capabilities on the nanoscale engineering side and is also an extension of the semiconductor chemistry R&D activities performed at the College of Nanoscale Science and Engineering in Albany, NY, USA since 2007. This new collaboration is an extension of the successful R&D collaborations between the Electrochemical Research group of Professor Dr. Uziel Landau at CWRU and Atotech.



# EU Chemicals Sector Output Down 1.5% for 2012

Full-year Numbers Slightly Better than Cefic Forecast Due to Stronger-than-expected Q4

**On the Rebound** – EU chemicals production contracted by 1.5% in 2012 compared with 2011, according to the latest Cefic Chemicals Trends Report. The full-year figure was slightly better than the 2.0% decline Cefic had predicted in its December 2012 forecast, due to above-zero output growth in the fourth quarter. Monthly data for December 2012 show a 1.2% increase compared with the same month in 2011. EU chemicals production levels remain, however, 6.2% below the 2007 peak.

Trade data available through November 2012 show a €45.9 billion EU chemicals net trade surplus, €9.4 billion beyond the level seen during the same period the year prior. EU chemicals prices in December climbed by 3.0% compared with the same period the year prior. The full-year overall price level for chemicals rose by 2.7% compared with 2011. Overall chemicals industry confidence indicators deteriorated slightly in January, mainly due to lower order-book assessments.

#### December Output Up

The EU chemicals production index for December was up 1.2% compared with December the year prior [see Figure 1]. It marked the third consecutive month of above-zero index readings. Petrochemicals jumped 3.4% year-on-year in December. Consumer chemicals and polymers output rose by 2.6 and 2.4% respectively in December compared with the year prior. Basic inorganics production fell in December by 2% year on year. Specialty chemicals output was down

slightly, shrinking 0.2% during the month as compared with the previous year.

**2012 Prices Climb by 2.7%,  
December Monthly Prices Up 3.0%**

Prices for EU chemicals were 2.7% higher during 2012 compared with the previous year. Prices for petrochemicals and consumer chemicals rose on a year-on-year basis in 2012 by 1.4 and 1.3% respectively. Basic inorganics registered in 2012 the highest price increase compared to 2011, up 3.2%. Year-on-year EU chemicals prices rose in December by 3.0% compared to the same month the year prior.

#### EU Trade Surplus Expands Further in November

Trade data available through November show a €45.9 billion year-to-date EU chemicals net trade surplus with other markets, up €9.4 billion compared with same 11-month period the year prior. The EU net trade surplus with the NAFTA region contributed significantly to the jump in the January-to-November overall surplus, reaching €10.7 billion, 27% higher than in January-November 2011. The EU net trade surplus with non-EU Europe, which includes Russia and Turkey, reached €14.4 billion during the 11-month period, up €2.9 billion compared with the same period the previous year. A slight downturn occurred in the trade surplus with Asia, excluding Japan and China, edging up by €0.4 billion to €4.6 billion.

#### January-to-November EU Sales Surpass 2008 Pre-crisis Period

EU chemicals sales during the first eleven months of 2012 were 4.7% higher than the pre-crisis, full-year

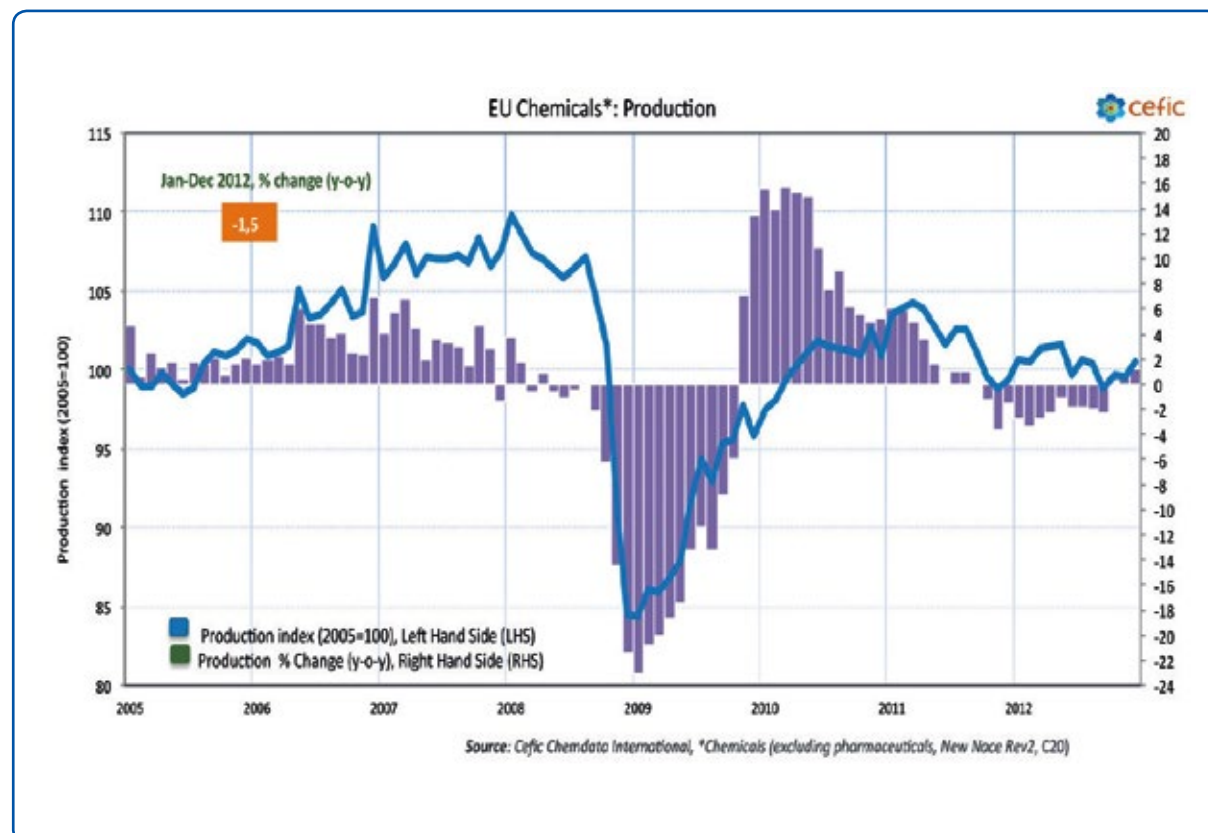
peak level reached in 2008. November sales were 2.7% higher compared with November the year prior. Sales for the first-eleven months of 2012 were 1.0% below the comparable period in 2011.

#### EU Chemicals Confidence Indicator Weakens in January

The EU chemical industry confidence indicator (CCI) remained low in January. The CCI, generated by Cefic, showed a slight decline compared with the month prior. Based on data from the European Commission business and consumer survey report published in January, CCI underlying data point to worsening in assessment of order-book levels relating to the EU sector.

► [www.cefic.be](http://www.cefic.be)

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## Cautious EU Chemical Industry

Continued Page 1

#### Arkema Touts Strong Performance Despite Dip

France's Arkema's turned in what it called a "strong financial performance" in 2012, despite the nearly 4% decrease in EBITDA to €996 million and the 8.4% decline in sales to



*The weaker performance reflects the less favourable and more volatile economic environment.*

Thierry Le Hénaff, CEO Arkema

€6.4 billion. Speaking in Paris, CEO Thierry Le Hénaff said the weaker performance, which was "in line with guidance," reflected the less favourable and more volatile economic environment compared with 2011. Although the EBITDA margin eroded from 17.5% to 15.6%, it was "among the highest in the industry," he asserted.

2013, with emerging markets providing most of the growth.

In an unaudited statement, privately owned Ineos, the former British group now based in Switzerland, blamed the 11.5% decline in 2012 EBITDA in part on the weaker performance of its Olefins & Polyolefins (O&P) business in Europe, as the leak-related closure of the Elgin gas



*Cost efficiencies resulting from the integration of Rhodia allowed the group to meet profitability.*

Jean-Pierre Clamadieu, CEO Solvay

Le Henaff said Arkema is "confident" that it can repeat its 2012 performance in 2013, although it is "cautious about the macro-economic environment." Toward its goal of becoming a world leader in specialty chemicals and advanced materials by 2016, the French producer will focus its efforts on organic growth, investing mainly in new capacity.

In Basel, Harriolf Kottmann, CEO of Swiss specialty chemicals player Clariant, reported EBITDA of Sfr. 802 million for 2012, a decline of 4% on sales 8% higher at Sfr.

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# Chains Of Change

## Effective Supply Chain Management Crafts Challenges into Commercial Strategy

**Bright Spots in Tough Times** – Delivering a commercially driven supply chain is the biggest challenge that chemical manufacturers face in 2013, according to industry research. Macroeconomic factors, such as a volatile economic environment and increasing pressure on European margins due to the rise of shale gas in North America and large outputs from emerging markets, force supply chain managers to standardize processes and to deliver improved supply chain best practices and modeling systems. Mark Nikolich, CEO Europe for Braskem, said these challenges can become opportunities for growth. In his opinion, the chemical market can take advantage of volatility by investing in people and specific projects, achieving improved synergies in multiple regions, and by understanding the risks and capitalizing on the opportunities in current global production and demand trends. Nikolich will speak at Logichem Europe about the importance of using the supply chain to drive commercial strategy. Fellow speakers Peter Devos and Sukumar Narasimhan also will address effective supply chain management at Logichem, the world's largest gathering for the chemical supply chain community. On behalf of CHEManager Europe, Dan Mellins-Cohen (Editor, LogiChem), spoke to Peter Devos, supply chain competence director at Monsanto, and Sukumar Narasimhan, senior vice president, supply chain, Reliance Industries, about supply chain strategies.

**CHEManager Europe: What have been your biggest changes and/or successes of 2012?**

**P. Devos (Monsanto):** Our company and businesses have been growing over 2012, and we faced the challenge in the supply chain to cope with this growth — not only from a volume but also from a people, process and systems point of view.

Besides, we are starting to work in a more global supply chain environment where we start aligning the SC business processes and systems globally. Third, we are bringing the supply chain closer to the customer, increasing customer focus and customer-commercial integration.

**S. Narasimhan (Reliance Industries):** There is an increasing awareness in organizations about the impact effective/efficient supply chains can have on the operating results. Hence, the route to survival — if not competitiveness — has been for firms to continuously search for improvement opportunities in supply chains. 2012 and onward should be the best times in the career of SCM professionals.

**What are your biggest challenges for 2013, and how are you planning to tackle them?**

**P. Devos (Monsanto):** Cope with fluctuation in sales demand. This is be-

ing tackled by investing in demand planning processes, tools and organization. As we have been faced with continuous business growth, our supply chain focus is on new people development and training. With this development of new people, you build new future talent.

Realignment of the S&OP/IBP processes also remains a continuous attention point.

**S. Narasimhan (Reliance):** The biggest challenge in 2013 would be to sustain the steam on supply chain initiatives that have all too suddenly sprung up in companies all the world over.

**What approach do you take to balancing the need for increased flexibility and agility against that of over-complexity?**

**P. Devos (Monsanto):** As indicated above the more you grow and the more a company integrates the processes globally, the higher the end-to-end complexity becomes. Luckily, we can offset part of that complexity through process simplification and standardization. Another part of the complexity can be offset with new, higher performing IT systems, allowing continuous cross-functional alignment while focusing on complexity reduction, cost and service.

**S. Narasimhan (Reliance):** We ceaselessly work toward simplifying processes in supply chains, not only within our own organizations, but across our suppliers and customers as well. This way, we are able to achieve a quantum improvement in efficiencies and tackle sustainability issues along the complete spec-

trum of firms engaged in a vertical product chain. I guess this should be the way forward across all companies in the next few years, if we are serious about sustenance in the long run. Industry associations will need to come together to create "cluster communities" so end-to-end solutions can be put in place that enhance standards across the board. Simplified processes will automatically make organizations agile.

**Some critics argue that the financial crisis has been good for supply chain and logistics functions, raising its importance in the wider business structure. Do you agree, and do you think it will last once we are "beyond the crisis"?**

**P. Devos (Monsanto):** I would say that every crisis situation — on the financial downside or on the business upside-growth — forces a company to rethink its processes and organization. So, yes, a crisis can help and forces to refocus. I'm afraid we need to learn to cope with that on a more continuous basis, not just waiting for the next crisis.

**S. Narasimhan (Reliance):** I completely agree. Global meltdown has meant a "heating up" of the supply chain function as the provider for these elusive "cash liberation" strategies in business. It will be completely up to us SCM professionals to perform and remain in the center of all businesses.

**What have been the most effective strategies you have employed to improve your team's alignment with the rest of the business?**



**P. Devos (Monsanto):** Putting the problems on the table as they appear, making them discussable cross-functionally, and ensuring you are using the same vocabulary/lexicon across commercial, finance and supply chain. Allow people to discuss burning topics in an open way while being bold but also respecting each other's opinions. Try to work together; consider a problem as a joint opportunity.

**S. Narasimhan (Reliance):** Constant prod-

ing of the benefits accruing from end-to-end assessment of processes both one step back — suppliers — and one step forward — customers — in addition to our own processes has been achieved after quite some time and with great reluctance

Logichem 2013 will take place 16-18 April, 2013 at Ramada Plaza, Antwerp, Belgium. Find out more at [www.logichemeurope.com](http://www.logichemeurope.com)

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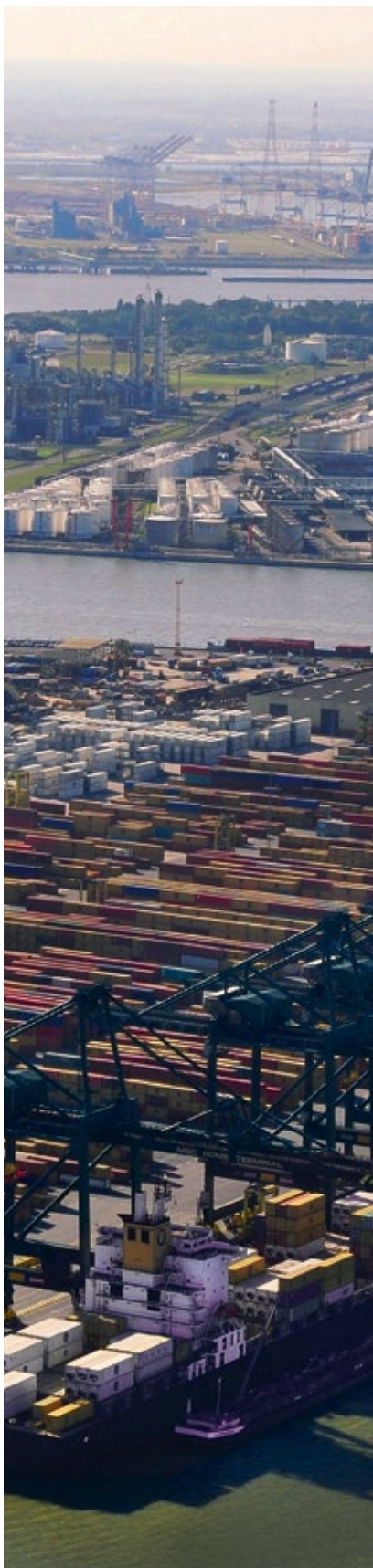
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## German Chemical Contractors Confident after Orders Rise 30% in 2012

Germany's large plant contractors saw order intake slide by 18% in 2012 against 2011, due in major part to a slump in business at home. The country's chemical process plant builders, however, stood out positively. Under the more challenging conditions facing the market since the 2008/2009 financial crisis, chemical contractors were "very satisfied" with the 30% increase in contract value, said the contractors' committee, AGAB, in the German machinery manufacturers' association VDMA.

The upswing was due equally to business at home and abroad, whereby AGAB said its members benefited from orders for new large plants built by German chemical companies. For the first time since 2006, the value of domestic business exceeded €0.5 billion. However, this was still considerably below 2006 and 2007, when order intake was worth more than €5 billion.

German contractors have not been able to participate significantly in the chemical plant building boom in the Middle East, often losing out to Asian competitors in all but licensing and technology segments. While the turbulence associated with the so-called Arab spring depressed contract activity in that region last year, AGAB said the outlook there for the medium term is good.

Russia and Eastern Europe are "interesting markets" for chemical plant builders, the committee said, in particular for those with a focus on energy. Contracts from the region increased nearly 10% last year, and German contractors are building up local networks to be prepared when the boom gets under way. The situation in India, where German companies are well established, is said to be similar. AGAB also sees good medium-term chances in China and Brazil.

As the organization noted, the shale gas boom in the US is revitalizing new plant construction there. German engineering firms with considerable process knowhow are already involved in several such projects, including the construction of ammonia and methanol plants, LNG export terminals and they are keen to grab a bigger slice of the pie.

Looking at trends, AGAB said, that despite the advance of Asian competitors, German and European process plant contractors have good chances to win worldwide projects, due to their technological competence and their experience in building efficient and environmentally friendly facilities. After the setbacks of the years 2007 to 2009, the upward trend seen last year is seen as continuing in 2013. The greatest potential is in the BRIC countries, the grouping said.

## Emirates SkyCargo Strengthens Cool Chain Service

Emirates SkyCargo has strengthened its cool chain premium service with the appointment of CSafe, a global provider of cool chain solutions as an additional cool chain solutions provider. The airline's cool chain premium service specializes in the transport of temperature-sensitive products, including pharmaceuticals. The contract will provide units for SkyCargo's important Dublin to Australia route, which operates through Dubai. Upon completion of a successful test period, SkyCargo will analyze additional lanes for opportunities to further expand the agreement.

SkyCargo offers three Cool Chain solutions, namely Cool Chain Basic, Cool Chain Advanced and Cool Chain Premium, each of which is designed to meet the requirements and spe-

cific needs of customers for the shipment of temperature sensitive products from fruit and vegetables to healthcare products and pharmaceuticals. In 2011 to 2012 financial

year, SkyCargo carried more than 3700 tonnes of temperature-sensitive pharmaceutical and healthcare products through its Cool Chain Premium Service.





# Business Agility Is Paramount

Chemical Companies Must Ensure Their Value Chains Are Agile in Volatile Times

**Management Strategy** – 2012 was a challenging year. But despite the signs of a new economic downturn in several customer industries, the Euro crisis and the increased market volatility, the chemical industry accomplished a rather good business year. Many of the chemical companies were able to increase their revenues. What is the outlook for 2013? The worldwide development for the chemical industry is quite unclear because of the uncertain economic development in major regions and new emerging markets. Leaving stronger signals for an overall downturn behind, recently there is growing indication for economic recovery in China and the US. The European development is still hard to be estimated due to diverse relevance and impact of the debt crisis. In a nutshell: chemical companies worldwide will have to prepare for another volatile year. One of the keys to this challenge is business agility.

there are abundant reasons to question oneself about the adequacy of the current business set-up in order to deal with the above challenges in an efficient way.

## How to Assess Business Agility

An evaluation of the agility of the company respective to its business environment should identify the strengths and weaknesses of the current setup and capabilities. A structured approach indicates separate areas of potential improvements. Additionally, a so-called stress test can help to assess how well the company can adapt to various adverse scenarios in its business environment.

## Methodology of Agility Assessment

The current business complexity and volatility are identified and mapped. On the basis of this base scenario a first evaluation of the adequacy of the business agility is performed.

The evaluation of internal and external complexities is necessary in order to come to realistic objectives about business agility. It will also give an indication how agility could be increased by reducing complexity. Business agility objectives must be different e.g. for a business that operates interconnected plants in various countries and manages thousands of SKU's and customers interactions from a business with few locations and a less complex product offer. There are different dimensions to be looked at during the assessment, like organizational



the agility of the company and create the link to business continuity management.

## Stimulating a Dynamic Company Culture

Business agility is paramount to excel in today's fast changing, sometimes unstable, global economy. In its broadest sense, it relates to a company's overall capabilities to adapt quickly to all kinds of external changes. In this article the focus has been placed on supply chain agility.

The many internal, as well as external factors determining business success through agility can be assessed in a structured way. To find the right balance between cost effectiveness and flexibility, it is important to be fact driven. The right balance needs to reflect an actively chosen risk profile that the company wants to adopt. However, there is not always a strong negative correlation between flexibility and cost within a chosen risk profile. Being aware of certain risks and managing them actively does not necessarily carry extra costs. A proactive approach to achieve the right business agility prevents extra costs and increases customer satisfaction. It also stimulates a dynamic company culture that is based on alertness and constant change and which forms a good basis for outperforming competition and long term success.

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## Why is Business Agility so Crucial?

The term business agility is coined to express the ability of a company to adapt rapidly and cost efficiently to changes in its business environment. In today's business environment of increased volatility in all kind of factors, a dynamic adaptation is of vital importance to the success of enterprises. The business environment in recent years has been characterized by unpredictable business cycles, caused mainly by the ongoing financial crisis. From the demand side as well as from the cost side, fluctuations have been larger than

in the past and also more erratic. Other drivers of volatility are rapid geographic demand shifts caused by demographic developments. Another factor complicating the situation for companies in the chemical industry has been increased globalization with the continuing build-up of highly complex global supply chains. Additionally, political instability in regions deemed as future growth markets for exports or production bases, has heightened the sense of political risk factors. Last but not least, the regular occurrence of natural disasters has shown how vulnerable end market demand or supply chains can be. So

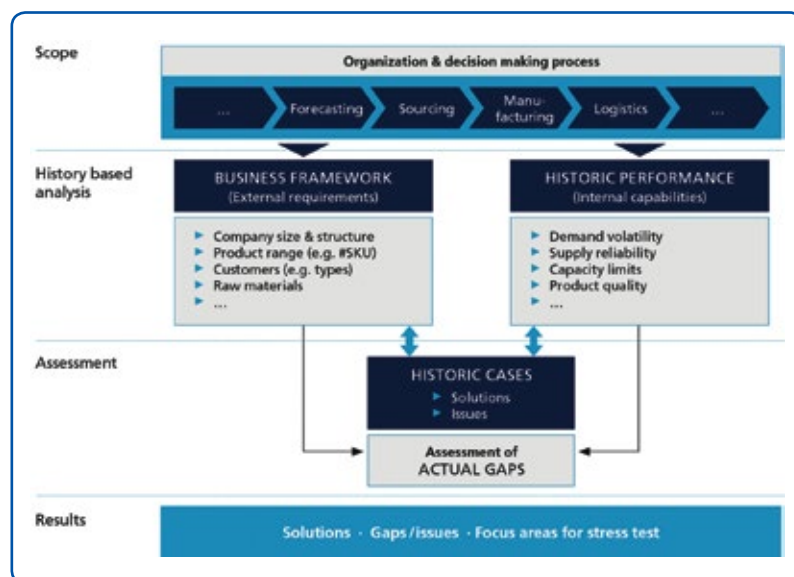


Fig. 1: Methodology of Agility Assessment

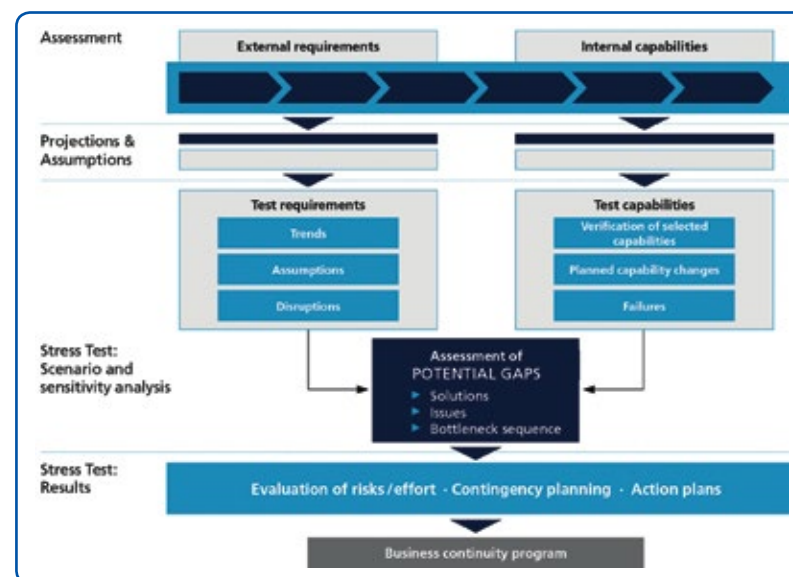


Fig. 2: Agility Stress Test

the business response will be assessed. The scenarios will consider assumptions about future developments as well as potential supply or manufacturing disruptions. The adverse scenarios of the stress test can include e.g.:

- Sharp, temporary drops or increases in demand
- A longer period of increased demand volatility
- A temporary non-delivery by the main one or two raw material suppliers (e.g. by force majeure)
- A temporary shut-down of one, or more, production lines (e.g. by force majeure)
- Strong price increases of the two main, raw materials
- Possible scenarios resulting from regulatory changes in the industry

## Agility Stress Test

Based on the results from looking at historic data, in a second step adverse scenarios need to be simulated and the effectiveness of

Some of the above scenarios can be simulated based on the data from the overall assessment, while others need some additional data (e.g. on suppliers' supply chains etc.). These scenarios can also be put to a reality test if doubts about the technical production, or logistical capacities, exist. For a real life simulation, the production of certain critical production lines can be put to the limit to assess real capacities and related variable costs and product quality. Supply chain planning can carry out a mid-term planning exercise on the basis of an assumed plant failure. The evaluation of the estimated business response can then form the input for the development of a focused action plan to increase

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# The Shale Gas Game

## Part 1: Shale Gas Resources and Development Trends in Major Economies

**Resources and Feedstock** – Headlines frequently state that shale gas is a “game changer”. A game usually implies that there are winners and losers among its participants. However, the shale gas game is not limited to its active players such as upstream and midstream companies, but also affects downstream players in a world with an increasingly competitive and volatile raw materials landscape. Understanding global shale gas developments and anticipating downstream threats and opportunities is not just an interesting academic exercise, rather, it is a necessity for numerous strategic investments and raw material sourcing issues. Hence, the question for a large number of global chemical companies is not whether they want to join the game, but more how to play it as involved participants.

Before considering implications for downstream players, it is important to critically review the potential of shale gas both in terms of resources and production. Part 1 of this article focuses on assessing the sustainability of shale gas supply and provides an outlook on the developments in the two major economies of China and Europe. Part 2 (in CHEManager Europe’s May issue) will focus on the implications of shale gas for downstream players.

### Is Shale Gas a Long-Term Resource?

As indicated by the Energy Information Administration (EIA) and various other sources, shale gas is available on all inhabited continents in large amounts and much more widely distributed than conventional oil and gas resources. This makes it a truly global resource with current estimates of around 140 billion tons (7,000 EJ) of discovered technically recoverable shale gas. Available ex-



ploration data is currently limited – especially outside the US – thus, this figure is likely to increase in the coming years. Fig. 1 shows the figures currently circulating in the gas business for technically recoverable resources in three major economic regions in various units.

While these large numbers seem to be impressive, they are difficult to interpret in terms of impact. By comparing them with conventional resources and consumption rates, they can be put into better perspective.

A quick look at shale gas and appropriate conventional resources reveals that the energy content of shale gas is comparatively small. The same applies to the reserves that are defined as resources that

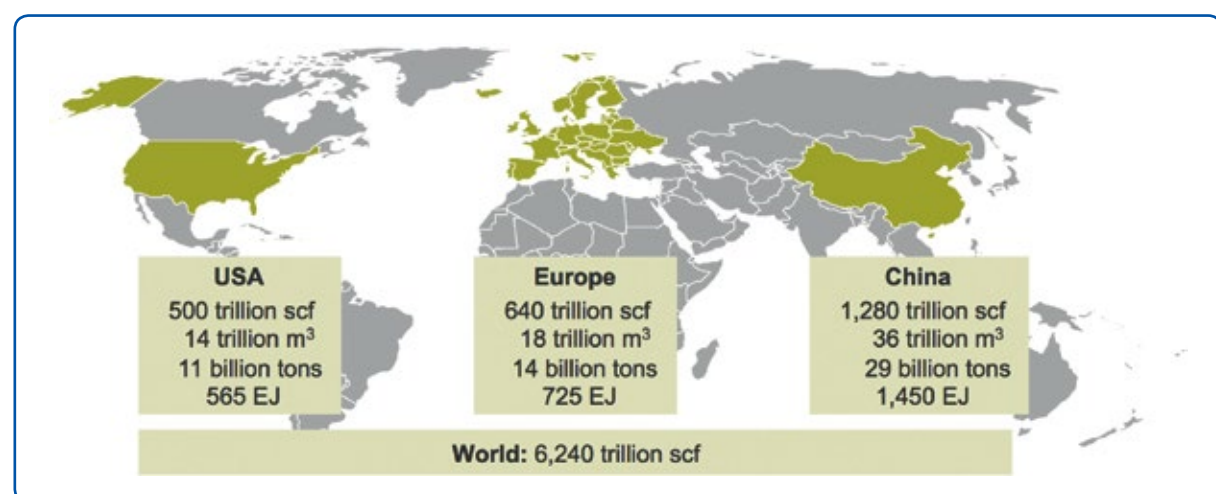


Fig. 1: Global discovered technically recoverable shale gas resources.

Source: EIA; Stratley analysis. Note: Europe excludes Russia; mass estimation in tons by using average shale gas mass density of  $\approx 0.8\text{kg/m}^3$ ; average energy value of shale gas:  $1\text{ scf} \approx 1.13\text{ million J}$ . As wet shale gas is assumed for average value calculations, mass and energy values can be seen as upper limits.

are economically recoverable. Even if technological progress or increasing gas prices result in significantly higher reserves, shale gas is not the globally dominant raw material in terms of deposits.

This is even more understandable if one considers that there are various other energy and feedstock sources in addition to those mentioned in Fig. 2, e.g. nuclear energy, shale oil, coal bed methane, etc. Nevertheless, in areas rich of shale gas, it can become a major source of energy and feedstock, as can be seen in the Marcellus area in the US, for example.

### More Than a Temporary Hype in the US

An analysis of shale gas consumption requires a more differentiated view of shale gas. Shale gas is generally a mix of alkanes: methane and natural gas liquids, with its main components being ethane, propane, butanes and natural gasoline. Fig. 3 shows how long the two dominant constituents of shale gas in terms of volume – methane and ethane – can meet future US demand. To calculate the range figure in years for methane, estimated US shale gas production rates are used. For the range figure in years for ethane, US ethane cracker capacity for ethane from shale is used. In the calculations it is assumed that half of the total US cracker capacity as of 2017 for ethane can be covered by conventional gas or from sources other than shale and the other half is covered by ethane from shale.

Reserves are likely to significantly increase in the next years, thus today’s resources are used for the estimations and the resulting time values are clearly upper thresholds. The actual time values are somewhat lower, but still might be a few decades. Based on today’s available data, our rough analysis above leads us to the following answer to the question above: Shale gas in the US is definitely more than a subject of temporary hype. It has

the potential to meet gas demand for the next decades. However, it will only be one energy and feedstock supplier among other sources and cannot be seen as the long-term solution to meet society’s current high energy and feedstock demands.

Will there also be a shale gas boom in China and Europe? Considering the large estimated shale gas resources in China (29 billion tons) and in Europe (14 billion tons) and stagnating conventional gas production rates, this question appears to be reasonable. The conditions and drivers in China and Europe are different, hence the two regions have to be evaluated separately with respect to their shale gas development potential.

### Can China Meet or Beat the 2020 Target?

The Chinese government has recognized its huge shale gas deposits as a valuable resource. By offering subsidies and by defining a clear production target for 2020 (12–24 million tons/year), the government is highly supportive and clearly aims to increase its raw material autarky. Environmental issues are rather treated as challenges to be

addressed than as threatening obstacles. Is a game-changing shale gas boom thus expected to occur in China as it has done in the US?

One obstacle frequently stated in the shale gas community is the oligopolistic market. 80% or more of the known shale gas resources are under the control of China’s two largest oil and gas players, Sinopec and PetroChina. Under current conditions, small and medium-sized Chinese enterprises, as well as international upstream companies, can hardly acquire access to the resources. While this market is certainly different to the market in the US, we would not draw the conclusion that the market conditions in China are either more or less favorable than in the US.

Instead, we focus on shale gas extraction costs and technology. There are strong indications that Chinese shale gas is, on average, located in shale plays 3–4 km below the surface, in often hilly and/or remote locations in the Sichuan and Tarim basins. Up to half of the total Chinese shale gas resources are in the arid and remote Tarim basin, where the ex-

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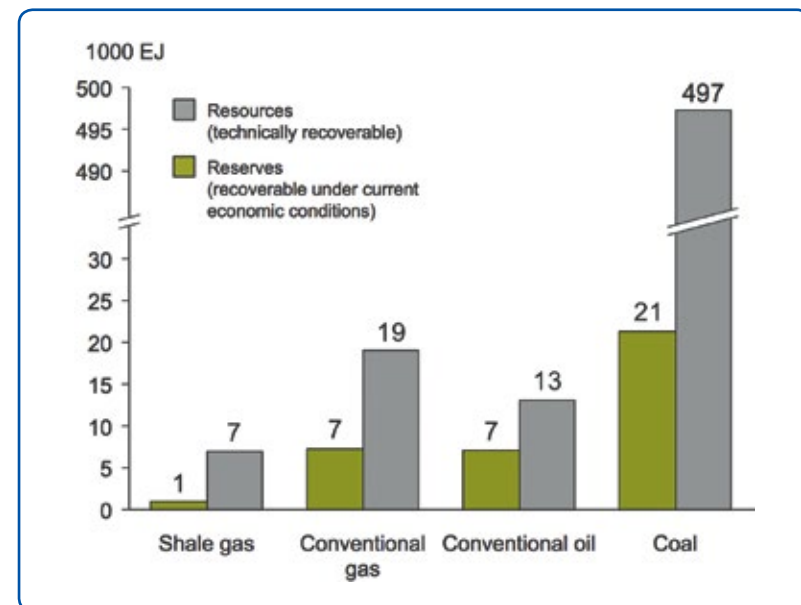


Fig. 2: Energy content of global fossil deposits as of 2011.

Source: DERA; EIA; Stratley analysis. Note: The shale gas reserves figure is a very rough estimate as of Q1/2013 and is an upper limit for the time being.

	US resources (tcf)	US resources (million t)	US production from shale (million t/a)	
Methane	400–450	7,700–8,700	150–300	Methane from shale resources would last for 25 to 60 years in the US with estimated production rate for the next decade
Ethane	20–40	730–1,500	16–24	Assuming that ethane from shale supplies half of the US ethane cracker capacities as of 2017, the range is 30 to 90 years

Fig. 3: Range of methane and ethane supply from shale in the U.S.

Source: EIA; Oil & Gas Journal; Stratley analysis. Note: Methane density =  $0.68\text{kg/m}^3$  and ethane density =  $1.28\text{kg/m}^3$ . It is assumed that US shale gas (total resources: 500 tcf) contains 85  $\pm$  5% methane and 6  $\pm$  2% ethane on average, both very rough estimates.

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## The Japanese Economy Expects a Big Boost to FY13 Growth from Policy Effects

Rising Sun – Expectations regarding the economic policies of Japan's new government have risen and the mood has quickly shifted since the December 2012 Lower House elections. The coalition government between the Liberal Democratic Party, headed by Prime Minister Shinzo Abe, and the New Komeito, had campaigned on promises of stimulative and reflationary economic measures, and the new government has been steadily delivering following its inauguration.

Emergency economic measures for the revitalization of the Japanese economy are one of the three prongs of so-called 'Abenomics', and JPY13.1 trillion in spending (of this, a total of JPY10.3 trillion is related to emergency economic measures) and the second biggest supplementary budget ever were approved in mid-January. Monetary policy changes include the introduction of a price stability target of 2%, agreed upon at the end-January Monetary Policy Meeting. Together with the Government, the BoJ released a joint statement expressing resolve to 'achieve this target at the earliest possible time.'

With the introduction of Abenomics, the JPY has been falling. The JPY has weakened from approximately USD/JPY80 to the USD/JPY90 range, and from EUR/JPY110 to more than EUR/JPY120. The JPY's weakening has caused share prices to surge. Corporate and household sentiment have also started to improve automatically. The leading DI of future economic conditions in the Economy Watchers Survey and consumer confidence rose considerably in January, to the highest level since the collapse of Lehman Brothers.

Japan's economy had been nearly on the precipice of another downturn as overseas economies slowed, but now appears to be headed toward a recovery, because of the stimulus measures under the Abe Administration. First, the supplementary budget was passed in February, and appears likely to be executed quickly in order to lay the groundwork for the Upper House election in July and the consumption tax hike. Because of this, spending will be concentrated in FY13 and is expected to help push up economic growth for the year. This is likely to



offset the drop-off in spending related to earthquake reconstruction. Further, in light of Abenomics, the USD/JPY exchange rate is now expected to reflect a 10% weakening of the JPY. This is estimated to result in an aggregate positive impact on real GDP for the year because of an

improvement in net exports (an increase in exports and decrease in imports), the ripple effect triggered from a rise in exports, and a wealth effect from higher share prices. As a result, real GDP growth is anticipated to be fairly strong, at a rate of 2.2% YoY in FY13. On the other

hand, a major concern is the risk of reflationary policies being too effective and hurting confidence in Japan's policy management as a result. If this happens, market interest rates could jump and impede private sector demand. In addition, if the JPY keeps weakening, rising import costs could be a growing burden.

### Current Situation Corporate Sector and Outlook

Exports have been declining as overseas economies have weakened and because of the tensions with China, but have been showing signs of bottoming recently in terms of volume. Going forward, exports are projected to keep recovering, propelled by the sudden weakening of the JPY and gaining more upward momentum as overseas economies improve. Further, production rose 2.4% MoM in December as overseas demand stopped falling and on expectations of a recovery in domestic demand as well as inventory adjustments. Output is expected to keep rising at the same pace in January and February (by 2.6% MoM in January and 2.3%

MoM in February, according to the manufacturers production forecast survey).

Real capital expenditures slumped by an annualized -9.9% QoQ in Oct-Dec, the fourth straight quarter of decline. However, machinery orders (private sector, excluding the shipbuilding and power industries)—a leading indicator of capital expenditures—rose for the first time in three quarters in Oct-Dec, and are projected to rise again in Jan-Mar, however slightly. As described above, economic sentiment has improved suddenly recently. The real positive effects of a weaker JPY pushing up profits, especially for exporters, are very likely to become more apparent. Amidst these developments, capital expenditures are likely to slowly recover.

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## The Shale Gas Game

Continued Page 6

traordinarily high water supply and infrastructure costs impede development. The Sichuan basin has more favorable conditions and belongs to the basins where the most exploration activity is taking place. Shale gas production costs there are currently well above \$10/MMBtu (≈\$500/t) and even with learning curve effects, the production costs are not expected to compete with US production costs of \$4–6/MMBtu (≈\$200–300/t). Furthermore, Chinese shale gas is believed to be mostly methane, lacking the additional revenue of higher-valued natural gas liquids.

However, China has a very large domestic gas demand and gas import costs are high enough to justify investments into domestic shale gas development. The question is not if, but rather how fast China will develop its shale gas business. For this, they need technology, which has to be customized to the local topographic, geological and infrastructure conditions. Gas handling and transport facilities also have to be built. Catching up with technology and infrastructure may take a decade, but then a large-scale increase in shale gas production seems to be feasible.

### Can Europe Remove the Obstacles?

Excluding Russia, with its enormous conventional gas resources, Poland (187 tcf, EIA), France (180 tcf, EIA), Germany (46 tcf, BGR), Ukraine (42 tcf, EIA) and the UK (20 tcf, EIA)\* have so far been the main countries identified as having large shale gas resources and development potential. Although drilling and fracking technologies have become more efficient and environmental impacts have been reduced, the governments in Germany and France remain very restrictive about shale gas due to environmental concerns, impeding any investments that might lead to commercial projects. The governments of Poland, Ukraine and the UK see shale gas as a potential new contribution mainly to their own energy needs and possibly also as a chemical feedstock source.

Exploration of basins and shale gas production cost evaluations have already started in Poland and the UK and will presumably start in Ukraine soon. While in Poland enthusiasm has been somewhat dampened by test well yields being below expectations, the UK has obtained promising exploration data, e.g. in Lancashire and southern Scotland. Even in the more shale-gas-supportive countries in Europe, the regulation framework has yet to be finalized and wide-

spread exploration remains to be done before large-scale commercial projects can become possible.

### No Shale Gas Boom in China and Europe Before 2020

Based on our assessment of the two regions, and also taking various expert interviews in both China and Europe into account, we believe that there will be no shale gas boom similar to the current boom in the US in China and Europe before 2020. China may reach a production rate of up to 24 million tons/year by 2020, while Europe will remain largely explorative, with local projects in the UK, Ukraine and Poland. A prediction beyond 2020 is difficult, as this highly depends on governmental decisions and trends in the energy sector. However, current data and trends indicate that China could eventually trigger off large-scale commercial shale gas production projects that contribute to the domestic hydrocarbon supply mix. In Europe, large-scale commercial production may occur in selected countries such as the UK, Ukraine and Poland in the mid- to long-term.

The answers to the questions lead to the conclusion that the US shale gas boom is substantial and that China and Europe will not experience a similar boom in the next years. Hence, US prices for methane and ethane are expected to remain significantly below the respective prices in China and Europe. In the subsequent second part of this article "Changes in Global Alkene Supply and Strategic Implications Beyond the Obvious" to be published in CHEManager Europe's May issue, we will elaborate on the effects of this US energy and feedstock cost advantage for the chemical industry and create awareness of opportunities and threats beyond the obvious.

Sources: Bundesanstalt für Geowissenschaften und Rohstoffe (BGR), Deutsche Rohstoffagentur (DERA, part of BGR), Energy information administration (EIA), Expert discussions on shale gas conferences, Oil & Gas Journal, Stratley China office, Stratley experts in Germany, Stratley project experience.

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# Safe and Secure

## Realignment of the Pharmaceutical Supply Chain in Japan

**Bad Pill** – Patent expiries, technological developments, the introduction of innovative products, the increasing incidence of counterfeit drugs and the recent environmental disruptions have forced pharmaceutical companies to realign their supply chains.



Geetika Munjal  
Analyst, GBI Research

which represent 89% of the market (Fig. 1).

The introduction of price revisions has increased competition among the wholesalers and forced them to lower their costs to remain profitable. Additionally, a trend of strategic consolidations, mainly M&As, has started in the industry, resulting in a 45% decrease in the number of companies in the last decade alone.

The distribution of all medicines, including ethical drugs, OTC products and quasi-drugs (cosmeceuticals), from wholesalers is restricted to within five licensed distribution channels (Tab. 1).

### Drivers of Change

In 2008, many batches of an anticoagulant, heparin, were recalled

by the Food and Drug Administration (FDA) due to the contamination of the raw material imported from China. The incident highlighted the challenges faced by the pharmaceutical supply chain globally. Contaminated and counterfeit products became a threat for patients and manufacturers. As a result, pharmaceutical companies and Contract Manufacturing Organizations (CMOs) became increasingly vigilant about the quality of raw materials and finished products entering or leaving the shop floor.

Another setback for companies operating in Japan was the Ministry of Health, Labor and Welfare's (MHLW's) reduction of National Health Insurance drug prices by 6.5% in 2010, significantly more than the normal 2% decrease that had been followed since 1994. Because of this price revision, purchasing and selling price negotiations became more challenging, thereby affecting the profit margins of supply chain participants.

The Great East Japan Earthquake of 2011 and the following tsunami and nuclear accidents had a major impact on the already suffering pharmaceutical industry in the country. Many pharmaceutical companies suffered damages and some products experienced supply instability, for example Thyradin, a thyroxine-based thyroid hormone. Manufacturing stopped temporarily and emergency imports were required.

### Counter Measures

Efforts are being made along the entire value chain to maintain integrity and safety in the drug manu-



### Drug Distribution Channels and Stakeholders

Pharmaceutical products, mainly ethical and Over-the-Counter (OTC) drugs, follow the traditional wholesaler-based method of distribution in Japan. Ethical drugs are transferred from wholesalers to the patients by hospitals, clinics or dispensing pharmacies, while OTC products are dispensed by dispensing pharmacies and drug stores. A Direct-to-Pharmacy (DTP) route is also used for the distribution of OTC products.

The pharmaceutical distribution (wholesale) industry in Japan is an oligopoly of the top four wholesalers: Medipal Holdings, Alfresa Holdings, Suzuken Group and Toho Holdings,

Classification	General term	Japanese name	US equivalent	Drug class
DS1	Pharmacy	Yakkyoku	Pharmacies or drug stores	All varieties of drugs
DS2	General sales	Ippan Hanbai-gyo	Pharmacies or drug stores	All varieties of drugs
DS3	Druggist	Yakushusho	Pharmacies or drug stores	Prescription drugs and designated OTCs not allowed
DS4	Preferential sale	Tokurei Hanbai-gyo	Convenience store	OTC drugs from the positive list
DS5	Placement sale	Haichi Hannbai-gyo	Direct selling	OTC drugs from the positive list

Tab. 1: Licensed distribution channels for medicines in Japan.

Source: Japanese Self-Medication Industry

facture and distribution process. For this, pharmaceutical manufacturers, wholesalers and retailers are leaving no stone unturned. Takeda, for example, has started conducting periodic audits of raw material suppliers, CMOs, packagers, logistics centers and dealers. Questionnaires, facility tours, policy reviews, standard operating procedures, records and interviews are being used to ensure compliance with Takeda's regulations and expectations.

Additionally, the following measures have been taken to make the Japanese pharmaceutical supply chain safe, stable and secure:

### ■ SMS

Manufacturers assign a specific code to drug packages, and once a customer buys that drug, they send a message to a mobile authentication service that identifies it as counterfeit or legitimate. This is particularly useful for checking that no parallel trade exists in the distribution chain.

### ■ Barcoding

Barcodes are used extensively to identify specific products by conveying information such as the medication name, dose and route of administration. Depending on the arrangement of the strings, lines and spaces on the barcode, they are of three types, namely linear, two-dimensional matrix, and composite. In 2008, the Japanese government mandated that all medical products must be encoded with a Japan Article Number (JAN), which is a Global Trade Item Number (GTIN), assigned specifically for the Japanese market. A GTIN is 14 digits in length and signals the barcode format, packaging level, company prefix and an item reference number. After the issuance of the MHLW Guidelines for Barcode Marking, the rate of barcode marking on medical devices has been steadily increasing and now exceeds 80% (ISMP-Canada, 2008).

### ■ Radiofrequency Identification

Radiofrequency Identification (RFID) is gaining increasing use in the pharmaceutical industry to address issues such as drug traceability, inventory management at wholesalers, and dosing and dispensing errors at hospitals and pharmacies. An RFID label consists of a chip, which records information by means of radio waves. This information can be traced at the different levels in the supply chain for pharmaceutical drugs and serves as the backbone of the electronic pedigree (e-pedigree) system started in countries such as the US and UK. An e-pedigree helps to track the basic data elements of a drug as

it moves along the supply chain, such as lot number, potency, expiration, manufacturer and other data elements. However, some believe that this method does not ensure product authenticity (Cronin, 2008).

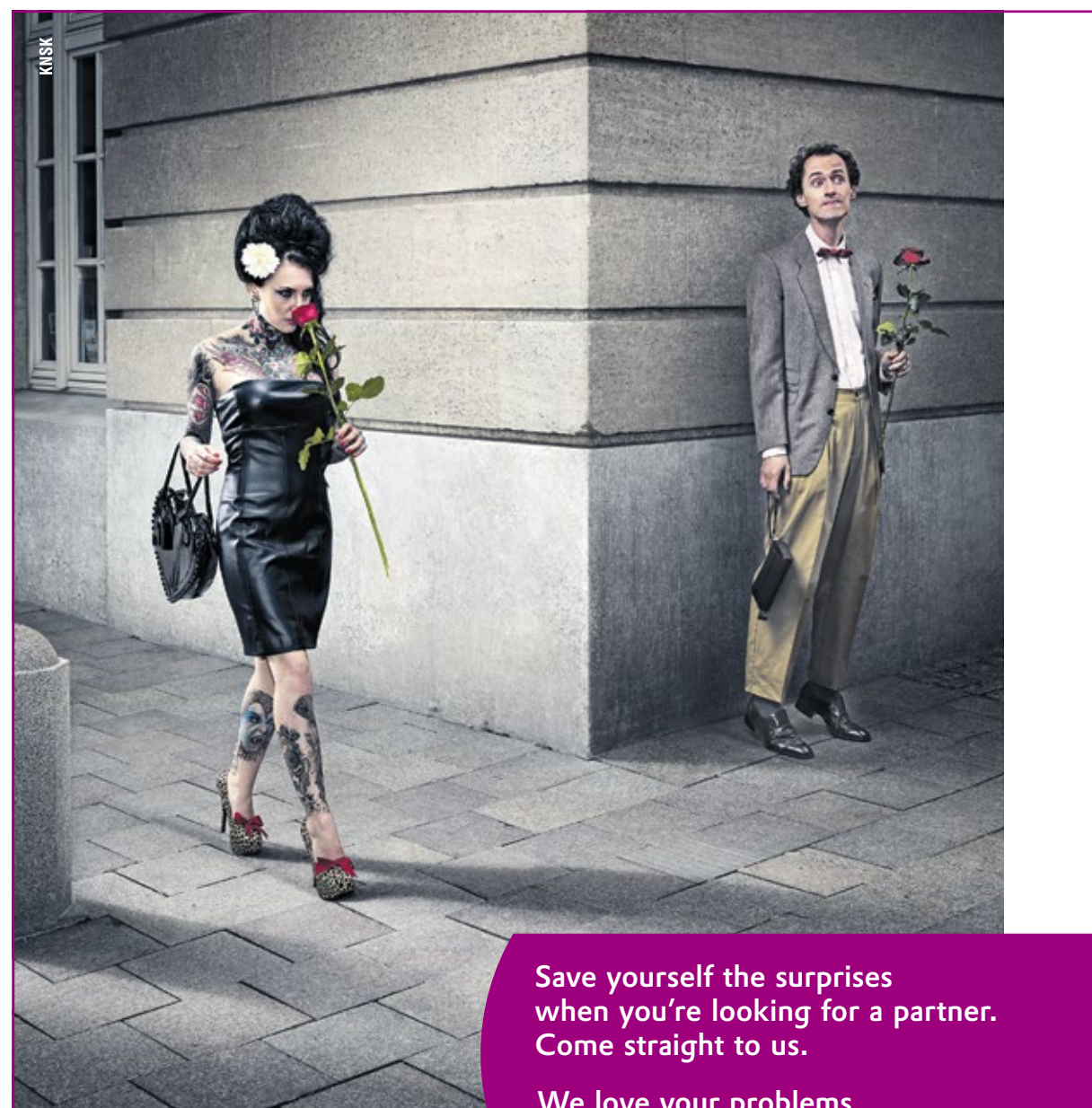
### ■ Business Continuity Planning

Although only marginally affected in comparison with other Japanese industries, production activity in some pharmaceutical manufacturer locations became stagnant due to the restricted power supply and damage to distribution centers

West are technologically advanced and proactive in fighting counterfeiting amidst the changing macro-economic and regulatory trends globally.

### The Full Story

GBI Research's report, entitled "Pharmaceutical Supply Chain in Japan – Periodic Drug Price Revisions by National Health Insurance Increase Competition and Squeeze Profit Margins" focuses on the current scenario of supply chain management.



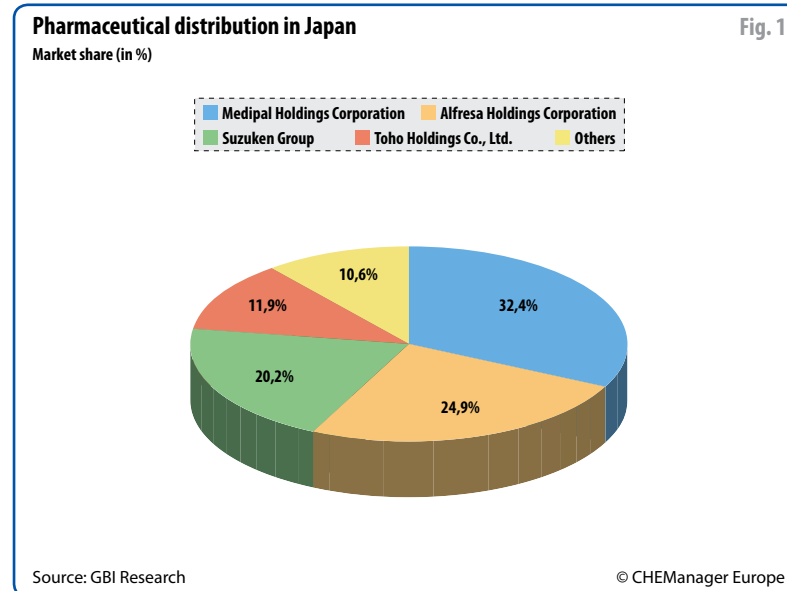
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as a result of the natural disasters in 2011. In response to the catastrophes and the damage following them, domestic pharmaceutical companies upgraded their disaster counter-measure system. For example, Suzuken, as part of its Business Continuity Plan (BCP), formulated guidelines to ensure the supply of pharmaceuticals in times of major disaster and implemented regular drills. The company's headquarters have been constructed in line with earthquake resistance criteria and have a private generator for use during electrical power failures. A cooperative relationship with hospitals and pharmacies has been developed so that products can be delivered through nationwide branches if supervising branches are not functioning.

### Still a Long Way to Go

Caught in the grip of recent environmental disasters and the fear of counterfeit drugs, it is of utmost importance for the pharmaceutical industry in Japan to ensure that the right drug reaches the right patient at the right time. Though efforts are being made at all levels, there is still a long way to go for Japanese companies to stay competitive and attractive. Their counterparts in the

It includes segmentation of the pharmaceutical supply industry by its major components, including manufacturers, wholesalers and medical institutions; and the key issues faced by them. It also provides an analysis of technologies adopted by pharmaceutical manufacturers and wholesalers in order to stay competitive in the current scenario with a competitive profiling of the key companies involved. Insights into the legal and regulatory landscape, focusing on laws and regulations followed to obtain marketing, manufacturing and distribution licenses for drugs in Japan, are also discussed in the report.

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# The Lean Revolution

## Why the Capital Plant Industry Is About to Undergo Its Own Lean Manufacturing Transformation

### Design and Construction

Lean Manufacturing principles have transformed product quality, efficiency and business agility in the volume manufacturing sectors such as the automotive industry. But the capital plant sector has sought unsuccessfully for the key to unlock Lean Construction. That key now exists and, just as in vehicle manufacturing, we can expect to see first movers gain a dominant competitive advantage.

There are three main reasons why the plant industry has so far been unable to develop lean methodologies:

Every plant project is unique and construction invariably starts before design is complete. There is little scope for developing business processes 'in the lab', so every project carries a high level of business risk. Even where this can be mitigated by modular, standardised design, the underlying problem remains.

Complexity is further increased by the use of multiple contractors, on different aspects of the project, across multiple locations and with interlocking contractual conditions which determine what information they are allowed to access.

Projects are essentially 'open-loop' processes. Designers and planners issue deliverables in the expectation that the downstream fabrication and construction processes will implement them accurately and on time. In practice, this rarely happens. Deviations usually come to light late in the construction sequence, when corrective action is most costly and time-consuming. Not surprisingly, research has found that three out of ten projects encounter problems serious enough to keep lawyers busy and around one in ten bankrupts the companies involved. Clearly, there is huge economic benefit to be gained, and not only by the contractors (EPCs) themselves. Project overruns are costly for their clients.

### Technology Breakthrough

Uniqueness and complexity are inherent in plant projects, but their open-loop nature doesn't have to be. Here lies the key. If we can create a feedback loop between the engineering, design, fabrication and construction stages, an integrated end-to-end process becomes possible.

The technology breakthrough that enables this is the ability to integrate as-built fabrication and construction geometry with the as-designed model in a common 3D design environment. This is achieved



Simon Bennett  
Aveva

by the use of 3D laser surveying equipment and powerful software which exploits the data generated. High-resolution 3D laser scanners are now affordable, compact and easy to use. Almost like the digital camera, they can be used easily at any point in the construction process with minimal disruption. Fabricators can use them as part of their inspection processes, returning accurate 3D models of, say, individual pipe spools. Module builders can similarly create highly accurate and finely detailed as-built models for validation against the design model.

The immediate benefit is that a deviation from design can be identified at the earliest possible stage, enabling prompt and informed corrective action. According to the nature and severity of the deviation, correction may entail just the rework of an individual item, or the adjustment of adjacent design which has not yet been released for production. Increasingly, major plant modules are often fabricated on the opposite side of the world from the construction site; discovering and correcting a deviation before dispatch is clearly preferable to discovering it only after the module arrives on site.

### 3D Plant Design

This new capability has been embodied in the latest generation of 3D plant design software. By itself, this will not transform an EPC into a Lean Construction business overnight, but it does provide the long-awaited key to unlock new business. Lean is not a goal to be achieved but a journey to be undertaken and there will be considerable changes in project execution practices along the way. Perhaps the most challenging will be changing the nature of contractual relationships between the various project participants. Currently, a subcontractor or supplier is incentivized only to deliver the specified information or materials to the next immediate customer in the chain. There is no stake in the successful outcome of the overall project and no commercial incentive to improve business processes between companies who may well be in competition with each other.

This challenge is not insuperable. Some years ago, one major operator in the oil & gas industry set about standardizing on a common 3D design solution and requiring all its

contractors to share work using it. There was much initial skepticism among the contractors, who had concerns about loss of intellectual property. However, by working with its contractors to establish appropriate commercial relationships and means of sharing information securely, the company evolved a highly successful, collaborative structure which benefits all parties. The key to such change is to establish, maintain and demonstrate trust.

### Role Model: Automotive Industry

One of the most significant benefits of lean processes is business agility. Previously, automotive component manufacturers were very good at producing long production runs of identical parts, regardless of their quality or the actual demand for them. The result was excessive stockholding, wastage and considerable business inertia. Today, each supplier has a direct stake in the quality of the end product and can flex its output rapidly to meet demand fluctuations. By establishing a closed information loop embracing all project participants, a similar situation can be created in the plant industry.

Replacing our old 2D CAD systems with modern 3D design systems transformed the nature of engineering. Today, new technology is about to trigger a similar transformation in the way we execute complex capital projects. The potential gains are considerable, both for the EPCs themselves in reducing project cost and delivery time, and for their clients in earlier revenues from better quality, less costly plants. Both will be able to respond more effectively to new market opportunities.

### A Digital Plant Information Asset

There is an additional, less obvious benefit to the plant operators. It is now possible to reverse engineer laser-scanned as-built models into intelligent 3D design models, and also to add intelligence to as-built models. This enables the 3D design model to be progressively adjusted as the project progresses so that at handover it accurately represents the true state of the finished plant. This is a genuinely new capability that greatly facilitates asset lifecycle management. Upgrades and revamps become quicker, cheaper and

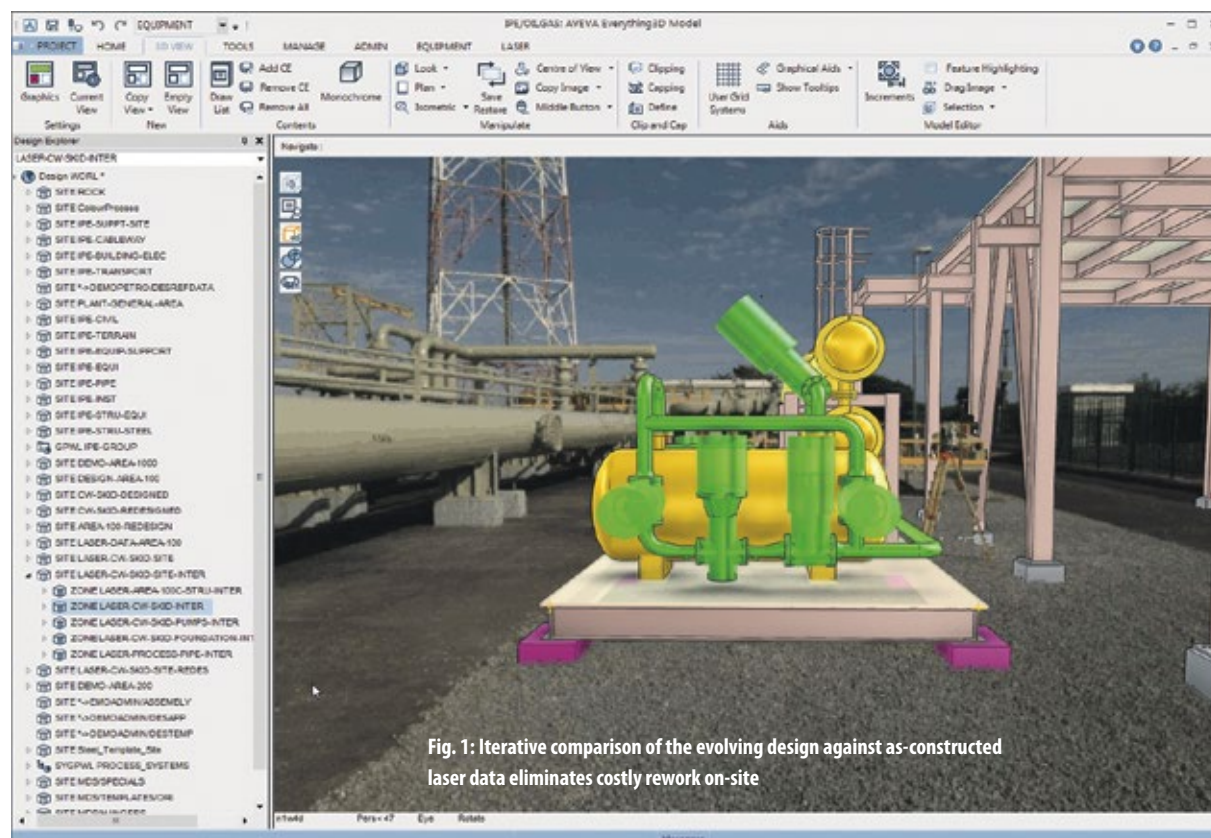


Fig. 1: Iterative comparison of the evolving design against as-constructed laser data eliminates costly rework on-site

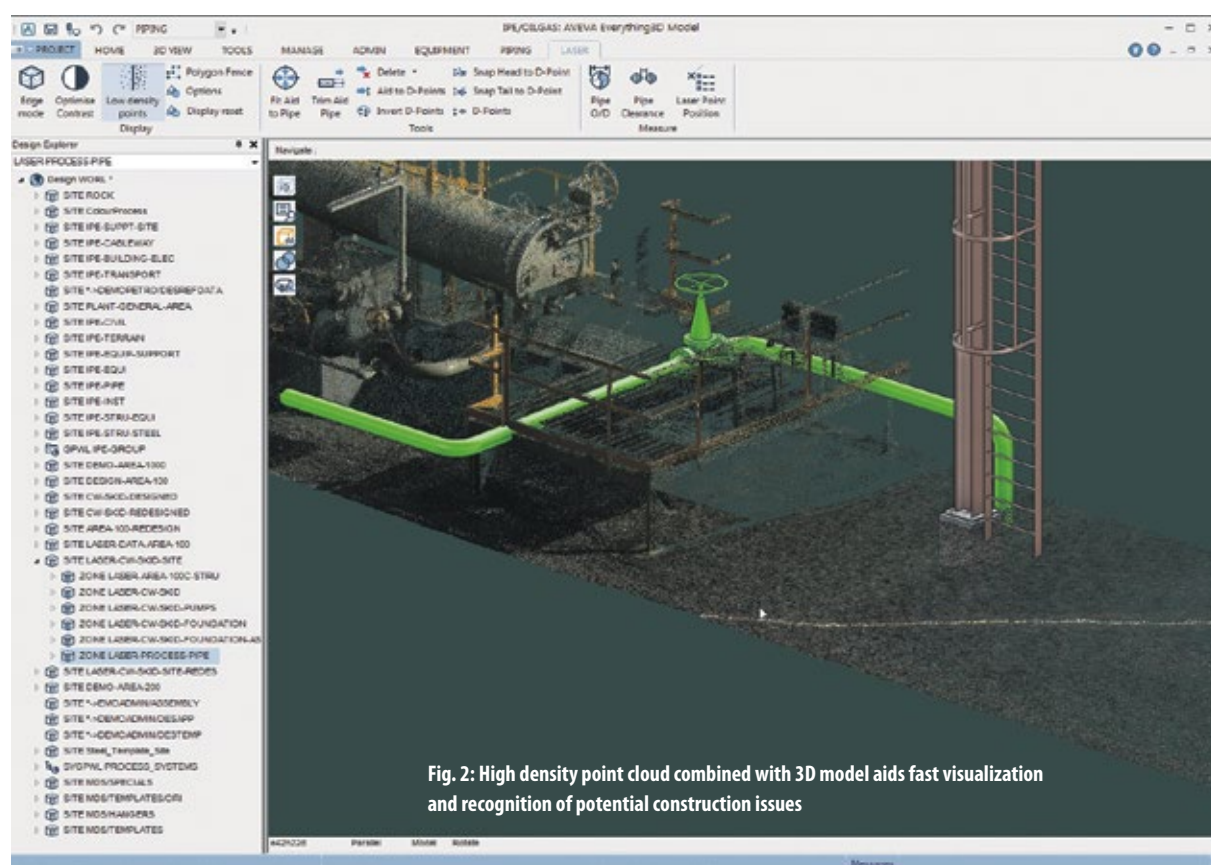


Fig. 2: High density point cloud combined with 3D model aids fast visualization and recognition of potential construction issues

less disruptive if the contractor has precise knowledge of the as-built plant. Even minor repairs, such as replacing a damaged pipe, are easier because the replacement can be made from accurate data generated from the plant model. And the model can form the core of a Digital Plant information asset which supports

every aspect of safe and efficient operations.

Just as the pioneers of Lean Manufacturing came to dominate the automotive industry, so will first movers into Lean Construction rapidly gain the advantage in the plant industries. And we will all benefit.

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## Kem One Files for Bankruptcy

Continued Page 1

French press reports say the proceedings pertain solely to Kem One SAS, which operates the upstream vinyls chain including PVC polymerization, and production facilities in Fos-sur-Mer, Lavera, Saint Auban, Saint Fons and Balan. The compounds and profiles activities run by Kem One Innovative Vinyls are not involved. The company's trade unions, which on learning of the bankruptcy plan burned pallets and tires at the entrance to the Lavera plant, are seeking to have the downstream activities included in the insolvency and also are also

calling for Arkema to reassume responsibility for the business. Kem One is believed to owe its raw materials suppliers, including Arkema and the French company's parent, Total, as much as €125 million. While Klesch said had it known of the business's financial position it would not have bought it, Arkema said that the buyer had been granted "complete transparency" during the due diligence period.

The unions accuse the buyer, in particular chairman Gary Klesch, of mismanagement. They are demanding accountability for the €100 million in cash the firm received as part of the deal.

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# Managing A Moving Target

An International Study Analyzes Organizational Structures of Chemical Companies in the Area of Operations

**A World Of Change** – Globalization and a more competitive and complex business environment have created constant pressure for structural change of chemical supply chain processes. The trend toward consolidation leads to distinctive challenges for operations management regarding its organizational structure and its efficient utilization. A transparent framework and methodology has to be established in order to leverage synergies within the value chain network.

## The Global Change of Operations in the Chemical Industry

In the 21st century, the chemical industry is much more diversified and globalized than before. Climate and demographic change as well as the protection of the environment demand attention. Companies also have to stay innovative, flexible and quick to respond to a market change. Logistics and production strategies are no longer based only on cost efficiency, quality and short lead-times, but flexible and robust supply chain management and the ability to adapt quickly to business dynamics can provide a competitive advantage.

How can a chemical company translate these dynamic changes and business requirements into an organizational strategy for operations? A lot of enterprises answer this question by launching restructuring projects, which create a time-

consuming reorganization process and high uncertainty for employees. A transparent analysis of the value chain needs to be implemented in order to prevent an expensive and distracting restructuring and identify the critical organizational factors.

## Organizational Benchmark of Operations Management

An international expert survey was conducted in close collaboration with Merck Chemicals (Shanghai) Co. Ltd. and the "Forschungsinstitut für Betriebswirtschaftslehre – Unternehmensführung, Logistik und Produktion" chaired by Professor Horst Wildemann from the Technical University Munich, in order to provide new insights into the organizational structure of operations in the chemical industry. The target groups for this organizational benchmarking study were senior managers in the chemical industry. The specific purpose of this research was to identify variables that influence the organizational structure of technical operations management in the chemical industry, as well as to derive guidelines for the organizational design of operations.

## High Potentials Regarding an Efficient Restructuring Process

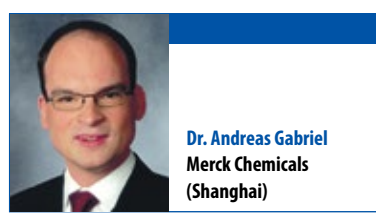
The results of the survey illustrated in Fig. 1 prove the highly practical relevance of the research topic. Of all research subjects, 91 % considered operations as a core competency in their chemical company, whereas 17 % were not satisfied with their structure. Furthermore, more than 74 % have undertaken a restructuring program of opera-

tions in the last five years, and 29 % are planning a reorganization project. These numbers emphasize the strategic importance of the organizational design as well as the remaining potential chemical companies seem to expect from reorganizing its operations. It also indicates the need for further investigation regarding a suitable and transparent methodology, which supports the complex redesign process.

## Traditional Organizational Models are Dominating the Chemical Industry

The coherences between internal business and external requirements as well as the specific attributes of the supply chain and production network create a unique situation for operations management and its organization. The conducted survey reveals interesting insights regarding the general formal organizational structure of operations, presented in Fig. 2. It shows that the functional and divisional structures are dominating the chemical industry. In contrast, the percentage of companies using a process-oriented structure is quite low. Three organizational core elements of operations management could be identified: Manufacturing, supply chain management and operational excellence.

Distribution and logistics as well as quality management possess ambivalent structural solutions. A clear tendency toward separation from operations can be recognized regarding procurement and EHS (environment, health, safety and security), which emphasizes the high strategic relevance of these two functions in the value chain network.



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## Value Chain Management Implies a Clear Focus on Product Life Cycles and Capacity

The trend toward strategic value chain design and process management can also be recognized in the chemical industry. Figures 3-6 (c.f. page 16, back cover) are illustrating the survey results of the different specializations of each value chain (Fig. 3), correlations regarding operations complexity and business diversity (Fig. 4), the correlation between specific capacity models and the distinct organizational structure (Fig. 5), and suggestions for operations strategies for different stages of the product life cycle (Fig. 6).

## Transparent Organizational Structures Need to Be Implemented

The development of operational excellence is an important competitive factor regarding efficient value chain design and related to specific infor-



## mal organizational characteristics.

The survey revealed that chemical companies that don't put a lot of focus on operational excellence exhibit a lesser degree of formalization of their processes as well as a tendency toward functional thinking and goal conflicts. There is no clear accountability for performance, and process transparency is not managed well.

The first phase for organizational excellence is to develop clear accountability and transparent roles within the operations organization. Enhanced internal customer orientation and performance transparency are the next steps toward superior operational excellence, along with a diverse spectrum of work. Finally, there is tremendous potential in the utilization of the knowledge of the chemical workers. Chemical organizations should utilize this internal entrepreneurship, in order to achieve a sustainable competitive advantage for the long-term.

## Results

The process of structuring an operations organization needs to leverage synergies within the value chain as well as enhance the focus on core competencies of the business. The larger and more diverse a chemical portfolio becomes, the more complex its operations and the number of production and supply chain processes. In order to serve the business, an organization has to react to this development with decentralization of its operations organization and implement flexible and adaptable customer-oriented structures. A clear focus on product life cycles as well as sophisticated resource management needs to be implemented, in order to achieve an efficient performance and cost structure. Concepts such as complexity and process management can enhance the transparency, accountability and internal customer orientation of an organization. If there isn't a stronger consideration of these informal attributes, an operation's restructuring effort might face tremendous resistance and turnover in the course of the redesign. Hence, a clear analysis as well as monitoring of the organizational characteristics will not only help the overall efficiency of an operations restructuring process, but it will also be a sustainable competitive advantage for the long term.

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For figures 3 to 6, please refer to back cover.

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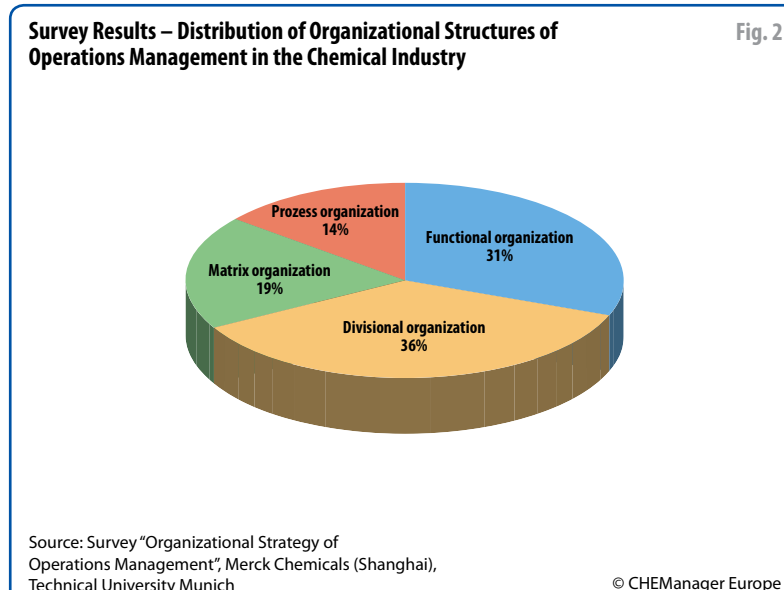
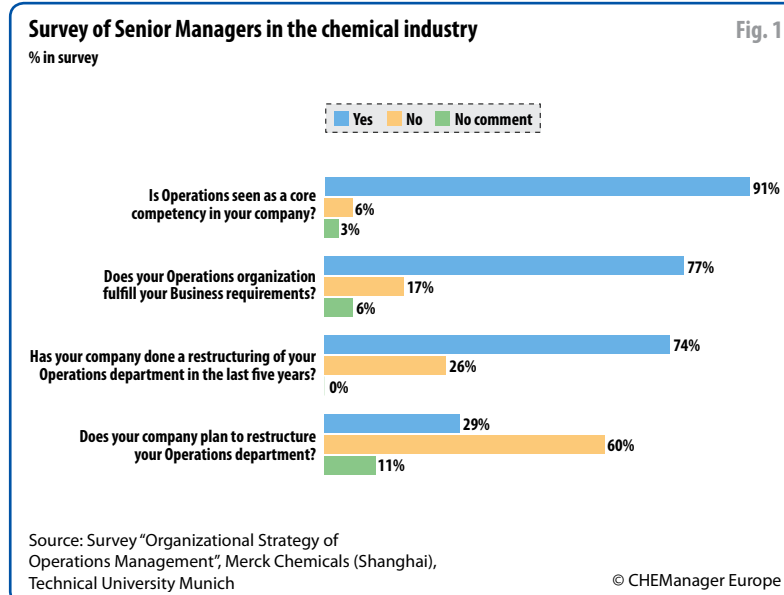
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# Drying, Heating or Cooling

Versatile Drying Units Can Do It All – and Even More

**An All-Rounder** – Sometimes, what it takes to get the job done is highly specialized equipment. Nevertheless, quite often universal all-rounder units with their high flexibility have a lead: By combining process steps like sterilizing, crystallizing, calcining, coating or reacting substances, modern Boono dryers/coolers can be used in a variety of applications.

Pellets, pastes and wet powders – Boono dryers/coolers are versatile devices. They can be used to dry, heat up or cool down with any heat medium, from animal feed to plastics and polymers providing a thorough mixing and gentle heat transfer. Nara has developed a Boono dryer/cooler that provides an indirect heat transfer, so that the product has no direct contact with the transfer heat medium. The hollow shaft, Boono wings, and the double-walled trough are heated or cooled with water, steam or oil, providing a large contact surface with the product. The gas flow through the product during drying removes vapours and prevents condensation. This minimizes the emission of gas and the minimization of loss of heat.

From a commercial point of view, there are several advantages: Pneumatic conveyor type dryers can only be used for short-time drying processes, since they do not allow the configuration of a residence time. Fluid bed dryers have greater air and gas consumption and require larger-sized components such as fans and air vents. Further, more hot gas is released to the environment. Thus, the energy loss of fluid bed units is significantly higher.

Boono Dryers/Coolers have multiple applications – these include drying materials or substances from more than 50% moisture to



ppm values, improving a substance's morphology, or reducing amounts of waste.

## Drying

Nara paddle type dryers/coolers can be used for a variety of applications – one is drying modified starch. In contrast to native starch, modified starch must be kept at a certain temperature during drying to obtain the desired characteristics. An application for wheat is similar to this procedure. In this case, the machine was also used as a reactor in order to weaken the wheat's gas holding capacity. In a second process which is also reactive, wheat powder was roasted, enabling it to then be used as a component in curry powder.

## Sterilizing

Another challenge is the partial sterilization of animal feed, or additives for forage. When animal feed is being processed, the target is to reduce the amount of microorganisms below a critical limit. This is achieved by raising the product's temperature from room temperature to 75-80 by heating. Steam is also fed into the process in order to accelerate the desired reduction in bacteria. The Boono wing geometry is adjusted accordingly to ensure optimal residence time and particularly even transport of the product through the machine. Good results have already been achieved when sterilizing fishmeal and wheat starch.

## Processing

A frequent application is drying and cooling of amino acids or proteins. Protein processing is used in the food sector for confectionery, seasoning or health drinks. The number of applications requires high flexibility in terms of process layout. It can be generally said that not only cooling, drying and heating are important process steps, but also the product changes taking place simultaneously. As a result, the amino acids are chemically changed or modified in the machine, creating new desired characteristics.

## Crystallizing

A further application is to heat material that is then kept at a constant temperature for a certain period of time. The plastics industry uses this process to allow polymers to crystallize further, for example. At an advanced stage of crystallization, the characteristics of the monopolymer, copolymer or terpolymer change, enable new, improved products to be manufactured with these modified substances.

## Keeping the Temperature

In addition to drying, the heat transfer area can also be used for other temperature dependent procedures. For example, materials can be reacted in the dryer or modified in terms of their chemical structure. The latter can be a crystallization process, but also a destructive process. The powder's initial structure is destroyed – a substance that irritates the skin is treated in such a way that irritant effect is reduced or allayed while retaining its effectiveness.

Since the main part of the dryer's heat transfer zone consists of an arrangement of v-shaped Boono wings, there is a large and effective

heat transfer area. The result is a compact, requiring little space for set up.

## Characteristics and Benefits

With the Boono wings (Nara paddle type wings) moving with a rotation frequency of only 10 to 40 revolutions per minute, abrasion and material wear are reduced to a minimum. This also reduces the risk of material breakage. A homogeneous heat transfer is guaranteed due to the continuous and thorough mixing by the Boono wings' opposite rotation and their v-shaped, sloping surfaces. The Boono wing's alternating interlocking movements and their proximity to the container's inner surface provide a continuous self-cleaning of the device.

The drying sequence and residence time can be controlled and set easily thus allowing for customizing to the physical characteristics of the material. It is possible to adjust the number of shafts or wings, the num-

ber of revolutions, the temperature and the processing time.

Thanks to the continuous thorough mixing of the material by the alternating interlocking Boono wings, viscous materials with a very high moisture content can be processed. The dryers design prevents the settling of product deposits by eliminating dead spots.

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## BASF and Cargill Work on Sustainable Coconut Oil

Cargill and BASF have launched a program to develop a sustainable coconut oil supply chain in the Philippines. The two companies will work on the project in partnership with the German government's development agency, GIZ, using co-funding provided by the German Federal Ministry for Economic Cooperation and Development.

The initiative will initially focus on 2,500 smallholder coconut growers in the southern Philippine island of Mindanao, helping them to convert to more sustainable practices and in the process improving their livelihoods through improved productivity and by producing coconut oil of a higher quality that can be sold for higher prices.

In addition, the project will provide greater healthcare access for coconut farmers to the country's health insurance program, PhilHealth. The farmers, who have already started the first phase of training, will be provided with newly designed coconut dryers to improve the quality of coconut meat and coconut oil.

Cargill is taking part in the scheme because it will help meet the sustainability requirements it imposes on its suppliers, while BASF has similar aims for suppliers to its home and personal care business. Coconut oil is used mainly in food products, but coconut oil derivatives are also used in the home and personal care industry.

## Rockwood May Bundle Sachtleben and Additives to Attract Buyers

US specialty chemicals producer Rockwood is said to be preparing to bundle its titanium dioxide subsidiary Sachtleben with its performance additives business to facilitate a divestment of the two units. Reports say first bids for the combined businesses are due at the end of April and could fetch as much as \$2 billion, or 6.7 times combined EBITDA. Sachtleben up to now has not attracted the interest the company had hoped after buying the 39% stake held by joint venture partner Kemira to simplify the sale process.

Potential bidders for the assets are believed to include private

equity investors Bain Capital, Permira, Blackstone Group and EQT. Investment bank Lazard is organizing the sale. Dogged by pricing issues and overcapacity, the titanium dioxide industry has been sailing troubled waters in recent years. The performance additives unit produces color pigments used in paint as well as clay additives to improve the characteristics of building materials.

Separately, Rockwood is also selling its industrial ceramics unit CeramTec. According to reports, first-round bids were due at the end of March.

## Dow: New Specialty Plastics Plants & Sale of Licensing, Additives Business

Dow Chemical has launched plans to build a number of new specialty plastics production plants on the US Gulf coast over the next five to seven years, leveraging cheap shale gas-derived feedstocks. The new facilities, including at least one previously announced project, are in the front end engineering and design (FEED) phase, expected to be completed in 2014, and will draw ethylene from a new ethylene cracker slated for start-up in 2017.

The investment includes the previously announced "Nordel" EPDM plant; a plant for high melt index elastomers Dow's "Affinity" hot melt adhesives; a facility for "Elite" enhanced polyethylene; and specialty LDPE for packaging and E&E applications. Dow executive vice president Jim Fitterling, said the investments will supply businesses that have consistently delivered a higher return on capital, in line with the chemical group's long-term strategy to deliver faster growth with lower earnings volatility.

Other projects on the Gulf, with an eye to supplying both North and

South America, are being "progressed," Dow said. Concurrently, in addition to the cracker, ethane feedstock output and flexibility is being upgraded at Plaquemine, Louisiana, up to 2015. The new propylene facility to feed the epoxies and polyurethanes franchises is also on track to start up in 2015.

Separately, Dow has tentatively agreed a 50:50 joint venture with Japan's Idemitsu Kosan and Mitsui & Co to produce 300,000 ty of linear alpha olefins in the US by 2016. Plans are to be finalized in 2014. A location has not yet been announced but observers believe it will be also built on the US Gulf coast as it will utilize an integrated supply of ethylene from Dow's production grid on the Gulf.

As part of a scheme to shed "slow growth" activities worth \$1.5 billion over the next 18 months, the chemical mammoth has also announced that it will sell two plastics-related businesses. Earmarked for divestment are the propylene licensing and catalyst unit and the plastics additives units.

## Sabir Quits Trinidad Methanol Project

Saudi Arabian chemical giant Sabir is pulling back from its envisioned participation with China's state-owned petrochemicals group Sinopec in a planned \$5.3 billion olefins in Trinidad and Tobago. The Saudi producer said the partners had failed to agree on fundamental

conditions for the complex. Some sources said the stumbling block was a failure to agree on the price of natural gas. With shale gas exploitation changing the rules of the feedstock game, US chemical producers are claiming a cost advantage over other international projects.

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## Insight into the Cosmeceutical Market

The global population grows older while increasing social pressures drive individuals to look younger. Consumer awareness has risen for cosmeceutical products which offer a

way to keep up appearances without going under the knife, a new report by market experts GBI Research says. The report states that the market for cosmeceuticals – cosmetics which

contain active pharmaceutical ingredients to exhibit therapeutic effects on the skin – represents the fastest growing segment of today's personal care industry. Demand is spiraling, driven

mainly by anti-aging products, which offer an alternate to cosmetic surgical procedures, which promise more dramatic results but at a higher cost in terms of time, money and safety.

its effects, and make no direct claims concerning results. The consumer is often left to guess at associations between elaborate ingredients and purported outcomes.

Procter & Gamble (P&G), L'Oréal, Unilever and Beiersdorf, who attribute their success to building big brands such as Olay, L'Oréal, Garnier and Nivea with massive marketing budgets.



### What's Inside?

Cosmeceuticals encompass a wide range of products. For example, anti-dandruff shampoo is a cosmetic as it cleanses the hair, but is also a pharmaceutical as it treats the scalp. Similarly, a tinted moisturizer may offer cosmetic enhancement while providing sun factor protection and anti-aging properties. Common ingredients in cosmeceuticals include hydroxy acids such as salicylic acid, antioxidants such as vitamins C, and natural botanicals such as aloe vera, along with enzymes, hormones, and topical anesthetics.

Cosmeceuticals are not officially recognized by the Food and Drug Administration (FDA), so while products are tested for safety by the manufacturer and the FDA, proof of the claimed therapeutic advantages is not demanded. Many cosmeceutical marketers include ingredients with only have anecdotal evidence of

However, cosmeceuticals must adhere to specific regulations for Good Manufacturing Practices (GMP) to ensure that products are not misbranded. Product efficacy is scrutinized by the US Federal Trade Commission (FTC), and cosmeceutical products that are perceived to be promising unrealistic expectations may be pulled from the shelves.

Cosmeceutical marketers must also adhere to guidelines set by the FTC for product marketing, which censor exaggerated or false product claims. Misrepresentative advertising is a matter of constant debate in the beauty industry, with fake eye-lashes used in mascara adverts and airbrushing applied to anti-wrinkle cream poster girls. Big claims are made in the highly competitive, billion dollar industry.

### The Players

The market is dominated by a small number of large players such as

### The Markets

The cosmeceuticals markets in the U.S., the U.K., France, Germany, Italy, Spain and Japan were estimated to be worth \$30.9 billion collectively in 2011, with the combined markets expected to reach \$42.4 billion by 2018, following growth at a CAGR of 4.6%. Presently, cosmeceutical companies rely on developed nations, but increasing wealth in emerging markets such as Latin America, China and India is expected to see products reach out to an even wider audience in the future.

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## Big R&D Investment Trend as Mid-Cap Biotechs Push to Get Drugs to Market

Biotech firms eager to push drug candidates through clinical trials prompted an overall increase in R&D expenditure of 20% in just a year, research and consulting firm GlobalData states. GlobalData's new report "PharmaLeaders: Innovative Mid-Cap Biotechnology Benchmark Report – Financial Benchmarking, Pipeline Assessment & Competitive Analysis of Innovative Biotechs", which compares the competitive

position of 15 innovative mid-cap biotech companies\*\* on 20 financial metrics, states that the peer group R&D spend for Q3 2012 reached \$746.8 million, climbing from \$621.1 million in Q3 2011.

"Oncology is the main focus of biotech R&D activities," Adam Dion, GlobalData's Analyst covering Healthcare Industry Dynamics, "which is driving peer group R&D expenses higher" says.

Regeneron was the firm with the highest R&D expenditure for Q3 2012, with an outlay of \$158 million. According to the report, Regeneron's R&D spend has increased steadily each quarter since Q3 2011, when the total stood at \$128 million. "Biotech companies are becoming increasingly more successful at developing innovative therapies," Dion says. "However, our research has found that the

high cost of bringing these therapies to market continues to erode corporate profitability."

In terms of percentages, ViroPharma displayed the biggest year-to-year drop in R&D expenditure. The company's R&D spending plummeted 28% year-to-year, from \$22.9 million in Q3 2011 to \$16.5 million in Q3 2012. The decrease in ViroPharma's R&D spend was caused by the Food and Drug Administration's

suspension of the company's clinical trials of its flagship product Cinryze due to safety concerns.

"The FDA put a hold on two of the company's Phase II clinical studies when trials revealed elevated antibody levels detected in the treatment arm of the study," Dion explains. "These concerns have since been addressed and, with FDA approval, the firm resumed the trials in September of last year."

As defined by a proprietary ratings system based on a number of financial metrics including revenue, sales growth and cost containment, GlobalData identified Regeneron as the peer group benchmark leader in the third quarter, overtaking the Q2 2012 number one, Alexion.

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Employee: Mike Green/Production Operator

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### German Merck Inks MS License Deal with Opexa

German chemicals and pharmaceuticals producer Merck has entered an option and license agreement with US biotech drug maker Opexa Therapeutics to develop and commercialize Teelna (imilecleucel-T), an investigational T-cell therapy for treatment of Multiple Sclerosis. The drug currently being developed by Opexa is in a Phase IIb clinical trial for patients with the secondary progressive form of the disease (SPMS).

It has received fast track designation from the US Food and Drug Administration. Under the agreement, Merck will pay Opexa \$5 million up front for granting the German company an option for the exclusive license of the Teelna treatment program for MS. The option may be exercised prior to or upon conclusion of the ongoing clinical trials. On exercising the license option, Merck would pay an upfront license fee and

receive worldwide development and commercial rights except in Japan.

The deal with Opexa illustrates Merck Serono's commitment to employ creative ways of accessing external innovation to develop potential next-generation multiple sclerosis treatments, especially in an area of unmet need, said Susan Hebert, head of global business development strategy at Merck's biological drugs arm.

### Glaxo SmithKline Chief Says New Drugs Can Be Cheaper

The pharmaceutical industry should be able to charge less for new drugs in future by passing on R&D efficiencies to its customers, Andrew Witty, CEO of GlaxoSmithKline (GSK) told a healthcare conference in London in March. Although drug makers have traditionally argued that premium prices are needed to pay for the high cost of developing a new medicine, Witty said "it is not unrealistic" to expect that new innovations ought to be priced at or in some cases below the prices the usual range, something "completely normal in other industries."

Efficiency in research can massively reduce the cost of drug development, the CEO remarked. Using GSK as an example, he said "a major revamp in the way research is conducted means the rate of return on R&D investment has increased by about 30% in the past three or four years because fewer drugs have flopped in late-stage testing."

Alongside improvements in research, global demand for medicines is increasing and the explosion in the volume of products sold in emerging markets should contribute to lower unit costs, Witty said.

GSK has for some years adopted a strategy of offering lower prices in less-developed markets in a bid to balance volume against price and maximize overall sales.

According to a December study of R&D productivity among the world's 12 top drug makers by Deloitte and Thomson Reuters, the average cost of developing a new medicine, including failures, is now \$1.1 billion. The figures ranged, however, from \$315 million for the most successful company to as much as \$2.8 billion.

### Cedarburg Hauser Adds Capabilities at Denver Facility

Cedarburg Hauser Pharmaceuticals has added controlled substance capabilities at its Denver, CO facility. Both of Cedarburg Hauser's facilities, in Colorado and Wisconsin, now hold DEA registrations allowing for the production and analysis of schedule II-V controlled substances.

The kilo-lab manufacturing suites and analytical laboratories at the Denver location are ideal for the development of small molecule APIs, particularly those with unique man-

ufacturing challenges such as potent compounds, controlled substances, and small molecule conjugates.

Cedarburg Hauser specializes in the development and manufacturing of small molecule APIs. We leverage a talented group of scientists and supporting-staff, as well as a centralized approach to project management, to ensure on-time and on-budget completion of projects involving the development, scale-up, and manufacturing of complex APIs.

Last summer, the Grafton, WI-based contract development and manufacturing organization (CDMO) expanded the capacity of its Wisconsin based active pharmaceutical ingredient (API) manufacturing plant. The expansion efforts are a result of an increased demand for contract manufacturing of commercial APIs and are accompanied by additional upgrades aimed at improving safety and GMP systems.



# Less Pain, More Gain

Developments of Drug Delivery Devices are Increasingly Focused on Patients' Needs

## Delivery Boom – Drug Delivery

Devices currently rank among the major pharmaceutical trends. Their optimization is largely influenced by the pharmaceutical industry, physicians and patients. Development of new devices is increasingly focused on patients' needs. They give top priority to simplified handling, reduced pain, continuous documentation and facilitated adherence to medication intervals.

A precise definition of Drug Delivery Devices (DDD) is almost impossible to find. In general, DDDs support the transportation of active ingredients to the part of the body where they are needed and therefore can be considered an application facility. Whether they are defined as pharmaceuticals or medical products depends on their purpose. For example, a powder inhaler qualifies as a pharmaceutical, while a catheter dissected with heparin qualifies as a medical product.

### Pen Systems: Close to Perfection

Because of a significant refinement of most DDDs in recent years, for some appliances little potential for improvement is left. The introduction of pen systems in 1985 considerably enhanced patients' quality of life. Pens are loaded using cartridges and usually serve as multiple application systems. Several functionalities such as level indication and haptic of pen systems already have been optimized. Moreover, today's pen systems feature electronic components such as memory con-



Dr. Jérôme Freissmuth  
Bosch Packaging  
Technology

and feature a needle cover keeping the needle hidden as long as possible. This often helps users overcome fears of self-injection. Diseases such as multiple sclerosis, osteoporosis, hepatitis, rheumatism and anemia are typical fields for the application of auto injectors. Treatment of these requires a singular dose or regular administration during longer intervals and is profitable from the industry's point of view. Therefore, intensive development of auto injectors is justified not only to improve patients' quality of life but also from an economic perspective.

Further advancements mainly refer to production conditions. With optimized materials and designs, production costs will decrease. As a result, devices are no longer too expensive to be applied as reusable items. Some experts believe needle-free injection technology will soon be successful. One of the reasons is the vaccine campaign launched by the World Health Organization (WHO). However, the pharmaceutical market remains cautious of these systems because they are believed to cause similar pain as a puncture does.

### Transdermal Devices: More Convenience

Transdermal delivery devices are patch systems containing active agents, for instance within matrices, which are diffused through the skin. Recent developments have led to op-

timized patch sizes and adherence features of the patches for better skin tolerance. The Western world's affinity for electronic devices is also influencing pharmaceutical applications. Exciting new developments comprise a combination of patch and pump, so-called "patch pumps." For example, the Pancreum BetaWedge insulin pump is a small device with a Bluetooth-enabled Personal Diabetes Analyzer (PDA). It adheres to the skin and delivers insulin for as long as three days. Electronic devices such as technologically suitable MP3 players and memory cards enable easy and convenient measurement of the blood sugar level. With "MyDose," Roche is developing a single-use infusion device for the subcutaneous delivery of a new drug formulation containing monoclonal antibodies such as Herceptin and MabThera. The subcutaneous delivery is based on the patient's individual bodyweight or surface. It is easier to administer, and application times are significantly reduced. The main functional component of the device is the "Vartridge," a hybrid container that combines the features of glass vials and cartridges and is controlled via the electronics in the pump. As opposed to intravenous applications, patients no longer need to be treated in hospitals and are more independent in their everyday routine.

### Pulmonary Systems: Focus on Asthma and COPD

Inhalable insulin seemed to hold a lot of promise. But the large size of the inhaler, increased treatment costs and the requirement for much higher insulin doses led to its withdrawal. The market for pulmonary systems has noticeably slowed down in developed countries while it is still growing in emerging markets. Yet pharmaceutical engineers continue with the advancement of these systems mainly with respect to asthma and COPD (chronic obstructive pulmonary disease). There are three different types of pulmonary systems. MDI (metered dose inhaler) is the most common technology in the market at low cost level, especially for emergency products. The aerosol-based inhaler delivers the required amount of gaseous medicine to the lungs. New products, however, are rarely developed in the form of MDIs for environmental and compliance reasons such as patients' coordination problems between breathing and actuation.

The technology of the future – if no oral medication is available – is the DPI (dry powder inhaler) with its simple application and small size. Medication is delivered to the lungs in the form of dry powder, which patients inhale without any solvent.

The third pulmonary system is the nebulizer, which administers the inhalation liquid in the form of fine drops. Patients inhale the medication as a mist generated by different technologies such as ultrasound, piezo crystals or vibrating mesh.

### DDDs: Simplifying the Lives of Patients

Many established medical devices, and especially applications for chil-

dren, have been significantly optimized over the past years. Some of them are approaching their improvement limits; others still have potential for refinement. In general, the equipment tends to be smaller, and handling is safer, easier and more convenient. At the same time, costs are decreasing for those devices that hardly require any further improvement. In many fields, the market will not work without DDDs. The compatibility of a device such as a pen, an auto injector or a pump with a new drug is an important precondition for its success, especially in developed countries. The so-called "pharmerging markets" require more basic and affordable technologies. Once the average unit cost decreases, the optimized DDDs will also be successfully placed in these markets in large numbers. The trend toward more convenience with a clear focus on patients' compliance is expected to continue at a smart pace.

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tags/Pharma



Fig. 1: The reusable Ypsomed ServoPen with intuitive handling is a pen system for insulin injection.

ontrol, which is mainly an application for children.

Further refinement will focus on easier and safer handling, such as improved needle protection to help avoid injuries and unintended application. The optimization of other parenteral systems also focuses on the patients' compliance, reflecting the awareness of fears such as needle phobia. Auto injectors are usually loaded using pre-filled syringes

timized patch sizes and adherence features of the patches for better skin tolerance.

The Western world's affinity for electronic devices is also influencing pharmaceutical applications. Exciting new developments comprise a combination of patch and pump, so-called "patch pumps." For example, the Pancreum BetaWedge insulin pump is a small device with a Bluetooth-enabled Personal Dia-

## French Drugs Market Will Shrink Further in 2013

Drug sales in France will decline further in 2013 as government austerity measures curb healthcare spending in Europe's second-biggest drugs market, a recent study suggests. The author, pharmaceutical intelligence firm IMS Health, forecasts that the market will shrink by 3.4% after a 2.3% setback in 2012, its first annual decline on record.

The market for drugs sold in French pharmacies is expected to drop by 3.4% this year, after sliding

2.3% in 2012, and will reflect government cuts in healthcare spending through price cuts on branded drugs and favoured prescriptions of cheaper generic drugs.

France's expected slowdown contrasts with slight increases forecast for other mature markets in northern Europe and Japan and more sharply with growth of over 10% expected in China and Brazil. However, it should be less steep than in southern European countries sad-

dled with austerity measures. The study adds that French spending could be pushed up when new, innovative treatments lacking generic competition are launched, starting in 2014.

France is Europe's second-largest drug market after Germany. Its pharmaceutical industry is the fourth largest contributor to the country's trade balance and one of the few sectors with a trade surplus.

## Merck & Co to Delay Launch of New Osteoporosis Drug

US drug maker Merck & Co has said it will not submit its osteoporosis treatment odanacatib to US regulators until next year pending the results of data from an extension trial. While an independent monitoring

board in July 2012 recommended stopping Phase III trials because data had already proven the drug reduced fracture risk, the panel at the same time flagged certain potential safety concerns.

Merck continued the trial to better examine the undisclosed issues. The company's older osteoporosis drug Fosamax was the world's top-seller, with annual sales of \$3 billion until its US patent lapsed in 2008.

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# The Future of Pharma

## The Deconstruction of the Pharma Value Chain May Not Be a One-Size-Fits-All Recipe for Big Pharma

**The Rise of Generics** – In 2011, CMS Pharma was invited to take part in a conference in Mumbai to discuss the emergence of “supergenerics,” a new form of generic drugs with improved properties such as safety, efficacy, stability or improved commercial attractiveness such as taste or route of administration. Those drugs are most often based on an incremental reformulation of a generic API (active pharmaceutical ingredient) or the combination of multiple generic APIs.

Leaving the conference, we were convinced supergenerics had a role to play in the future of the pharmaceutical industry. The main Indian players, Cipla, Ranbaxy, Dr. Reddy, Lupin, Zydus, Sun and others were all vying for a piece of the action.

The benefits of supergenerics seem compelling. Development costs tend to be limited with investments in the range of \$50 million, which in the pharmaceutical world is considered to be a rather small ticket. Development timeframes are also short, ranging from three to four years, significantly less than the 12-year average needed to commercialize new molecular entities. A successful outcome could yield a combination drug, a new formulation or a new route of administration, with three to five years of exclusivity in the USA under USFDA 505(b)(2).

But beyond the short-term financial benefits to the various players in the marketplace, it was still unclear to us how big of a game changer supergenerics would be longer-term. With the pervasive myth that generic drugs are not really profitable, one could reasonably question the effect of those drugs in shaping the industry's future.



Andrew Badrot  
CMS Pharma

But facts speak otherwise. CMS Pharma compared the financial performance of the top 14 generic companies vs. the top 14 Big Pharma companies. The results clearly demonstrate the power of generics: Over the five years spanning 2007 to 2011, generic companies achieved an average EBIT margin of 18.5% while Big Pharma had 25.5%. That profitability gap of 7 percentage points is certainly noticeable but in no way can dismiss generics to be a “non-profitable” product class. By measuring corporate performance through return on assets (RoA), in 2010, generics achieved a RoA of 7.3% vs. 8.0% for Big Pharma, a near par. In fact, this set of generic companies trades at 30% higher valuations compared with its Big Pharma peers, with a TEV-to-EBIT ratio of 12.6 times vs. 9.4 times for Big Pharma in 2011.

In addition, looking at the topline growth of the pharmaceutical business beyond 2016, IMS estimates nearly \$1.4 trillion in pharmaceutical drug sales by 2020. Two-thirds of the growth between 2012 and 2020 is forecasted to come from emerging countries, including BRIC, where generic drugs dominate the market. We estimate that approximately 50% of future global pharmaceutical drug market growth will come from generics.

### So Why Does It Matter?

At the J.P. Morgan Healthcare Conference 2013, Jeremy Levin, Teva's CEO, discussed at length his “fusion” of R&D and the new strategy for the development of NTEs (new thera-

peutic entity), an acronym coined by Teva to describe its strategy for combining APIs, reformulating them or developing new delivery mechanisms. Whether labeled NTEs or supergenerics, the perspective painted by Teva for the future of medicines is powerful and compelling.

Through its vision, scale and focus, Teva is bringing supergenerics/NTEs to the industry forefront and is using it as a transformational driver over the coming 10 years.

As a fully integrated pharma company with one of the broadest

portfolios of drugs marketed globally, integrated capabilities in API and formulation development, production in 74 factories globally, and nearly \$1.2 billion in R&D spending, Teva is refocusing its core growth strategy around NTEs. And if anyone can deliver that vision, Teva is ideally positioned to do so. Why? We see three reasons that set it apart from its peers:

- Teva is focused on generics like no other company of its scale is.
- Teva is by far the largest generics company, supplying one in six prescription drugs in the USA and 71 billion tablets worldwide. It has the largest portfolio of generic drugs with more than 1,300 molecules.
- With its broad and cost-effective manufacturing base and supplier network, Teva can deliver well-priced solutions to the market, quickly and reliably.

In addition, Teva can play eye-to-eye with its innovator peers on the following points:

- Teva also has new chemical entity (NCE) development capabilities: Copaxone is its leading treatment for multiple sclerosis with \$3 billion in sales in 2011 accounting for one-third of the MS market. Additionally the company has 15 drugs in late-stage development and another 13 programs in mid-stage trials. It has added innovator biotech expertise following the acquisition of Cephalon two years ago.
- It has the R&D know-how both on the generics and NCE side, and thus can create cross-pollinated teams with advanced technical skillsets in both areas. This in turn speeds up the R&D discovery process and increases chances of creating effective combination drugs.
- Finally, with its extensive regulatory expertise, Teva is well suited to work hand-in-hand with regulatory agencies to review and frame the approval processes for those NTEs.

### What Could it Mean to Big Pharma?

If the “fusion” of NCE and generic R&D delivers its promise, if Teva succeeds in delivering above-average returns to the industry, where will it leave the rest of its Big Pharma peers?

Some Big Pharma may enter the “fusion” fray. Novartis (through San-

doz) has a substantial generics business. GSK, Sanofi, J&J and Bayer also have strong franchises with a combination of generics and OTCs while Boehringer Ingelheim has a large OTC portfolio. They all have the R&D strength to pursue such an approach. Abbott decided to go down an opposite path and split its generics and NCE business. Abbott retained the established pharma product group together with medical devices, diagnostics and nutrition while the newly established Abbvie

2012) estimates up to 90% of global private R&D spending is driven by manufacturing.

### What Could the Future for Big Pharma Look Like?

Venturing to look into the future, Big Pharma in 2025 could be a streamlined organization that develops, manufactures and markets drugs worldwide, a back-to-the-future scenario defying some of the current wisdom circling some executive suites:

- R&D along the “fusion” model from Teva is a very attractive contention and could likely over-perform the “split” model pursued by Abbott and possibly others.
- Manufacturing will be based on core knowledge held by the company combined with outsourcing intended to manage capex, enhance risk-mitigation linked to supply chain events and load-balancing of the manufacturing footprint.
- Marketing will no longer differentiate between innovator drugs and branded generic drugs. All will be marketed through similar channels under the same company brand. Indeed, why ignore the mass-market power of generics and limit the brand awareness? All drugs, OTCs included, will become sought-after vehicles putting the brand on patient tables and bathroom mirror medicine cabinets. Expecting patients to value an NCE and a generic drug differently is like expecting a car driver to value a spark plug from Bosch differently from NGK. They won't.

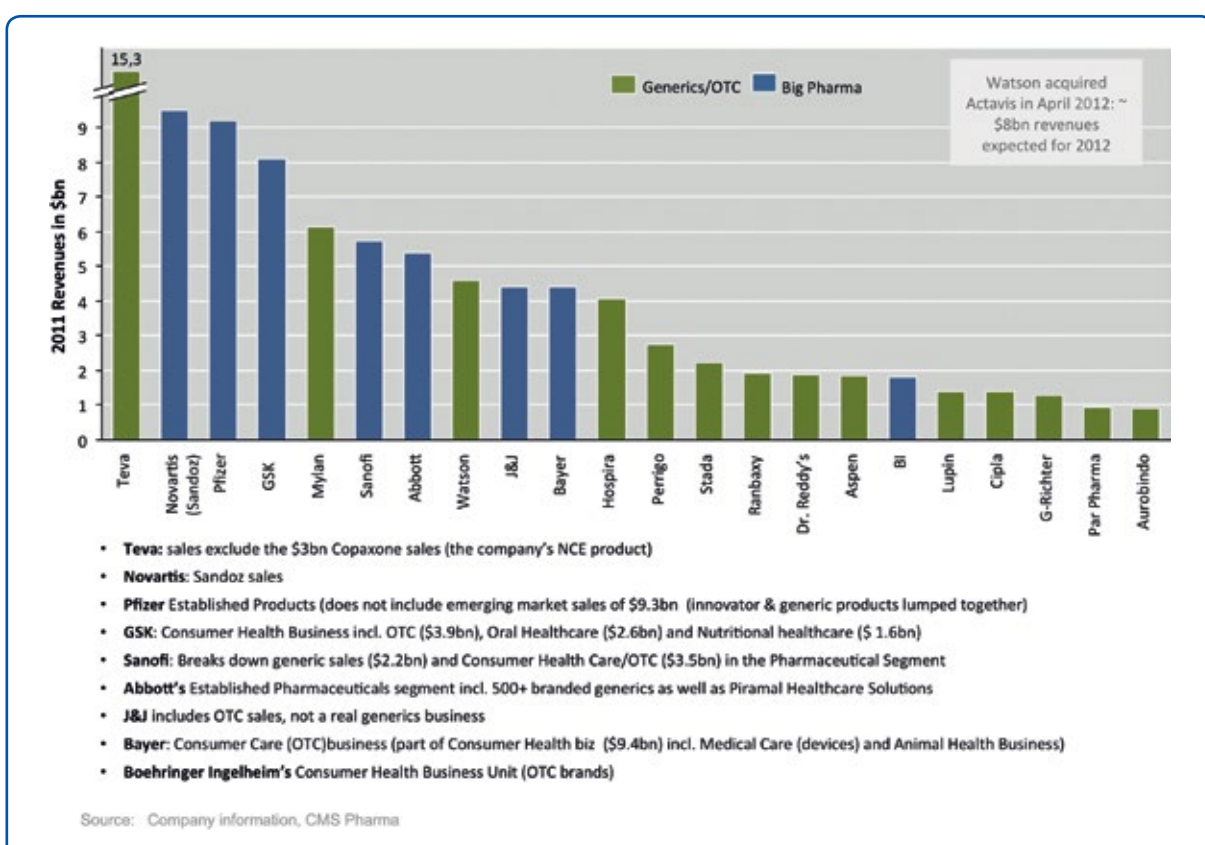
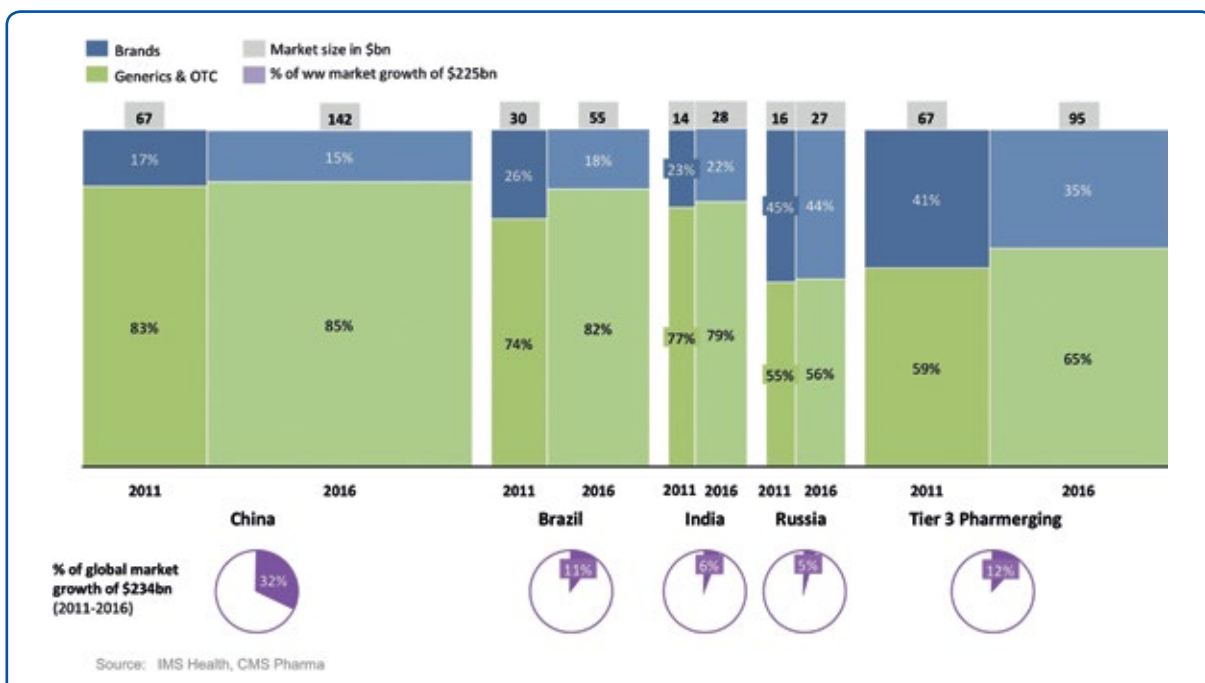
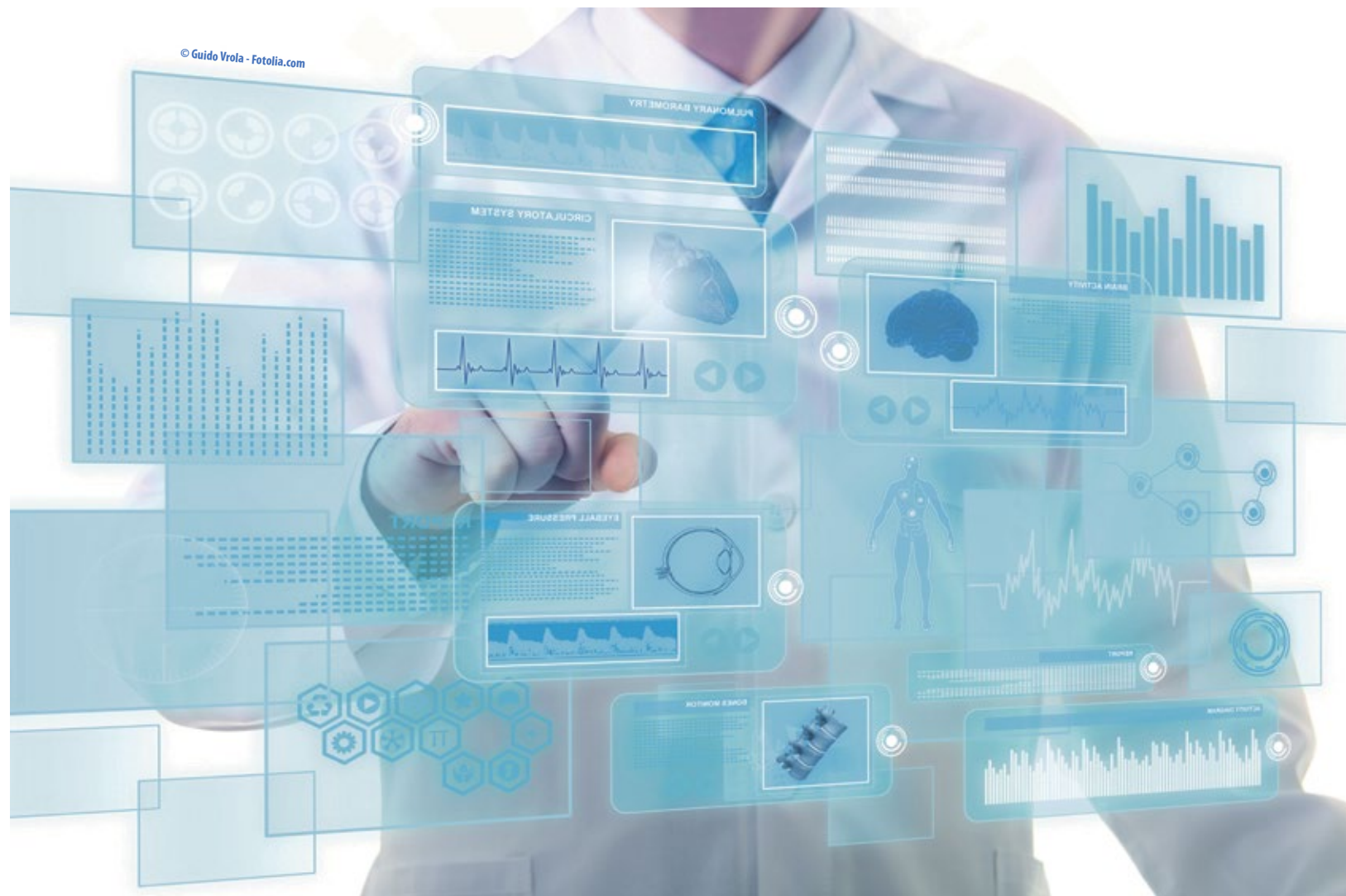
This article is co-published in Contract Pharma.

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## EVENTS

**Antec 2013, 22–24 April 2013, Cincinnati, OH, USA**

Antec, the largest annual technical conference for the plastics industry in the USA, organized by the Society of Plastics Engineers (SPE) features approximately 600 peer-reviewed technical presentations in 40 different areas of plastics. The SPE expects 2,500 attendees. The conference includes an NPE powered exhibit floor featuring the industry's top suppliers and solutions providers. In addition, Antec will comprise of a tradeshow, three new technology forums, "Business of Plastics Sessions" presented by the Society of the Plastics Industry (SPI), as well as Tutorial Sessions in areas including extrusion, injection molding, composites, thermosets, and decorating & assembly

► [www.4spe.org](http://www.4spe.org)

**Powtech & Technopharm 2013, 23–25 April 2013, Nuremberg, Germany**

Size reduction, mixing, conveying, dosing and filling – mechanical processing technologies are an essential part of the chemical industry. Powtech offers a comprehensive overview of the latest technologies for processing powder, granules and bulk solids specifically for development, process and works engineers from all sectors of the chemical industry. A visit to the parallel Technopharm is also worthwhile. The exhibition, this year under the motto of "Pharma. Manufacturing. Excellence", is the established European innovation forum for the development and manufacture of solid, semi-solid and liquid forms of drugs.

► [www.powtech.de](http://www.powtech.de), [www.technopharm.de](http://www.technopharm.de)

**Fecc Annual Congress 2013, 17-19 June, Hamburg, Germany**

With evolution and leadership in mind, Fecc has chosen "Distribution: Driving innovation in the supply chain" as this year's theme for its 2013 congress, the leading event for the European chemical distribution and trading industry. With a revamped programme the Fecc congress honors its theme by introducing different elements to the schedule. The first session of the congress will tackle how to do business in emerging markets, discussing the challenges and competition in chemicals and ground realities that should be at the top of every chemical executive's agenda, when entering these markets.

► [www.fecc-congress.com](http://www.fecc-congress.com)

**PEPP 2013, 18-19 June 2013, Istanbul, Turkey**

PEPP 2013, the 22nd Annual Polyethylene-Polypropylene Chain Global Technology & Business Forum, addresses important implications for the polyolefin industry from the upstream business challenges to downstream technical applications. The event, organized by IHS in partnership with PlasticsEurope provides a comprehensive overview for polymer producers and converters under the motto "Critical Insights into Polyolefins: Competitive Manufacturing & Processing Across the Value Chain". A pre-conference workshop on 17 June 2013 will focus on Bio-based Plastics and Chemicals.

► <http://ihsglobalevents.com/pepp2013/>

**Shale Gas, Heavy Oils and Coal - Implications on Refining and Petrochemistry, 9-11 October 2013, Dresden, Germany**

The Conference is jointly organized by the Petrochemistry Division of DGMK (German Society for Petroleum and Coal Science and Technology), the Division of Industrial Chemistry of the Società Chimica Italiana (SCI) and ÖGEW (Austrian Society for Petroleum Science). The Conference will address scientific and technical issues related to the general theme. Particular emphasis will be on the recent developments in shale gas production and its potential implications on the manufacture of fuels and petrochemicals, the recovery of heavy oils from oil sands and other sources and their thermal and/or catalytic transformation to useful and clean products, and the potential of coal at certain places in the world as feedstock for the manufacture of petrochemicals via gasification, hydrogenation or intermediate acetylene formation.

► [petrochemistry@dgmk.de](mailto:petrochemistry@dgmk.de), [www.dgmk.de/petrochemistry](http://www.dgmk.de/petrochemistry)

**Specialty & Agro Chemicals America, 9-11 September 2013, Wilmington, NC, USA**

The organizer of the 2nd annual Specialty & Agro Chemicals America experiences increasing interest in the show. This momentum is being driven by the show's "back to basics" focus on the agrochemical and industrial/specialty chemical markets and its focus on the domestic American chemical industry. Over 70 companies have registered as exhibitors, compared to 46 companies that exhibited at last year's inaugural show. The program includes exhibitor capability showcases and talks covering agrochemical and specialty chemical market trends.

► [www.chemicalsamerica.com](http://www.chemicalsamerica.com)

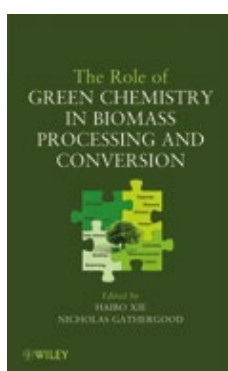
**ChemExpo Africa, 6-7 November, 2013, Johannesburg, South Africa**

The South African chemical industry is the largest of its kind in Africa and has been identified by the government as a key driver of economic growth. Local chemical exports have been growing at a significant rate since 1999 compared to other industries. ChemExpo Africa is a new trade event designed to connect buyers, manufacturers, suppliers, distributors and end-users from a wealth of chemical-related product sectors such as fine & specialty chemicals for Pharma, Agro, Cosmetics & Healthcare, Water Treatment, Flavors & Fragrances, Inks, Dyes & Dyestuffs and Oil-field Chemicals.

► [www.chemspevents.com/chemexpoafrika/](http://www.chemspevents.com/chemexpoafrika/)

**The Role of Green Chemistry in Biomass Processing and Conversion**

Taking millions of years to form, fossil fuels are non-renewable resources; it is estimated that they will be depleted by the end of this century. Moreover, the production and use of fossil fuels have resulted in considerable environmental harm. The generation of environmentally friendly energy from renewable sources such as biomass is therefore essential. This book fo-



cuses on the integration of green chemistry concepts into biomass processes and conversion in order to take full advantage of the potential of biomass to replace unsustainable resources and meet global needs for fuel as well as other chemicals and materials.

► The Role of Green Chemistry in Biomass Processing and Conversion

Haibo Xie, Nicholas Gathergood  
John Wiley & Sons  
Price: € 109,-  
ISBN 13: 978-0-470-64410-2

**High Temperature Experiments in Chemistry and Materials Science**

Cutting edge high temperature materials include high temperature superconductors, solid oxide fuel cells, thermoelectric materials and ultrahigh temperature construction materials (including metals, cermets and ceramics) and have applications in key areas such as energy, transportation and space technologies. This book introduces the concepts which underpin research into these critical materials including thermodynamics, kinetics and various physical, chemical and modelling techniques with a focus



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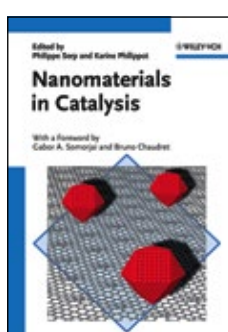
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► High Temperature Experiments in Chemistry and Materials Science

Keith Motzfeldt  
John Wiley & Sons  
Price: € 129,-  
ISBN 13: 978-1-118-45769-6

**Nanomaterials in Catalysis**

Nanocatalysis has emerged as a field at the interface between homogeneous and heterogeneous catalysis and offers unique solutions to the demanding requirements for catalyst improvement. Heterogeneous catalysis represents one of the oldest commercial applications of nanoscience and nanoparticles of metals, semiconductors, oxides, and other compounds have been widely used for important chemical reactions. The main focus of this field is the development of well-defined catalysts, which may include both metal nanoparticles and a nanomaterial as the support. These nanocatalysts should display



the benefits of both homogeneous and heterogeneous catalysts, such as high efficiency and selectivity, stability and easy recovery/recycling. The concept of nanocatalysis is outlined in this book provides a comprehensive overview of the science of colloidal nanoparticles. A broad range of topics, from the fundamentals to applications in catalysis, are covered, without excluding micelles, nanoparticles in ionic liquids, dendrimers, nanotubes, and nanooxides, as well as modeling, and the characterization of nanocatalysts, making it an indispensable reference for both researchers at universities and professionals in industry.

► Nanomaterials in Catalysis

Philippe Serp, Karine Philippot  
Wiley-VCH  
Price: € 149,-  
ISBN 13: 978-3-527-33124-6



## PEOPLE

**Dr. Michael Grolmes**, a founding principal of Fauske & Associates (FAI) and owner of Centaurus Technology, is re-joining FAI's team as an exclusive consultant. Dr. Grolmes spent 10 years with FAI before founding Centaurus where he has served as president for the last 20 years. Grolmes has more than 40 years of experience in multi-phase thermal hydraulics and process safety. He is an expert in the fields of fires, dust and powder explosions, runaway chemical reactions and related process safety technology. Founded in 1980, FAI became a wholly owned subsidiary of Westinghouse in 1986. FAI is recognized for phenomenological modeling related to the prevention and accommodation of chemical and nuclear power accidents.



Terry Robinson

**Terry Robinson** has been appointed as Executive Director of the Catalent Applied Drug Delivery Institute. The Institute was established in 2012 to accelerate the adoption of advanced drug delivery technologies through industry and academic collaboration, research, education, and the sharing of information. Robinson's appointment is a significant step in the furtherance of its mission to develop better treatments for patients. Robinson joined Catalent in 2008 as Director of Global Accounts, having previously held senior positions within large pharmaceutical companies. She brings more than two decades of experience in the pharmaceutical industry.



Roger Perlmutter

**Dr. Roger Perlmutter** will head Merck & Co's research and development, replacing retiring Dr. Peter Kim, who leaves behind a mixed record over the past decade at the drug-maker's highly respected laboratories. Merck, after recent setbacks for some of its most important experimental drugs, said the former Amgen research chief will take over as of April 15, and Kim will stay on as a company advisor until August. The appointment represents a homecoming for Perlmutter, 60, who joined Amgen in February 2001 after four years with Merck, where he oversaw global basic research and preclinical development.



Franz Humer

**Dr. Franz Humer**, Roche's influential Chairman said he will not stand for re-election next year, potentially accelerating a shift of emphasis towards the Swiss drugmaker's U.S. operations. "Roche is in excellent shape and well positioned to meet future challenges. This is a good time to hand over to a successor," Humer, 66, said in a surprise announcement at the company's annual general meeting in Basel. Humer, who has joint Swiss and Austrian citizenship, was the driving force behind the takeover in 2009 of U.S. biotech company Genentech, which has produced some of Roche's top-selling cancer medicines and helped it avoid the pain of patent expiries ravaging many rivals. A top candidate to replace Humer is Genentech and Apple chairman Arthur Levinson, who analysts say would pursue Humer's strategy of focusing on innovation but might push the company's centre of gravity further across the Atlantic.



Wolfram Stichert

**Dr. Wolfram Stichert**, co-founder and board member of hte since 2000, has been named new CEO as of January 1, 2013. He replaces Dr. Dirk Demuth, who has left the company. "I am very excited about this new role", says Dr. Stichert. "It is my personal aim to foster hte's quality leadership and enhance our customers' R&D with innovative concepts." Being one of the co-founders of the company, Dr. Stichert joined hte as one of the first employees in 1999 and has headed several organizational and scientific teams to support hte's foundation and growth processes. Dr. Stichert studied chemistry and economics, receiving a degree in economics from the University of Hagen as well as a degree and PhD in chemistry from the University of Frankfurt.

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FOR THE CHEMICAL AND LIFE SCIENCE INDUSTRIES 2013

**SPECIAL ISSUE: Distribution & Logistics for the Chemical and Life Science Industries**

Distributed together with CHEManager, CHEManager Europe such as at FECC Annual Congress, Chemspec Europe, Transport Logistic, CESIO and Forum Chemielogistik.

- Publishing date: May 23
- Advertising deadline: May 2

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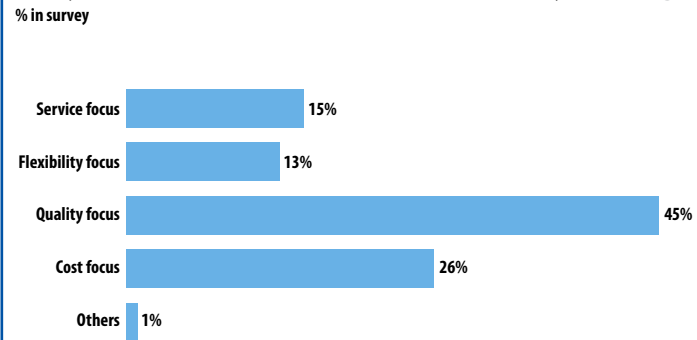
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## Operations Management in the Chemical Industry

### Survey Results – Value Chain Focus in the Chemical Industry



Source: Survey "Organizational Strategy of Operations Management", Merck Chemicals (Shanghai), Technical University Munich

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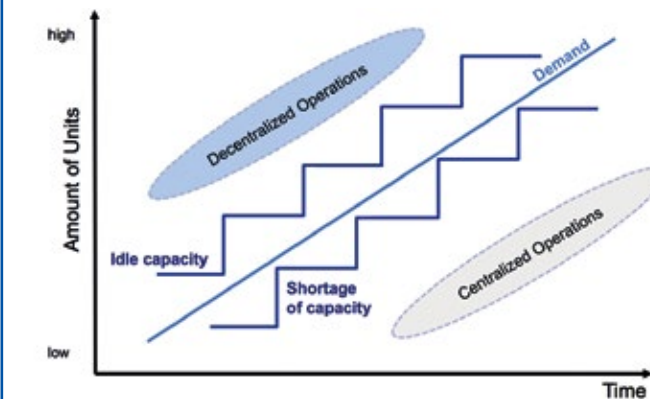
### Correlation of Organizational Structure, Operations Complexity and Business Diversity



Source: Survey "Organizational Strategy of Operations Management", Merck Chemicals (Shanghai), Technical University Munich

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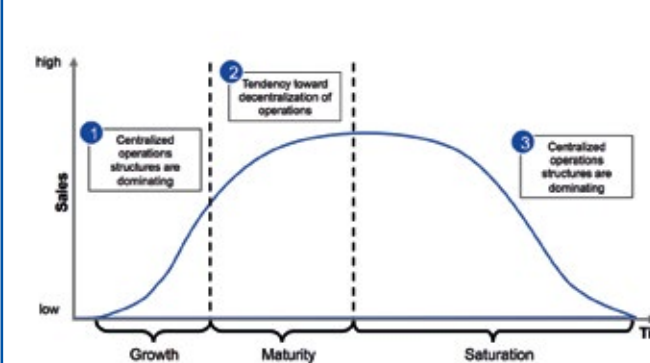
### Coherence of Capacity and Operations Structure



Source: Survey "Organizational Strategy of Operations Management", Merck Chemicals (Shanghai), Technical University Munich

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### Operations Structures in Different Product Life Cycles



Source: Levitt, T (1965), 'Exploit the product life cycle', Harvard Business Review, vol. 43, no. 6, p. 81, Survey "Organizational Strategy of Operations Management", Merck Chemicals (Shanghai), Technical University Munich

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An international expert survey conducted by Merck Chemicals (Shanghai) and Technical University Munich provides new insights into the organizational structure of operations in the chemical industry (c.f. the full article including Figs. 1 and 2 on page 10 of this issue). The trend toward strategic value chain design and process management can also be recognized in the chemical industry. Fig. 3 illustrates the survey results of the different specializations of each value chain in the chemical industry.

A quality focus is clearly dominating the operations organization, which needs to handle the internal and external complexity of manufacturing and supply chain processes as well as the diversity of the business portfolio. The survey could reveal new correlations regarding these two factors, which are shown in Fig. 4. It implies that a higher degree of business diversity as well as operations complexity suggest the utilization of a decentralized structure.

Higher complexity often implies growth of a business and a larger portfolio, which requires professional resource management. Managing capacity with a view toward the fulfillment of customer expectations as well as efficient asset utilization is a complex task in the chemical value chain network. Ensuring smooth operational processes by providing enough technical capacity increases labor and costs.

An interesting point of the survey is the correlation between specific capacity models and the distinct organizational structure that is primarily associated with them, which is illustrated in Fig. 5. There is a tendency toward idle technical capacity if decentralization increases. Therefore, companies need to implement a more sophisticated capacity management, in order to lower and monitor an excess of resources.

This includes a higher focus on product life cycle management. The survey indicates that products and services possess different operations strategies in each stage of their life cycle, which is illustrated in Fig. 6. During the growth stage, the dominating organization is a functional structure. Sophisticated and clear processes for new products need to be established, which can be achieved by the traditional functional structure. In the maturity stage, the business grows and the formal structures tend to develop into a more decentralized structure.

A focus on transparent resource management during this phase helps to prevent the unnecessary buildup of capacity. During the saturation stage, the trend toward process standardization increases and there is a significant tendency toward centralized structures. A chemical company needs to be aware of this phenomenon and design its operations structure as well as available capacity adequately in advance.

For more information on existing organizational models, the efficient restructuring of operations management, the importance of operational excellence as a competitive factor regarding efficient value chain design, and comprehensive survey results, please refer to page 10 of this issue.

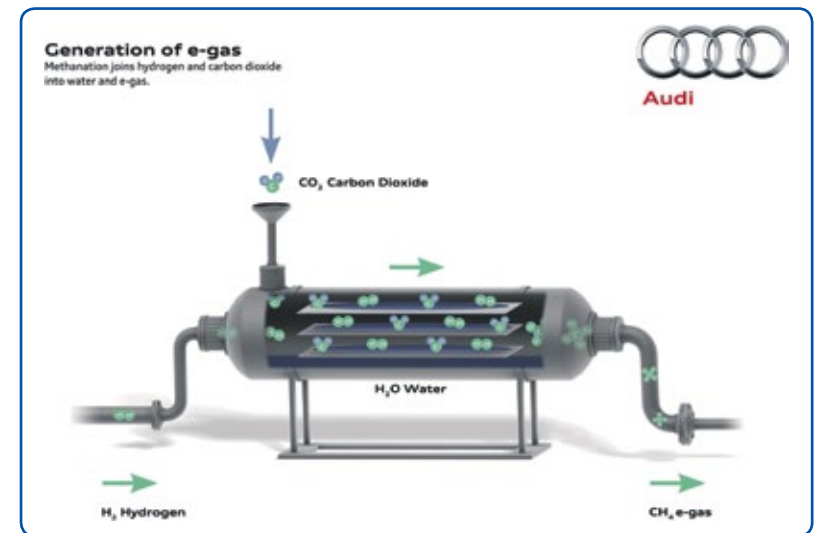
## Potential of Synthetic Methane on an Industrial Scale

While the change in energy policy is being discussed, MAN and Audi are creating facts. The vehicle manufacturer will produce and feed synthetic methane (Audi e-gas) into the public natural gas network starting summer 2013. The core component of the plant, which is being built in cooperation with equipment manufacturer SolarFuel, is a methanation reactor developed by MAN's Diesel & Turbo business.

Construction and production of the e-gas plant unit that is around 16 meters high done by MAN's specialists for chemical and physical reactors in Deggendorf, Germany. In December 2012, a heavy-duty transporter took the ready-for-use tower to the SolarFuel site in Werlte, which is 782 km away.

The ability to produce carbon neutral fuel from renewable electricity makes this facility special. Audi e-gas can be stored and transported with infrastructure currently available as it is nearly identical to fossil-based natural gas chemically speaking. As such, it can easily be distributed via the natural gas network as well as delivered to CNG stations.

"This order stresses once more our competence in building chemical apparatus with the aid of which



synthetic fuel can be produced," said Dr. Josef Dachs, head of MAN Diesel & Turbo's site in Deggendorf. "Whether we are talking about the Pearl in Qatar, the largest gas-to-liquids plant in the world operated by Shell, or Audi's e-gas project in the Emsland: Our know-how is in demand worldwide when it comes to finding and providing solutions for the future's mobility."

At Audi's plant, electricity from wind or solar energy is converted into e-gas in two major steps. In the first, the electricity is used for electrolysis. This process splits water (H<sub>2</sub>O) molecules into oxygen (O<sub>2</sub>)

and hydrogen (H<sub>2</sub>). The hydrogen then reacts with carbon dioxide (CO<sub>2</sub>), itself being a waste product from a nearby biogas plant, to become methane (CH<sub>4</sub>).

The dual electricity / gas principle of Audi's e-gas project is a practical example of how to make good use of the wind energy excess on stormy days when the existing German grid is insufficient to carry the load. The SolarFuel Werlte facility will generate enough CO<sub>2</sub>-neutral e-gas to power 1,500 CNG cars over 15,000 km every year.

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### Index

A. Schulman	1	Dr. Reddy	14	Novartis	14
Abbott	14	Drägerwerk	7	Opexa	12
Abbvie	14	DSM	1	Pepperl + Fuchs	9
ABCR	6	DuPont	1	PetroChina	6
AGAB	3	Eastman	1	Pfizer	14
Alfresa	8	Emirates SkyCargo	3	Procter & Gamble	12
Amgen	15	Evonik Industries	8	Ranbaxy	14
Antwerp Port Authority	4	Fauske & Associates (FAI)	15	Reliance Industries	4
Arkema	1, 9	FDA	14	Rhodia	1
Atotech	1	Fecc	15	Robert Bosch Verpackungsmaschinen	13
Audi	16	Ferro	1	Roche	15
Aveva	9	GBI Research	8, 12	Rockwood	11
Bank of Japan	7	Gempex	14	Roman Seliger Armaturenfabrik	1
Bank of Tokyo	7	GlaxoSmithKline	1, 12	Sabie	11
BASF	1, 11	GlobalData	12	Sanofi	14
Bayer	1, 14	GSK	14	Sinopec	6
Beiersdorf	12	Ineos	1	SolarFuel	16
Beumer	11	InfraServ Höchst	13	Solvay	1
Biesterfeld Spezialchemie	16	J&J	14	Stratley	6
Bilfinger Ind. Service	10	John Wiley & Sons	15	Sun	14
Boehringer Ingelheim	14	KemOne	1, 9	Suzuken Group	8
Bosch Packaging Technology	13	Klesch	1, 9	Technical University Munich	10, 16
Brabender Technologie	3	L'Oréal	12	Teva	14
Braskem	4	Lanxess	1	THE	15
Camelot Management Consultants	5	Lupin	14	Toho Holdings	8
Cargill	11	LyondellBasell	1	Unicore	12
Case Western Reserve University	1	MAN Diesel & Turbo	16	Unilever	12
Catalent	15	Medipal Holdings	8	University of Frankfurt	15
Cedarburg Hauser	12	Merck & Co.	10, 13, 15, 16	VCI	1
Cefic	1, 3	Merck KGaA	12	VDMA	3
Cipla	14	Mitsubishi	7	WBR Worldwide	4
Clariant	1, 5	Moelis & Co	1	Wiley-VCH	15
CMS Advisors	14	Monsanto	4	Worldwide Business Research	4
Dow	1, 11	Nara Machinery	9, 11	Zydlus	14

## Imprint

**Publisher:**  
Wiley-VCH Verlag  
GmbH & Co. KGaA  
GIT VERLAG  
A Company of  
John Wiley & Sons, Inc.

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

CHEManager Europe  
appears 11 times in 2013.

Print run: 20,000  
(IVW Report  
Q4 2012: 19546 tvA)  
Ninth year 2013  
Subscriptions  
11 issues €85.70  
incl. postage  
single copy €13.80  
plus postage

Students receive a discount of  
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**Printed by**  
Druckzentrum Rhein-Main  
GmbH & Co. KG  
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65248 Rüsselsheim

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ISSN 1861-0404