CHEManager EUROPE

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THE NEWSPAPER FOR THE CHEMICAL AND LIFE SCIENCE MARKETS

**Markets and Companies**

*A look at the fragmented world of specialty chemicals*

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**Markets and Companies**

*What impact do megatrends have on the chemical industry?*

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## Newsflow

**M&A-News:**

Lonza buys Arch Chemicals for $1.2 billion, making it a leader in the Microbial Control Business. Lonza CEO Stefan Borgas said the acquisition is an "excellent strategic fit" for the Swiss-based fine chemicals and contract manufacturing company.

Ecolab puts down over $5 billion Nalco, making it the largest acquisition in the company's history. Ecolab has a market capitalization of $12.85 billion, while Nalco has a market capitalization of $4 billion.

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CABB, a German provider of chemical building blocks, fine and specialty chemicals and custom manufacturing solutions, has acquired KemFine Group for about €140 million.

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**Investments:**

AkzoNobel said it is investing €140 million to convert its chlorine plant in Frankfurt, Germany, to state-of-the-art membrane electrolysis technology. The new facility, which will increase capacity by 50 %, is expected to go onstream at the end of 2013.

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Solvay has announced it will invest about €120 million in building a specialty polymers production plant in China in order to continue serving fast growing demand in the market.

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**People:**

AkzoNobel CEO Hans Wijers said he will be stepping down after the company's annual meeting next May. Sulzer President and CEO Ton Büchner is slated to take over the helm of the Dutch company.

Switzerland-based Carbogen Amcis announced that Mark C. Griffiths has been named chief executive officer, effective immediately

Beiersdorf's Markus Pinger will take over the reins at Celesio on Aug. 15. He is replacing Dr. Fritz Oesterle, who left the company at the end of June.

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# Focusing The Lens

## Anne Kilgore on Eastman's Heritage of Sustainability

**Spotlight** – It's a fitting analogy for a company whose roots lie in chemicals for photographic processes — focusing the lens. Eastman has sharpened the focus on its sustainability efforts in recent years, which has earned the company a spot in the Newsweek Green Rankings two years running. The Tennessee-based maker of chemicals, fibers and plastics material also launched its first sustainability review last year and joined the U.S. Department of Energy's Save Energy Now initiative. Brandi Schuster spoke with Eastman's Global Sustainability Director Anne Kilgore about how sustainability affects every aspect of the company's business, from process improvement to organic and inorganic growth.

*CHEManager Europe: Anne, as director of global sustainability at Eastman, what's your take of the use of the word "sustainability" in the industry?*

**A. Kilgore**: I always try to be careful when I use that word; when used too much, it gives people the idea that companies are just greenwashing when they talk about how sustainable they are. At Eastman, we have always had a focus on process improvement when it comes to eliminating waste. This is something we excel at, because it's good for cost, efficiency and the environment.

*Under its environmental goals, Eastman is shooting for annual 2.5% energy-efficiency improvements and a 20% reduction in greenhouse gas intensity over the next 10 years. How does the company plan on doing this?*

**A. Kilgore**: This is part of our Save Energy Now leader pledge we made with the U.S. Department of Energy. As only one of 11 chemical companies participating, this commitment will be challenging for our company, but it was very important for Eastman to be a part of this program. With this being a 10-year goal, we don't yet have a clear line of sight of how we're going to get there, which makes it all the more ambitious. We are bringing a level of focus and internal funding to make this happen, and it's being driven from the very top of the company to make sure we stay on track. One thing we are doing in light of the pledge is conducting assessments and surveys across our facilities. Going in at the actual site level helps those manufacturing areas better pinpoint sources of energy intensity and loss, through things like steam leaks and other sources of degradation. These are just a few aspects that will keep us on track and make sure we reach our goals.

As I said, Eastman has always had a focus on waste elimination process improvement, so we have a natural focus on process excellence. It isn't a surprise to any of our manufacturing sites that they can improve their throughput and their costs by improving the way they deal with energy, be it consumption, capture, recycling, reduction or elimination. In the end, this pledge is about how we can improve our footprint for our customers, and how we can run our plants more efficiently. The combination of these two factors will help us achieve this goal.

*Eastman launched its first sustainability review last year, which outlines the company's strategy for using sustainability as a primary driver of growth and innovation. The goal for economic growth states that two-thirds of the revenues from new product launches will offer sustainability benefits compared with the prevailing alternatives in the market. What does this mean specifically for Eastman's product line up and what are some "sustainability benefits"?*

**A. Kilgore**: We strive to help our customers deliver safer products that maximize value and minimize environmental impact. For us, sustainable attributes include enhanced safety, reduced carbon footprint, decreased water usage, and renewable raw material sourcing, among many more. Moving forward, a number of our new product lines will offer an improvement in one of those areas compared to alternative products.

One example of our advantaged product lines is the Solus family of performance additives that offer superior performance, productivity and aesthetics for more sustainable VOC-compliant paint and coatings. Solus is based on Eastman's cellulosic chemistry, which we have been pioneering over the past several decades for use in a variety of paint and coating applications. Because cellulose is nature's most abundant biopolymer, we are able to build the Solus line from renewable and sustainable raw material feedstock.

*Would you say that for Eastman, sustainability is more of a term that has to be adapted depending on what area you are talking about or what customers you are working with?*

**A. Kilgore**: Sustainability is what it is. I truly believe it is a very broad and holistic way of running a company, and actually participating in the value chain. When companies begin to consider concrete things they want to do to achieve a more sustainable footprint, that is the point where adaptability has to come into play. Companies have to listen to what their customers and value chains need and what solutions they want. Then a company has to leverage against its own technical expertise, and what it is able to achieve through its own portfolio, within its R&D pipeline and through its inorganic growth focus.

*When it comes to inorganic growth, what does Eastman look for in an acquisition or joint venture, particularly with the sustainability concept in mind?*

**A. Kilgore**: When we look at our inorganic growth opportunities, the lens that we apply has four high-level criteria to it: region, product offering, feedstock and sustainability.

Eastman is trying to disproportionately invest in fast-expanding regions. Acquisitions and joint ventures that help us meet the growing demand in these emerging economies are very interesting for us. Particularly in geographies such as BRIC countries, discretionary income is on the rise and with it the demand for more consumer products.

Another aspect we look at is differentiated products. We have a solid core of products that we're driving, and we have our R&D pipeline. We then ask ourselves: How can we go with adjacent technologies through acquisitions in order to differentiate our portfolio?

We also look at advantaged feedstock, which is defined as not only being in a low cost position, but also as being sustainable, such as from a cost of transport point of view. We also take into consideration the kinds of raw materials that would be involved in an acquisition or in a joint venture.

Sustainability is the fourth of these criteria, and it serves as an umbrella for the other three. We want to make sure that the differentiated products in any potential offering have sustainability benefits. This takes us back to the criteria Eastman uses when accessing its own products — carbon footprint; lifecycle assessment within the factory gates down to the final product; water usage; demand on other kinds of raw materials; feedstock origin; recyclability, etc.

In the end, we ask ourselves: Is this a nice offering from a financial point and feedstock point of view? Are the products in the portfolio in question going to deliver sustainability benefits? Will it offer differentiation from the current products in the Eastman portfolio?

*Has the company made any recent acquisitions that met all of these criteria?*

**A. Kilgore**: In June of this year, we announced the acquisition of Sterling Chemicals, a North American manufacturer of plasticizers and acetic acid. We plan to modify and restart Sterling's currently idled plasticizer manufacturing facility to produce non-phthalate plasticizers.

In March 2010, we also acquired Genovique Specialties, a global producer of benzoate non-phthalate plasticizers and sodium benzoate. Eastman has continued to see a growing customer demand for non-phthalate plasticizers over the past couple of years. Through the Genovique acquisition, Eastman is uniquely positioned to offer customers a broad range of general purpose and specialty non-phthalate plasticizer solutions that meet regulatory requirements throughout the world.

Both of these acquisitions fit perfectly with our business strategy to grow our family of non-phthalate plasicizers, and we feel it has positioned us to lead the industry by providing a wide range of solutions.

*In Newsweek's 2009 Green Rankings, Eastman was no. 95 out of 500 companies, and no. 2 in the category basic materials. The company seems to have slipped in 2010, coming up no. 143 overall and no. 7 in basic materials. What do you attribute this to?*

**A. Kilgore**: We are still pleased with the ranking. While the parameters didn't change, but the companies included in the ranking did, and that can affect the average score for the total companies in the population and the relative position against the average. That means that in 2010, the average went up because the companies that were included in the ranking changed.

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***Sustainable attributes include enhanced safety, reduced carbon footprint, decreased water usage and renewable raw material sourcing.***

**Anne Kilgore,**
**Global Sustainability Director, Eastman**

## CONTENT





# Arch Buy Puts Lonza at Head of Microbial Control Business

Lonza said it will acquire U.S. biocide producer Arch Chemicals for about $1.2 billion. The cash offer is subject to customary conditions including the tendering of more than two-thirds of Arch Chemicals' outstanding shares of common stock and clearance from antitrust regulatory authorities. Lonza began its tender offer on July 15; it is set to expire on Aug. 11.

Lonza CEO Stefan Borgas said the acquisition is an "excellent strategic fit" for the Swiss-based fine chemicals and contract manufacturing company. The takeover will put the company at the forefront of the microbial control business, with 2010 pro-forma sales in the market of about $1.6 billion, combining the complementary product solutions of both companies.

Stefan Borgas, Lonza, CEO

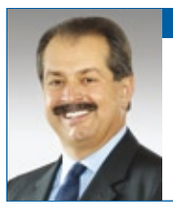
The global microbial control market is currently valued at approximately $10 billion, and is growing at approximately 4-6% per year. The key end-use segments of the market – water treatment, hygiene, materials protection and personal care – are growing at faster rates. The largest markets are North America, Europe and Japan. The fastest growing microbial control markets are Brazil, India, China and South Africa. ■

# AkzoNobel to Invest €140 Million in Frankfurt

AkzoNobel said it is investing €140 million to convert its chlorine plant in Frankfurt, Germany, to state-of-the-art membrane electrolysis technology. The new facility, which will increase current capacity by around 50%, will help to reinforce the company's positions in Europe's caustic lye and chloromethanes markets, while the total eco-footprint per ton of product will be improved by nearly 30%. Due to come on stream in the fourth quarter of 2013, the Frankfurt operations will apply the latest membrane technology and enable the business to increase annual production of chlorine at the location to an expected 250 kilotons, up from 165 kilotons today.

AkzoNobel Industrial Chemicals operates three chlorine plants in Germany (Frankfurt, Bitterfeld and Ibbenbueren) and two in the Netherlands (Rotterdam and Delfzijl). In 2010, these five facilities exceeded one million tons in total production. Mostly known as a disinfectant for drinking water and in swimming pools, chlorine is used for a wide variety of applications, including PVC, epoxies and polyurethanes. It is also used in the production of 85% of all pharmaceuticals. The company took over the site in Frankfurt in 2009 as part of the LII Europe acquisition. ■

# Dow Chemical, Saudi Aramco Announce JV



Andrew Liveris, Dow CEO

Dow Chemical and Saudi Aramco have approved the formation of a joint venture to build and operate a world-scale, fully integrated chemicals complex in Jubail Industrial City, Saudi Arabia. The new joint venture will be named as Sadara Chemical Company. Construction will begin immediately and the first production units will come on line in the second half of 2015, with all units expected to be up and running in 2016. Once operational, Sadara is expected to deliver annual revenues of approximately $10 billion.

"[This] announcement is outstanding proof of Dow's ongoing commitment to our growth strategy," said Andrew Liveris, Dow's chairman and CEO.

Total investment for the project, including third party investments, will be approximately $20 billion. Sadara will become an equal joint venture between Saudi Aramco and Dow after an initial public offering. In addition to equity from the partners, Export Credit Agencies and financial institutions will provide project financing to Sadara. ■

# DuPont Acquires Innovalight

DuPont has acquired Innovalight for an undisclosed amount. Innovalight is a company specializing in advanced silicon inks and process technologies that increase the efficiency of crystalline silicon solar cells. The acquisition further strengthens DuPont's position in materials for the solar energy market, enabling a broader and more integrated photovoltaic materials and technology offering. ■

# Cathay Industrial Biotech Files for IPO Of Up To $200 Million

China's Cathay Industrial Biotech, the world's largest producer of biobutanol, has filed a registration statement on Form F-1 with the U.S. Securities and Exchange Commission to raise up to $200 million in an initial public offering of American Depository Shares. Shanghai, China-based Cathay Industrial Biotech has applied for the listing of the ADSs on the Nasdaq Global Select Market under the symbol "CBIO," the filing showed.

The company, which generated annual sales of $124.6 million in 2010, has two additional product candidates in its development pipeline: I+G, a food flavor enhancer that complements monosodium glutamate (MSG), and a bioprocess technology to produce biobutanol from cellulosic biomass feedstock. The company expects to start commercial sales of I+G by the end of the first half of 2012. ■

# Ecolab Buys Nalco for $5 Billion

Cleaning and pest-control service provider Ecolab has agreed to take over water treatment company Nalco Holding for about $5.4 billion. The total enterprise value on the deal is said to be around $8 billion, including net debt. This is the largest-ever acquisition for the St. Paul, Minn.-based Ecolab.

Nalco is a producer of chemicals aimed at reducing resource consumption and minimizing environmental releases. The company, founded in 1928 as National Aluminate Corp., was publicly traded until 1999, when it was acquired by French utilities giant GDF Suez for $4.1 billion.

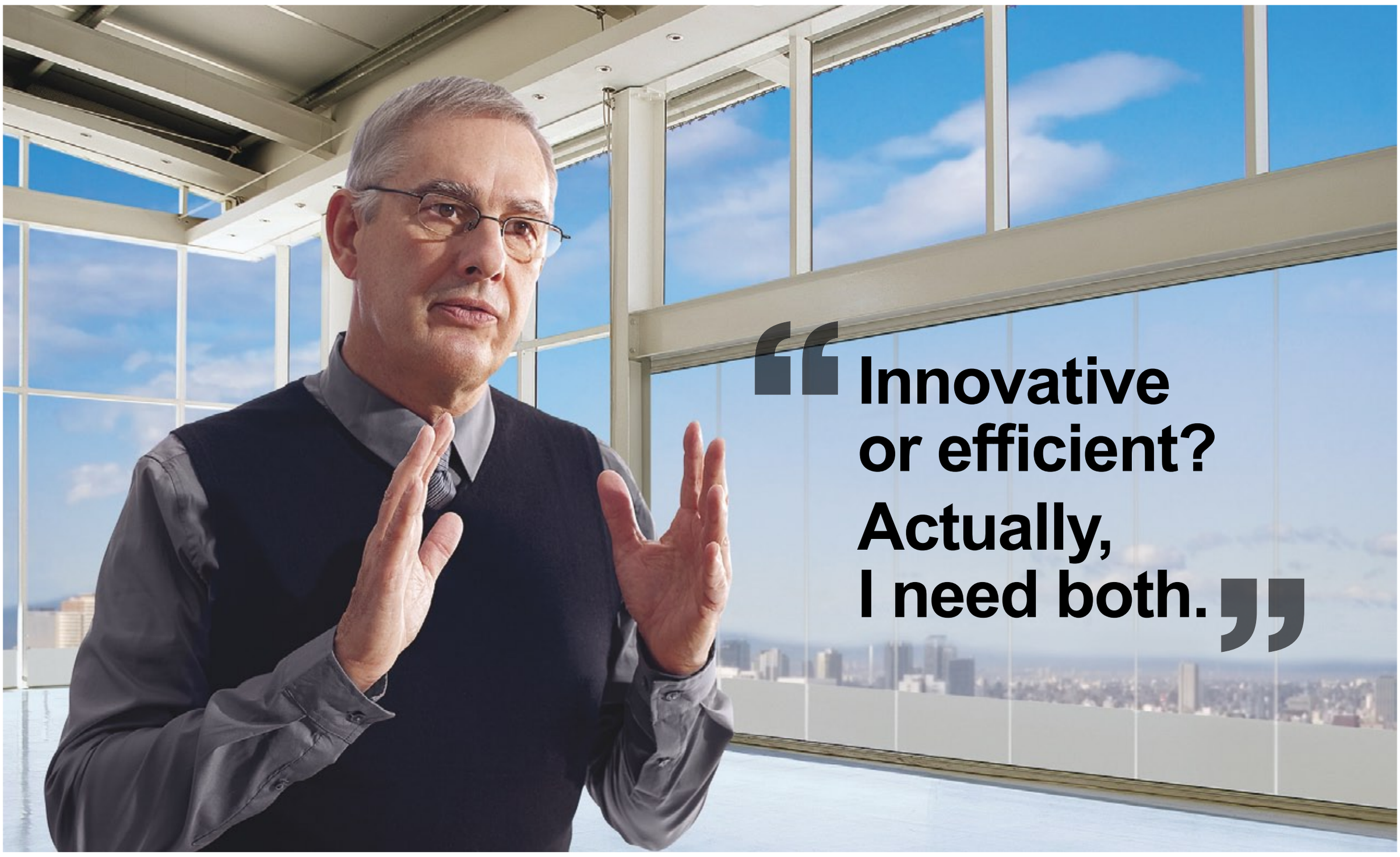
Nalco was sold by GDF Suez in 2003 to a group comprised of Blackstone Group, Apollo Management and Goldman Sachs Capital Partners for $4.2 billion, and filed to go public a year later. Ecolab has a market capitalization of $12.85 billion, while Nalco has a market capitalization of $4 billion. ■

# Solutia Q2 Profit Rises

Solutia reported second-quarter net income attributable to the company of $68 million or $0.56 per share, compared to $41 million or $0.34 per share last year.

Adjusted earnings for the quarter increased to $69 million or $0.57 per share, compared to $53 million or $0.44 per share in the prior year period. On average, six analysts polled by Thomson Reuters expected earnings of $0.56 per share for the quarter. Analysts' estimates typically exclude special items.

Net sales for the quarter grew 8% to $543 million from $502 million in the same period last year. Looking forward, the company maintained its adjusted earnings guidance range of $2.10 to $2.25 for the full year. Analysts currently expect $2.21 per share for the full year. ■

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DOW CORNING


**CABB to Acquire KemFine Group** CABB, a German provider of chemical building blocks, fine and specialty chemicals, and custom manufacturing solutions, has acquired KemFine Group through its Swiss subsidiary AXCABB for an estimated €140 million. The transaction is subject to standard competition clearances. KemFine Group focuses on the custom manufacturing of fine chemicals for the global agro and pharma industry. It is headquartered in Helsinki and operates a production facility in Kokkola, Finland. It has approximately 190 employees and in 2010 had sales of €81 million.

CABB is one of the world's leading suppliers of chemical building blocks based on chlorine and acetic acid and is the world market leader in monochloroacetic acid (MCAA), an essential component used in a wide range of applications ranging from herbicides, personal care to the food industry. It is also a leading custom manufacturer for global agrochemical, food, pharma and chemical companies.

**Wacker Sells Tire-Release-Agent Business to Rhein Chemie** Germany's specialty chemical products company Wacker Chemie has sold its silicone-based tire-release-agent business to Rhein Chemie Rheinau for an undisclosed purchase price. Wacker noted that the two companies signed a purchase agreement and the multiyear agreement ensures that Rhein Chemie will continue to be supplied with Wacker's silicones for the manufacture of tire-release agents. As part of the agreement, Rhein Chemie acquires the rights to related product formulations, as well as existing segment-specific contracts and inventories. Furthermore, Wacker will continue to supply Rhein Chemie with the required silicone raw materials, among other products.

**Emerson Acquires Net Safety Monitoring** Emerson Process Management, a business of Emerson, has acquired Net Safety Monitoring, Inc., a global company active in the design, development and manufacture of fixed toxic and combustible gas detectors, flame detectors, safety systems, and other safety and security products. The acquisition expands Emerson's capabilities to provide comprehensive process controls and safety monitoring for the toughest industrial environments. Terms of the agreement were not disclosed.

Net Safety and its global sales and support offices in Calgary, Houston, Abu Dhabi, Beijing and Singapore will continue operating as a separate business within Emerson Process Management's Analytical Group.


**Dow Chemical, Ube Form Electrolyte Joint Venture** Dow Chemical has formed a joint venture with Japan's Ube Industries to produce electrolytes for lithium ion batteries, the companies said.

The joint venture, Advanced Electrolyte Technologies LLC, will build a plant near Dow's Midland, Mich., manufacturing complex in 2012 to produce electrolytes, which act as an electrical conduit between a battery's cathode and anode. Each company will have a 50% stake in the venture. Dow declined to provide specifics of its initial investment.

Midland-based Dow expects the market for lithium ion battery materials to reach $8 billion by 2020, up from $400 million today. There are no estimates on the number of jobs the venture will create, and revenue estimates are not being disclosed, a Dow spokesman said.

Dow said the new plant would be able to produce 5,000 to 10,000 tons of electrolytes per year.

The joint venture is considering building plants in China and Europe within five years, Dow said.

**Azerbaijan's SOCAR Raises Stake in Turkish JV** Azeri state energy company SOCAR has raised its stake in a joint-venture with Turkish company Turkas Energy to 75% from a previous 51%, Turkas said in a statement. SOCAR has acquired 23.98% from Aksoy Holding, which owns 0.02% in the JV after the deal. Turkas owns the remaining 25%.

SOCAR/Turkas JV was set up in 2006 to invest in projects in the oil, oil refinery and chemical sectors and for selling natural gas in Turkey. It plans to construct an oil refinery in Turkey with a capacity of 10 million tons per year and to create port infrastructure.

Investment in both projects is estimated at about $5 billion. The refinery will supply major Turkish petrochemicals firm Petkim, which is controlled by SOCAR. Its main products will be gasoil, jet gasoline, naphtha produced for domestic consumption in Turkey as well as for export.

**SABIC, Maaden JV Starts Initial Production** Saudi Arabian Mining (Maaden) has said its phosphate joint venture with Saudi Basic Industries Corp (SABIC) started initial production in June.

"Maaden … announces that Maaden Phosphate Company has started initial production from the first production lines of sulfuric acid, phosphoric acid for captive use and Diammonium Phoshate Fertilizer (DAP)," Maaden said in a bourse statement.

SABIC owns 30% in the joint venture, while Maaden holds the remainder. The joint venture will produce about three million tons per year of DAP when it reaches full production, the statement said.

# Cefic Sees 4.5% Growth in 2011

According to the latest Cefic Chemical Trends report, EU chemicals production continued to expand in April, up 2.9% over April 2010. The first four months of 2011 have been strong for the sector, with production up to 4.7% year over year. The trade group revised upward its annual summary forecast of chemicals sector economists, predicting growth in 2011 to reach 4.5%. This is up from the initial 2.5% predicted in November. Cefic said it doesn't expect 2012 to be as strong, forecasting 2.5% growth for next year.

Speaking at a press briefing in Birmingham, Cefic Director General Hubert Mandery said: "Strong growth since our last forecast was driven especially by a combination of robust manufacturing and continued strong durable goods exports. EU output by the end of this year will likely remain below all-time

Hubert Mandery, Cefic Director General

levels reached in 2007, but should reach the pre-crisis threshold toward mid-2012."

The chemicals trade group forecasts EU gross domestic product to grow by 1.8% in 2011, up from 1.6% originally forecast in November. Cefic predicts expansion in 2012 to remain unchanged at 1.8%, while expecting EU manufacturing to grow by around 6% in 2011 and 3% in 2012.

Alan Eastwood, economic adviser for the UK Chemical Industries Association, noted the uneven development in manufacturing output in the EU27 countries. While all of the countries are recovering from the economic downturn, Poland is leading the way in output, well ahead of Germany and the EU27 average. Bringing up the rear are countries such as Italy and Spain.

In terms of global demand, Eastwood said that China and the rest of Asia continue to be the main locomotive of strong overseas demand.

"Outside Asia, developed markets are expanding, but at slower rates, while the overall world economy continues to make slow but steady progress," he said.

Strong orders from EU durable goods manufacturing, especially light vehicles and machinery and equipment, have led to bottlenecks that now appear in chemicals subsectors as demand outstrips supply. Construction, an important chemicals customer, remains depressed but shows early signs of turning the corner. Automotive and plastics processing are two sectors where recovery has been particularly strong.

Sources of uncertainty include continued turbulence in the eurozone due to unresolved problems with sovereign debt. Outside of the EU market, geopolitical concerns have placed upward pressure on commodity prices, namely oil.

The industry has continued to fine tune its business since the pre-crisis levels in early 2008, paring down the workforce by 9% while net exports have reached a record high. Sources of increased competitive pressures will come from developing countries, especially increased capacity in Asia and the continued use of low-cost shale gas in the U.S.

*Brandi Schuster in Birmingham*

# Beyond The Production Site

## How Sustainable Practices Can Make Companies More Innovative

**Innovatus** – The word innovation derives from the Latin innovare, an expression that dates back to 1540 and means "to renew or change." In other words, an innovation can be considered anything that adds value by having novelty as a consequence.

Ideally, innovation should be a current that flows through the organizational chart of every company, regardless of hierarchical levels. In order to deliver an improved outcome, all members of the supply chain must be outrageously engaged in making improvements focused on reaching innovative results.

Being such a crucial effort towards development and success, innovation is also one of the greatest paradoxes of our time. We live in a world where everything needs to be faster, more efficient, more productive, easier – and preferably cheaper. Technological improvements have made it possible for the industry to reach outstanding results in a time-efficient, cost-effective way. On the other hand, environmental consequences can be devastating. So, the very first question that arises is: How to innovate in a sustainable and ethical manner?

### It's Not Easy Being Green

In 1996, the United Nations Conference on Trade and Development (UNCTAD) launched the BioTrade Initiative – an undoubtedly innovative concept. BioTrade refers to the collection, production, transformation and commercialization of goods and services derived from native biodiversity under the criteria of environmental, social and economic sustainability.

Although an increasing number of companies claim to be green, adopting ecologically friendly practices is simply not enough. It is necessary to be sustainable – and that means supplying products from transparent and traceable sources in strict compliance with global socio-environmental standards. Thus, sustainability is the result of three interdependent factors: natural environment, economic vitality and healthy communities.

Filipe Sabará, Business Director, Beraca

The first step towards establishing a sustainable production chain is the responsible exploitation of natural resources. Researchers at University of Maryland estimate that the income generated by forest resources corresponds to approximately $1.1 trillion per year. At the same time, according to a study conducted by Dr. Philip M. Fearnside at the National Institute of Amazonian Research (INPA), it would be necessary to spend $3 trillion per year to control the negative effects of global warming as a consequence of deforestation.

### Quality Of Life

The conservation of natural resources, though, must be combined to improvements in the quality of life of local populations. The best way to reach this balance is through neo-extractivist activities, which make use of developed technologies, respect the communities' identity and lifestyle, apply fair prices, and have a compensation policy for environmental services such as clean water and soil, carbon sequestration, and reforestation.

The first challenge related to ethical sourcing involves identifying sustainable activities that can be performed by local communities in industrial scale within the environmental capacity. Further to that, each extractive product has individual ecological, economic, social and ethnic-botanical characteristics and requires special attention regarding labor absorption, manufacturing expertise, stock management, market development, shelf-live evaluation, and social/economic organization.


**The only way to build long-lasting relationships with local communities is to bring traditional and scientific knowledge to industrial scale through a sustainable process.**

### A Transparent Relationship

The Biodiversity Enhancement Program created 10 years ago by Beraca aims to ensure traceability in the supply of raw materials from Brazilian biomes, particularly the Amazon region. Focused on local communities, our project contributes to improve regional development and to preserve the largest rainforest in the world.

The only way to build long-lasting relationships with local communities is to bring traditional and scientific knowledge to industrial scale through a sustainable process. A transparent relationship must be established prior to harvesting and contracts must be based on benefit sharing, taking into account the use of genetic resources and intellectual property rights. The company must also invest in local development, which includes improvements in infrastructure, training, handling, and certification of raw materials.

Last but not least, while the concept of ethical sourcing is usually only related to the relationships with suppliers, it is also crucial for companies to communicate and work closely with other stakeholders. Consumers must also be provided with knowledge concerning the environmental and social impacts involved in the finished product.

Innovation must be linked to nature conservation and social enhancement through partnerships between companies, local communities and consumers. Before taking action, the industry must carefully analyze our planet's reality and identify potential vulnerabilities regarding the growing demand for products and services. Above all, innovation is only legitimate if it contributes towards promoting sustainable development on a global scale.

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**Syngenta H1 Profit Up** Syngenta reported a 14% rise in its first-half net income attributable to the company's shareholders to $1.43 billion from $1.25 billion last year. Excluding restructuring and impairment, quarterly earnings per share were $15.60, higher than $13.95 in the year earlier period. The company reported first-half sales of $7.7 billion, up 14% from $6.74 billion in the comparable period a year ago. Sales at constant exchange rates increased by 12%.

**Air Products Q3 Profit Rises** Industrial chemical and gas producer Air Products reported a higher third-quarter profit, as sales grew 14% from last year. The company also provided earnings per share guidance for the fourth quarter and fiscal 2011. In the third quarter, net income attributable to the company increased to $326.5 million or $1.5 per share from $253.2 million or $1.17 per share in the previous year. Earnings from continuing operations for the recent quarter were $1.46 per share. For the fiscal, earnings are expected to be in the range of $5.70 to $5.75 per share.

**AkzoNobel Q2 Profit Flat** AkzoNobel reported that its second-quarter profit from continuing operations was almost flat at €273 million. Earnings per share from continuing operations were €1.07 compared to €1.05 in the previous year quarter. Net income for the period was €268 million, lower than €273 million in the prior year quarter. Earnings per share from total operations decreased to €1.14 from €1.16 in the same quarter last year. Adjusted net income for continuing operations was €256 million, compared to €275 million in the same period last year. Adjusted earnings per share for the quarter were 1.09, down from €1.18 in the previous year quarter. Quarterly revenue rose 5% to €4.1 billion from €3.91 billion last year, driven by volume and price.

**Johnson Matthey Q1 Underlying Profit Rises** Autocatalysts and precious metals maker Johnson Matthey reported a strong growth in its first-quarter profit and sales, benefited principally from higher demand for products and operational leverage. Looking ahead, the company projects significant growth in the first half. In its interim management statement for the first quarter, Johnson Matthey noted that its underlying profit before tax increased 19% from last year to 98.2 million pounds. Sales for the quarter, excluding sales of precious metals, grew 12% to 617 million pounds.

**Mosaic Q4 Profit Surges** Mosaic has reported a substantially higher profit for the fourth quarter, as sales grew 54% on increased selling prices and volumes. Looking ahead, the company provided a positive outlook for fiscal year 2012. For the fourth quarter, Mosaic's profit surged to $649.2 million or $1.45 per share from $396.1 million or $0.89 per share in the year-ago period. Results for the quarter include $52 million or $0.07 per share of discrete expenses that included an asset write-off, additional environmental accruals, multi-year community investments, and Cargill split-off transaction expenses.

Revenues for the quarter grew 54% to $2.860 billion from $1.860 billion in the year-ago quarter. Five Wall Street analysts had a consensus revenue estimate of $2.54 billion for the quarter.

**Avery Dennison Details Weak Q2 Outlook** Avery Dennison provided a weak second-quarter outlook and also cut its expectations for the full year. The company attributed the weak outlook to a nearly 5% decline in unit volumes at its Pressure-sensitive Materials, and Retail Branding & Information Solutions segments. For the second quarter, the company expects earnings of $0.64 to $0.69 per share, and adjusted earnings of $0.74 to $0.79 per share. On average, seven analysts polled by Thomson Reuters expect earnings of $0.88 per share for the quarter. Analysts' estimates typically exclude special items. The Pasadena, Calif.-based company expects second-quarter revenues of about $1.7 billion. Wall Street analysts expected revenues of $1.83 billion for the quarter.

**Novartis Posts Higher Q2 Profit** Novartis reported second-quarter net income of $2.73 billion or $1.13 per share versus $2.44 billion or $1.06 per share in the year-ago quarter. Core net income for the quarter increased to $3.56 billion or $1.48 per share from $2 77 billion or $1.20 per share in the previous year. Quarterly sales climbed to $14.92 billion from $11.72 billion in the prior year. Analysts polled by Thomson Reuters expected the company to report earnings of $1.40 per share on revenues of $14.42 billion for the quarter. Analysts' estimates typically exclude special items.

**Johnson & Johnson Q2 Profit Down** Johnson & Johnson reported that its second-quarter net earnings were $2.776 billion or $1 per share, down from $3.449 billion or $1.23 per share in the same quarter last year. Adjusted net earnings rose to $3.548 billion or $1.28 per share, from $3.382 billion or $1.21 per share in the year ago quarter. Analysts polled by Thomson Reuters expected the company to report earnings of $1.23 per share for the quarter. Analysts' estimates typically exclude special items.

Sales for the quarter rose to $16.60 billion from $15.33 billion in the prior year quarter. Eleven analysts had consensus revenue estimate of $16.22 billion for the quarter.

The company maintained its earnings guidance for full-year 2011 of $4.90-$5 per share. Analysts expect the company to report earnings of $4.95 per share for fiscal 2011.

**Lilly Q2 Profit Slips; Revises 2011 Outlook** Eli Lilly's Q2 net income decreased to $1.20 billion or $1.07 per share from $1.35 billion or $1.22 per share last year, mainly driven by lower operating income, partially offset by a lower effective tax rate. In the second quarter of 2011, worldwide total revenue was $6.253 billion, an increase of 9% compared with $5.75 billion in the second quarter of 2010. This 9% revenue growth was comprised of increases of 5% in volume and 4% due to the impact of foreign exchange rates. Twelve analysts estimated revenues of $5.99 billion for the quarter.

# Focusing The Lens

◀ Continued **Page 1**

However, it should be noted that our reputation scoring from them actually went up. We were given credit for more transparency in our reporting and our willingness to talk about where Eastman is on its journey and what we are trying to do to improve the overall sustainability of our plants, our facilities and our products.

***In that regard, how important is looking for alternative feedstock for Eastman?***

**A. Kilgore**: This is something very important to Eastman, and we are actively researching it through our sustainable materials platform. We also have a legacy of cellulose technology, and this still feeds a significant part of our current portfolio. Therefore, we're always looking ways to leverage and accelerate adjacent product development using this kind of technology.

We also have new innovation products in our growth pipeline that are sourced from natural materials. For example, we are working to apply acetyl technology and our expertise in acetylation onto wood products in order to apply an acetylation process to lumber and wood products to increase their durability and lifetime.

We are also researching the more traditional bio-based route to chemicals using non-edible natural feedstocks. In general, the area of alternative feedstocks is something we look at growing both organically and inorganically.

***In light of the reform of the Toxic Substances Control Act in the U.S. and the rollout of Reach in Europe, how does Eastman stay ahead of environmental regulations?***

**A. Kilgore**: Staying ahead just for the sake of staying ahead could be money wasted. We pay close attention to external trends and changing perceptions; we are also very active in non-governmental and governmental associates alike. That way, we get a sense of what might be coming down the line in terms of regulations. Then we can find out what we can do to help shape them with our expertise and how we can also adjust our strategy to actually benefit from any forthcoming regulations.

Looking at Reach, we've taken the European regulation as an opportunity to drive business growth rather that seeing it as another bothersome compliance requirement. We've been very active in determining what products we were going to register, where we were going to register them and how we were going to leverage them.

***How did Eastman deal with products that could be problematic under Reach?***

**A. Kilgore**: We have very few products that we were disadvantaged as a result of the registration, mainly because Eastman has always worked to remove products that we considered to be problematic from our portfolio. We have assessment criteria we use when we try to understand how sustainable our products are; we look at aspects such as toxicity, hazard, footprint, material consumption, waste stream, etc. Over the years, we've intentionally moved away from "problematic" products and have moved into other areas to create a fairly benign portfolio. Also, Eastman's infrastructure certainly also helped: With a 90-year history and 25 years of Responsible Care, we already had a lot of things documented.

***So Reach hasn't posed any real problems for Eastman.***

**A. Kilgore**: Well, it has posed all sorts of costs for us, which is normal when it comes to regulations. We clearly had all of the challenges all other players have. The bottom line is that it is not inexpensive to comply with all of these broad-range regulations that are happening all over the world. In the end, however, we actually grew in some areas as a result of Reach, and the regulation didn't present any problems in terms of our relationships with our customers.

▶ www.eastman.com

# A Fragmented Industry

## Global Specialty Chemicals is a World of Extremes

**Commoditization** – The global specialty chemicals industry has revenues in excess of $550 billion and is quite fragmented with 350 industry sub-segments and considerable geographic diversity. While the industry provided considerable growth and added value characteristics through the early 1990s, it has been on the path of commoditization for over a decade. The economic crisis that peaked in 2009 featured a significant decline of revenues in North America and Europe but comparatively better performance among Asian specialty chemical sectors.

Uwe Nickel,
Arthur D. Little

It has regained strength in the beginning of 2010 and has reached today all time highs with historically high earnings before interest, tax, depreciation and amortization (EBITDA) margins for nearly every specialty chemicals company due to excellent utilization rates and a partially regained strength to pass raw material prices to customers.

The world of specialty chemicals has evolved today to be a world of extremes – dominated by larger players or new larger entrants that lever diversified portfolios, scale and more sophisticated management approach, offset by the more traditional focused and multi-business smaller cap specialty players. The development in and after the economic crisis while having tested the robustness of both focused and larger diversified players has not driven the level of consolidation thought likely by many industry observers and has interestingly underscored the financial resiliency of this segment.

The industry shift to larger diversified portfolio structures and the commodity-light approach has been a theme that has been employed by many successful industry participants. The shift rightfully reflects a higher value financial path for these companies looking at sustained cash flow potential and asset intensity.

### Big is Beautiful: Scale and Portfolio Diversification

Increasingly today, the specialties market is becoming dominated by larger portfolio players with multi-chemical capability bringing management sophistication, scale and global reach. These sophisticated players are pursuing complex, multi-technology growth markets and platforms in nutrition, electronics and other attractive product areas that are supported by strong macro-level growth trends. These are large and long duration investments that also usually require acquisitive entry for at least in part. We have been seeing a range of acquisitions by companies like Dow, DSM and BASF over the years that are strategically motivated filling in the "mosaic" pieces that fit with longer-term strategic ambitions and increase entry barriers for smaller, less sophisticated players.

Consequently, following global megatrends and incorporating them into the strategic portfolio management as well as finding new growth through innovation provides large opportunities for the specialty chemicals industry if companies can leverage their capabilities and size. For small specialty chemicals companies it will be difficult to finance long-term innovations that help to solve the key challenges of humankind and generate the amount of profit in return.

### China and the Middle East: Aggressive Growth in Specialties?

Asian companies currently have a ravenous appetite for cross-border deals to access more specialties growth to cover the rising need of specialties countries like China. The specialty sector in many ways is illusive to these new entrants – except, of course, to the more commoditized parts of the industry that have far lower entry barriers. Much of the specialty sector is rife with commercial complexity that includes a product technology and customer complexity dimension that present very significant barriers to easy entry. The desire to grow in specialties and need to access intellectual capital will likely drive some additional cross border deals. These transactions will serve to provide an impetus to develop a more common view of return criteria and we believe are healthy for the normalization of the industry. A couple of large sophisticated players in China have emerged that will help consolidate the fragmented China market and build meaningful capability in specialties moving forward.

Furthermore, the Middle East – which has focused on base chemicals based on cheap feedstock rather than on the development of specialty chemicals over the last 25 years – will mainly boost itself through acquisitions or joint ventures. The search of opportunities in the specialty chemicals market (instead of more petrochemicals) as strategic portfolio alternatives has been triggered by changes in feedstock availability and prices. This also goes for local or government-owned petrochemical companies that have to search more for alternative products and markets that create value through the process chain and a higher specialization rate via application services. On top of it, there is a clear demand in this region to increase the specific employment rate per ton produced (which is 10 to 50 times higher in specialty chemicals compared to petrochemicals) to contribute to the efforts and needs to overcome high unemployment rates in some of the Middle East countries.

### David vs. Goliath: The Power of Focus

While larger portfolio players will have an edge in accessing more sophisticated growth opportunities, the power of focus is tried and true in the specialties area. Companies like Ecolab, IFF, Altana and Merck KGaA are small to medium and highly profitable companies that are leaders in their respective fields by focusing on a relatively narrow but highly specialized portfolio. The value of focus extends through to market, domain and business model approach. These segments often have a significant incumbency advantage and nice entry barriers that are often not technology related, but rather related to fragmented market structure, branding and strong commercial innovation on the basis of excellent application know how and highly functionalized products.

While these examples are more extreme in terms of focus, there are many cases of companies that have created more focused businesses from larger diffuse portfolio – for example, Arch Chemical – the biocide company – and Albemarle with a leading position in catalysts and selected fine chemistries. In both cases, the companies created profitable niches in which they can build out advantaged positions.

Well-chosen specialty domains can be highly profitable and, if well managed, sustainable for advantage, and certainly defensible from many forms of new entry, but often times not scalable or providing much in terms of growth optionality.

### Consolidation Path: Where's All the Consolidation?

There has been a fair amount of consolidation over the last few years that has been largely driven l by cross-border interests and larger strategic portfolio strategies. We have seen BASF aggressively pursue several sizeable transactions including Engelhard, Ciba and Cognis – addressing several strategic growth ambitions. Dow's acquisition of Rohm and Haas and Solvay's recent takeover of Rhodia has been an historic event in terms of the magnitude of the portfolio shift attempted.

While timing appeared to be the enemy of BASF's Ciba acquisition and Dow's purchase of Rohm and Haas lead to relatively high EBITDA multiples, it is a tribute to management have executed on these multi-step implementations in the middle of a downturn swing of the economy in 2008. Today, these acquisitions have become significant and profitable cornerstones of the portfolio of those companies going forward. The ultimate company will have a diverse specialties platform that should be positioned for success across an array of attractive growth markets, albeit this can only be accomplished with a price that makes it difficult for the deal to ever be accretive given the timing.

While a number of companies have escaped the distressed category in the past 12 months, new industry consolidation has been stymied by availability of credit, relative valuation levels and perceived risk related primarily to demand uncertainty.

### It's All About Growth: Driven by Portfolio and Innovation Management

Ultimately, creating value is all about driving sustainable growth that can be attributed to strong portfolio and innovation management. The portfolio side incorporates the both the business and geographic aspects of portfolio management. Companies like PPG have done a great job of managing the geographic aspects of their portfolio and illustrate the value that can be garnered from optimizing along this dimension in the context of low growth portfolio. But the fullness of portfolio management requires proactivity to manage the underlying growth of a corporation's portfolio with the addition of corporate growth platforms that have linkage to the company and present attractive growth potential.

The other lever that companies have at their disposable to manage growth is innovation. But other than doing more of the same or incremental innovations is a strictly market-driven approach to get more to the unmet needs of consumers. Enhancement of improved products into new markets or even enlargement into new markets and new products and services will force the necessary step change. This can only be achieved by leaving the traditional paths of finding new growth and combine several innovation technologies to a new cocktail to find new spaces or the "needle in the haystack" of a traditional market.

By facing the changes of the specialty chemicals markets and taking rigorous actions to focus or diversify on a very large scale, top management will be able to leverage the performance and turn it into sustainability going forward.


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# Global Megatrends

## Differentiating Success Factor or Just a Hollow Phrase?

**Just A Word?** – The word "megatrend" is a beloved buzzword – but what implications will these trends have on the chemical industry? The Boston Consulting Group's Udo Jung examines value creation in the industry and offers this warning: "Chemicals companies will not differentiate themselves with colorful pictures in their annual reports and glowing accounts of megatrends' assumed automatic benefits for their businesses."

**Udo Jung,**
**Senior Partner, Global Leader Chemicals Sector, The Boston Consulting Group**

Megatrends refer to fundamental changes with concrete and lasting impact, both on the lives of individuals and on the macro-economic development of entire nations and regions. The list of megatrends is long, with the following are in the foreground:

- Demography and strongly divergent population development in different regions of the world
- The wide divergence in anticipated growth rates among individual regions among the regions of the world, a "global two-speed-economy"
- Resource constraints with the resulting necessity of considerably more efficient use of resources
- Continuously increasing mobility combined with simultaneously drastically lower costs of information processing, transmission and documentation
- After the end of the Cold War era, the transition to a multipolar world, including intensified regional conflict and terrorist activities and consequently higher security needs.

The list goes on and on. Megatrends will have a serious impact on the world economy and on all sectors of industry, including global chemicals. Individual megatrends can be translated concretely into demand for chemicals products or for end products that require specific chemical primary products. For instance, the megatrend resource efficiency leads to concrete demand for chemicals products: e.g. use of weight-reducing high-performance materials in automobile manufacturing, with the goal of reducing fuel consumption (fig. 1).

Therefore, it comes as no surprise that nearly all chemical companies are emphasizing the connection between global megatrends and their own growth opportunities: Megatrends as drivers of growth. But the relevant terms and catchwords often seem generic and interchangeable. Why a particular company should profit more from a specific megatrend – as relative to its competitors – often remains unexplained, and it is almost never stated which strategies are relevant to make the most of megatrends for a certain company.

### Long-Term Value Creation by Global Chemicals Companies

Which chemical companies, in which regions and segments, have really created value in the past five, 10, or 20 years? What do chemicals companies with long-term successful track records have in common? Do megatrends play a role here? Every year, The Boston Consulting Group analyzes value creation by publicly listed companies on a global basis using total shareholder return (TSR, or the annual change in the price of a share including dividends).

For companies in the high-investment chemicals industry, multi-year comparisons are particularly revealing: Per year, by what percent did the TSR of a company change on average over the last five, 10, or 20 years (fig. 2)?

BASF, for instance, improved its TSR by an average of 17% per year over the last 20 years and is thus among the top quartile of the 83 chemicals companies that have been listed for the last 20 years. Over the last five years, BASF raised its TSR by 17.9% per year on average, putting it in the second quartile of the 131 analyzed companies that have been listed for at least five years.

### A Look at the Facts

Can any patterns be discerned in long-term value creation by chemicals companies? Figures three and four show the first results of our analysis.

Figure 3 shows average annual value creation for 125 chemicals companies over the last five years. The figure also shows the range of annual value creation within the categories. The range is wide in many segments: Value creation is determined by specific portfolio momentum, business model and the quality of the company's management. But its regional and segment-specific positioning are also relevant. In figure 3, regions and segments are displayed by decreasing annual value creation. The first patterns become visible: Asian chemical companies (except in Japan) achieved higher value creation on average than their American or European counterparts. As far as segments are concerned, the value creation hit list is led by fertilizers, basic chemicals (other than in Japan), industrial gases and agrochemicals. Exactly the same four segments are on top in 10-year value creation as in five-year value creation!

### Value-Creation Clusters

Figure 4 shows that there is a connection between major long standing global megatrends and the ranking of value creation clusters.

- In terms of yearly average, Asian chemicals companies (with the exception of Japan) created more value by far than chemicals companies in other regions. Here, we can see that demand for chemicals in many Asian countries has benefited especially basic chemicals and numerous polymer applications. Drivers of this growth in basic chemicals are the massive growth of processing industries in Asia; emerging countries' significant investments in the improvement of infrastructure; and the fact that especially in countries such as China and India, but also in the densely populated countries of Southeast Asia, the rise in disposable per-capita income has enabled and will continue to enable millions of people to become active consumers for the first time.
- The value creation clusters fertilizer and agrochemicals have links with the megatrends demographics (with the resulting strong increase in demand for, e.g., meat and processed foods) and resource shortages – in this case, arable land.
- The negative value creation of basic chemicals companies in the Middle East is not particularly significant, due to the low number of companies (three). But it is also an indication that major investments in future business (including acquisitions, but especially new production capacities) in the service of long-term strategies – derived to some extent on the development goals of the respective economies – have not yet become profitable.
- Typical for the European chemicals industry are special chemicals companies and companies with broad business portfolios. Value creation in these clusters is at least as good – and often better – than in other regions. Is this surprising? Will it last? We are not surprised, and we believe that European chemical companies will continue to represent a central and value-creating cluster among their peers worldwide: They are currently in the process of positioning themselves globally and often have an edge over American and especially Japanese chemical companies.

But there is another relevant factor that is extremely important: Our analyses showed that European chemicals companies have "learned" to create value in very different and differentiating chemicals segments. This ability to manage various business models under one roof is one of European (and leading American) chemicals companies' strengths. Businesses that have a "complexity requirement" achieve customer retention and provide a basis for innovation. Non complex management of complex businesses – this is the key.

### Megatrends and Value Creation in the Next Decade

What hypotheses can be derived for the future from our considerations so far? What should individual chemicals companies do to get the most benefit and value out of the described megatrends? Some of these megatrends, or their effects, will gain dramatically in importance. One example: By 2030, about 85% of the total increase in consumption spending in Germany will come from people over 55! What demand for chemicals products will result from this? Over two thirds of the global growth of the chemicals industry through 2020 will take place in Asia. Efficient use of resources and the attendant requirements – including the relevant regulatory requirements and costly sanctions for inefficiency – will gain hugely in importance.

Chemicals companies will not differentiate themselves with colorful pictures in their annual reports and glowing accounts of megatrends' assumed automatic benefits for their businesses.

Chemicals companies will differentiate themselves with the concrete measures they take and which structural changes they realize to achieve real and lasting advantages from megatrends. In 2020, almost 50% of the global demand for chemicals will come from Asia. The center of gravity for growth and demand will shift. European chemicals companies are in the process of establishing production sites in Asia, for Asia. Is this enough? Research and product development also often belong in Asia, for Asia.

Companies have to do even more: Their own centers of gravity have to be more closely aligned with global chemicals markets and market growth. This applies not only to sales markets and production networks, but also to global chemicals companies' decision-making centers and processes: Are they close enough to the market? Are the people making the decisions familiar with the respective growth markets' cultures, attitudes, and languages? Is the available market knowledge on a par with the importance of the respective market? Often, mature but stagnating markets are subjected to "micromarketing," while highly diverse market segments in China and India are all thrown into the same pot.

And there's another megatrend that applies here: Fast-growing companies in emerging markets (an obsolete term, since these markets have long since emerged; it's more applicable to say "rapidly developing economies" or RDEs) are driving their own globalization from Asia – with a level of ambition, energy, and long-term outlook that American and European incumbents often tend to gravely underestimate.

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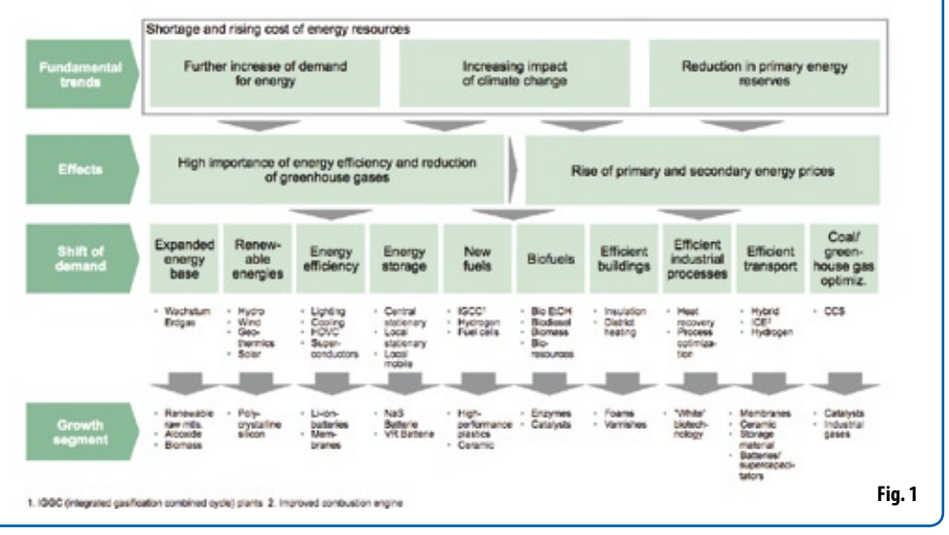


Fig. 1

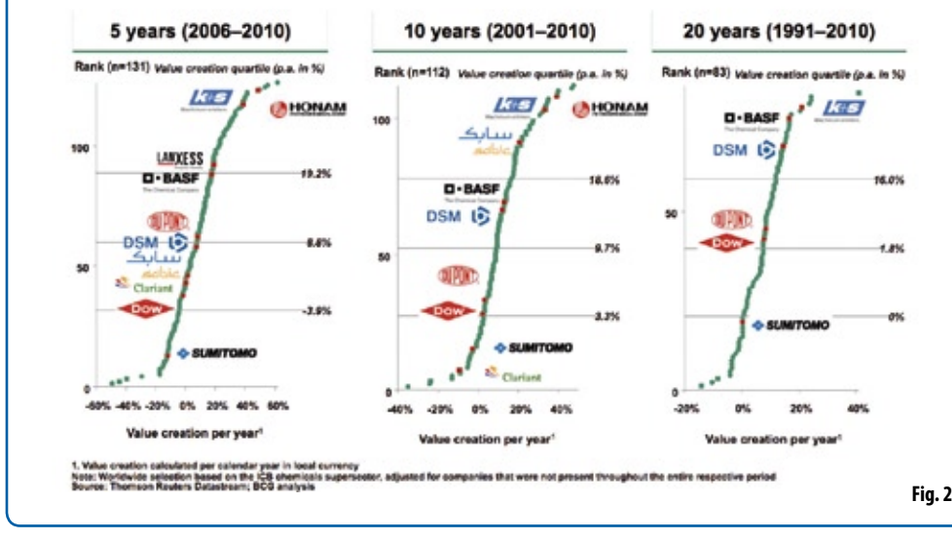


Fig. 2

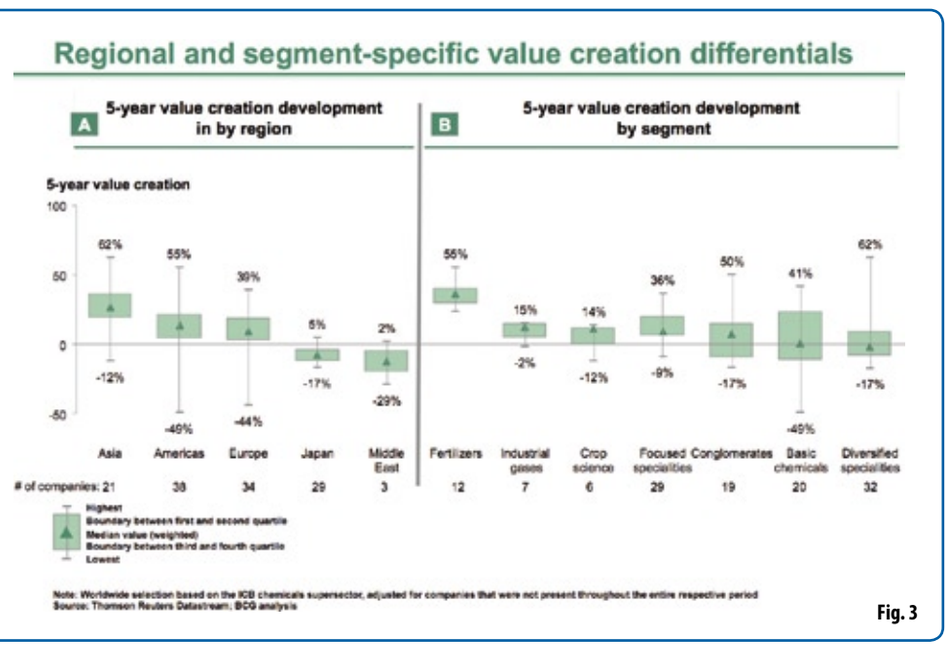


Fig. 3

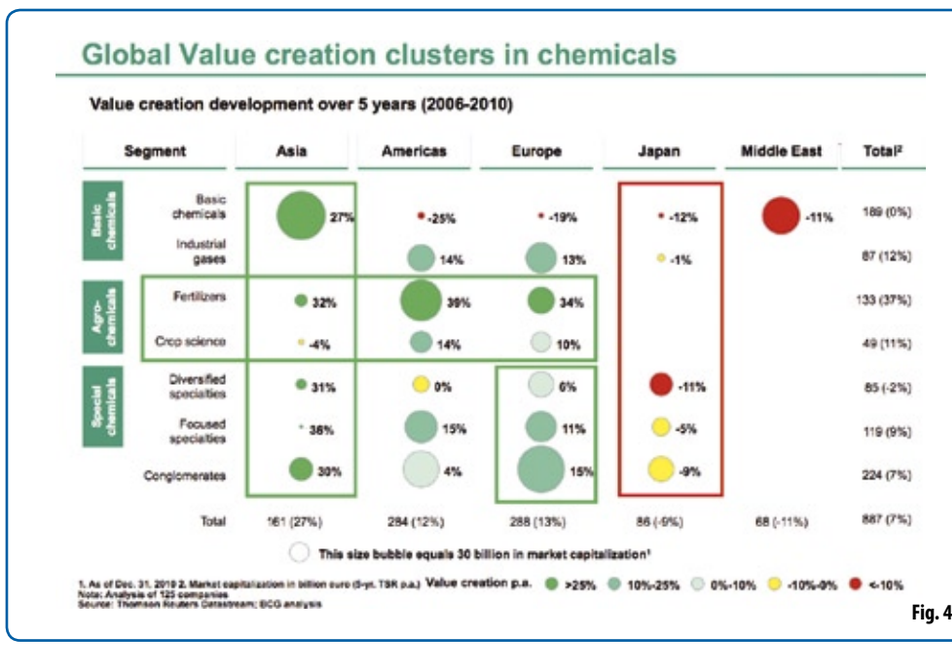


Fig. 4

# A Market on the Move

## Huge Potential to Win Customers in The Field Of Turnaround/Shutdown Projects

**All Encompassing** – A T.A. Cook survey is the first study to address the supply and demand ends for shutdown/turnaround (TAR) projects in the process industry and provides an all-encompassing and detailed market overview for Germany, Austria and Switzerland.

Large industrial plants, like those operated by the chemical industry, must be shut down and undergo general overhaul at regular intervals for both legal and technical reasons. In the petrochemical industry, this is usually referred to as a shutdown/turnaround (or TAR) project. The survey published in May 2010 was designed to identify development potential of this market segment on the one hand and to create greater market transparency at the supply and demand ends on the other.

### Shutdown/Turnaround Projects an Attractive Business

The survey shows that the market volume for turnaround/shutdown services amounts to €610 million per year.

"The market volume for this specialized service is surprisingly large and therefore interesting for technical service providers," said head of studies Mateus Siwek. Total demand among refineries amounts to around €2.1 billion over a shutdown cycle of five years. On an annualized and adjusted basis, this translates to around €345 million. The demand for crackers (olefin plants) was found to be €76 million, while petrochemical plants account for around €188 million per year.

In order to determine the market volume, 39 petrochemical production sites and 159 providers of technical services were analyzed and polled in detail. Deriving from this group, a total of 99 interviews, almost 50%, were evaluated. All of the participants were active in the petrochemical or chemical industry. Sixty-three percent of the interviewees stated that they also offered their services in the energy sector. Twenty-four percent of the respondents were CEOs, 40% executives and 26 considered themselves to be turnaround experts.

The number of shutdown projects in the market segment reviewed totals to around 70 each year. For the period from 2010 to 2020, the survey identified a total of 108 major turnaround projects (each with a volume of more than €30 million). It can be seen that the years 2011, 2013, 2016, 2017 and 2019 will see a smaller number of relevant TAR projects.

### New Market Opportunities Despite a Declining Market Volume

The survey also identified several trends, which were verified in form of a Delphi survey with selected experts. All in all, the experts expected overall demand for technical services for turnarounds to decline by 20% by 2020.

"The most important drivers of this development are the declining demand for petrochemical products and the relocation of plant capacities to the Middle East and Asia," Siwek said.

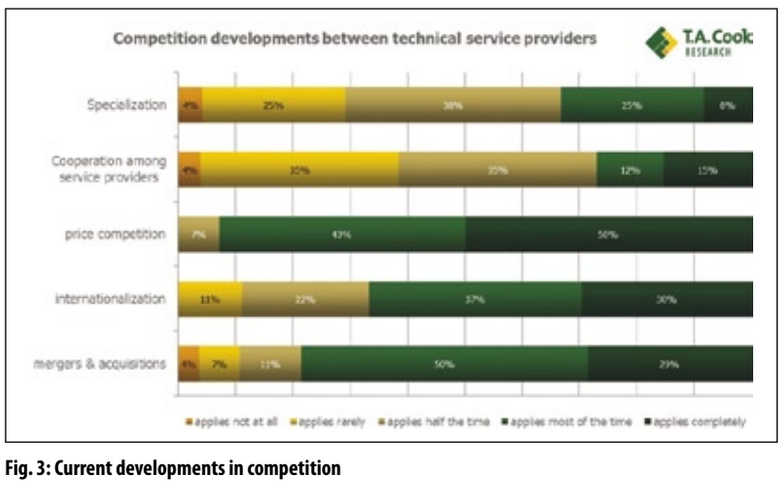


Fig. 3: Current developments in competition

Only part of the declining demand can be explained by global economic tension. Another key factor is the growth of implementing measures to improve energy efficiency and the use of green technologies for energy production. Declining demand leads to an oversupply of processing capacity.

"On the other hand, order volume for projects can be expected to increase between 2011 and 2016 as a result of increased investment spendings by plant operators," Siwek said.

The investment backlog of the past years led to a suspension of investment and the postponement of turnaround projects. Hence, newcomers in the turnaround/shutdown market are likely to have a good chance of winning new contracts, also due to the fact that 50% of plant operators regularly change one of their main contractors. However, the temporary need to catch up will not lead to a sustainable recovery of order volumes.

### A Few Specialists Dominate the Market

At the moment, the market is still dominated by "turnaround providers with general contractor competence." Turnover of this provider group is estimated to be around €180 million to €230 million per year (fig. 1). This means that 7% of providers (out of 159 firms surveyed) account for around 30% of the total market volume. A detailed look at the competing providers shows that the group of "TAR providers with general contractor competence" has the highest awareness of all the groups. As part of the survey, all service providers were asked to identify their three largest competitors. The most frequent answers were TKX, Voith ERMO and the BIS Group, followed by MCE Ost, Ebert Hera and WWV Wärmeverwertung Merseburg.

Taking relative turnover, resources and competencies into consideration, three TAR-specific groups (fig. 2) can be identified. The market is dominated by TKX, Voith ERMO and the BIS Group. Voith and the BIS Group are, to a certain degree, TAR newcomers and have moved up to the group of leading TAR firms through the acquisition of MCE (today: BIS Group) and ERMO (today: Voith Industrial Services). The BIS Group has become the TAR firm recording the highest turnover, primarily through acquisitions. All three providers are generally equally well-positioned. In terms of their target group, TKX and the BIS Group have a broader base than Voith ERMO because the latter focuses particularly on refinery customers. The survey showed that according to plant operators Voith ERMO offers the most attractive TAR project business model.

WWV, Ebert Hera, Hertel and Weber rank midfield. With the exception of Hertel, these are all medium-sized enterprises that are very well capable of executing TAR projects as general contractors. As main contractors they coordinate a wide range of subcontractors when requested by their customers. Hertel and Ebert Hera pursue a proactive market expansion course because both companies increase their market share by acquisitions and investments. Weber and WWV primarily generate growth from successful customer relations. The third group is made up of Infracor and Tectrion. These two companies control their local market as service providers for chemical parks. It remains to be seen whether they will manage to open up customer groups outside their locations through their cooperation networks or whether they will cooperate with other "TAR general contractor firms" in the medium term. It is very likely that it will be difficult for reasons of competition to execute large TAR projects (which require a great deal of resources) with all three providers at the same time. Operators will develop new execution models which will generate very attractive growth prospects for medium-sized enterprises.

| No. | Provider (group of TAR general contractors only) | TAR turnover (estimated) in Euro From | Until |
|---|---|---|---|
| 1 | BIS Group (total) | 35,000,000 | 40,000,000 |
| 2 | Voith Industrial Service ERMO GmbH | 30,000,000 | 35,000,000 |
| 3 | Hertel GmbH Germany | 25,000,000 | 30,000,000 |
| 4 | ThyssenKrupp Xervon GmbH | 25,000,000 | 30,000,000 |
| 5 | Ebert Hera Gruppe | 12,000,000 | 15,000,000 |
| 6 | WWV Wärmeverwertung GmbH & Co. | 10,000,000 | 15,000,000 |
| 7 | MCE Industrietechnik Ost (today: BIS) | 10,000,000 | 15,000,000 |
| 8 | Weber GmbH & Co. Rohrleitungsbau und Industrieanlagen | 12,000,000 | 15,000,000 |
| 9 | Rohrer Group | 8,000,000 | 12,000,000 |
| 10 | IMO Industriemontagen GmbH | 6,000,000 | 10,000,000 |
| 11 | Infracor Technik | 3,000,000 | 6,000,000 |
| 12 | TECTRION Instandhaltungslösungen | 3,000,000 | 5,000,000 |
| | Total | 179,000,000 | 228,000,000 |

Fig. 1: Turnaround providers with general contractor competence


Fig. 2: Relative positioning of leading TAR suppliers

### Resources Are Not as Limited as Believed

From the plant operators' perspective, the increase in resource problems as seen on the market in recent years was primarily due to the fact that the market was determined by large-scale shutdowns. Another bottleneck factor in this context is the limited time slots for turnaround projects (spring, autumn). Answers by plant operators give evidence that they estimate the number of available TAR metal workers (mechanical trades) on the German market to be around 1,500. However, resources are in fact not as limited as believed: The analysis of providers shows that around 1,100 mobile professionals are permanently available for TAR projects. They are supplemented by another 2,000 qualified pipe fitters who are contractually integrated into TAR projects via the group of staff providing companies or specialized subcontractors. It can be calculated that, all in all, around 3,000 workers specialized in mechanical work for TAR projects are available on the market.

It can be stated that the market is currently undergoing a change. New providers of technical services are using the arising chances to establish a foothold in the market, and operators of petrochemical plants are rethinking their traditional strategies of executing turnarounds. It is not just providers of technical services who wore badly affected by declining orders due to the crisis, many operators of petrochemical plants also suffered losses. The premature assumption that reduced production volumes and smaller margins lead to the execution of maintenance work and turnaround projects ahead of schedule did not materialize. All manufacturers are currently keeping a close eye on their cashflow and avoid spending on anything that is not absolutely necessary. This has also had major repercussions on project business. Most suppliers are expecting more mergers and strong price competition. The T.A. Cook study offers a basis for decision making by providing condensed information about the market for technical services.

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### Market Study

Market Study "Technical Services for Turnarounds in Petrochemical Plants"
D-A-CH, English
You can order a copy of the study at the price of €4,400 plus VAT. Just send an email with your mailing and invoice address to markus.caspari@wiley.com.
You can also send a fax to +49 (0) 6151-8090-145 and/or you can use the PDF order form at www.chemanager-online.com/turnaround-study.



Ton Büchner (l.) and Hans Wijers

**Hans Wijers to Leave AkzoNobel in 2012** AkzoNobel has announced that CEO Hans Wijers will be stepping down with effect from the company's annual general meeting in 2012. Sulzer President and CEO Ton Büchner is slated to take over the helm of the Dutch company. Wijers joined AkzoNobel as member of the board of management in October 2002, and was subsequently appointed CEO in May 2003.

Büchner has been CEO of Sulzer since 2007. He joined Sulzer in 1994 and has held a number of operational and leadership roles across the company including the presidencies of two of its divisions, Sulzer Turbomachinery Services and Sulzer Pumps. He was also chief representative and responsible for Sulzer operations in China. He will join AkzoNobel in January.

David E. Constable

**David E. Constable Takes Over as Sasol CEO** Sasol has appointed Fluor Corp.'s David E. Constable as chief executive officer, marking the first time ever that the South African company has gone with an outside hire for the position. Constable, who took over at Sasol on July 1, was group president of operations at Fluor. Constable is an engineer with 30 years of experience in heavy industry, operations and construction and has spent time in the power, energy and chemicals industries.

Mark C. Griffiths

**Mark C. Griffiths Named Carbogen Amcis CEO** Switzerland-based Carbogen Amcis announced that Mark C. Griffiths has been named chief executive officer, effective immediately. In his new role, Griffiths will have responsibility for the company's Swiss business and will report to Jay Vyas, managing director of Dishman Pharmaceuticals and Chemicals, Carbogen Amcis' parent company.

Griffiths has been associated with Carbogen Amcis as director of operations and chief executive officer for almost 10 years. Most recently, he has been working for the Dishman Group as operations advisor overseeing the design and construction of the group's large-scale manufacturing facilities for commercial supply of highly potent APIs (HPAPIs) in Shanghai, China, and Ahmedabad, India.

Markus Pinger

**Markus Pinger to Become New CEO Of Celesio** Celesio has appointed Markus Pinger, currently a member of the management board at Beiersdorf, as new chairman of the management board and CEO of the company. Pinger will assume his new responsibility as of Aug. 15. He will be succeeding Dr. Fritz Oesterle, who left the company at the end of June. Wolfgang Mähr, member of Celesio's management board, is acting as interim chairman of the management board during the transition period through Aug. 15.

Hans-Joachim Müller

**Clariant Appoints Hans-Joachim Müller Member of the Executive Committee** Clariant said it has appointed Dr. Hans-Joachim Müller member of the Executive Committee. He joined the company on July 1 from Süd-Chemie, where he was a member of the managing board. Before he was head of the global business unit Catalytic Technologies at Süd-Chemie. Müller will be responsible for the business units Catalysis & Energy and Functional Materials.

**LyondellBasell's Names Senior Vice President, Olefins and Polyolefins Americas** LyondellBasell has appointed Tim Roberts senior vice president, Olefins and Polyolefins for the Americas region. He will be based in Houston, Texas. Roberts most recently served as vice president of Planning and Development for Chevron Phillips Chemical.

Prior to this, Roberts was president and CEO of Americas Styrenics, a joint venture between the Dow Chemical Company and Chevron Phillips Chemical. Roberts has worked for Chevron Phillips, its predecessors and/or joint ventures for more than 20 years. In that time he held a number of management positions with increasing responsibilities including global business manager, director of capital projects, and country manager in Qatar.

**DSM Appoints New Chief Technology Officer** DSM has appointed Marcel Wubbolts, currently vice president R&D DSM Innovation Center, to the position of chief technology officer as of Oct. 1, reporting to Rob van Leen, chief innovation officer.

He joined DSM as a senior scientist and became Managing Director of DSM Biotech GmbH, in Jülich, Germany. Thereafter, he was competence manager Biocatalysis & Biotransformations and then became program director at the DSM Innovation Center in Delft, the Netherlands, running the Industrial Biotechnology program

Marcel will succeed Jos Put who will continue to be an adviser to DSM e.g. in the field of material sciences and for several of the DSM Science and Technology awards.

**Actelion Shakes Up Board, Appoints COO** Actelion said in a statement it has appointed Otto Schwarz, head of business strategy and operations at Actelion since 2008, as COO, allowing Chief Executive Jean-Paul Clozel to focus more on strategic matters. Actelion also said it was changing its executive committee to strengthen leadership and governance. In addition to Clozel and Schwarz, the core executive committee would be made up of Chief Financial Officer Andrew Oakley, Head of Global Clinical Development Guy Braunstein and Chief Business Development Officer Nicholas Franco.

# Chemicals

LEGISLATION · PROCESSES · TECHNOLOGIES





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# The Beauty of Life Sciences

## Food, Pharma and Cosmetics Particularly Appealing for Chemical Distributors

**Desirable Markets** – The area of life sciences covers nutrition, health and wellness of animals and humans. As such, several segments of this industry are attractive to chemical distributors, in particular pharmaceuticals, food, and cosmetics. Chemical distributors supply these segments with ingredients, additives, excipients and processing aids. From a producer's perspective, the attractiveness of these segments is typically defined by relevant market size, growth, profitability and sustainability.

By those measures, pharmaceuticals are more attractive to producers as a segment than are cosmetics and food. However, when we rank the segments from the perspective of a chemical distributor, we find on average that the most attractive segment is cosmetics, followed by food and then pharmaceuticals.

### The Slide, Funnel and Hourglass

Why is it the case that producers and chemical distributors value the attractiveness of those segments differently? The answer can be found in the structural strength of a chemical distributor as an intermediary party between producers and customers, irrespective of the size, growth, profitability and partly sustainability of the specific segments from a producer perspective.

Eighty-four percent of European chemical sales are done directly, 7% through agents or traders, and 9% via chemical distributors. Schematically we can describe the structural strength of a chemical distributor along three patterns: the Slide, the Funnel and the Hourglass.

In Slide structures, less than 2% of chemicals are distributed via chemical distributors. In this category, the distributor adds limited value as only an additional intermediary between supplier and customer.

In Funnel structures, 17% of chemicals are sold via chemical distributors. Here, the distributor share is higher because chemical distributors can provide services that the producers cannot, including providing A- and B-customers with small product quantities (bulk breaking), special supply chain – logistics or financial services, and servicing small C- and D-customers. This is especially true when the chemical distributor provides additional marketing and technical services or when the chemical distributor covers a region or product application that the producer cannot or does not want to serve.

**Dr. Wolfgang Falter,**
**Managing Director,**
**Alix Partners**

The most attractive structure for a chemical distributor is the Hourglass situation, where about 27 % of all Hourglass revenues involve distributors. In the Hourglass situation, distributors work not only with the C- and D-customer base of the Funnel situation, but also bundle different products from different suppliers, act as importer of non-local products and serve the marketing and sales arm for minor product applications. This requires chemical distributors to offer technical, application technology, analytical, and other lab services. In the Hourglass, chemical distributors enjoy a very strong and sustainable position, marked by high growth and profitability, irrespective of the dynamics of the producer market segments.

### The Hourglass in 3 Life Science Segments

#### Pharmaceuticals

There are three categories of distributed chemicals in the pharma chain: (1) active pharmaceutical ingredients (APIs) from bulk active intermediates (BAIs) and base- or petrochemicals; (2) solvents, additives and processing aids that are used by merchant or captive API-producers; and (3) excipients for formulators. For a general chemical distributor, only categories B and C offer an attractive structure. This is because category A faces very high regulatory (U.S. FDA, cGMP, dossiers) entry barriers and long cycle times. Only specialized distributors, like Helm, Alfred E. Tiefenbacher or Welding, just to name a few, with dossier and specific competences, have a strong position in this segment. Additionally, there is the real risk of API-producers leaving Europe for Asia. Traditional chemical distributors can do business with categories B and C, but there are relatively high regulatory entry barriers, and the position is not scalable. Thus this segment offers opportunities for specialized distributors and for distributors who are already in this segment, but only a limited market entry and expansion potential.

The life sciences industry – and especially pharmaceuticals, food and cosmetics – contains segments that are attractive for chemical distributors.

#### Food

There are four major areas for the distribution of chemicals into the food chain: (1) fertilizers and (2) plant protection agents for the agricultural seed and plantation markets; (3) veterinary chemicals for the protection of animals; and (4) food ingredients and food processing aids for food production. Fertilizers are bulk commodities that are either served directly or via traders. Plant protection agents and veterinary chemicals are very specific products that are sold mostly direct into the customer channels. Food Ingredients, however, are attractive for chemical distributors. Different ingredients from different producers, a limited number of active distributors in the food segment, a relatively high technical service need, and changing needs (low fat, low cholesterol, probiotic, etc.) in a customer market that is very fragmented create an attractive market segment for chemical distributors.

#### Cosmetics

Cosmetics is the most attractive segment for chemical distribution. The value of chemicals in cosmetics is about the same as in pharmaceuticals, but chemicals in cosmetics account for one-quarter of value, whereas in pharmaceuticals, chemicals account for less than 10% of value. Surfactants account for 30% of the chemicals in cosmetics, but there are many more chemicals, like active ingredients (5%, i.e. vitamins, polysaccharides, proteins/peptides, enzymes); additives (17%, preservatives, emollients, UV-absorbers, waterproofing agents); colors (3%); fragrances (20%); excipients/ binders (3%); chelating agents (12%); and (specialty) solvents (10%). Relatively few chemical distributors bundle those different products from different international producers. From a pure business volume perspective, the top 10 big soapers (Beiersdorf, Colgate, Estée Lauder, Henkel, J&J, Kao, L'Oréal, P&G, Shiseido and Unilever) are attractive. Additionally, the other, more fragmented customer half of the cosmetics industry is also very attractive, as it needs to follow or set fashion trends and needs additional technical and lab services, which gives the distributor a larger share of the value chain.

### Summary

The life sciences industry – and especially pharmaceuticals, food and cosmetics – contains segments that are generally attractive for chemical distributors, as they are sizable, profitable and sustainable in Europe. What makes a segment attractive to a distributor may not be the same as what makes a segment attractive to a producer. Instead, the attractiveness of a sector depends on the degree of Hourglass structure between producers and customers. Segments with fashion elements (short life cycles) are more attractive than segments with high entry barriers and long life cycles.

Opportunities for distributors are typically higher in side chains (additives, excipients, processing aids) and with the main chain only when there are several different ingredients. Single ingredients, like in APIs are attractive for specialty distributors that fulfill the specific needs (e.g. dossiers, cGMP, FDA).

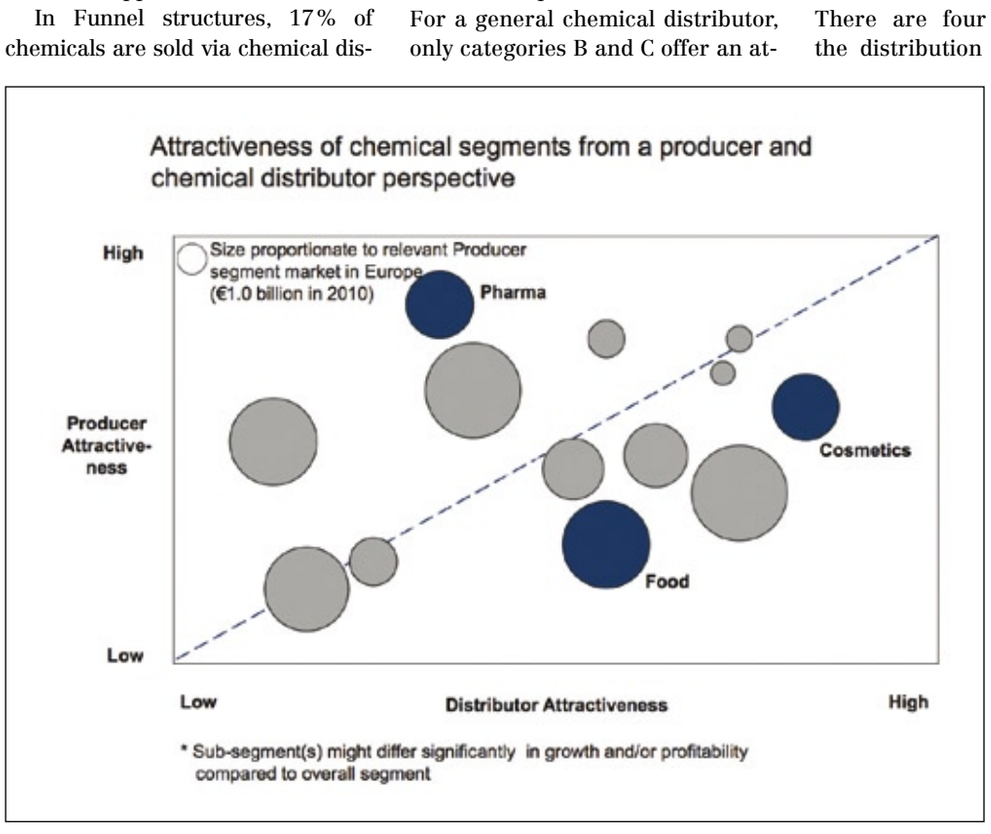


Fig. 1: Attractiveness of chemical segments from a producer and chemical distributor perspective

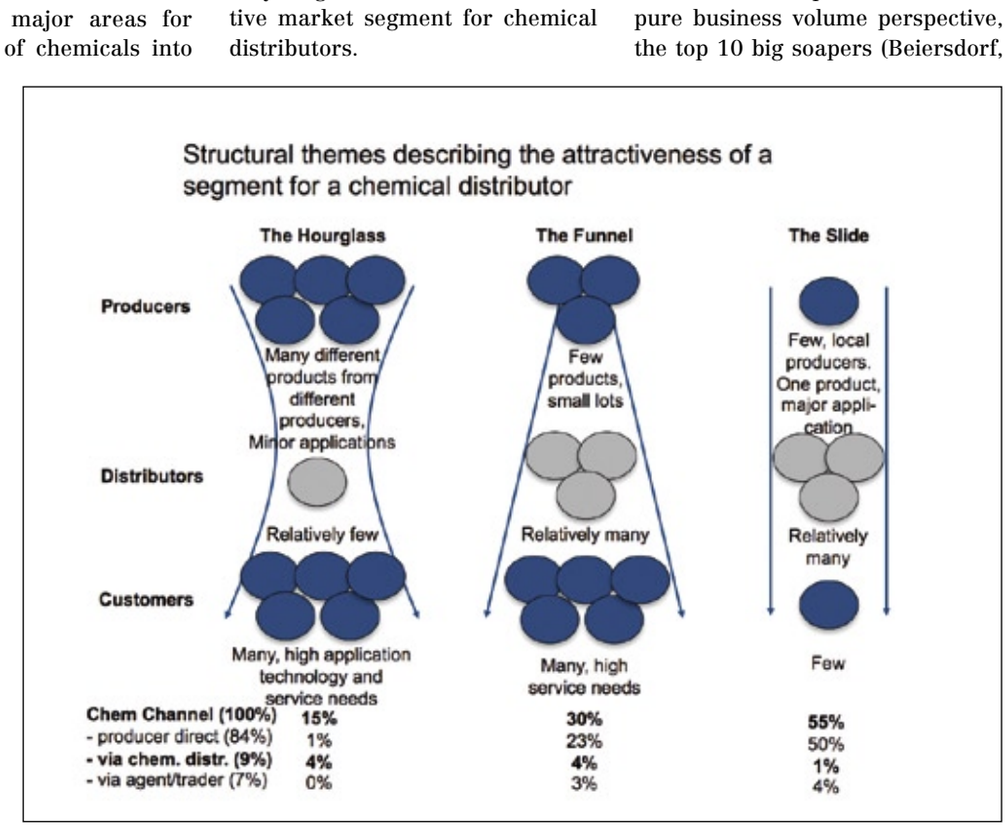


Fig. 2: Structural themes illustrating the attractiveness of a segment for a chemical distributor

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# Conductive Coatings Using Carbon Nanotubes

## A Fascinating Material for the Coating Producer's Toolbox

**Initial Steps** – Even if early indications for the existence of carbon nanotubes (CNT) date back to a Russian publication from the 1950s, detailed research on carbon nanotubes is not considered to have really started until 1991. At that time, Prof. Sumio Iijima observed carbon nanotubes with electron microscopy, and a new field of carbon research began. Nowadays, carbon nanotubes are increasingly losing their status as a curiosity. Today's production capacity has increased enormously over the last few years, and hundreds of tons are produced to satisfy market demand.

Dr. Michael Berkei,
Head of Nano Technology,
BYK-Chemie

Carbon nanotubes can be described as sheets of graphene that are rolled to form a tube. Depending on the synthesis and reaction parameter, single-wall carbon nanotubes (SWCNTs) as well as multi-walled (MWCNTs) can be produced. In the case of MWCNTs, several independent tubes are grown in concentric circles. Their outer diameter is usually in the range of 20nm, about 2,000 times thinner than a human hair. Their length can be around 10µm, and thus their aspect ratio can be in the range of a few hundreds to thousands.

### Superior Properties of Carbon Nanotubes

Due to the high aspect ratio of carbon nanotubes and given their low density, huge surface areas of a few hundred $m^2/g$ are usually obtained. We can imagine one gram of material exhibiting a surface area similar to that of an average semidetached house.

Because of these parameters, carbon nanotubes seek to reduce their surface energy and tend to easily agglomerate in the form of bundles and skeins. This entanglement is already encouraged during their synthesis. To derive the full benefit from carbon nanotubes, one has to break off these agglomerates to achieve a good dispersion. We have already reported on how to disperse carbon nanotubes and how complicated the process is (CHEManager Europe 9/2009). Not only the right amount of shear forces is needed, but also optimized wetting and dispersing additives are required to stabilize the carbon nanotubes.

### Dispersion Into Individual Tubes

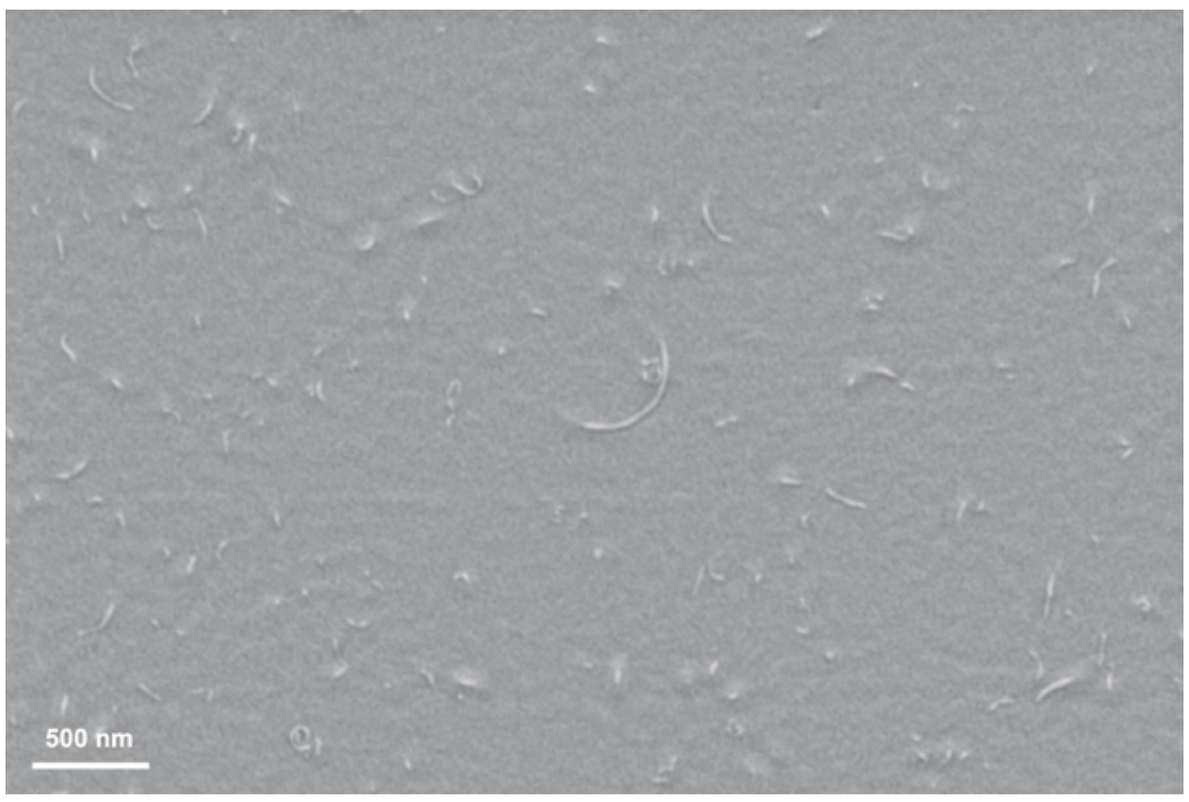
Since most coating producers do not want to spend several years and thousands of euros of research costs developing a process to disperse carbon nanotubes, they are focusing on already pre-dispersed carbon nanotubes in the form of aqueous or solvent-borne dispersions. This not only offers comfortable access to carbon nanotubes; it also gives advantages in respect of safety. Most concerns about the health hazards of carbon nanotubes are related to their powder form. To avoid the creation of carbon nanotube dust, dispersions using polymeric wetting and dispersing additives of high molecular weight are beneficial. If the dispersion dries to a solid residue, a sticky film will be formed instead of a dusty powder.

### Choosing the Right Carbon Nanotubes Is Key

Depending on their diameter and length, carbon nanotubes are expected to behave differently in human bodies if inhaled. Most producers and users are focusing on thin and flexible carbon nanotubes. This is due to the fact that thick and rigid tubes are assumed to show some kind of asbestos-like behaviour. In this case, human macrophages cannot digest the fibrous particles and fail in phagocytosis. This would also mean that the particles would not be removed from the human body and could cause inflammation. To avoid such problems, people should therefore focus on thin and flexible carbon nanotubes with diameters well below 50nm.

### Price Considerations

While single-wall carbon nanotubes exhibit superior properties, their synthesis is still extremely complicated, and yields are small. Because of this, single-wall carbon nanotubes are still much more expensive than multi-wall carbon nanotubes. Consequently, most companies focus on multi-wall carbon nanotubes for industrial applications in coatings and plastics. But it is not only the difference in price between single-wall and multi-wall carbon nanotubes one has to consider; it is also the comparison to other conductive materials such as carbon black or copper or silver particles that should be taken into account. Comparing the prices of different conductive materials, we can assume the following order of increasing prices: carbon black ≈ copper < multi-wall carbon nanotubes < silver < conductive polymers ≈ single wall carbon nanotubes. Multi-wall carbon nanotubes can be considered as a medium-priced conductive material. This order can, of course, change depending on both quality and particle size, and given that copper or silver nanoparticles are much more expensive compared to the bulk metal.

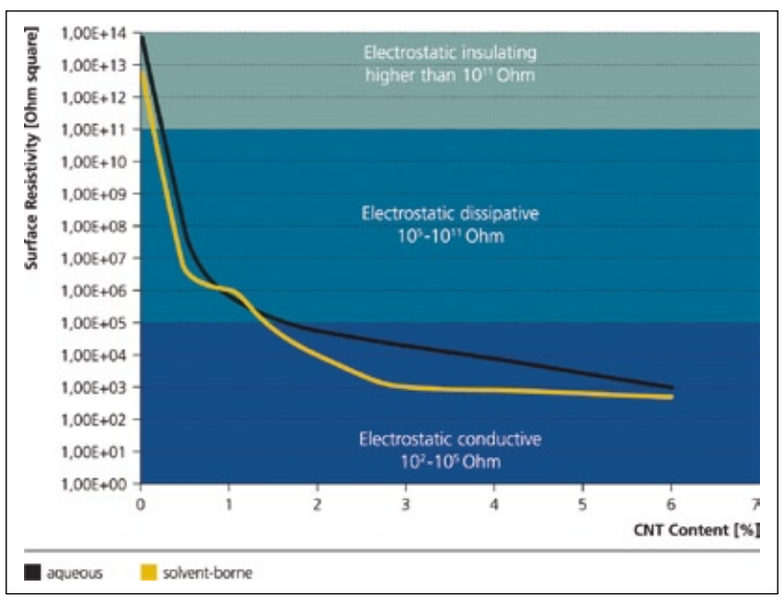



Scanning electron microscopy image of a clear coating's surface where 0.5 % multi wall carbon nanotubes are incorporated. Please note the perfect distribution of carbon nanotubes and how strong they are embedded into the matrix to ensure permanent conductivity.

### Size Matters

There are many ways cited in the literature for how to disperse carbon nanotubes into a matrix. Most procedures use high shear forces that can break the carbon nanotubes into short fragments during the dispersion process. Very often, dispersions of carbon nanotubes with a reduced length of up to a mere 200nm are obtained. In such cases, the aspect ratio would have been reduced from about 1,000 to about 10, and the unique properties of carbon nanotubes would have been diminished. It is therefore very important for the coating manufacturer to choose the right dispersion process or, even better, to use already pre-dispersed carbon nanotubes.

Keeping a high aspect ratio also guarantees lower percolation thresholds, which also lead to higher transparency. From all the conductive pigments used today, carbon nanotubes offer the highest aspect ratio and provide, for example, higher transparency and better mechanical properties than carbon black or metal particles. There is only one drawback to be considered. Carbon nanotubes are black and have a high level of jetness. Another point of importance is to keep the concentration of carbon nanotubes in application as low as possible.




Surface resistivity of aqueous and solvent-borne clear coats depending on concentration of multi wall carbon nanotubes.

### Effects Are Permanent

In contrast to organic anti-statica, which are often based on quarternary ammonia salts and provide a thin water film on the surface, carbon nanotubes offer permanent electrical conductivity. The tubes are embedded in the matrix, and only parts protrude from the surface, providing good surface conductivity and volume conductivity as well (fig. 1). It seems that there is also no real orientation inside the coating matrix. The carbon nanotubes often turn in their direction, resulting in a woven network. This can also lead to improved mechanical properties, such as better fatigue resistance or bending strength. Even if there is sometimes no improvement in mechanical properties, a good dispersion of carbon nanotubes will prevent any negative influence on mechanical properties.

### Life Is Not Black or White

Excellent dispersion is also necessary to enable the coating producer to generate electrical conductivity at low carbon nanotube concentration (fig. 2). The lower the percolation threshold is, the more likely it is to use carbon nanotubes. Otherwise, everyone would prefer to use the cheaper carbon black or copper particles. But it is not simply an effect due to the aspect ratio of carbon nanotubes; it is also a matter of surface chemistry and matrix interaction. Carbon nanotubes are considered to consist of sp2-hybridized carbon and can be described as an unsaturated system with highly mobile -electrons. Depending on the resin chemistry, there is more or less interaction to be expected between carbon nanotubes and the coating ingredients. If the interaction is too strong, it can lead to a kind of insulating effect because the resin polymer is attracted by the carbon nanotubes and wraps around them in such a way that percolation is limited or blocked. This would result in good dispersion, but not in the electrical conductivity desired. If the interaction is too low, it might result in incompatibility and even in flocculation. In this case, one would need higher amounts of carbon nanotubes to reach percolation, and this could make such application totally unfeasible. It is like in real life: things are never black or white. One should aim for something in between.

### Curing Conditions Can Be Important

The curing conditions and the curing mechanism of the coating system also impact the carbon nanotube performance. Imagine you are using a latex dispersion where the carbon nanotubes can arrange themselves around the latex particles to form a 3-dimensional network. Compared to a 2-pack system or UV-curable system where the resulting coating matrix is built up by monomers or oligomers, everyone would expect the latex dispersion to result in lower percolation thresholds. But this is not generally true. Depending on the curing conditions and the mobility of the carbon nanotubes, very nice results are also observable in 2-pack systems and in baking enamels. Low concentrations of 0.5 % to 1 % phr carbon nanotubes result in anti-static properties, and electrical conductivity is reached with contents of 2 % to 4 % phr. In contrast, even high concentrations of 8 % carbon nanotubes show no effect at all in some coatings. It is really something one has to try and to do some reformulation work on his coating if necessary.

### Have We Reached Our Targets?

Carbon nanotubes are gaining in interest due to the ever-increasing demand from the market for functional coatings. In the long-term effort to save material as well as energy, most applications are looking for thinner coatings with higher functionalities. We are just beginning to turn these dreams into reality, and we need to obtain the maximum performance from these carbon nanotubes. As with any other new technology or new material, carbon nanotubes have to be considered as another interesting material with promising properties. They cannot perform miracles. People have to be realistic in their expectations, and more research and efforts have to be undertaken to really derive the benefits from this fascinating material.

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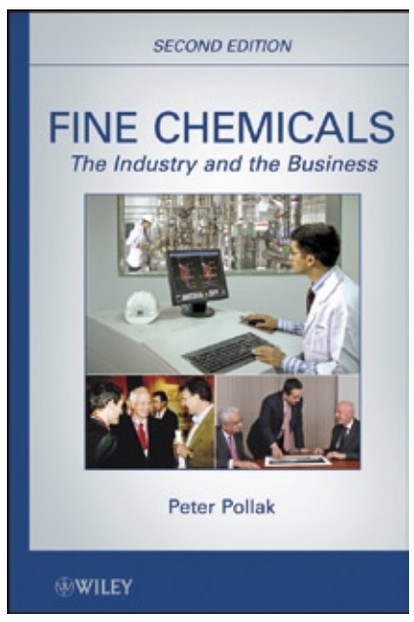
## Fine Chemicals – The Industry and the Business

A second, revised edition, which takes into consideration the developments in the field since the first edition was written, including substantial updating of facts and figures and other content, like a discussion of the offer/demand balance for fine chemicals.

This book is a comprehensive reference on one of the most exciting and challenging segments of the modern chemical industry, and a practical guide for developing and succeeding in the multibillion fine chemicals business. The book is divided into three parts: 1. The Fine Chemicals Industry – definitions, products, technologies, facilities, costs, and management aspects; 2. The Business – the market, customers, and marketing; and 3. Outlook: changes in the offer/demand scenario, the role of emerging companies in Asia (especially China and India), and forecast of market changes.




Peter Pollak, PhD, is internationally recognized as a pioneer in the development of the modern pharmaceutical fine chemicals industry.

*Find out in our September issue how you can win a free copy!*

Peter Pollak
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## ICL, BPC Sign Potash Deals With China

Israel Chemicals (ICL) is the latest company to sign deals to supply Chinese customers with potash during the second half of 2011. The company said it will supply 500,000 tons of potash during the second half of 2011, following 500,000 tons sold in the first half.

ICL said its price is similar to recent prices recorded by other potash suppliers in the market and is about $70 a ton higher than selling prices to China in the first half of 2011.

The number of ICL's Chinese customers has increased since 2010 and it sells its potash directly to Chinese fertilizer producers and distributors, the company said.

Potash export consortium Canpotex said in late June it will supply China with 630,000 tons of the crop nutrient in the second half of 2011 and indicated the price on the new contract rose about 17.5 % over previous contract levels to about $470 a ton.

The Canpotex deal followed an announcement by Belarusian Potash Company (BPC), which agreed to a second half potash deliveries contract with major Chinese fertilizer importers at prices $70 a ton higher than in the first half.

The trader, which handles 30 % of world potash supply, agreed to sell a minimum of 500,000 tons to China with options to sell another 200,000 tons at a price of $470 per ton on a cost-and-freight basis.

"The latest contract with Chinese importers will be a new price benchmark which will undoubtedly influence both spot prices and long-term contract prices," BPC Chief Executive Vladimir Nikolayenko was quoted as saying in a statement.

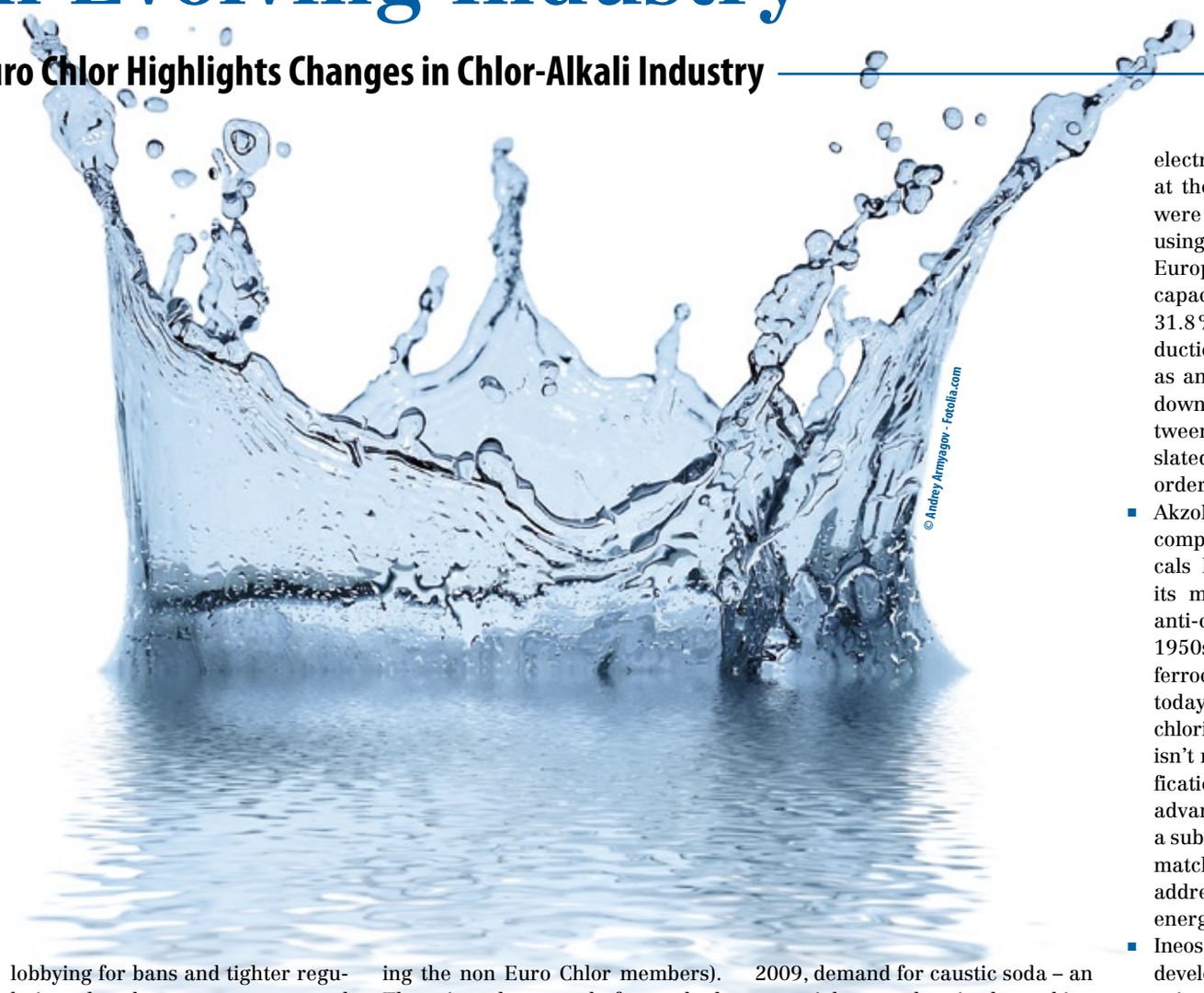
BPC switched to six-month contracts with China this year after negotiations for previous years' sales stretched well into the calendar year.

The second half contract was priced higher than the $400 in the first half contract, though contract volumes were less in the second half of the year, when stockpiling of fertilizer is less intensive.

BPC said the contract was signed with Chinese state-owned oil and chemicals company Sinochem and CNAMPGC – the largest Chinese importers of mineral fertilizers. ■

# An Evolving Industry

## Euro Chlor Highlights Changes in Chlor-Alkali Industry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**The Spectre of Substitution** – The industry federation Euro Chlor distributed its 2009–2010 annual report in April at its chlorine technology conference & exhibition under the title, "The spectre of substitution calls for vigilance." While this holds true for all branches of the chemical industry, the chlorine-alkali sector often finds itself at the center of debate when it comes to issues such as the Restriction on Hazardous Substances (RoHS); many environmental lobby groups have been pushing for a ban on organochlorines, organobromides and PVC for use in electric appliances. While a plenary vote in the parliament didn't lead to an outright ban under the RoHS Directive, chlorinated chemicals face continued pressure, for example by placing them on various priority lists. Some substances have been placed on the Reach candidate list for Substances of Very High Concern (SVHC) and for example also on the "POP-list" (UNEP Stockholm Convention).

In his foreword in the annual report, Euro Chlor Executive Director Alistair Steel discusses the two paths within the "spectre of substitution."

"The Cefic Policy Center sees substitution being implemented in two distinctly different ways." The first one, he writes, is via legislation, particularly through Reach. The second one is market-driven substitution.

Steel says that kind of substitution is particularly difficult to tackle, as "it is never obvious just who is driving it in any particular instance." Using PVC – the largest single consumer for chlorine – and the recent ban on use of dichloromethane in paint strippers to illustrate his point, he says that it's clear that environmentalists are the ones active in lobbying for bans and tighter regulations, but downstream users and retailers also play a role. Also, Steel points out that many companies sometimes offer substitutes where testing is not yet complete.

"This is bad practice and will result in splintering our chemical industry as a whole," he writes. "We will look foolish, and worse still, our efforts to act from a position of unison and the strength which that brings will be seriously compromised."

One concrete point of substitution of a hazardous chemical used in production the chlor-alkali industry has been working steadily on is the replacement of mercury-based plants with new membrane ones. Membrane technology now accounts for more than 51% of the industry's installed capacity, which is on track for the group's voluntary commitments to have phased out all mercury-based chlor-alkali capacity by 2020.

### Mercury, Diaphragm And Membrane

Chlorine is produced by electrolysis using three main technologies: mercury, diaphragm and membrane. Ten years ago, mercury technology accounted for about 60% of European chlorine capacity (including the non Euro Chlor members). There is a clear trend of a gradual shift away from mercury cells to the more energy-efficient membrane technology (today: mercury: 31.8% – membrane: 51.2%). Three mercury cell rooms were converted to membrane technology during 2009, and another was definitively shut down. During 2010, some plants reduced their mercury based capacity.

### Market Overview

After being deeply affected by the 2008–2009 downturn, 2010 chlorine production and demand registered the fastest rebounds, albeit remaining well below the pre-crisis levels. With nearly 10 million tons in 2010, European chlorine production was 9.9% higher than in the previous year. The 2010 average capacity utilization rate reached 79.0% compared to 71.1% in 2009.

Germany remained Europe's largest chlorine producer, accounting for 45% of European production, followed by Belgium/The Netherlands with 15.7%, and France with 11.4%. These top three regions accounted together for 72% of total European chlorine manufacture in 2010.

After a drastic drop and, consequently, record high stock levels in 2009, demand for caustic soda – an essential co-product in the making of chlorine – managed to recover, although it is still not as robust and stable as before the crisis. Overall average monthly stock levels remained just below the 250,000 tons mark. In May 2011, stocks were down to 234,000 tons.

### Conference Highlights

At the 8th International Chlorine Technology Conference & Exhibition in Budapest, industry players and stakeholders discussed a wide-range of topics, from technology to safety, health and environmental protection. Some highlights included:

- Dolf van Wijk, Euro Chlor's director of Science & Regulatory Affairs, discussed the new industrial emissions directive and what implications it has for the chlor-alkali industry. Van Wijk emphasized that the new directive, which went into effect in January, replaces the IPPC and varies in several points from it. Member states have two years to implement it, and its aim is to harmonize plant permitting in order to create a level playing field.
- Philippe Ancery, Solvay, went over the decommissioning of mercury electrolysis units. He said that at the beginning of 2011, there were still 34 chlorine cell rooms using mercury cell technology in Europe, and that mercury-based capacity represents today about 31.8% of the total chlorine production capacity. He used Solvay as an example, which has shutdown three mercury plants between 2006–2001 and has two slated for a partial shutdown in order to convert them in 2012.
- AkzoNobel: The Dutch chemical company's Industrial Chemicals business unit spoke about its mTA, which is used as an anti-caking agent for salt. In the 1950s, the company developed ferrocyanide for this use, but with today's membrane electrolysis in chlorine production, ferrocyanide isn't removed during brine purification, putting it at a cost disadvantage. AkzoNobel's mTA is a substitute for ferrocyanide that matches its performance while addressing the issue of increased energy consumption.
- Ineos Technologies: The UK-based developer and licensor of technologies for the global petrochemical industry discussed technical considerations for membrane cellroom design, touching on the four key aspects that should be considered in design: brine purity and salt selection; cellroom pressure control; stray current management; and shut-down management. They also discussed their Bichlor electrolysers, which are designed to minimize the life time costs of manufacturing chlorine, sodium/potassium hydroxide and hydrogen while maintaining the highest safety standards.
- Uhdenora: The Italy-based joint company of Uhde and Industrie de Nora looked at the major challenges facing the chlor-alkali industry in the near future: the rising cost of energy; the phase-out of mercury; the recycling of chlorine and the transport of liquid chlorine.

*Brandi Schuster*

chemanager-online.com/en/tags/chlorine

## A Mercury-Free Future


**Alistair Steel,** Executive Director of Euro Chlor

***CHEManager Europe: The mercury process still is used in 31% of all chlorine processes. What does Euro Chlor actively do to phase out the mercury process capacity?***

**A. Steel**: In 1999, Euro Chlor negotiated a voluntary agreement with the European Commission in which all Euro Chlor members agreed to convert their mercury-based chlorine plants to membrane by 2020. I am pleased to say that to date, all Euro Chlor member's conversion plans are in line with the voluntary phase-out of mercury technology by 2020. This is how we've been able to reduce the amount of mercury still being used in the industry to 31%.

We are also in continuous dialogue with various member companies to aid them in their discussions with their national regulatory authorities. In fact, some countries have phase-out dates that are well before 2020. We're able to help companies formulate their plans as well as their costs. However, every conversion from mercury to membrane is individual, specific to the site where the conversion is taking place.

***The chlorine-alkali industry is an energy intensive industry because of the electricity that is needed as a raw material that cannot be substituted. Does the electricity come only from fuel and gas resources and what alternatives could be used in the future?***

**A. Steel**: The chlorine industry primarily purchases from multinational electricity generators, and what fuel they use tends to be a political matter. They have their own policies on where they get their fuel from, ranging from gas and coal to renewable resources, like wind, water and even wave-generated electricity. But as consumers, Euro Chlor members have no influence over what that fuel source ultimately is. However, in some instances, combined heat and power – the so-called CHP generation scheme – which are used on-site, can offer some flexibility. But CHP schemes have tended to be fueled by gas in recent years, or other waste gases that are available from other processes on the site, particularly if the site is close to an oil cracker. The bottom line is that as a consumer, we have no control over what the alternative fuels are.

***Nuclear power plays a role in the chlorine process as well, especially in Asia and the Middle East. Facing the nuclear disaster in Japan, what does Germany's complete pullout from nuclear power by 2022 mean for the industry?***

**A. Steel**: As I mentioned before, as consumers, we don't have any control over what kinds of fuel is used in the energy mix. Germany's decision to pull out of nuclear power was entirely political. As far as the chlorine industry is concerned, it does raise concerns over security of supply. I'm sure that from a political point of view, the German authorities will assure that there will be an adequate supply for both industrial and domestic use. So far, there's no real effect on us, but we will continue to monitor the situation carefully in the hope that we can influence a secure supply of electricity well into the future.

***How would you describe the relationship between Euro Chlor and the European Commission and Parliament?***

**A. Steel**: I would say that our relationship is one of healthy respect, which hasn't always been the case. If we go back 25 years when Euro Chlor was just being started up, I would say the respect wasn't there. In fact, it was very adversarial – we were constantly under attack. Over the years, Euro Chlor, through its work with the Commission and the Parliament, has been able to show that it is worthy of trust.

Professor Justin Greenwood of Aberdeen University concluded in a 2004 benchmark study that Euro Chlor was one of the most trustworthy European trade organizations. This doesn't mean that Euro Chlor gets an easy ride from the European institutions – we are constantly being challenged – but we are respected for our use of sound science, common sense and good use of risk assessment processes. In fact, we were probably one of the first organizations to really use this concept in its argumentation with the European authorities.

# A Blueprint For Flexibility

## Saving Time and Money with Ethernet

**A Leap Forward** – In process engineering, most signals are still transmitted in analog form – and Shaw Industries, the world's largest carpet manufacturer, was no exception. Until the company dared to take a great leap forward and converted a dye line to Ethernet.

All in the flow: In order to dye carpets, various dyes and additives have to be precisely measured. Shaw relies on Endress+Hauser devices with Ethernet technology.

The crisis was a major blow to the American real estate market. Shaw Industries, market leader in floorings for the residential sector, was affected. But the company took action even before the worst of the recession – and looked for ways to produce more flexibly and efficiently. "In finding a new solution for dying fitted carpets, we have succeeded in taking a major step forward," said Jay McClure, technology and integration manager at the Department for Computer-integrated Manufacturing at Shaw Industries.

At the center of this solution is an industrial Ethernet network – and groundbreaking flowmeter engineering from Endress+Hauser. But first things first …

The majority of carpeting for residential use is dyed in an immersion bath. For this process, concentrated dyes and additives are injected into a water stream. "Our task was to convert the system so that we could extend the scope of products processed on the same line," said Kevin Espy, senior project engineer at Shaw Industries. In order to achieve this, the number of injection loops had to be increased to 40. "Above all, we had to change the entire layout to be able to extend the flow range of the individual loops. Depending on the fiber, completely different dyes and additives are required in widely varying quantities."

Numerous factors influence the quantity of dye solution required. The plant runs faster or slower depending on how long the carpet has to be pre-treated in the steam bath. Dark shades need more dye; the same applies to heavy carpet fabrics. Added to this are stringent quality requirements. "The flow rates mustn't vary by more than one percent from the specified rate," said Espy.

### Stepping Into the Digital Future

It was soon obvious that this objective could not be reached using analog signal transmission. "The old technology limited us in what we could do," McClure said. "With a 4 to 20 milliamp signal, we would never have achieved the data resolution needed for such a large flow range." Changing to digital HART protocol was the obvious solution – but things took a different turn.

The newly designed dye line was to be controlled using PlantPAx, a

Continues **Page 13** ▶

## 'Expect The Unexpected'

**Record Year** – Endress+Hauser can look back on a successful 2010: With about 8,600 employees worldwide, the company achieved a turnover of €1.3 billion. The company reported excellent or even record-breaking numbers in most areas, making 2010 "the best year ever" for Endress+Hauser. The one downside: The strong Swiss franc over the euro did its job of tarnishing the positive news a little. In francs, the company's was much lower than its record year in 2008. CHEManager Europe's Dr. Volker Oestreich asked Michael Ziesemer, Endress+Hauser's COO and executive board member, about the company's plans for further development.

Michael Ziesemer, COO, Endress+Hauser

***CHEManager Europe: Which regions and branches would you say contributed the most to Endress+Hauser's success in the last year?***

**M. Ziesemer**: The economic recovery was palpable worldwide from the beginning of the year. Just a few markets – including Greece, Ireland and Scandinavia – were exempt from this. We saw the strongest growth in the U.S., where our business grew 38.2 %, which was even stronger than the growth in Asia, which was 28.5 %. Emerging markets have gained much more importance much quicker than expected, mainly as a result of the economic crisis. However, investments are also being made in Germany: It's now considered to be the most competitive EU country.

Our largest branch – the food industry – gave us our greatest push. In this area, plant and machine engineering companies – manufacturers of bottling plants, for example – recovered very quickly. Also, thanks to the need for more raw materials, basic materials industry also contributed to our success. The pharma and chemical industries, the oil and gas sector, metallurgy, power plant technology as well as water and effluent treatment also developed well. Only the paper and pulp industry remained in the red.

***How has your company reacted to the economic upswing?***

**M. Ziesemer**: Our financial independence allows Endress+Hauser to set its sights on long-term goals and to stay true to our convictions. Since we hardly made any reductions in staff during the crisis, we were able to go full-steam ahead once the recovery began.

In 2010, Endress+Hauser inaugurated a new building in Wrocław, Poland. Our sales center in China also started up a distribution center in Shanghai. Our Dutch marketing company recently moved into a new building in Naarden. Endress+Hauser Thailand is planning on expanding its offices, and the sales center in Malaysia will invest in its own building. Also, we plan on establishing a Saudi Arabian office together with a partner this year. We are clearly sending the signal that we are continuing our global expansion in all relevant markets.

***What about the risks?***

**M. Ziesemer**: 2011 got off to a good start for us. Our new orders and sales are currently in the double-digit range over 2010, which was also a good year. However, we expect this development to taper off in the second half of 2011. There are still many uncertainties that can affect the market: The financial crisis is not completely over, and many countries' debt – also in the eurozone – is like a mortgage on the future. The political unrest in North Africa and the Middle East, but also the disaster in Japan showed us that a company has to expect the unexpected at all times. After what happened in Japan, we were far less concerned about the economic developments there as we were about worldwide production losses, particularly in light of the fact that Japan is the most important distributor of electronic components, and the supply is already tight. We have to remain vigilant and flexible and keep taking advantages of opportunities, but we cannot overlook the risks.

***What technological developments have you observed in process automation? What are your expectations for the near future?***

**M. Ziesemer**: Wireless fieldbus communication has gained in industrial importance. As we expected, our customers use WirelessHART technology where it makes sense, such as in plant areas that are far from each other or in mobile applications. Our largest contract in this area came recently from Colombia: We're installing 700 WirelessHART transmitters in an oil field. Other communication topics include the integration of equipment, where we work intensively to support the process with FDI in order to find a comprehensive solution. We also work with web technologies, from which significant benefits for the customer can be created.

***What specific web technologies?***

**M. Ziesemer**: I am thinking of mobile application with apps for service and maintenance as well as continuous communication from the field over the plant asset management all the way to EPR. This could be used, for example, to allow the field device to trigger an order for spare parts.

***But that could also be risky.***

**M. Ziesemer**: You're surely thinking of data security. The Stuxnet worm startled the entire automation industry. Protection from sabotage and espionage is important. Every new piece of technology that is installed has to be safe from hackers. Because of cost reasons and because of application reasons, there is no way getting around the fact that the established standards surrounding hard- and software must be used. There is still a lot to be done.


**Praxair Subsidiary to Supply to Braskem** Industrial gas producer Praxair said its Brazilian subsidiary White Martins has signed a 15-year agreement to supply nitrogen and oxygen to Braskem, a petrochemical company based in Brazil. White Martins will build and operate a new cryogenic on-site air separation plant with a capacity of 200 tons per day. The plant will supply Braskem's expanded polyvinyl chloride unit in the state of Alagoas, in Brazil's northeast region. Braskem has invested an estimated $635 million in the new industrial unit that is is scheduled to start operations in the first half of 2012.

**Mitsubishi Chemical to Make Solar Cell Film** Mitsubishi Chemical said it will spend about $123 million through 2015 to grab 30 % of the global market for adhesive film used in solar cells and will launch a large plant in China by the end of 2012. Group firm Mitsubishi Plastics recently installed adhesive film manufacturing equipment at its plant in Nagahama, Shiga Prefecture, which can turn out 3,000 tons of the film annually, the Nikkei said. Total production capacity, including other locations, will be raised to 5,000–6,000 tons by year-end, for sale to solar cell manufacturers mostly in Japan, China, the United States and Europe. Mitsubishi Plastics will build the Chinese plant – capable of making 20,000 tons of the film a year – in either Shanghai or Jiangsu Province, with construction set to start at the end of the year, Nikkei said. By 2015, annual capacity at the Chinese plant will be raised to 60,000 tons, Nikkei said.

**Evonik-Uhde Process Basis of HPPO Plant in China** Representatives of Uhde, Evonik and a delegation from the Chinese province of Jilin have signed a non-exclusive license for the construction and operation of an HPPO (hydrogen peroxide propylene oxide) plant at Jilin in north-east China. Uhde's scope of services will include key parts of the engineering design, supply of equipment and plant erection and commissioning support. The licensing agreement will allow a joint venture which to be formed between Jilin Shenhua and Jilin North Chemical Company (JNCC) to build a plant for the production of 300,000 tons of propylene oxide based on a process developed by Uhde and Evonik. Propylene oxide is a raw material for polyurethane foams, which are used for insulation in the building industry, for upholstering comfortable furniture and for automotive lightweight construction.

**Solvay to Build Specialty Polymers Production Plant in China** Solvay has announced it will invest about €120 million in building a specialty polymers production plant in China in order to continue serving fast growing demand in the market. The plant will be built at Solvay's industrial site in Changshu in the province of Jiangsu and is scheduled to become operational at the beginning of 2014.

**Wacker Starts Operating Production Lines for High-Purity Silicone Elastomers** Wacker has started operating several silicone-polymer production lines at its Burghausen site. The lines are for high-purity specialty silicones, encapsulation and coating compounds, as well as UV-activated silicones for the medical, LED and electronics industries. As these products must meet particularly high quality and purity requirements, a new cleanroom facility was added to the site. The new facility meets Wacker's novel Clean Operations principles and thus fulfills quality and purity standards otherwise only typical of the semiconductor and pharmaceutical industries. "In general, this plant is operating according to selected Good Manufacturing Practice principles, which makes it one of a kind worldwide," said Dr. Bernd Pachaly, head of the Engineering Silicones business unit, at the start of production in early July.

**Linde to Build Largest Air Separation Plant in Indonesia** Linde Indonesia, a member of the Linde Group, announced that it had entered into a long term industrial gases supply scheme agreement with PT. Krakatau Posco. PT. Krakatau Posco, a joint venture between POSCO and Krakatau Steel, is building a three million tons per year steelworks in the first phase in the Cilegon area, located about 100km west of Jakarta. To support the gases requirements, Linde will invest about €88 million to install a new air separation plant at Cilegon which is capable of producing approximately 2,000 tons per dayof oxygen. In addition to meeting the 1,680 tons per day oxygen requirement of PT.KP's new steelworks, Linde's new plant, which will be commissioned by October 2013, will also produce liquid products to meet the growing demand for industrial gases in West Java.

**Exxon Mobil Delays Start of Singapore Ethylene Unit to 2012** Exxon Mobil will delay the start-up of its one million tons-per-year (tpy) ethylene cracker on Jurong Island in Singapore into next year instead of the end of 2011 due to longer-than-expected safety checks needed for its petrochemical projects. The cracker was part of a host of projects which include two new polyethylene units which have a combined capacity of 1.2 million tpy and a 300,000 tpy specialty elastomers unit.

**SABIC Signs 50/50 JV with Mitsubishi Rayon** SABIC said it signed a 50/50 joint venture agreement with Mitsubishi Rayon to build and operate two plants in Jubail. One of the plants will produce methyl methacrylate monomer and will be the biggest plant in the world at a capacity of 250,000 metric tons a year, the company said in a statement. The other plant will produce polymethyl methacarylate with a capacity of 40,000 metric tons a year, the statement said.

# A Blueprint For Flexibility

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control system from Rockwell Automation. It operates with EtherNet/IP, an Ethernet protocol designed to meet industry requirements and widely used in factory automation. One day, Rockwell Automation approached the company and drew their attention to a Coriolis flowmeter with EtherNet/IP interface: the Promass 83 from Endress+Hauser.

"We were very interested in the concept right from the outset," Espy said. Nevertheless, it wasn't an easy decision. "Changing your supplier is always a major issue. The personnel have been trained, they are familiar with the devices, there's a stock of spares – it needs really compelling reasons." Instruments from several manufacturers were put through stringent tests, looking at function, precision and reliability. Communication protocols, the dimensions of the housing and of course the price were all taken into consideration in the decision-making process. In the end, Endress+Hauser's Promass Coriolis flowmeter stood out, Epsy said.

Shaw Industries therefore decided on Endress+Hauser and Ethernet technology. The installation went smoothly, and as each instrument has its own IP address, it can be immediately accessed via the network once connected. This saves time, particularly for configuration.

### More Products, Easier Operation

The new plant has been working for more than a year now without any problems. The improvement is striking: The flow range has more than doubled, and the flow rate can be varied between 0.5 and more than 50 liters a minute. Now 78 different products can now be dyed on the same line instead of the previous 48. And because the dye solution can be dosed exactly and specifically, batch tanks are no longer required. This cuts down time and effort as well as reducing the consumption of dyes and additives. Not only does this save money, but it is also environmentally friendly. The new plant has become something of a prototype; further production lines are scheduled to be converted.

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# BASF to Build CSB Plant in Bahrain

BASF has announced it will build a state-of-the-art plant for customer specific antioxidant blends (CSB) in Bahrain. CSBs are key additives for the production of polymers for the plastics industry, especially for the Middle East region. Construction of the new facility will start in September. It will become one of the world's largest CSB plants with an annual capacity of about 16,000 metric tons. The new plant will be operational already by end of 2012.

This new plant will come in addition to the existing manufacturing agreement for CSBs with Astra Polymer in the Kingdom of Saudi Arabia, making BASF the largest CSB supplier in this region, the company said. BASF also said that the facility will be well positioned to serve the fast growing polymer market in the Middle East with special focus on key customers in the countries of the Gulf Cooperation Council (GCC), one of the fastest growing regions for the production of polyolefin resins worldwide. ■

# Lanxess Expanding Krefeld Menthol Facility

Lanxess has begun the expansion of its menthol facility at its Krefeld-Uerdingen site; the company said it will double its capacity. Completion of the project is scheduled for the first half of 2012. The company said the additional quantities of thymol, crude menthol and D,I-menthol will allow contact parnter Symrise, manufacturer of synthetic menthol and thymol, to enter into long-term supply agreements.

As part of the construction project, three large distillation columns will be erected this fall. The largest will be about 50 meters tall and it was designed by Lanxess engineers specifically for this purpose. "A column of such dimension is special for our plant," said production manager Dr. Lutz Heuer. Assembly of the enormous structural elements will begin once they have been delivered to their destination in Uerdingen – an operation that will require special transportation as a heavy load. "We will use three cranes, one of which has a lifting capacity of 900 metric tons and is the largest available in Germany. It will also enable us to lift the heaviest single element, which weighs 90 metric tons," said Heuer. ■

# The Latest from Fukushima Daiichi

Japanese engineers are inching towards gaining control of the Fukushima Daiichi nuclear power plant which was crippled by an earthquake and tsunami on March 11, triggering the world's worst nuclear disaster in 25 years.

Tokyo Electric Power (TEPCO), the owner of the plant, began operating decontamination and cooling systems in June, taking it closer to a cold shutdown of reactors that suffered meltdowns early in the crisis.

This satellite image of Fukushima Daiichi shows the remaining ruins of the plant. (Photo ©DigitalGlobe)

### What Is Happening?

The disaster in March knocked out the cooling systems at the Daiichi plant, 240km (150 miles) northeast of Tokyo, causing meltdowns of nuclear fuel rods at three of the plant's six reactors.

As an emergency measure, TEPCO cooled the reactors by pumping in tens of thousands of tons of water, much of it drawn directly from the sea. Some of that water is now stored in huge tanks and some is still in the basements of the reactor buildings, threatening to leak into the ocean.

Drawing on technology from French, U.S. and Japanese companies, TEPCO completed a system to decontaminate the accumulated water and pump it back to cool the reactors.

The system started on June 17 and has repeatedly stalled but, as of July 5, TEPCO had treated nearly 14,000 tons of water. It estimates that 120,000 tons of highly radiated water has accumulated at the plant.

The pace of the decontamination is running at about 80% of TEPCO's initial plan and the utility may not meet its self-imposed target to complete the decontamination by January.

### What Is Hampering TEPCO?

The decontamination system was built in a hurry from a patchwork of technologies and its very complexity – it has to remove oil and radioactive substances and desalinate the water in different steps – has left it prone to breaking down.

The cooling system uses 4 kilometers (2.5 miles) of plastic piping that snakes through the compound, which is a headache to maintain.

TEPCO is also stretched with a full load of other tasks. It is covering some of the reactor buildings with giant structures to contain radiation and is also injecting the reactors with nitrogen to prevent hydrogen explosions.

The searing summer heat is another challenge for the workers, with the threat of dehydration and heat stroke that much greater due to the protective suits and masks they have to wear.

### How Long Will the Crisis Last?

TEPCO aims to stabilize the plant by January. But with the gradual revelation of the true extent of the damage to the reactors, many experts said the process could take longer.

On Monday, TEPCO will review its self-imposed clean-up plan, first released in April, and may amend some of its targets.

Even after the plant is under control, clean-up work at the site is expected to continue for years.

### What Are Some of the Consequences of the Disaster?

Nearly 80,000 people have been forced to evacuate their homes, most of them from a 20-km (12-mile) radius around the plant. Living in fear of radiation has become part of life for residents both near and far from the plant.

The crisis has prompted Japanese Prime Minister Naoto Kan to call for a complete review of national energy policy and a bigger role for renewable sources such as solar power.

It has also hampered efforts to restart reactors idled for regular checks, raising the possibility of power outages during the peak summer and winter demand periods.

A poll last month showed nearly 70% of Japanese opposed restarting idled reactors, although that would mean having to cut back on power use and would threaten economic activity. ■

# Up In The Clouds

## 6 Questions Every Executive Should Ask About Cloud Computing

**Evolving Technology** – Most chemicals companies still are at an early stage in their adoption and usage of cloud computing, but the industry's structure and prevailing trends mean it is well-positioned to leverage major benefits from this emerging technology. With cost pressures increasing due to high and volatile commodity prices, and intensifying global competition driving a need for greater operational excellence, chemicals businesses need to achieve a fundamental reduction in their underlying cost base.

**Markus Fuhrmann,**
**Senior Executive,**
**Accenture**

At the same time, challenges such as ongoing globalization of both manufacturing and research and development (R&D), industry consolidation and the rise of the sustainability agenda are demanding new approaches to operating models. These pressures are compounded by the need to manage and mitigate supply chain risks more effectively in a globalized world, and to respond to customers' demand for shorter lead times and more specialized formulations.

To help chemicals industry decision makers make the right choices about cloud computing, Accenture has identified six key questions that we think they should ask about this still new phenomenon.

### 1. What Is Cloud Computing, and How Does It Work?

Accenture defines cloud computing as the "the dynamic provisioning of IT capabilities, whether hardware, software or services, via the Internet." In general, a cloud-based model provides rapid acquisition, low to no capital investment, relatively low operating costs and variable pricing tied directly to use. As a result, cloud technologies allow IT to respond faster and more effectively to the changing needs of the business, creating new services and opening new markets, thereby helping to achieve high performance.

Clouds can take two forms: private and public. Private clouds are built within a company's data center and are designed to provision and distribute virtual application, infrastructure and communications services for internal business users. In contrast, public clouds extend the data center's capabilities by enabling the provision of IT services from third-party providers over a network.

The choice between private and public clouds represents a trade-off between security and flexibility. A company using a private cloud gains the perceived benefits of lower risk and higher data security, since it owns and holds the cloud data and services within its own infrastructure, an approach that is sometimes required by regulators. A public cloud is seen as involving higher risk, since the user's data is held externally alongside that of other businesses, but it also tends to offer greater flexibility and scalability than a private cloud.

### 2. What Benefits Can Clouds Bring to My Organization?

The three top benefits of cloud computing most commonly talked about today are cost, flexibility and speed to market. However, forward-looking companies are already thinking about how cloud technologies will fundamentally change the face of their operations in the longer term.

**Cost**

Low prices on cloud services are a big part of their allure. For example, a major pharmaceuticals group was reported to have paid Amazon Web Services only $89 to analyze data on a drug under development – a job that would have required its researchers to buy 25 servers to perform in-house. Using clouds also shaved three months off the IT budget and approval process, resulting in faster time to market and $1 billion in opportunity costs avoided. Add the savings from eliminating the cost of servers, software licenses, maintenance fees, data center space, electricity and IT labor, and the benefits of replacing a large up-front capital expense with a low, pay-for-use operating expense, and the financial appeal of cloud computing is obvious.

**Flexibility**

Clouds offer extraordinarily flexible resources: They can be summoned quickly when needed, grow by assigning more servers to a job, then shrink or disappear when no longer needed. That makes clouds well-suited for sporadic, seasonal or temporary work, for finishing tasks at lightning speed and processing vast amounts of data, and for software development and testing projects. Clouds can also supplement conventional systems when demand for computing exceeds supply. And since they are an operational expense, cloud services can often bypass the capital-expense approval process, and be quicker to procure than conventional systems.

**Speed**

With cloud computing, additional infrastructure required for activities such as new product developments can be added more quickly and easily to the existing IT environment. This means that if additional development or testing platforms are required, there is no need to buy or lease the required hardware. More generally, the inherent flexibility and scalability of cloud solutions can help organizations become more agile and responsive, as well as increasing their ability to impose a standard set of applications or processes enterprise wide. For applications that require a great deal of IT infrastructure (servers and storage), cloud computing can help significantly shorten the lead time to procure, deliver and install the service. Overall, properly implemented cloud architecture can mean the time and costs of provisioning an innovative IT service have never been lower.

A further benefit is that as industry consolidation continues, use of cloud computing boosts the speed at which IT systems can be integrated in the wake of a mergers and acquisitions deal. Similarly, in the event of a disposal, the unit that has been sold off can be "unplugged" from the IT organization more quickly and cleanly.

### 3. How Can Cloud Computing Help Me Gain Competitive Advantage Over My Competitors?

When exploring the use of the cloud computing, chemicals industry chief information officers (CIOs) should carefully consider how the technology can meet the needs of their particular segment. While reducing the cost of noncore activities is relevant for most firms, other aspects of cloud technology may be more relevant to specific business models. For example, a company operating as a specialty chemical provider may benefit more from the ability to rapidly adopt applications for marketing and pricing made available in the cloud; than would a commodity producer that depends on repeatable, global processes to drive a consistent manufacturing process. Also, experience shows that firms relying on innovation as their primary growth engine can offload large computing cycles to offsite servers to reduce the period of achieving experimental results.

More generally, companies in the chemicals industry face a number of common challenges springing from global economic trends, movements in the commodities markets, and ongoing change among customers, suppliers and the broader global environment. Cloud computing can help chemical companies drive operational excellence; meet growing and changing customer demands; accelerate new product innovation and ramp-to-volume manufacturing in key markets; reduce IT spending; manage and mitigate supply chain risks; and enable faster and more flexible delivery of new IT systems.

**Want More?**

This article is a condensed version of the Accenture study "Six questions every executive in the chemicals industry should ask about cloud computing." The study can be downloaded in its entirety here: http://ht.ly/5Dg3B

### 4. Can I Depend on Cloud Computing to Save My Organization Money?

CIOs say they are finding real savings from cloud computing, but executives should not take the promises and projections of cloud savings at face value. The articles about companies that have saved money rarely explain how these savings were calculated, and several apparently rigorous analyses of cloud savings have been attacked as unrealistic. In our experience, even where U.S.-based firms move their internal applications to the cloud, they usually decide to retain a number of services in-house, because the costs of hosting a server internally, whether in an optimized data center located in the United States or in a captive facility offshore, are lower than that of an external cloud service.

Executives need to look closely into the costs of cloud computing for their organizations. They should seek rigorous return-on-investment case studies based on actual cloud usage, rather than estimates of anticipated savings. Hardware, after all, is a relatively small component of data center costs. They need to uncover the hidden management, transition and usage costs that reveal themselves only when organizations start to work with the technology. They need to evaluate the pricing models of different kinds of cloud services. And they need to work with the finance department to develop a consistent and acceptable approach to measuring the costs and return from clouds. Only then can they reliably estimate the savings.

For chemicals businesses, the following are critical to realizing the greatest possible cost benefits from adopting cloud technologies:

- Adopting common standards that make sharing of knowledge and services easier.
- Using standard, "fit-for-purpose" and clearly defined service levels as much as possible, geared to requirements of the specific service.
- Applying standard security and data privacy restrictions appropriately, taking into account the fact that most services offered by cloud providers today are managed and provisioned on a cross-border rather than in-country basis.
- Overcoming any departmental "ownership" issues so as much work can be moved to the shared cloud as possible.
- Taking care to maintain flexibility around procurement and not get too tied into specific suppliers.

### 5. How Will Cloud Computing Affect the Way My Organization Operates in the Future?

Ongoing globalization will require chemicals companies to change their operating and business models. As well as playing a role in meeting the industry challenges, cloud computing also will help companies approach and operate many parts of their business in a radically different way, achieving a permanent step-change in their operational effectiveness and competitiveness. Key elements of the chemicals industry's future operating models will include the following: innovation enabled and driven by global R&D networks; new products and new markets; an increase need for customized solutions; an increased role if IT to enable co-production; continued outsourcing of noncore functions and shared services; increased competition in talent recruitment; and additional value contribution from IT.

**Early Days**

As with the benefits of cloud computing, it is still too early to reach a comprehensive view of all the ways in which the cloud will change how chemicals companies operate. Strategists must investigate what new business services should be pursued using cloud computing, while CIOs must track the evolution of the technology and the market for cloud services to ensure their strategic ambitions do not outrun the capabilities of the technology. More generally, chemicals companies that fail to embrace the cloud may find their IT options become increasingly limited over time, as will their ability to contain costs and collaborate effectively along the supply chain.

There is a growing view that if chemicals companies want to continue to take advantage of packaged software application in the future, they may find that most of this software is written only for the cloud, and that if they have not created a cloud-friendly or cloud-relevant IT environment they will not be able to benefit. This view is supported by the fact that venture capitalists investing in the software industry are increasingly focusing on funding new entrants who are building their applications specifically for the cloud.

### 6. What About Assurance of Security and Data Privacy?

Security and data privacy remain prime concerns for cloud implementers in all industries. The fear of their data being "in the cloud" is often the single greatest hurdle that leaders must overcome to build trust and gain the benefits from cloud computing. CIOs are concerned that their data could be stolen or compromised by hackers, mixed with data from their cloud providers' other customers, or released by mistake. Any of the above could expose companies to compensation claims, public embarrassment, lawsuits and "brand damage." Many companies have very specific challenges in areas of security and data privacy.

However, many companies' IT estates currently consist of fragmented landscapes of security and data privacy approaches and policies taken across different departments. The move to cloud computing may actually provide a catalyst for driving greater security and reduced costs.

For chemicals organizations, the major security concern is usually around their R&D and the distinctive intellectual property that it creates, effectively the "crown jewels" of their businesses. It also is important that as companies choose cloud service providers they include security and data privacy capabilities as a major part of the selection criteria. The key to understanding security in cloud computing is to realize that the technology is not a break with the past. Instead it represents the logical next step in the outsourcing of commodity services to many of the same trusted IT providers that have been leaders in the field for years.

### Beginning The Journey

The chemicals industry's migration to cloud computing: not a question of "if", but "when" While it may take time for companies to transition to cloud computing, beginning the journey early can deliver some substantial financial benefits. Executives are still grappling with its risks, possibilities and the cost of writing off current IT investments. However, for several companies the transition to a hybrid cloud environment is already underway. Those that move early to embrace this future will position themselves to be tomorrow's high-performance businesses.

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# Cornerstone Of Sustainability

## SAP's Martin Hill on the Importance of Chemical Compliance

**Hand In Hand** – Compliance with regulations implemented to protect humans and the environment has been a top priority for chemical companies in Europe in the recent years. On the other hand, sustainability is gaining in importance in all industries. Brandi Schuster caught up with Prof. Dr. Martin Hill, vice president of sustainability EMEA at SAP, to talk about the correlation of the two topics. Hill has many years of experience in chemical compliance consultancy and sustainability. He also teaches entrepreneurship and sustainability at the University of Siegen, Germany.

**Dr. Martin Hill,**
**Vice President of Sustainability EMEA, SAP**

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*CHEManager Europe: Martin, in your opinion, what are the biggest challenges for European companies regarding chemical compliance?*

**M. Hill**: The biggest challenge is to comply with the Reach regulation. This EU regulation aims to centralize and simplify chemicals legislation throughout Europe. The declared objective was to improve the level of knowledge about dangers and risks that chemicals may pose. Companies are expected to assume even more responsibility for the safe use of their products. As a consequence, Reach brought about a plentitude of tasks the European chemical industry had to fulfill during the past years. And it still keeps them busy.

Now the chemical industry has all the necessary knowhow about the requirements. What is crucial now is that companies must integrate their Reach processes in their supply chain communication and in their IT environment. Reach is not a one-time effort; the real challenge is to stay compliant. It will be vital to include compliance checks e.g. into procurement and sales processes. By doing so, they secure the transparency and efficiency of their compliance processes connected to Reach.

**Reach is not a one-time effort; the real challenge is to stay compliant.**

*What steps can companies take to make sure they are compliant?*

**M. Hill**: Firstly, they need to understand the Reach requirements applicable to them, based on the role they have in the Reach context. A second step would be to translate those requirements into process requirements and to reorganize business processes accordingly. Finally, they need to implement those business processes with IT solutions. For example, a company has to detect its role or roles under Reach. Most of the companies will not only have one role, for example as a downstream user. For some substances or products they might have the role of an importer. So they have to check those products and substances first and then initiate the next steps, including registration etc.

The crucial point again is not to do it one-time and then being in a position "Hurray, we are compliant!" This would be a mistake. The important thing is to install processes to observe the product and substance portfolio and detect your obligations. It might be that the change of an International Commercial rule could already change your position in a supply chain.

*The European Chemicals Agency (ECHA) recently said that after screening over 400 registration dossiers for intermediates, 86% of them seem not to contain sufficient information to demonstrate that these conditions are fulfilled. Where do you see the major hurdles in compliance: In companies who don't have the proper workforce to deal with compliance issues such as Reach; or inside the watchdog organizations, who might not be clear on their requirements?*

**M. Hill**: ECHA said that 86% of the dossiers were insufficient in terms of some data were missing. That does not necessarily mean that the dossiers were totally wrong and not justifiable. I am sure the chemical industry has the right people on board to deal with Reach and other compliance topics. I think we have to grant a period of time were such issues caused by lack of clarity or different interpretations can happen. And this is a real hurdle. We have to remind ourselves what Reach means for companies and within what timeline they have to fulfill these obligations. I am sure some of the issues concerning the dossiers were caused by evolving and not always finalized interpretations and discussions.

*Does compliance give Western chemical companies a competitive advantage over their Asian counterparts?*

**M. Hill**: Fulfilling the regulatory requirements for things such as Reach also brings about an innovation process. For example, chemical producers develop new substances that are less hazardous or new production processes. And they learn more about the substances they have been using in the past. We also have to consider the dynamic evolvement of, let's say, "Reach-like" upcoming regulations especially in the Asia/Pacific region. These regulations will set the same level playing field for all companies and this is good. The still outstanding Toxic Substances Control Act (TSCA) reform in the U.S. can already be a disadvantage for U.S. companies.

Using an integrated IT system that involves all locations and production sites worldwide enables them to react quickly to new and changing compliance requirements – no matter from which world region they derive. This definitely means a competitive advantage. From our experience, more and more countries put regulations into practice, despite the efforts to harmonize regulations worldwide. In 2009, there were more than 2000 Environment, Health and Safety (EHS) regulations worldwide, that was a rise of 72% compared to 2007.

*Are European companies well prepared to do business in Asia? What are the biggest pitfalls and what steps have to be taken in terms of compliance?*

**M. Hill**: From all that I have seen at European chemical companies, they are well prepared to do business in Asia. In fact, they could not afford to be badly prepared, in times of global competition. The challenge they have to take is to fulfill all the Asia specific product notification systems like China New Chemical Substance Notification, Japanese Chemical Substance Control Law (CSCL) or Korean Toxic Chemical Control Act (TCCA). Some of them are quite similar to Reach, so companies can reuse the data they already have in their IT systems. Others require data on different substances or similar data but in another format. This makes it quite complex to comply with all the different notification systems.

*Does regulatory compliance automatically equal sustainability in the chemical industry?*

**M. Hill**: Some people say regulatory compliance is only one part of the story. Due to the complexity of worldwide regulations and the necessity to be compliant with those, we believe it to be the cornerstone of a sustainability strategy in a chemical company. For many of our customers, compliance has first priority. You cannot operate in a sustainable manner if you are not compliant. For example, how could you secure markets in the future if you would risk losing the permission to sell your products due to incompliance with a local regulation? But, of course, the concept of sustainability goes far beyond being compliant. We identify it to increase short and long-term profitability by holistically managing economic, social and environmental risks and opportunities.

*From your discussions with the chief sustainability officers of SAP's key customers, what are some of the most direct needs in the chemical industry in terms of sustainability?*

**M. Hill**: As I said, the first priority is regulatory compliance in order to be able to do business worldwide and so to protect revenue, as we see with the no data, no market principle. Secondly, in times of rising energy costs, energy efficiency is crucial to drive profitability. Thirdly, brand protection and brand innovation are necessary to protect and grow revenue. Just think about BP, whose market cap was cut in half in just two months during the oil spill and has gone from being no. 1 in its category to the last on the brand-loyalty index maintained by Brand Keys, a research consultancy in the world that specializes in customer loyalty. Another priority in order to intensify stakeholder communication and improve reputation is sustainability performance reporting. This means, gathering all sustainability relevant data of an organization and to make it transparent and vivid to all stakeholders regularly or whenever required.

*Is sustainability business critical for the chemical industry?*

**M. Hill**: Yes, and not only for the chemical industry! According to the UN Global Compact CEO Survey 2010, 93% of CEOs state that sustainability is critical for the success of their future businesses. This is an astonishing big percentage; it shows that business leaders have understood that sustainability is not only a trend topic like many others, but a new management approach. Implemented thoroughly, it brings about a business transformation to cover the future challenges like rising energy costs or worldwide regulations, just to name a few. In the years to come, companies need to manage their resources in a different way.

On the other hand, a lot of companies from different branches climb on the sustainability bandwagon or use "green washing" for their marketing campaigns.

It is my firm conviction that within the next few years, business reality will separate the wheat from the chaff – sustainability needs to be an integral part of a business strategy, not only a campaign. Already today, companies with a positive sustainability rating are more successful than others: In 2010, A.T. Kearney Consultants analyzed companies from the Dow Jones Sustainability Indexes (DJSI). For the months May to November 2008 they found out that DJSI listed companies from 16 out of 18 branches experienced a stock market value enhancement of 15% compared to the average of the respective branch. The Corporate Knights Global 100, which lists the 100 most sustainable cooperations, showed a similar development: Since its inception in 2005, the market indicator has grown 16% more than the comparable index MSCI All Country World, which measures equity market performance of developed markets.

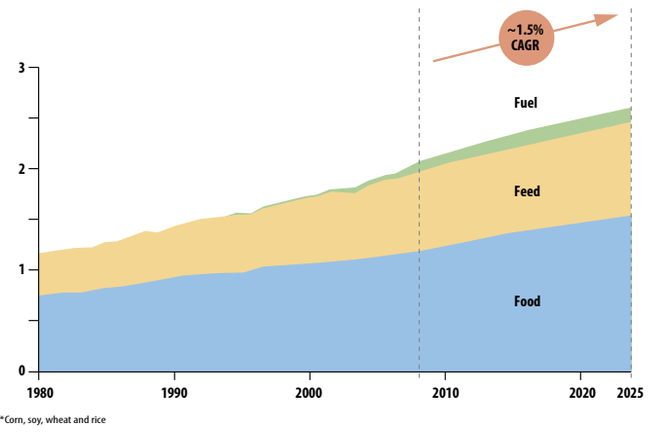
▶ www.sap.com

chemanager-online.com/en/tags/sustainability

# Global Challenges — Food Production and Sustainable Energy

Grain demand*
billions of metric tons

Fig. 1




*Corn, soy, wheat and rice

Source: USDA, Syngenta

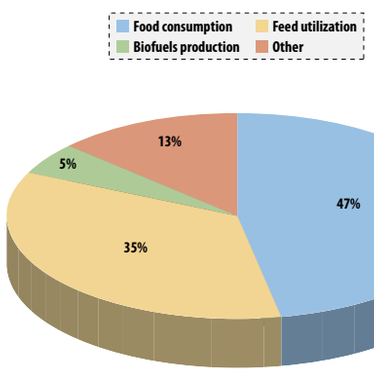


## Worldwide Demand For Grain

Despite significant growth in food production over the past 50 years, nearly 1 billion people in the world still suffer from hunger and even more are malnourished. Farmers will need to produce around 1.5% more grain every year, representing an increase of 35% by 2030 and greater than 70% by 2050. Since 1980, demand for field crops has increased almost 85%, from 1.2 billion to almost 2.2 billion metric tons, with the increased demand for food and feed as key drivers. More recently, people are also looking to biofuels to meet our energy needs in ways that mitigate the growing problem of green house emissions.

2009 uses of cereals production

Fig. 2




Source: FAO / Syngenta

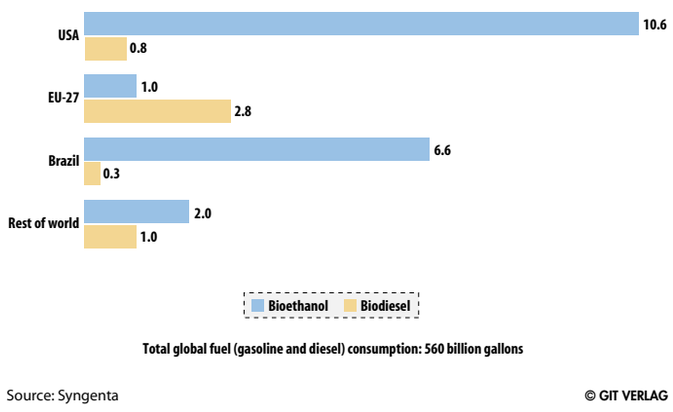


## Uses Of Cereals Production

Demand for grain has increased almost 85% since 1980 and will continue to increase at an average rate of 1.5% per year. Cereals produced for food consumption still leads the way with 47%, while biofuels production only makes up 5%. Agriculture is receiving increasing attention worldwide as government and non-government authorities recognize that there is a need to increase productivity in a more accelerated way in order to ensure food security and improved nutrition to a growing population. At the same time, responding to changes in climate, using the limited natural resources in a sustainable way and respecting biodiversity pose additional challenges to achieving increased farm productivity at the required speed.

2009 biofuel production estimate: 25 billion gallons
billions of gallons

Fig. 3




Total global fuel (gasoline and diesel) consumption: 560 billion gallons

Source: Syngenta

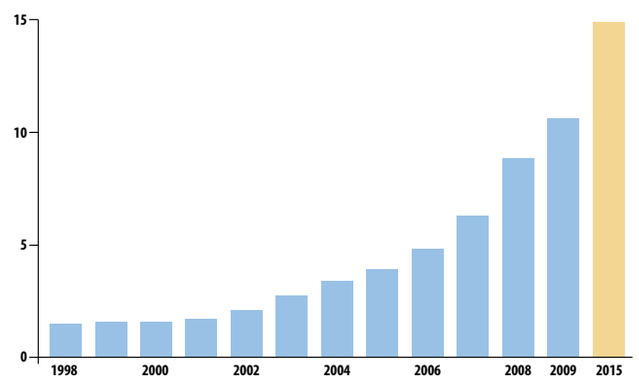


## Worldwide Biofuel Production

Global energy demands are expected to increase approximately 50% by 2030. As fossil fuels are increasingly limited, energy from biofuels produced from plants is now playing a more important role as an alternative. The U.S. and Brazil have invested heavily in this area, producing 70% of the world's biofuels. In Brazil, ethanol from sugar cane produces 40% of the world's bioethanol and has locally replaced 50% of the gasoline used in light vehicles. In 2003 the EU adopted a biofuels directive setting a target of 5.75% for renewable energy consumed in transport by 2010; latest forecasts suggest this has not been achieved. Subsequently biofuels targets have been set for 2020 calling for a minimum market share target of 10%.

The U.S. Renewable Fuels Standard; ethanol production
billions of gallons

Fig. 4




Source: Renewable Fuels Association / Syngenta



## U.S. Renewable Fuels Standard

As the U.S. ethanol industry expands, the amount of corn used for ethanol production is increasing. The Energy Policy Act of 2005 established the first-ever Renewable Fuels Standard (RFS) in federal law, requiring increasing volumes of ethanol and biodiesel to be blended with the U.S. fuel supply between 2006 and 2012. The Energy Independence and Security Act of 2007 amended and increased the RFS, requiring 10.5 billion gallons of renewable fuel use in 2009, stepping up to 36 billion gallons by 2022. Under the modified RFS, corn-based ethanol is essentially capped at 15 billion gallons by 2015, while the balance must be derived from advanced biofuels such as cellulosic and non-corn-based ethanol.

**Sowing The Future** – Every year, Bayer CropScience awards a full scholarship for participation in the 2011 European Plant Breeding Academy. The Academy offers a maximum of 20 participants a professional development course in advanced plant breeding designed and managed by the Seed Biotechnology Center at University of California, Davis, California (UC Davis). At the end of the two-year course, participants will have the skills and know-how to start a career as a professional plant breeder in the seed industry.

The European Plant Breeding Academy relies on combined industry efforts from key partners in each country hosting a module including FlandersBio (Belgium), the European Seed Association (Belgium), Vegepolys (France), Leibniz Institute of Plant Genetics and Crop Plant Research (Germany), the German Plant Breeders Association, Seed Valley and Naktuinbouw in The Netherlands, Center for Research in Agricultural Genomics in Spain and the Spanish Plant Breeders Association. The first Academy program was offered in 2006 and has since attracted 66 participants from 17 countries and over 40 organizations. It involves six one week intensive modules over a two year period. The 2011/12 program commences in October with modules to take place in Belgium, France, Germany, The Netherlands, Spain and the U.S. **www.pba.ucdavis.edu**

## Coming up in our September issue

**Ease into autumn with these topics in the next issue of CHEManager Europe:**

- **NNE Pharmaplan highlights its new structure and current trends in the pharma market**
- **IChemE President Sir William Wakeham discusses the importance of the field of chemical engineering**
- **An in-depth look at sustainability in chemical industry logistics and transport**
- **Wacker experts focus on the relationship between chemistry and biotechnology**

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