



Chemicals

How the cosmetics industry is playing its part in sustainable development

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THE NEWSPAPER FOR THE
CHEMICAL AND
LIFE SCIENCE MARKETS

Logistics

Recent developments and current trends in supply-chain management

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A Game-Changer

Bridging the Gap between Sustainability and Industry in the Field of Bio-based Specialty Chemicals

Formed in 2007, Elevance Renewable Sciences produces high-performance ingredients for use in personal care products, detergents, lubricants, and other specialty chemicals and fuel markets from natural, plant-based oils. Based on its model, the Woodridge, Illinois, USA based enterprise claims to be the first company to successfully bridge the renewables and chemicals industries. Elevance is one of the companies that could revolutionize the specialty chemicals value chain. CHEManager International asked Bob Kumpf, chief technology officer at Elevance, about his strategy to further develop the company's innovative technologies and bringing novel bio-based specialty products onto the market.

CHEManager International: Where has Elevance come from and how did the company start?

B. Kumpf: Elevance began with a grant from the US Department of Energy in 2004, and today we are a high-growth biochemistry company delivering specialty chemicals that exceed the performance of existing products while leaving a smaller environmental footprint. These specialty chemicals are used in personal care products, detergents and cleaners, engineered polymers, lubricants and additives, and other specialty chemicals markets.

Using a proprietary and Nobel Prize-winning technology called olefin metathesis, we have built and now operate a 180,000 metric ton world-scale biorefinery in a joint venture with Wilmar International; acquired and begun converting a wholly owned biodiesel facility into a second 310,000 metric ton biorefinery; established collaborations with leading chemical industry players in feedstocks, technology, manufacturing and markets; and commercialized a string of novel, high-performance products that include cleaning and personal care ingredients and a renewable synthetic base oil.

As a high-performance, renewable, collaboration-oriented company, we are in a unique market position in the \$500 billion specialty chemical market.

What is your expectation for the future market growth for bio-based specialty chemicals from natural oils?

B. Kumpf: Future market growth will be significant. Today, Elevance is commercially supplying partners with better-performing, cost-competitive renewable alternatives to petrochemicals across multiple industries. Through our groundbreaking technology, Elevance is delivering and enabling high-performance specialty chemicals that meet critical industry needs and trends. Our products, and those of our customers, are helping the industry move beyond petrochemicals to something that is better, a new generation of chemistry with a smaller environmental footprint — a new category of products we call Renewicals.

Continues Page 7



Bob Kumpf, CEO,
Elevance Renewable
Sciences

Ki KRESTA industries

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NEWSFLOW

M&A-News: Celgene has agreed to pay \$7.2 billion to acquire compatriot **Receptos**.

Platform Specialty Products has offered \$2.3 billion for all shares of UK-based **Alent**.

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Companies: Sanofi has announced plans to streamline its corporate structure with effect from January 2016.

Ineos is planning to move some of its corporate functions back to the UK.

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Investments: BASF has commissioned a new production plant for form-release agents at its Staßfurt, Germany, site.

Borealis plans to invest €160 million to upgrade and revamp four cracker furnaces at Stenungsund, Sweden.

More on Page 9 and 14

People: Evonik appointed Ralph Sven Kaufmann as new COO, replacing Patrik Wohlhauser.

More on Page 15

Monsanto Steps up Pressure in Pursuit of Syngenta

Agribusiness giant Monsanto is leaving no stone unturned in its quest to take over Swiss rival Syngenta. Since making an initial hostile \$45 billion bid in May, its management has held meetings with representatives of the Swiss company and its major shareholders as well as US farmers and legislators.

Syngenta has continued to hold out, with supervisory board chairman Michel Demaré taking to YouTube to present the company's arguments. In particular, he said the bid "grossly undervalues" the world's largest producer of chemical crop protectants and the US rival is downplaying the execution risks inherent in such a deal. "Monsanto has endorsed our strategy and clearly demonstrated that it has great value," Demaré said, but it is "trying to buy the company 'on the cheap.'"

Monsanto, which needs Syngenta to regain muscle in conventional crop protection after years of betting mainly on seed, meanwhile appears to have convinced at least one major investor of the merits of its strategy. The news agency Bloom-



Michel Demaré, chairman of the board, Syngenta

berg reported in mid-July that Paulson & Co., the hedge fund of billionaire US investor John Paulson, had acquired "a large number of shares" in Syngenta, which could place the fund among the Swiss firm's 20 largest shareholders.

Convincing US farmers that a deal between the two global behemoths will not further reduce competition in the market for seed and chemicals, and legislators that Monsanto will not move tax dollars outside the country have also been at the top of the company's to-do list this summer.

In an "Open Letter to Growers" published as a full-page advertisement in rural US newspapers, CEO Hugh Grant said the combination with Syngenta would "create a portfolio of choices that can improve your day-to-day-operations

in the near term" and also "a new company focused on accelerating innovation and sustainability in agriculture." To legislators, he said Monsanto intended to pay taxes "on all US operations of the merged company," even if it moved corporate headquarters to London, as has been suggested.

Behind the scenes in Europe, observers of the tussle are speculating on which peripheral deals could be forthcoming if, lured by the US offer, Syngenta shareholders agree to tender. Germany's Bayer and BASF, both agricultural giants in their own right, have been named as candidates for Syngenta's seed business, which Monsanto undoubtedly would have to sell to allay antitrust concerns.

After a wave of mergers in recent years, only six research-oriented agrochemical players are left in the industry, and many have cooperation pacts. "If the two biggest were to go together, inevitably it would force others to review their strategies," Bayer CropScience chief Liam Condon remarked in a news agency interview. (dw)

Inovyn Starts, BASF Quits PVC

Following clearance of the merger by the European Commission in mid-June, PVC producer Inovyn, the new 50:50 joint venture of Ineos and Solvay, officially started trading on Jul. 1.

Headquartered in London, the new company has pro forma sales of more than €3 billion, 4,300 employees and assets across 18 sites in Belgium, France, Germany, Italy, Norway, Spain, Sweden and the UK.

The partners said final terms of the JV agreement remain "materially unchanged" from those announced a year ago, when plans were first revealed. Upon closing, Solvay received an upfront cash payment of €150 million from Ineos, subject to customary adjustments such as actual working capital levels. In addition to contributing its entire European chlorovinyl business, Solvay has transferred liabilities of around €260 million to the new company. When the Belgian group sells its stake to Ineos in 2018, as agreed, it is due to receive an additional, performance-based payment in the range of €95-280 million.

Simultaneously, BASF announced the sale of its 25% stake in its SolVin



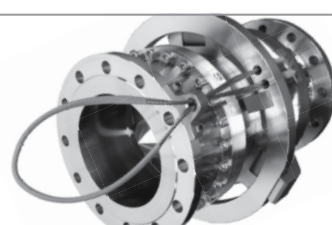
Jean-Pierre Clamadieu, CEO, Solvay

PVC joint venture with Solvay for an undisclosed sum, effective Jul 1. As part of the deal, Inovyn has agreed to supply basic chemicals to BASF's Antwerp, Belgium, site.

SolVin was established in 1999 as a 75:25 joint venture of Solvay and BASF. The German partner said at the time it intended to exit the business at some point in the future. Unclear is whether SolVin will be operated as a standalone company held by Inovyn or be absorbed by it. Integration of the former Belgian-German JV is not known to have been included in the terms of the EU approval of Inovyn but the PVC producer would seem certain to be bound to through supply agreements. At the latest when Solvay exits the business in 2018, full integration into Ineos would appear likely.

Commenting on the launch of Inovyn, Solvay CEO Jean-Pierre Clamadieu said the Belgian group's transformation "has reached a key milestone." Ineos chairman Jim Ratcliffe said the joint venture "combines two businesses with a strong heritage in the chlorovinyls industry, creating a company fit to thrive in an ever changing business environment." (dw)

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Platform Offers \$2.3 Billion for Alent

Private equity investor Platform Specialty Products has offered around \$2.3 billion, including debt, for all shares of UK-based Alent, a manufacturer of electronic chemicals specialty surface coatings.

Principal shareholder of Alent is private equity investor Cevian Capital with just under 22%. Commentators said the takeover was a deal waiting to happen after Cevian pushed for the company's carve-out from Cookson Group in 2012.

The takeover will allow Platform, owned by activist investors Martin Franklin, Bill Ackman and Nicolas Berggruen to merge its MacDermid unit, acquired for \$1.8 billion in 2013, with Alent's Enthone. Both make protective surface coatings for automotive and aircraft applications.

Platform, which is paying 13.9 times Alent's EBITDA, said it expects annual pretax cost savings of at least \$50 million through the integration. The investment group is said to be betting on demand for increasingly compact technology to fit in mobile phones and the addition of more electronics such as sensors in cars.

The current deal represents another step toward consolidation in the market for electronic chemicals, seen to be growing at twice the pace of the automotive industry. In 2013, Merck KGaA bought AZ Electronic Materials for \$2.8 billion, and Entegri bought ATMI for \$952 million.

Earlier this year, Platform agreed to acquire the electronic chemical and photomasks businesses of OM Group for \$365 million. (dw) ■

Celgene Offers \$7.2 Billion for Receptos

US biotech firm Celgene has agreed to pay \$7.2 billion, or \$232 per share, to acquire compatriot Receptos, a biotech company that makes a potential blockbuster drug to treat autoimmune diseases, including multiple sclerosis.

The all-cash offer is said to represent a 12% premium to California-based Receptos' closing price on Jul. 14, which observers said was a relatively modest amount compared to other recent transactions in the biotech sector. It follows by two weeks Celgene's announcement of plans to invest \$1 billion in Juno Therapeutics, a maker of experimental cancer treatments.

In an attempt to rapidly build a pipeline of new drugs through acquisitions and collaborations rather than internal R&D, Celgene has sealed 30 deals or partnerships since

2011. In April of this year it agreed to pay AstraZeneca an upfront fee of \$450 million to collaborate on one of the Swedish-British group's most promising immunotherapies. This partnership will be excluded from the agreement with Juno.

According to news reports, Receptos' most advanced drug, Ozanimod, is a treatment for relapsing multiple sclerosis that can be taken as a once-a-day pill, avoiding the need for injections that can cause considerable side effects. The drug is in late-stage clinical trials due to be completed in 2017, which – if successful – could pave the way for a commercial launch in 2019.

Ozanimod is also being tested in patients suffering from ulcerative colitis and Crohn's disease. A second drug, licensed from AbbVie, is in phase two trials for patients with Eosinophilic esophagitis. (dw) ■

Bayer MaterialScience to be Renamed Covestro

From Sept. 1, Bayer's engineering plastics sub-group Bayer MaterialScience (BMS) will begin trading as Covestro. The name change will precede an initial public offering planned for BMS in mid-2016 as Bayer prepares to reinvent itself as a pure life science player.

Explaining the name, future Covestro CEO, Patrick Thomas, said CO stands for collaboration with suppliers and customers, VEST for investment in state-of-the-art manufacturing facilities and STRO for strong, reflecting the company's strengths in innovation, in the market and in its workforce.

Covestro will be Europe's fourth largest chemical company in terms of sales behind BASF, LyondellBasell and Evonik. The engineering plastics producer meanwhile has entered

what it calls the "home stretch" of its Dream Production project, the manufacture of polyols from waste CO₂.

Polyols produced from the waste gas, made up to around 20% of CO₂, will be used to produce polyurethane foam for mattresses.

A new 25-t chemical reactor was installed at the heart of the future production line at the company's Dormagen, Germany, site, and the last key component, a CO₂ tank, is due to be installed later this year.

The facility is expected to go on stream in the first quarter of 2016. Intensive tests are said to have shown that the material produced from CO₂ is "at least as good" as conventional products made entirely from petrochemical feedstock, and the new production process is more sustainable. (dw) ■

German Antitrust Authority Allows BASF-Siegfried Deal

Germany's antitrust authority Bundeskartellamt has approved BASF's plans to sell its custom synthesis business, part of the Nutrition & Health division, and parts of its current active pharmaceutical ingredients (APIs) business to Zofingen, Switzerland-based Siegfried Holding.

Following the divestment, which has an enterprise value of €270 million, BASF intends to focus on

products for which it has a leading market position.

Siegfried will acquire APIs such as ephedrine, pseudoephedrine and caffeine, with annual sales of around €270 million, while BASF will retain its excipient portfolio and selected APIs, such as ibuprofen, omega-3 fatty acids and polyethyleneglycol (PEG).

The Swiss company said it expects the transaction be finalized at the beginning of the fourth quarter. (dw) ■

Ardian Acquires ES and IM Businesses from DPx Holdings

Austrian private equity investor Ardian has acquired Exclusive Synthesis (ES) and Maleic Anhydride Intermediates & Specialties (IM) from Linz-based DPx Holdings for an undisclosed sum. The assets held by the 51:49 joint venture of investor JLL Partners and Dutch chemical Group DSM were merged in 2013 from holdings of DSM Pharmaceutical Products and Patheon. ES develops and produces chemical

intermediates for agriculture and other industries. IM produces maleic anhydride, along with a large number of intermediates, derivatives and esters. Together they reported sales of some €200 million in 2014.

With Ardian's support, management led by CEO Wolfgang Hillisch plans to "significantly strengthen" the units' market position and expand through organic growth and acquisitions. (dw) ■

AkzoNobel to Sell Biomaterials Technology to Ashland

In a transaction that is set to close in the third quarter of this year, AkzoNobel has announced plans to sell its biomaterials technology to Ashland of the US. The Dutch chemical producer said the business is in its early phase of commercialization, and the divestment plans follow a strategic review that determined it was not a good fit with the company's portfolio.

The activities are focused on plant-based chemistry used to develop products for various applications, such as high performance beauty technologies.

"This transaction will enable us to focus on our core technology platforms, specialty surfactants and polymers, and help reinforce our leadership position in both areas," Akzo Nobel said. (dw) ■

Ineos Said Moving Corporate Functions Back to UK

Ineos is planning to move some of its corporate functions back to the UK from its current headquarters in Switzerland, according to unconfirmed press reports.

In an interview with the London newspaper Daily Mail, the petrochemical group's chairman said he is "cheerful about coming back to the UK," five years after moving headquarters from Lyndhurst in Hampshire to Rolle, Switzerland – near Lausanne – after failing to win tax breaks from the then-Labour government.

"We increasingly found ourselves gravitating towards London. There was so much going on for our business, and we had grown substantially here," Ratcliffe said. At its new base in London, he said Ineos will have a large trading floor for its oil and gas traders, who are currently based at Canary Wharf. "A few people will move from Lausanne."

"The return of such a successful business is a massive coup for the policies of (prime minister) Da-

vid Cameron and (chancellor of the exchequer) George Osborne," the newspaper commented. The British government has been trying to lure fresh corporate investment with the promise of lower corporation taxes.

Ratcliffe, who himself will remain a Swiss resident, said the move in 2010 – after the Labour government of Prime Minister Gordon Brown declined to temporarily defer VAT payments of £350 million when the chemical producer found itself overexposed to the financial crisis – has saved Ineos £100 million in tax annually.

Ineos is still one of the largest manufacturing businesses in the UK. Many of its assets remain there, notably the mammoth petrochemicals complex at Grangemouth in Scotland – despite Ratcliffe's repeated threats to pull out. The group is close to completing an export terminal for shale gas near Grangemouth, for which it won pledges of investment aid from both the UK and Scottish governments (dw) ■

K+S Rejects PotashCorp Takeover Bid

As the cross-continental M&A drive gears up, German minerals producer K+S has rejected a €41-per-share unsolicited takeover offer for all of the company's shares made in late June by Canadian rival Potash Corporation of Saskatchewan.

The offer "does not reflect the fundamental value of K+S and is not in its best interest," said CEO Norbert Steiner. "Not only does this proposal undervalue our potash and magnesium products and our salt business, it completely disregards the value of our Legacy Project," he added.

According to the CEO, the book value alone of the Legacy potash mine in Saskatchewan, scheduled to begin production in mid-2016, is €11 per share, and considering future earnings K+S management calculates a value of up to €21 per share. "This," he said, "is not yet reflected in the share price."

Steiner also pointed to strategic initiatives across both the potash and magnesium and salt business units, which he said contribute to the positive outlook for the Kassel-based

company. The "Salt 2020" strategy alone, he said, is expected to produce a sustainable increase in operating profit of up to €250 million.

K+S has already invested more than €2 billion in the Legacy project, which is said to be on time and on budget. "The first tons of potash will be produced by the end of 2016, and positive cash flows will be generated already from 2017 onward," Steiner said. "We believe PotashCorp is trying to take advantage of the valuation gap to take over K+S and gain control over Legacy."

Steiner noted that K+S management is "not suitably convinced" that PotashCorp has a sustained interest in continuing the fertilizer and salt businesses in their current form, which are "strategically, technically and economically intertwined." Along with the government of the German state of Hesse, in which most of the mines are located, the company is concerned about the future of the more than 30,000 direct and indirect jobs associated with its mining and domestic raw material production. (dw) ■

Sanofi to Streamline Global Organization from 2016

French drugmaker Sanofi has announced plans to streamline its corporate structure with effect from January 2016. The company pointed to its heritage formed from a combination of venerable companies – including Aventis, the merged drugs business of Germany's Hoechst and France's Rhone-Poulenc – which has enabled it to deliver "highly innovative treatments."

Sanofi said it is now poised to achieve significant growth with the potential of launching up to six new medicines in 2015 and about one every six months between 2016 and 2018. The new organization "simplifies and focuses Sanofi to optimize growth," said Olivier Brandicourt, who took over as CEO in April.

Five new global business units are planned to be created. General Medicines & Emerging Markets will be headed by Peter Guenther and will consist of Sanofi's established products, generics, consumer healthcare, and all pharmaceutical businesses in emerging markets.

The Specialty Care global business unit, to be called Sanofi Genzyme, will be led by David Meeker and will consist of Sanofi's medicines in rare diseases, multiple sclerosis, oncology and immunology, including the two investigational biologics, sarilumab and dupilumab.

Sanofi's Diabetes & Cardiovascular global business unit will be led by Pascale Witz and will consist of diabetes care medicines as well as cardiovascular, including pralutab (alirocumab).

As global business units, Sanofi Pasteur and Merial will continue to manage their current portfolios of vaccines and animal health products. Olivier Charneil will continue to lead Sanofi Pasteur and Carsten Hellmann will continue to lead Merial. Similar to Research and Development and Industrial Affairs, all functions will be globalized to better serve the business units, the French drugmaker said. The makeup of the executive committee will remain unchanged. (dw) ■

SGL Carbon to Carve Out Performance Products

Defining what management calls "the next strategic milestones for ensuring sustainable profitable growth," Wiesbaden, Germany-based carbon and graphite producer SGL Carbon has announced plans to carve out its Performance Products (PP) business, which makes and markets in particular graphite electrodes, into a standalone company. For the business units Graphite Materials & Systems (GMS) and Carbon Fibers & Materials (CFM), it intends to pursue "an accelerated growth strategy."

The carve-out of PP is planned to be completed by the end of the 2016 business year. The company said the unit will "adapt its business model to the changed market conditions especially in graphite electrodes." This could mean a stock market flotation, a joint venture or partnership with a financial investor.

SGL added that the repositioning will allow PP to "flexibly react to new strategic options, allowing it to participate in "future consolidation scenarios in the graphite electrode

industry." For the remaining units, management is targeting organic sales growth of around 50% against the 2014 figure of €737 million, coupled with "selective bolt-on acquisitions." For some time, SGL has been pursuing expansion scenarios for lithium ion batteries, LEDs and lightweight carbon materials.

The company said the decisions represent a further development of its strategy launched in 2013 with the cost savings program SGL2015 and continued in September 2014 with the announcement of the key strategic cornerstones. The main financial target is and remains to improve the return on capital employed (on an EBITDA basis) in the group as well as in the business units to at least 15% in the medium term.

Savings of more than €240 million are targeted through SGL2015, expected to be largely completed this year. According to the company, €172 million of the goal was achieved by the end of the first quarter of 2015. (dw) ■

DuPont and Chemours Face Hefty US Fines

DuPont is said to have burdened its newly listed Performance Chemicals spin-off Chemours with potential liabilities at 171 of its US production sites. The new company will also share some of the thousands of dollars in fines the US Occupational Safety and Health Administration (OSHA) has threatened to slap on the chemical giant for safety violations.

Reports say up to 25 active production facilities could be subject to the clean-up bill to be presented to Chemours by the US Environmental Protection Agency (EPA). Personal injury lawsuits are another potential threat to both the former parent and the spin-off. Apart from cleanup costs, Chemours is believed to face 3,500 personal injury and 32 wrongful death claims regarding the facility in Parkersburg, West Virginia, alone.

Estimates of potential cleanup costs the DuPont group including Chemours could face run to billions of dollars. However, any calculation is considered only a rough guess, as EPA has not completed all investigations – in particular for Pompton Lakes, New Jersey, where explosives were manufactured for 97 years.

Beyond civil suits, the group faces a minimum of \$99,000 in OSHA fines for violations related to four fatalities caused by a leak of methyl mercaptam during a loading procedure at the LaPorte, Texas, herbicide plant. The agency said DuPont's failure to correct safety violations such as rundown equipment, undertrained workers and undisclosed hazards led to the deaths.

OSHA is also proposing to add \$273,000 penalties for additional violations found in a separate inspection of the LaPorte site. In connection with these and a series of accidents at other facilities, it has placed DuPont on its five-year-old Severe Violator Enforcement Program list of problem companies.

The workplace safety watchdog said the chemical producer had "demonstrated indifference towards creating a safe and healthy workplace by committing willful or repeated violations, and/or failing to abate known hazards." In response to the complaints involving LaPorte, DuPont said it had identified and addressed most, if not all, of the agency's significant findings. (dw) ■

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Beyond REACH: Nanomaterials in the European Union

Confusion Swirls around Definition and Registration

Companies manufacturing, importing or distributing nanomaterials into the territory of the European Union do not only have to comply with the Registration, Evaluation, Authorization and Restriction of Chemicals (REACH). Two sector-based regulations and three EU member states oblige them to register substances, mixtures and articles containing nanomaterials. In addition to uncertainty about the legal definition of nanomaterials, the European Union currently has no coherent framework for registration.



Anthony Bochon, Squire Patton Boggs

The International Standards Organization (ISO) defines nanomaterials as materials "with any external dimension in the nanoscale or having internal structure or surface structure in the nanoscale." The so-called nanoscale is generally sized between 1 and 100 nm, a nanometer being a billionth of a meter. Materials with at least one dimension sized at the nanoscale generally have different physical or chemical properties than their form at a higher scale.

Though some nanomaterials exist naturally, most of them are engineered to make use of these specific properties that, according to some scientists, could have potentially hazardous effects on human health or on the environment. For these reasons, several EU regulations, mainly relating to the food sector, but also on cosmetics and biocides, contain requirements about the inclusion of nanomaterials in consumer products.

As most of these regulations do not identically define nanomaterials, the European Commission proposed a single definition of the term "nanomaterial" with its recommendation on Oct. 18, 2011. This EU definition differs from the ISO as it does not merely use the nanoscale criterion

to define nanomaterials. Though it provides some exceptions, this definition excludes from its scope materials with less than 50% of particles in the number size distribution having at least an external dimension in the nanoscale. This 50% threshold has been the source of disagreements between the commission and the European Parliament, as the latter would prefer to lower it to 10% to define nanomaterials in food-related regulations.

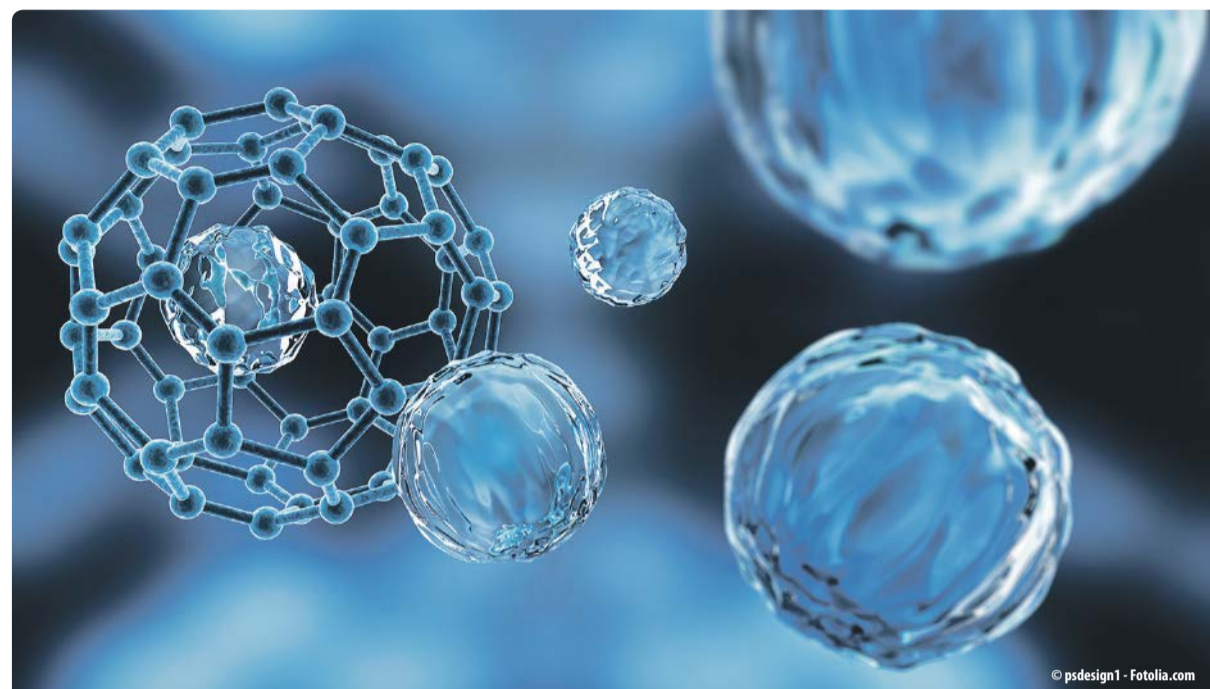
The European Parliament also has blocked attempts by the commission to harmonize the definitions in the pre-2011 regulations. The current debate about the new Novel Food Regulation shows that instead of having a legal framework based on a single definition of the term nanomaterial, the European Union has a legal patchwork that is further complicated by national initiatives imposing requirements on companies that go beyond those laid down in REACH.

Nanomaterials under REACH: Size Does Not Matter

Though it does not explicitly mention them, REACH applies to nano-

materials as its scope does not take the scale of materials into account. Leaving aside the issue with the tonnage threshold of REACH that excludes most of the nanomaterials from registration, some stakeholders consider that the registration requirements under REACH are simply insufficient to collect data on nanomaterials and that public authorities should act beyond REACH to get such information. As EU member states have failed to agree on amending REACH or adopting an EU-wide nanomaterials register, three member states have decided to legislate beyond REACH and have their own national register.

This undeniably entails legal certainty about REACH, as it provides that member states have no competence to further regulate substances already covered by the regulation itself. Even if the adoption of national registers would be admissible under REACH, it must nevertheless not infringe the EU Treaty rules on the free movement of goods within the EU internal market. Although member states may restrict the free movement of goods on grounds such as the protection of public health or the environment, any restric-



tion must still be necessary, objective and proportionate to the aim pursued. In light of this, it is not surprising that the legal service of the commission expressed concerns about the legality of the three national regimes in its reasoned opinion issued before their respective entries into force.

Nanomaterials Registers in EU Member States

In 2013, France became the first member state to impose the registration of nanomaterials, mixtures or articles containing them. Denmark became the second state in 2014, and Belgium will follow as of Jan. 1, 2016. The French and Belgian registers apply when the quantity of nanomaterials placed on the market exceeds 100 g/y, while there is no threshold at all in Denmark. While the latter applies to the distribution of articles to consumers, the two others apply to the distribution to professional users only. The scope of the Danish restriction is wider as it also covers naturally occurring nanomaterials and not only engineered nanomaterials. The French experience shows that there was ini-

tially little awareness about the existence of a national register though the number of addressees is potentially huge. With the approaching signing of a cooperation agreement between France and Belgium, companies can expect to face substantial fines if they fail to register their nanomaterials in these two countries, especially in Belgium where the so-called registration must be made before the substance, mixture or article is placed on the market, while France and Denmark only impose a post yearly notification.

EU-Specific Registration Requirements for Nanomaterials in Cosmetics and Biocides

Besides those concerning the food sector, two other EU regulations contain provisions on nanomaterials, which require companies to provide additional data before their products can access the internal market. Pursuant to the Cosmetics Regulation, the Cosmetics Products Notification Portal (CPNP) now has a separate section for the notification of cosmetic products containing a nanomaterial. In cases where there are doubts about safety, the commission will request the Scientific Com-

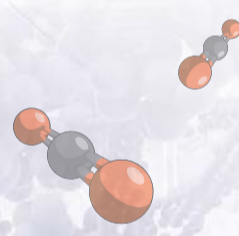
mittee for Consumer Safety (SCCS) to issue an opinion. The Biocidal Products Regulation also contains provisions on nanomaterials. It notably indicates that, unless it explicitly mentions it, the approval of an active substance does not cover nanomaterials. As a result, the simplified authorization procedure is not available when the biocidal products contain nanomaterials.

Future Developments

With Sweden aiming at adopting its own national register by the end of 2015 and with the recent proposal of the US Environmental Protection Agency advocating the reporting of nanoscale materials, there is little doubt that the question of the harmonization of registration requirements will be on the agenda of the European Union over the next few years.

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CO₂

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nova-Institut is proud to host the "4th Conference on Carbon Dioxide as Feedstock for Fuels, Chemistry and Polymers" on 29 – 30 September 2015 in Essen, Germany and invites interested stakeholders to register. More than 200 experts are expected to join Europe's largest event on Carbon Capture and Utilization (CCU) in 2015. The main focus of the conference topic is on technological breakthroughs for an efficient and low-cost utilization of CO₂ as energy source and for chemical building blocks.

It sounds like a daring vision – but could become reality faster than you may imagine! Already now, the implementation of carbon dioxide utilization as a raw material in a circular economy and as an energy source takes shape at a fast pace. Everyone is fascinated to hear about it for the first time: We can use various technologies to produce gaseous and fluid fuels from captured CO₂ and renewable energies like solar or wind energy. With the same technologies, we can also produce chemical building blocks that can supply basically all chemical and plastics industries.

Leading players will showcase some enhanced and also new applications using carbon dioxide as feedstock. Representatives from political bodies and research institutes will be on hand at the event to present and discuss the latest national and regional policies, strategies and visions. Do not miss the latest technological and political developments from this very impressive and dynamically evolving future-oriented field.

More information at www.co2-chemistry.eu

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UK Life Science Funding Hits 10-Year High

Financing for UK life science companies from equity markets and venture capital soared in 2014 and has remained buoyant throughout 2015 as the industry recovers from a long investment drought, according to an article in the business daily Financial Times (FT).

Investment has now reached its highest level for at least a decade, the newspaper says, and notes that this should be welcome news for the UK government, which through taxes and tax breaks has sought to promote life sciences. Figures released by the UK Bioindustry Association

(BIA) and research firm Evaluate show that money for life science raised through flotations rose more than eightfold in 2014 to £408 million and accounted for more than 40% of the total raised in this way by UK biotech firms in the past 10 years. Venture capital funding rose 71% to a high of \$430 million.

The FT credits rising risk appetite and ultra-low interest rates for the development, which it says has coincided with signs of a resurgence in biotech innovation on both sides of the Atlantic – even if UK financing figures remain a small fraction

of the money poured into the US sector.

The \$2.4 billion in venture capital raised by UK biotech companies in the past decade was only 7% of the \$37 billion pumped into their US counterparts, according to the research by BIA and Evaluate. Almost half the UK total stemmed from a 2014 single ipo – Circassia, an Oxford-based allergy drug developer.

To narrow the gap between the UK and the US in life science promotion, London mayor Boris Johnson has proposed creating a dedicated £10 billion mega fund. (dw)

European Parliament Approves TTIP Compromise

By a vote of 447 to 229, the European Parliament (EP) on Jul. 8 approved a compromise resolution to accelerate sagging negotiations on the Transatlantic Trade and Investment Partnership (TTIP) between the EU and the US. The Parliament also voted, 436 to 241, to proceed with the negotiations. It is not involved in the talks but has the power to reject any final agreement. Under the EP's plan, courts arbitrating disputes between companies and foreign governments would be staffed by publicly appointed, independent professional judges, and hearings would be open to the public, rather than private.

While the US has made arbitration of disputes a key condition of the trade agreement, European skeptics fear US multinational companies will try to challenge European food and environmental laws on grounds they restrict commerce.

To the disappointment of European chemical producers, the so-called Investor-State Dispute Settlement (ISDS) mechanism had been excluded from negotiations in an effort to speed up the talks. With the new EU resolution it could be reinstated.

Following the EP vote, interest groups on both sides of the ISDS is-

sue remained especially critical. The German chemical industry association (VCI) – Europe's largest producers' grouping – was vehement that REACH not be excluded from the regulatory cooperation with the US, as the resolution proposes. While EP president Martin Schulz said the ISDS compromise version provided for a transparent body to rule on disputes, the Green parliamentary faction said it still allowed foreign investors to use a separate layer of jurisdiction other than the domestic legal system. (dw)

European Plastics in Crisis

Epic Supply Shortage Erodes Converters' Confidence

Until recently, most chemical players outside the petrochemicals segment probably took scant notice of the upheaval in the European plastics production market. So when BASF in mid-May declared force majeure (FM) for ethylene-oxide based products in its Care Chemicals portfolio due to a captive shortage of the ethylene derivative (EO) it was a wake-up call.

The FM has since been removed, and business engines in the Care sector are once again humming. But the growing number and frequency of plant outages and the shortages they have caused has shaken plastics buyers' confidence that they will be supplied on time and thus be able to meet obligations to their own customers.

Buyers active in packaging, compounding, masterbatch or other downstream applications once took temporary outages in their stride, while at the same time keeping a wary eye on the developments. Now they tremble when opening communications marked "urgent."

First Half Year Sees 479 Outages

What earlier this year was only suspicion now seems to be official. The first half of 2015 was the worst for forces majeure in the past decade. Figures published by London-based chemical news and intelligence service ICIS show 479 outages from January to June – twice the number reported for the 2014 period and well above the previous peak of 375 in 2011, the year of the Fukushima near-meltdown.

Undoubtedly excluding the "mere" inability to supply a certain product on time, figures published by the European Plastics Converters Association

(EuPC) point to 41 shutdowns at European petrochemical plants in the past six months, compared with 26 for the whole of last year.

The list of companies declaring FM reads like a Who's Who of the commodity plastics production sector, including alongside BASF, the likes of Ineos, LyondellBasell, Sabic, Total, Shell, Repsol, Versalis, Vin-nolit, Vestolit and Kem One (the former Arkema PVC business).

Cracker Closures Cause Mayhem

Reasons for the outages are many. Often, they have followed cracker closures. These are easily explained – no ethylene, no polyethylene. Other glitches, including those at the Shell Deutschland Oil cracker at Wesseling, Germany, and the Total cracker at Lavéra, France, in spring have been blamed on fire.

Sometimes justification for the FM is simply unforeseen technical problems or equipment failure. While plastics converters believe that some of the outages could reflect their suppliers' desire to keep the market tight to support prices, trend trackers offer other analyses. One is that European producers have not budgeted enough for maintenance, mainly due to cost considerations. Most plants, the interpretation goes, are geared to operate at 80-85% of



capacity, but the unexpected surge in demand this year left them unprepared to run capacities flat out.

Plastics buyers' delayed reaction to the steady decline in oil prices in the second half of 2014 also has come in for criticism. When converters woke up and began to build up inventories ahead of price rises down the road, supply quickly dried up, some commentators say.

Turbulence Reaches 'Epic Proportions'

As, in spring, market turbulence reached what some called "epic proportions," Europe's plastics converters – led by packaging producers in Germany, France and the UK

– banded closer together to voice their concerns more forcefully. As the tightness showed no signs of abating soon, EuPC established the Polymers for Europe Alliance to fight back against the spate of FMs it said it doubted were legal.

In a statement headed "From Act of God to Act of Shareholder," the alliance said it planned to provide members with detailed information on the current polymer market and through EuPC's network of national associations assist polymer buyers – some of which it said were facing bankruptcy due to insufficient supply – in requesting suspension of certain EU import duties when sourcing material from outside the region.

Additionally, the alliance promised to review the possibility of joint purchasing platforms and help members seek legal action against their polymer suppliers for false force majeure declarations. Going forward, the platform also will invite European converters to rate their polymer suppliers on specific criteria, including adherence to "basic commercial and ethical rules." A study on the aging of polymer production sites in Europe also has been placed on the agenda.

Converters' Confidence at a Low Level

Confidence of plastic converters toward their suppliers is at a "very low

level," according to Alexandre Dangis, director general of EuPC. "We really need to understand what is going on," he says. If there is a need to import more polymer from outside Europe, how can this be done?

While buyers feel they are getting the short end of the stick, European producers of standard thermoplastics who compete with players in lower-cost regions such as North America and the Middle East, still see themselves hard pressed, despite lower input costs. The relief in raw materials prices has not been felt in all downstream markets, they point out. As the price of one precursor comes down, another goes up.

When supply tightens, prices tend to firm, but how much a plastics producer can improve its margins depends in part on the degree of integration, the argument goes. On another front, the deterioration of the euro has compounded the European plastics sector's woes.

Lured by the sound of cash being rung up at competitors on the other side of the pond – thanks to cheap shale gas-derived feedstock, many European players have been casting a long glance at prospects for building new plants in the US. This vision was blurred temporarily by the oil price plunge, but as Europe has not benefited, many companies are pulling out their calculators again.

For their part, buyers fear that more investment by plastics producers abroad could lead to even worse European polymer shortages in future.

Dede Williams, freelance journalist, Frankfurt, Germany

Lego to Boost R&D for Sustainable Materials

Lego, Danish manufacturer of the popular plastic bricks for toy applications, set aside 1 billion Danish Krone for research, development and implementation of new, sustainable, raw materials for manufacturing as well as packaging the play materials.

President and CEO Jørgen Vig Knudstorp said this is a major step for Lego on the way to achieving its ambitious goals for sustainable materials.

Knudstorp said the group already has taken important steps to reduce its carbon footprint and leave a positive impact on the planet by reducing the packaging size, introducing FSC-certified packaging as well as investing in an offshore wind farm.

"Now we are accelerating our focus on materials," he added.

As part of the effort, a Lego Sustainable Materials Center will be established this year at group head-

quarters in Billund, Denmark, where employees will work toward finding alternative materials. Satellite functions are planned to be set up in other countries, and the center also will collaborate and develop partnerships with relevant external stakeholders and experts. Lego manufactured 60 billion of the plastic elements in 2014, and finding alternatives to the materials currently used, which it did not specify, would significantly

reduce the products' impact on the planet, the Danish group said.

As an example of existing cooperations, Knudstorp pointed to the Climate Savers partnership Lego signed with WWF in 2013, which has targets on developing a sustainable materials strategy and was renewed this past spring with a view to better assessing the overall sustainability and environmental impact of new bio-based materials. (dw)

BASF Opens Online Store on Alibaba

BASF has opened its first online store especially for the Chinese market on the business-to-business platform Alibaba, becoming one of the first multinational chemical companies to have a presence there. One of its goals is to attract more business from small and medium-sized companies.

The German group will begin trading on Alibaba with a wide range of products, ranging from

polyamide and the polyurethanes precursor MDI to pigments and dispersions, nutrition and health ingredients. Its platform also supports small retailers of fuel additives and emissions treatment equipment.

Zheng Daqing, BASF's Senior Vice President, Business and Market Development Greater China, said SMEs account for 99% of all companies in China, and contribute 60% to the gross domestic product. (dw)

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Bio-based Economy: Potential Benefits and Risks

Need for Further Action to Realize the Full Potential of the European Bio-based Economy

Two trillion euros in annual turnover, 22 million jobs employing 9% of the European workforce and growing — the European Commission envisions a bright future for the European bioeconomy. However, critics paint some dark clouds into the picture. Although Europe is strong in research and development, finding large bio-based industrial plants remains a difficult task. Experts recognize a “valley of death” between scientific excellence and commercial success.

A growing number of large investments is made outside Europe, Bio-Amber’s succinic acid plant being only one example. Although the acid had been produced in large scale in France since 2010, a new facility for 30,000 t of the acid was built in Sarnia, Ontario, Canada. “Lack of finance” is one reason frequently cited when decision-makers are asked about the sluggish growth of the European bioeconomy. Financing experts counter that there is enough money available and that the challenge lies in finding the funding. Venture capital is still an important source of funding, although the global financial market crisis left its mark on the business. Before 2009, a lot of venture capital went into businesses less than 3 years old. After the crisis, more mature companies — 4 years and older — are preferred by venture capitalists.

Financing Bioeconomy: Finding the Funding

At the interface between private and public funding there is the Bio-Based Industries Joint Undertaking between the European Union and the Bio-based Industries Consortium. This public-private partnership with €2.7 billion from private investors and €975 million of EU funds operates under Horizon 2020. Horizon 2020 is the EU’s strategic framework for research and innovation for the years leading up to 2020 with a budget of €80 billion.

Complementary to Horizon 2020, the EU launched five structural and investment funds (ESIF), which are intended to push less-developed regions to economic flourishing.

Between the European Regional Development Fund (ERDF), the European Social Fund (ESF), the Cohesion Fund (CF), the European Agricultural Fund for Rural Development (EAFRD) and the European Maritime & Fisheries Fund (EMFF), in total there is €80 billion to €100 billion available. The bio-based economy is eligible for parts of all of them, as it is such a diverse topic. It is the explicit goal of the EU to develop close synergies between Horizon 2020 and ESIF. For applicants, this means they can tap into both sources at the same time, albeit with the constraint that no cost item can be funded twice.

Accompanying Horizon 2020 the European Investment Bank launched the InnovFin program to facilitate and accelerate access to finance for innovative businesses in Europe. The financing tool offers loans and guarantees from €25,000 for small and medium-sized enterprises (SMEs) to €300 million for large caps.

European Policy Needs to Enable Long-Term Planning

The other important factor that is considered a roadblock for bioeconomy is European policy. There is a general agreement among all players that Europe urgently needs a change in policy to keep up with worldwide competition. Long-term planning reliability is what investors seek most and what they are currently lacking in Europe.

The renewable energy directive is effective until 2020 with no decision in sight on what will be beyond this date. Until then biomass



is channeled preferably into fuel production, leaving behind those companies that compete for biomass to manufacture bio-based chemicals and materials. A level playing field for all industries is therefore top-most on the wish list of all those involved, both in industry and organizations like the German Bioeconomy Council.

Creating Market Pull by Public Procurement and Labeling

Other than for biofuels, market pull is missing in Europe. The US has successfully created considerable

market pull with its BioPreferred program, which is managed by the US Department of Agriculture (USDA). This program requires federal agencies to prefer items with the highest percentage of bio-based content when the purchase exceeds \$10,000 per year.

Critics accuse the USDA of distorting the market, but European manufacturers would love to see a similar program hereabouts, where public authorities spend about €2 trillion on goods and services annually. The German agency for renewable resources (Fachagentur Nachwachsende Rohstoffe) provides

a database that caters to the needs of public procurement staff, and Europe’s Green Public Procurement initiative works in this direction, too. However, both are wholly voluntary and rely on the awareness of the individual buyer.

In addition to the preferred procurement program, there is also the USDA Certified Biobased Product label. This indicates that the product has been tested to determine its bio-based content and has met the established minimum content. It is not restricted to products from US companies — European companies can apply for it, too. A label should provide consumers with clear information on the environmental performance of the product and guide their purchasing behavior toward sustainable choices.

The European bioeconomy would profit from such a label, too, as the Organization for Economic Cooperation and Development (OECD) stated

in 2011, but the standards required for developing such a label are still in discussion. This starts with the very basic question of how to determine the bio-based share. Content of bio-based carbon? Or is oxygen counted as well? Are we looking at atoms or at weight percent? It’s a complicated discussion. With the ecolabel index growing toward 500 different labels worldwide, establishing an assertive one would be no small feat.

Mandates And Bans

Mandates and bans are another means for influencing markets. Brazil was the first country to establish ethanol mandates for fuel 40 years ago, which certainly contributed to becoming a major player in the world bioethanol market. The idea caught on, and ethanol mandates are the norm today in many countries.

Italy set a positive example of how to get maximum positive effect out of the ban of a product. Thin, single-use, nonbiodegradable plastic carrier bags such as those from the supermarket’s produce section were forbidden in 2011. A biodegradable model replaced them and was used as a vehicle of education: Slogans were printed on the bags that prompted customers to reuse the bags to collect their organic kitchen waste. This awareness campaign was a huge success. As a result the use of single-use bags dropped by 50% and many consumers started to collect biowaste in their kitchens for the first time. The quality of the biowaste also increased. The resulting compost was contaminated with fewer nonbiodegradable bags as the consumer received only compostable ones. And there were more advantages: As fewer single-use bags went into circulation, the risk of littering was lowered. If biodegradable bags ended up in the sea, they decomposed quickly and posed no risk for fish and marine mammals. (rk)

Dechema Trend Report:

The article is based on a trend report commissioned by Dechema and written by international trade journalists. Dechema brings together experts from a wide range of disciplines, institutions and generations to stimulate scientific exchange in chemical engineering, process engineering and biotechnology. Dechema is globally known as the organizer of Achema. The world forum and leading trade show for the process industry will again take place June 11-15, 2018, in Frankfurt, Germany.

▶ www.achema.de

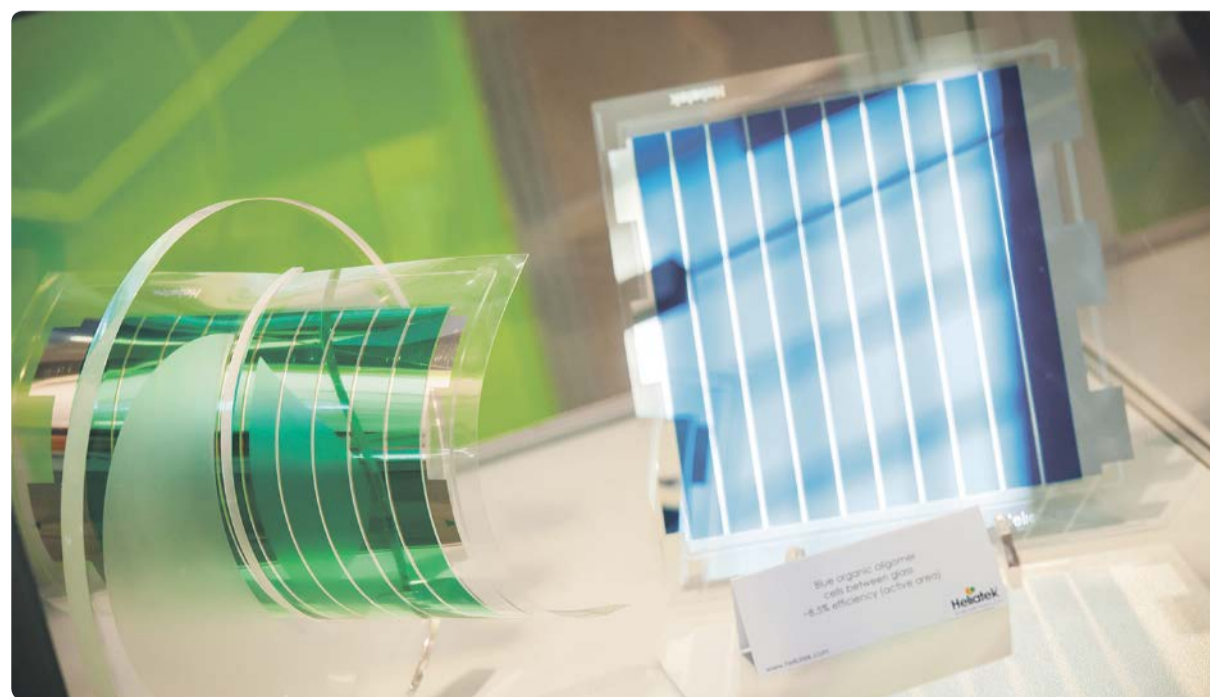
On the Way to the Internet of Everything

New Technologies Will Make It Possible to Integrate Intelligent Systems into Everyday Objects

The motto of the 11th Plastic Electronics Conference is “Enabling the Internet of Everything”. The conference will provide a vital forum for the full scope of organic electronics. It will take place on October 6–8, 2015, in Dresden, Germany, the same time as SEMICON Europa 2015. More than 400 exhibitors and over 6,000 professional visitors from around the world are expected to attend Europe’s leading semiconductor industry trade fair.

The Plastic Electronics Conference and SEMICON Europa 2015 are the only events in the world that bring new technologies like printed, flexible, organic, and large-area electronics together in the same place with the semiconductor industry’s entire traditional value-added chain, from materials and equipment to chip manufacturers and important clients.

Because it is only now becoming clearer that these two industry



segments share a common future, this year’s conference program will also reinforce that combination. Until now they have usually been discussed separately and the reason is that “plastic” electronics are very new and innovative. This is a field that is only just shifting from

research and development to the marketplace.

The technologies that have been developed in this new field are indeed attractive and they will advance the entire industry. Combining conventional semiconductor chips with new, smart sensors or

multi-functional systems on a flexible substrate would be useful in many areas and therefore applies to megatrends like the internet of things, wearable electronics, smart buildings, and ambient assisted living as well as traditional industries like automotive engineering.

For one example, printed sensor systems that are integrated into the packaging for delicate drugs or food can be used to document seamless adherence to the cold chain. These kinds of “smart” systems can be made from a wide range of materials – from plastic sheets to glass bottles to textiles.

From Vision to Reality

Ideas that will reach much further into the future than these applications will be discussed at the 11th Plastic Electronics Conference. That is because heterogeneous integration processes today allow the processing power and miniaturization of traditional silicon chips to be combined with other functionalities, including large-area sensors or systems for harvesting energy from a wide range of sources. Technologies like these make it possible to turn a vision into a reality that will widely expand the internet of things and services. That is why the theme of this year’s conference is “Enabling the Internet of Everything”.

Experts assume that the new technologies can reach the market quickly. On one hand, they will make it possible to integrate intelligent systems into everyday objects like textiles, home furnishings, and packaging. “Plastic” electronics create the conditions for continuously making electronic systems smarter, thinner, and ultimately even capable of being integrated or implanted in clothing. On the other hand, the new technologies could perfectly satisfy the industry’s desire for multifunctionality at relatively low cost. It’s worth it: Sensors are an essential component of these “intelligent” everyday objects and market researchers predict that 100 million pieces will be anywhere and everywhere by the year 2020.

Making this vision a reality, however, will require manufacturing processes that allow for improvements to “plastic” electronics components’ performance and reliability. Integration and packaging methods will be needed to introduce silicon chips (microcontrollers, for example) into flexible, elastic electronic systems.

Continues Page 7 ▶

A Game-Changer

Continued Page 1

Our specialty chemicals enable industry to address major market needs, such as improved solvency for better hard-surface cleaners; lubricant base oils with improved stability and fuel economy; detergents which can be more concentrated and clean better in cold water; and unique monomers for bio-based polymers and engineered plastics, including long-chain polyamides, polyurethanes and polyesters.

What are the main drivers for the market growth in these areas?

B. Kumpf: The critical industry needs and trends we are addressing are driven by regulations, customer demand and sustainability goals. Manufacturers across industries continue to look for alternative ingredients in an effort to comply with ever more vigorous environmental, health and safety regulations. These manufacturers must meet these increasingly challenging regulatory demands without compromising performance and limit the use of materials with unfavorable environmental profiles. Finding suitable alternatives with a sustainable footprint that exhibit high-performance characteristics customers demand, however, is no

and products. For example, Procter & Gamble has committed to a 2020 goal of replacing 25% of petroleum-based raw materials with sustainably sourced renewable materials in its products.

Elevance is working with industry to address industrial and consumer demand for improved performance and sustainability by utilizing renewable feedstocks and advanced sustainable manufacturing processes to produce novel renewable building blocks and ingredients that enable performance not previously possible.

What is your strategy to participate in this growth?

B. Kumpf: Elevance uses a collaborative business model that is designed to enable innovation while reducing the investment and risk that accompany it. We have established a number of collaborations that leverage sales and marketing expertise, distribution channels, technical know-how, product and application development expertise and manufacturing infrastructure. The variety of critical market needs that can be addressed by solutions enabled by our technology create significant growth opportunities that we have only begun to address with our current collaborations. We seek to develop new



Our specialty chemicals provide functional attributes that customers desire but that have not been commercially available. We produce these specialty chemicals at world scale and sell them at cost-effective, competitive prices. Our product characteristics are driving rapid adoption by customers looking for solutions to their product performance needs.

How could your model reshape the way people think about chemical ingredients?

B. Kumpf: Our focus is making better-performing specialty chemicals to improve the products that industry and consumers use every day and enable a more sustainable future for everyone. It's clear that we can make a difference. We can do things that have never been done before — today.

We are working with others in the industry to deliver a new category of solutions, Renewicals, which are products that exceed the performance of petrochemical-based products and do so with a smaller environmental footprint.

We have already commercialized the first Renewicals and have many others in development. By combining renewable feedstocks and ad-

vanced sustainable manufacturing processes, we can address society's demand for sustainable lifestyles.

We're doing it today, and will continue to advance the performance

B. Kumpf: The chemical industry serves customers and consumers worldwide, and the drivers we discussed earlier are impacting all of those customers. We have focused

Coatings business, where we are working with specialty monomers for engineered polymers as well as ingredients for coatings, adhesives, sealants and elastomer applications. We have also introduced novel synthetic lubricant base oils in our Lubricants and Additives platform.

What is your vision for Elevance?

B. Kumpf: We are working to make Elevance one of the leading global specialty chemical companies, creating solutions that will help our customers address society's demand for better, more sustainable lifestyles.

**Dr. Ralf Kempf,
Dr. Michael Reubold,
CHEManager International**

We can do things that have never been done before — today.

easy feat and has been the basis of industrywide research and development efforts.

For manufacturers of products and those who supply ingredients, industry trends provide a positive outlook for sustainable products. To meet the needs of a growing number of shoppers who choose products for sustainability as well as performance, consumer goods industry leaders, such as Procter & Gamble, Tesco, Unilever and Walmart, have taken ambitious and innovative steps to encourage their suppliers to offer more sustainable ingredients

and expand existing collaborations that leverage complementary capabilities and assets that will accelerate growth for us and our partners.

What are Elevance's core technologies?

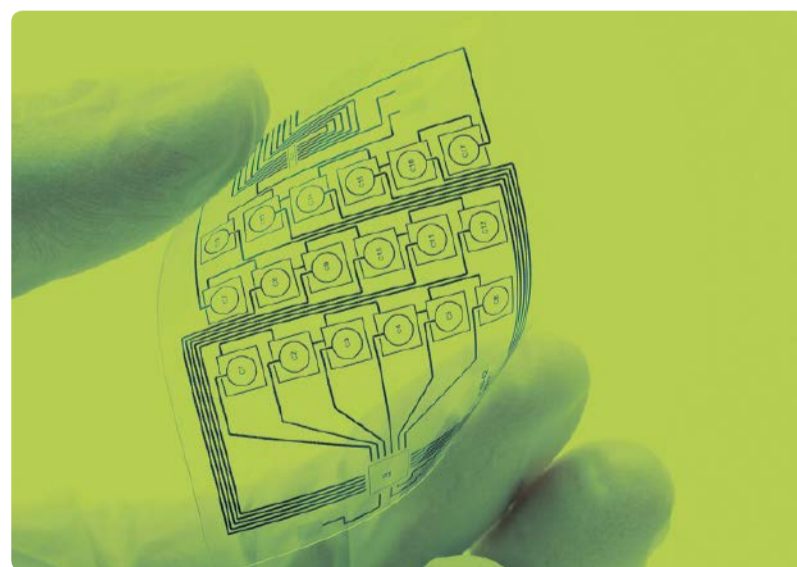
B. Kumpf: We produce our specialty chemicals using proprietary production processes based on metathesis catalysis. Elevance's biorefinery uses a highly efficient and selective metathesis catalyst to break down natural oils and recombine the fragments to produce high-value chemicals.

Continued Page 6

Conference Highlights

The Plastic Electronics Conference 2015 will address all these questions in discussions covering three areas: technology/materials, manufacturing, and business cases. The main speakers are well-known experts like Prof. Donal Bradley of Imperial College London, one of the co-inventors of organic electronics. The topics cover a wide range including organic photo-detectors and image sensors on a plastic substrate, organic light-emitting diode (OLED) manufacturing and measuring systems for quality control in roll-to-roll processing, and new transfer methods for manufacturing flexible displays.

In his presentation, Andreas Schaller of Robert Bosch will explain which options his company is already using for additive production and printed electronics. Dresden-based Heliatek will present its organic solar films. Arne Fleissner, development engineer with Osram OLED, will look at the status and progress in OLED lighting. In his keynote speech, Mark James, director of research and development at Merck Chemicals, will present concepts for high-performance semiconductor manufacturing with organic substances and with printing as well as photolithographic processes. Scien-



tists from well-known research institutions like Fraunhofer FEP and Fraunhofer ENAS will also give presentations in Dresden that will provide a glimpse into current research.

The Plastic Electronics Conference 2015 will be a unique chance to explore the opportunities that innovations in the field of organic and large-area electronics offer. Heterogeneous integration of "plastic" and traditional components is another milestone in that process. Semicon Europa 2015 will offer ideal opportunities for exchanges among specialists and for networking, including across specialized fields. Research, economics, and policy will all come together. Additionally,

the Innovation Village will integrate founders with funders in this comprehensive industry gathering. In all, the Plastic Electronics Conference 2015 will be the perfect launch pad for strategic partnerships.

In developing new technologies and products, organic electronics can also build on companies in the semiconductor industry's traditional value-added chain. Their long experience can help significantly reduce the distance between lab and fab.

Mr. Stephan Raitchel
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We deliver specialty chemicals that exceed the performance of existing products while leaving a smaller environmental footprint.

and cost effectiveness of our products going forward. It represents an exciting future for the chemical industry and society.

In which areas in terms of applications do you see above-average growth opportunities?

our efforts around three market-facing platforms: Consumer and Industrial Ingredients, where we are addressing opportunities in detergents, cleaners and solvents, personal care products, and performance waxes. Another platform is our Engineered Polymers and

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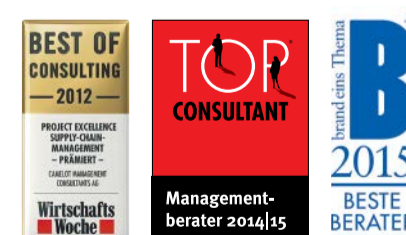
DEMAND & SUPPLY

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Sustainability: Lessons from the Cosmetics Industry

Finding the Right Balance of Economic Progress, Environmental Care and Social Responsibility

Almost every day, there are news stories about environmental damage and social inequality. Whether it is illegal immigrants attempting to enter Europe, erratic weather conditions, deforestation and depletion of natural resources, endangered species, overpopulation, or climate change, these are all stories (directly or indirectly) about sustainability. The challenge for the business world is how to make a difference to these issues, or rather encourage sustainable use of resources so they are 'part of the solution'. This article highlights how the cosmetics industry is playing its part in sustainable development.

To many, sustainability and cosmetics are two terms that do not sit well together. Indeed, at a summit organized by Organic Monitor, one environmentalist questioned the term 'sustainable cosmetics'. He remarked, 'is it me, or does no one else see this as the elephant in the room...how can you call vanity products like cosmetics sustainable?' Whilst he was not entirely right, he had a point. Human consumption is far exceeding the rate of replenishment of the planet's resources. Should the Earth's resources not be re-directed to more meaningful products than cosmetics?

The role of cosmetics in society is often understated. Many products like soap, shampoo, and toothpaste are an essential part of basic hygiene. Other products, such as sun care creams and rash lotions, play an important role in skin protection and health. Even make-up products like mascara and foundations contribute to society by raising the confidence and improving well-being of the wearers. Going back to ancient civilizations like that of the Egyptians, dyes were used as lipsticks and oils as fragrances. Thus, cosmetics have been and always will be an integral part of human society.

Sustainability in the Cosmetics Industry

However, how sustainable is the cosmetics industry? How is the cosmetics industry meeting the sustainability challenge compared to other industries? Some may be surprised to know that it is doing fairly well. Cosmetic and cosmetic ingredient firms are regularly featured in green lists of global enterprises.

Six cosmetic companies were listed in Ethisphere Institute's 2015



Amarjit Sahota, Organic Monitor

World's Most Ethical (WME) Companies list. Cosmetic companies on the WME list were L'Oreal, Shiseido, Colgate-Palmolive, Henkel, Kao Corporation, and Natura Brasil. Another study by Corporate Knights listed the 100 most sustainable corporations in the world; L'Oreal, Johnson & Johnson, Unilever, Henkel, and Natura Brasil were listed in the top 100 this year. The Corporate Knights methodology involves evaluating corporations on a number of environmental, social and governance performance measures.

Environmental Impacts

According to the Brundtland Commission, there are three pillars of sustainability. However, most cosmetic and ingredient firms are focusing on their environmental aspects. Figure 1 shows the various ways the cosmetics industry is addressing its environmental footprint. Most attention is going to raw ethical sourcing, green formulations, and sustainable packaging.

In general, the larger companies take a wider view; they also look at reducing resource usage, waste reduction, as well as operational efficiency. It is common for such companies to take a systematic approach to sustainability, setting targets for various areas. For instance,

L'Oreal made its "Shared Beauty For All" commitment in October 2013. The cosmetics multinational has pledged to make all its products have an environmental or social benefit by 2020. More ambitiously, it plans to reduce its environmental footprint by 60% whilst reaching 1 billion additional consumers. It has set individual targets for carbon emissions, water consumption, and waste reduction.

Green Formulations

One of the areas receiving considerable attention in the cosmetics industry (as well as related industries, such as cleaning products) is green formulations. A growing number of cosmetic and ingredient firms are shifting away from petroleum-based chemicals to plant-based ingredients for personal care and home care formulations. Rather than environmental issues, the major driver of this trend has been consumer concerns.

Consumers are concerned about the possible harmful effects of synthetic chemicals in their products. In cosmetics and toiletries, they are looking to avoid parabens, phthalates, petroleum oils and minerals and aluminium salts. They also look to avoid sodium lauryl sulphate (SLS) and sodium laureth sulphate (SLES) in their personal care and home care products. Evidence of this is from a Consumer Insights study by Organic Monitor in 2014 (fig. 1); 90% of UK consumers buy natural and organic cosmetics because they wish to avoid synthetic chemicals. Of the chemicals they look to avoid, parabens were top of the list; 63% of UK consumers mentioned parabens in 2014, up from 34% in 2007.

This development has led to a growing array of green materials being introduced that replace contentious synthetic chemicals. For instance, a number of plant-based surfactants have come into the market; one example is the EcoTain range of sugar-based surfactants of Clariant. Many cosmetic companies have also removed parabens from their formulations, replacing them with green preservative systems.

Environmental issues are also playing a role in the shift towards green ingredients. For instance, polyethylene beads - also called microplastic exfoliants - have come



under scrutiny in recent years because of their impact on marine ecosystems. A number of American states are introducing legislation to prohibit the manufacture and sale of personal care products with microplastic exfoliants. Green alternatives to microbeads are being developed from corn, jojoba, wood cellulose, and natural minerals.

The use of green ingredients also brings fresh challenges to the cosmetics industry. Unlike petroleum-based chemicals, they are susceptible to supply fluctuations, greater price volatility, as well as traceability issues. At a recent Sustainable Cosmetics Summit, a buyer of such materials stated they prefer to rely on a number of sources because of these issues.

Social and Economic Impacts

In terms of social impacts, ethical sourcing and fair trade practices are common. A growing number of cosmetic companies are implementing ethical sourcing programs, especially if they are getting raw materials from developing countries. The Swedish vegetable oils company AAK is a pioneer in setting up ethical sourcing projects for shea butter. Widely used in cosmetic products, shea butter is produced in the Sahel region of Africa. The UK organic cosmetics brand Neal's Yard Remedies is sourcing a number of its

ingredients according to fair trade practices. It received recognition for its ethical sourcing practices when it received the Sustainability Pioneer runner-up award at the 2014 Sustainable Beauty Awards.

Some companies have set up foundations to promote good causes. Group Boticario, the second leading cosmetics company in Brazil, set up the Boticario Group Foundation for Nature Protection in 1990. The foundation protects over 11,000 hectares of Atlantic rainforest and cerrado, two of the most endangered biomes in Brazil. The foundation has donated over \$10 million in nature reserve programs, enabling the discovery of 69 new species of plants and animals.

Few have gone further and invested in equitable customer-supplier relationships and social investment. The one area that needs most attention is the economic impact: indeed, not many companies could respond to the question: "how is your company having a sustainable economic impact?"

One reason is that many equate economics with profits - a term not commonly associated with sustainability. However, there are many ways companies can address their economic impacts. One way is to share wealth creation with stakeholders - and not just shareholders. A few American companies are reducing income inequality by capping executive salaries. For instance, the natural food retailer Whole Foods Market caps its executives pay at 19

times of its average employee's salary. Natura Brasil, arguably the most sustainable cosmetics company, is a pioneer in this respect as it is looking to integrate economic aspects into environmental and social impacts.

Future Outlook

The global population is projected to reach 9 billion by 2050. This growth brings benefits to consumer good companies in that they have a larger pool of customers, giving potentially higher sales and thus, profits. However, companies like Unilever and L'Oreal have realized the limitations of uncontrolled consumerism. They have set targets to reduce the amount of resources they use, waste they produce, whilst continuing to expand their business. They have realized that sustainability holds the key to sustainable business growth; the days of producing and consuming with no concern for tomorrow are long gone. These companies are not having sustainability as a stand-alone department, but integrating it into every aspect of their business. In this respect, there are many green lessons to learn from an industry that was once associated with 'vanity products'.

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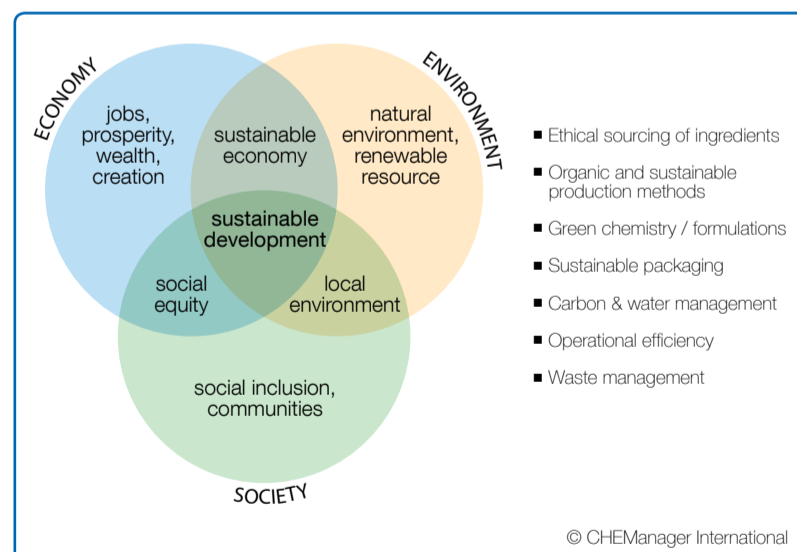


Fig. 1: Chemicals that UK buyers of natural and organic cosmetics look to avoid, 2014

Source: Consumer Insights Report (Organic Monitor)

Chemicals	2007 (%)	2014 (%)
Parabens	34	63
Sodium Laureth / Lauryl Sulphate (SLS, SLES)	30	32
Petrochemicals	8	30
Aluminium salts	16	23
Phthalates	2	19
Lanolin	3	17
Artificial perfumes	7	15
Other	16	7
Don't know / can't think of their names	31	12

Fig. 2: The Ecological Aspects of Sustainability

Source: Sustainable Cosmetics Summit (Organic Monitor)

Azelis Appointed as European Distributor for WeylChem

Azelis has been appointed as exclusive European distributor by WeylChem to offer its TAED (peroxide bleach activators) and specialty surfactants range, into homecare and industrial cleaning (H&I) markets. The deal covers the whole of Europe (excluding Italy, Greece and Iberia).

Vincent Bossert, Director Product Line Detergents for WeylChem said, "We are convinced that this change is beneficial to customers, and will

ensure a more dedicated mode of response than we have currently been able to offer directly with the WeylChem team. We are confident that Azelis will strengthen the current customer/supplier relationship even further."

Marnik Tack, International Market Manager H&I said, "We will work with WeylChem to develop new application ideas and exploit synergies in our range so far undiscovered." (rk)

DKSH Acquires Andreas Jennow

Swiss chemicals distributor DKSH has acquired specialty chemicals distributor Andreas Jennow, a major supplier of raw materials to the Nordic and Baltic countries.

The Swiss company said the buy widens its geographic coverage in Europe, as well as complementing its strong position in Asia and contributing to the consolidation of the market.

With its Business Unit Performance Materials, DKSH provides distribution services for its clients and suppliers in the chemical, per-

sonal care, pharmaceutical and food industries. It also offers sourcing services for specialty products from numerous markets across Asia, Europe and the Americas.

Andreas Jennow, founded in 1916, supplies a full product range for the specialty chemicals and personal care industries. The company with activities in Denmark, Sweden, Finland, Norway, Iceland, Estonia, Latvia and Lithuania reported net sales of around 30 million Swiss francs and "sound profitability" in 2014. (dw)

MWV Specialty Chemicals to be Named as Ingevity

Ingevity will be the new name of the MWV Specialty Chemicals division of WestRock, a provider of paper and packaging solutions. It will begin transacting business as Ingevity on September 1. The business is slated to be spun off as an independent, publicly-traded company around the end of the year.

The separation is expected to be executed by means of a tax-free spinoff of the Specialty Chemicals business to shareholders of WestRock, re-

sulting in two independent, publicly traded companies.

"The name speaks to our long-standing record of success and commitment to serving our customers through innovative products, processes and services. Our announcement is the first step in a comprehensive plan to launch our brand, and define our future as a separate and independent company," said Ed Rose, president, MWV Specialty Chemicals, about Ingevity. (rk)

Quantitative Supply-Chain Risk Management

Research Project to Indicate and Measure the Effect of Supply-Chain Risks

Certainly it is no big secret that in the process industry supply chains are becoming more complex all the time. For example, parts of the value-added chain that are outside a company's core competencies or not particularly profitable are often carved out or relocated to low-wage countries. End customers expect immediate or just-in-time personalized goods delivery. The end-to-end supply chains created are highly networked systems, fragmented and operated by a large number of diverse companies in various regions with different political systems.



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Bayer Technology Services



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The potential risks affecting these supply chains are growing steadily along with the complexity of these networks, though. Raw material supply bottlenecks, strikes, environmental disasters, regulatory changes and infrastructure problems are just a few of the risks that need to be taken into account. In addition to this, complex global supply chains are increasingly undergoing optimizations that can have unexpected consequences on risks. Although initiatives to reduce stock levels have a positive influence on working capital, for instance, they also typically make supply chains more susceptible to risks.

There are numerous examples showing that these risks can have significant consequences for companies forming part of these supply chains. The most widely known is probably the fire in 2000 at the Philips microprocessor production facility in New Mexico. Among other things, this facility made the microprocessors for cell phone companies Nokia and Ericsson. Ericsson trusted the predictions that microprocessor production would start again shortly and took no further action. Nokia's supply-chain concept, on the other hand, was far more flexible and enabled another supplier to be brought in immediately. As a result, Ericsson recorded sales losses of \$400 million, while Nokia's profits for the same year rose by 42%.

Questions and Problem-Solving Approach

This issue throws up numerous questions for entrepreneurs and supply-chain managers. What risks are my supply chains exposed to? Which of these risks are particularly critical for my business success? Which supply chains are especially at risk? Can I put a monetary value on the individual risks? Can I measure the effect of various improve-



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National University of Singapore

ments and calculate the effects on the supply chain?

These questions were addressed by the National University of Singapore (NUS) and Bayer Technology Services in a research project. The goal was to find a method based on a mathematical model for indicating the effect of supply-chain risks and enable these to be measured using appropriate indicators. The research focused on typical supply chains involving basic production and supply processes for manufacturing crop protection agents (see figure 1 for one of these networks). The supply chains of two different products are linked by joint use of the same production resources for active ingredient production.

An overview of the results of this joint research project is provided below. Further research activities are required to validate the method and make it suitable for wide-ranging applications.

Risk Identification and Assessment

Preliminary work by the NUS and other studies identified 110 different risks that are relevant to supply chains in the process industry. These risks can be classified, for example, into macro, industry and company levels with relevant sub-categories and summarized. Seven of these risks were selected as being particularly relevant for the joint research project.



There are numerous established procedures for assessing risks. Typically, they involve making statements about the frequency of occurrence and the severity of effects. Without doubt Failure Modes and Effects Analysis (FMEA) is the method most commonly used in practice. Experts estimate the probability, severity and detection values for each risk. By its very nature, this estimate is approximate and subjective. To make the procedure more objective, the research team developed an improved FMEA process (by using fuzzy set theory). This approach is still inaccurate, is confined to the part of the supply chain under consideration, and cannot provide an adequate picture of the influence on the entire supply chain and the associated monetary risks.

Simulation of Supply Chain Risks

To make genuinely quantitative statements about the monetary effect of risks on the entire supply chain, the research team developed simulation processes based on statistical models and successfully verified these using the network examples.

The first step was to model the occurrence of the risks under consideration using probability distributions. Dozens of statistical functions (such as exponential, Gaussian and Weibull distributions) are available to characterize the risk parameters TTF (time to failure) and TTR (time to recovery). In most cases, these parameters are easy to model or estimate using historical data from the companies involved (e.g., failure statistics for plant components, delivery reliability of suppliers) or public databases (e.g., for environmental disasters or strikes).

Software tools to simulate production and logistics networks make it possible to calculate the effect of these risks on the entire supply chain. The results are probability distributions for all state variables within the supply chain, which are then analyzed using statistical indicators such as mean, variance or skewness. The value at risk (VaR) approach familiar from finance is another such factor. VaR describes

the maximum monetary loss for a given probability (for example, not more than \$100 million in 95% of all cases). Research is still ongoing to determine whether and how this concept can be transferred to process-industry supply chains.

Figure 2 shows a result for the network in figure 1 by way of an example. In this case, the mean number of products sold and the average unit costs derived on that basis were analyzed. The graphic shows that in this example, the effect of strikes or machine failures is negligible compared with transport delays.

Risk Mitigation

To significantly reduce the risks of this specific network, consideration should be given, for example, to using redundant logistics service providers and/or increasing stock levels. However, this immediately raises further questions: Which of the conceivable measures are the most effective? Can I produce a cost/bene-

fit analysis to demonstrate the effect of the various measures? And what exact form should these measures take? For example, which storage locations would need to be expanded? And what additional quantities should they hold? Might there also be storage locations where I could reduce stock levels without increasing the risk to the supply chain?

Scenario analyses can be used to answer these questions based on the quantitative procedure described. This produces ideal mitigation strategies that can be assessed in monetary terms.

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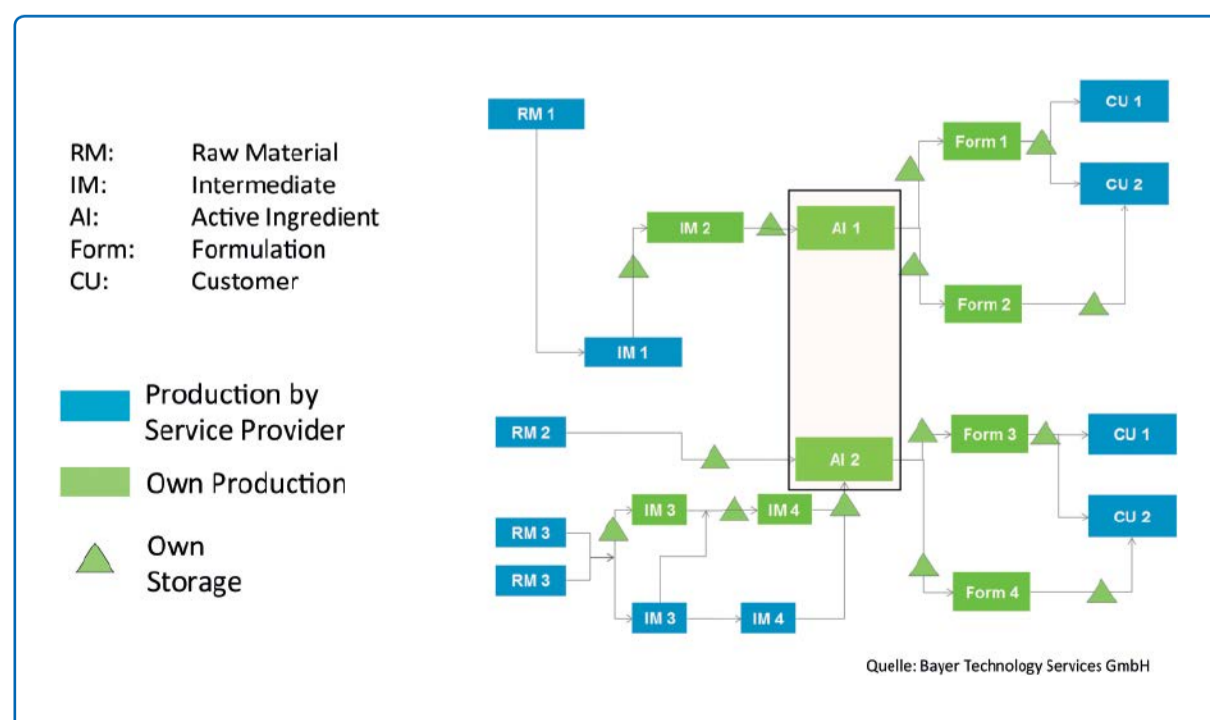


Fig. 1: Two production networks with joint production facilities

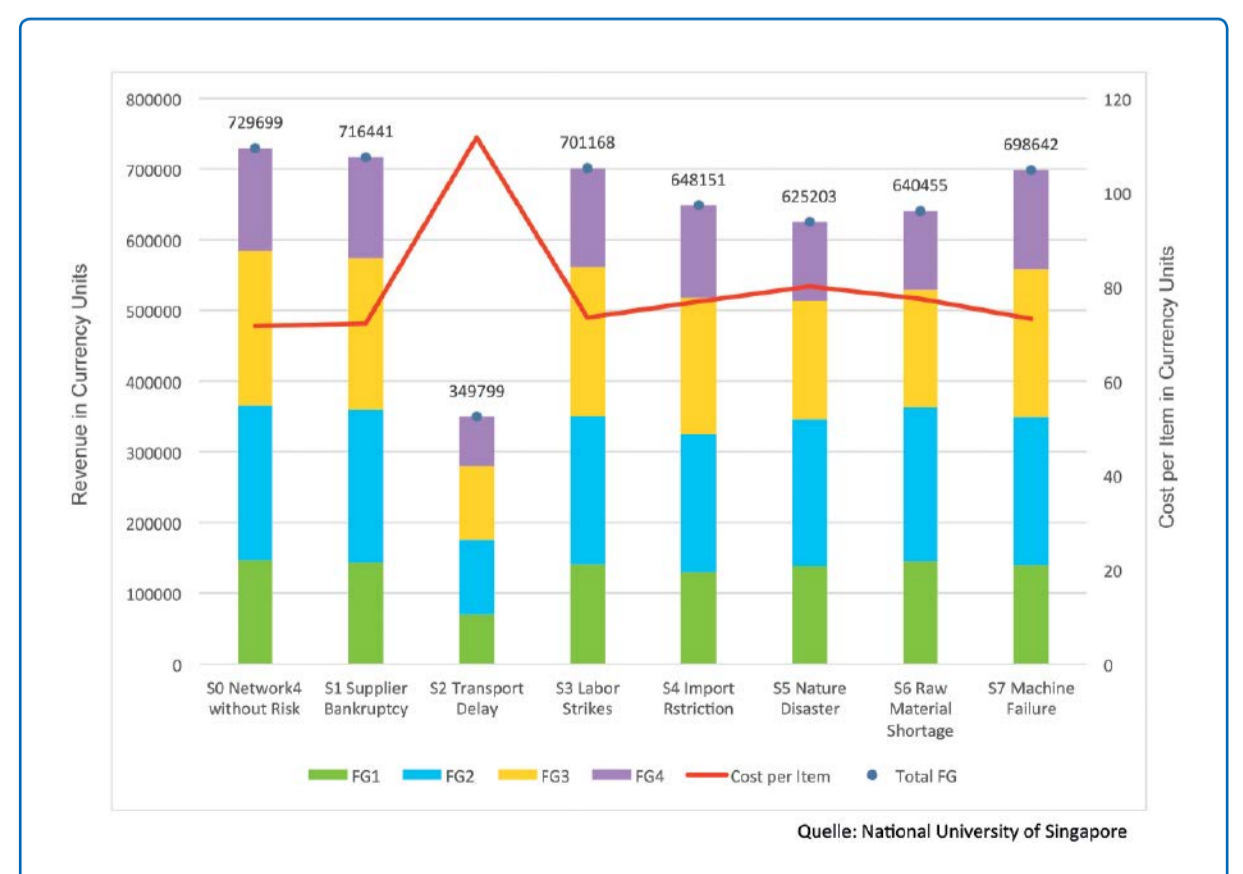


Fig. 2: Effect of risks on revenue and cost per item

Less-Than-Truckload Networks

European Market Flows with Network-Based Cross-Border Goods

The European market for less-than-truckload (LTL) services is characterized by rising competition and price pressure. A high-performance and well-structured network of hubs and depots is necessary to effectively meet customer requirements and to fulfill agreed service levels. The study "Less-Than-Truckload Networks" conducted by Fraunhofer SCS in cooperation with Altana, Dachser and KPMG aims to reach a higher level of transparency for the European cross-border LTL market.

LTL refers to individually labeled dry or staple goods and so-called groupage goods in shipments weighing between about 30 kg and 3 t, very often palletized. These shipments cannot be efficiently delivered directly to the consignee but require certain handling, including pickup and distribution by fleets of smaller trucks and consolidation for long-distance connections between regional depots or hubs. Because of the unique product features, especially the chemical and pharmaceutical industries show a variety of requirements for logistics service providers, but also a high relevance for international logistics services. Besides bulk goods transports, which are of enormous importance regarding logistics services for chemical and pharmaceutical products, LTL shipments are also relevant for this market segment.



Christian Reichenauer, Fraunhofer Center for Supply Chain Services SCS

ing transport and cargo securing, temperature control or traceability throughout the supply chain; this makes a flawless IT infrastructure indispensable. Very often it is not allowed to transport and store chemical or pharmaceutical goods with other commodity groups, which makes dedicated logistics networks or systems indispensable.

Besides the typical customer groups such as manufacturing companies, the do-it-yourself market is an integral part (e.g., delivery of paints and varnishes). The competitors providing LTL services for this cluster are large network operators, e.g., Dachser, DB Schenker or Deutsche Post DHL. However, specialized logistics companies such as Talke, Chemion or Hoyer should also be mentioned.

Chemical and Pharmaceutical Industries

In 2012, the European chemical and pharmaceutical industry (in EU's 28 nations plus Norway and Switzerland) generated a turnover of more than €850 billion, which is a share of nearly 10% in the total volume of all manufacturing industries in Europe. Around 33,000 companies offered employment for approximately 1.7 million people. Regarding sales, multinational players dominate the market. Five of the top 15 companies, presented in figure 1, are based in Germany, three each in Switzerland and in the United States.

The product range of these companies includes, for example, chemical feedstock and specialties, material science, cosmetic and sanitary products, as well as health-care solutions and pharmaceuticals. The industry is characterized by a high level of concentration with regard to the distribution of revenues. Large companies with more than 250 employees represent 3% of all market players but generate more than half of the sales revenues. Nearly two-thirds of market actors are small companies with a staff of fewer than 10 people. These firms only account for 2% of sales volume.

Sector-Specific Requirements

Since shipments for the chemical industry frequently contain sensitive or hazardous goods, it is essential to find logistics operators with the necessary know-how and handling skills. Topics like safety, security, quality and environmental awareness are of high importance here. Staff has to be appropriately educated, and the provider must be able to cope with the high complexity and to fulfill the prerequisites regard-

European LTL Tonnages

The total transboundary tonnage of all manufacturing industries traded between the 28 European countries assessed in the study comes to more than 1.12 billion t/y. As not all goods groups are equally manageable as LTL freight, only a small part is regarded as LTL potential. The volume for pan-European cross-border LTL transportation corresponds to around 89 million t, of which approximately 10 million t is attributable to the chemical and pharmaceutical industry.

As shown in figure 2, the hot spot for cross-border LTL transportation in this industrial branch is in central and western Europe. By far Germany is the largest exporter and importer of these products. The most important trading partners inbound and outbound are Belgium, France and the Netherlands, covering approximately 60% of German imports and about 38% of German exports. Belgium and the Netherlands also have high potential outgoing transport volumes of chemical and pharmaceutical goods, whereby the role of these countries as gateways for shipments from Asia or Arabia to Europe is also a reason for this.

The southeast European area shows comparatively weak demand. The top 20 trade lanes (measured in potential LTL tonnage) represent only a small share of 2.6% of all trade lanes surveyed, but amount to almost half of the potential LTL



tonnage. To avoid empty return transports, back load probabilities play a significant role for logistics companies. When regarding only chemical and pharmaceutical goods flows, a well-balanced trade lane with a back load probability of about 80% is from Germany to France. In contrast, transports from Germany to Italy show a back load probability of only 0.5%. To compensate for this, the service providers have to find solutions such as shifting to customer groups from other industrial branches.

Trends Affecting Daily Business

Price pressure, especially in countries with high minimum wages, has the strongest negative influence on the daily business of logistics service providers. Since transportation is a cross-border business, foreign companies are able to use their advantageous cost structure and compete with lower prices. An interesting fact is that price pressure seems to have a lower negative effect in the northern European countries than in the rest of the continent. Another trend showing strong negative effects is the rising competition on international logistics markets. Due to the ongoing extension of the European Union, especially long-haul services and the traffic between LTL hubs are affected by this trend. A higher competition does also influence and even intensify other trends like rising price pressure or lacking cost efficiency. LTL service providers have to find alternative strategies to escape from this price competition. This development is in particular crucial for central Europe.

IT and new technologies have a strong positive influence on the logistics industry. Logistics companies see huge potentials in integrating new technologies and applications. Buzzwords here include the Internet of Things, machine-to-machine (M2M) communication, Big Data, cloud computing or mobile apps. Nevertheless it is important to make sure that investments in IT are well-planned and that the implementation is not too complex for the supply-chain partners, as well as to be aware that benefits will not be realized in the short term.

A Highly Volatile Market

The European LTL market is a highly volatile market segment with rising price pressure and competition. In comprehensive pan-European networks, the market is dominated by large logistics companies having many operational locations in different countries at their disposal. Also cooperations play an important role, since they are very well-connected because of their network of often smaller members. Furthermore, a

variety of smaller and regionally oriented logistics service companies are also able to cope with the challenges of this market segment and can offer efficient and reliable

services on certain national and international trade lanes.

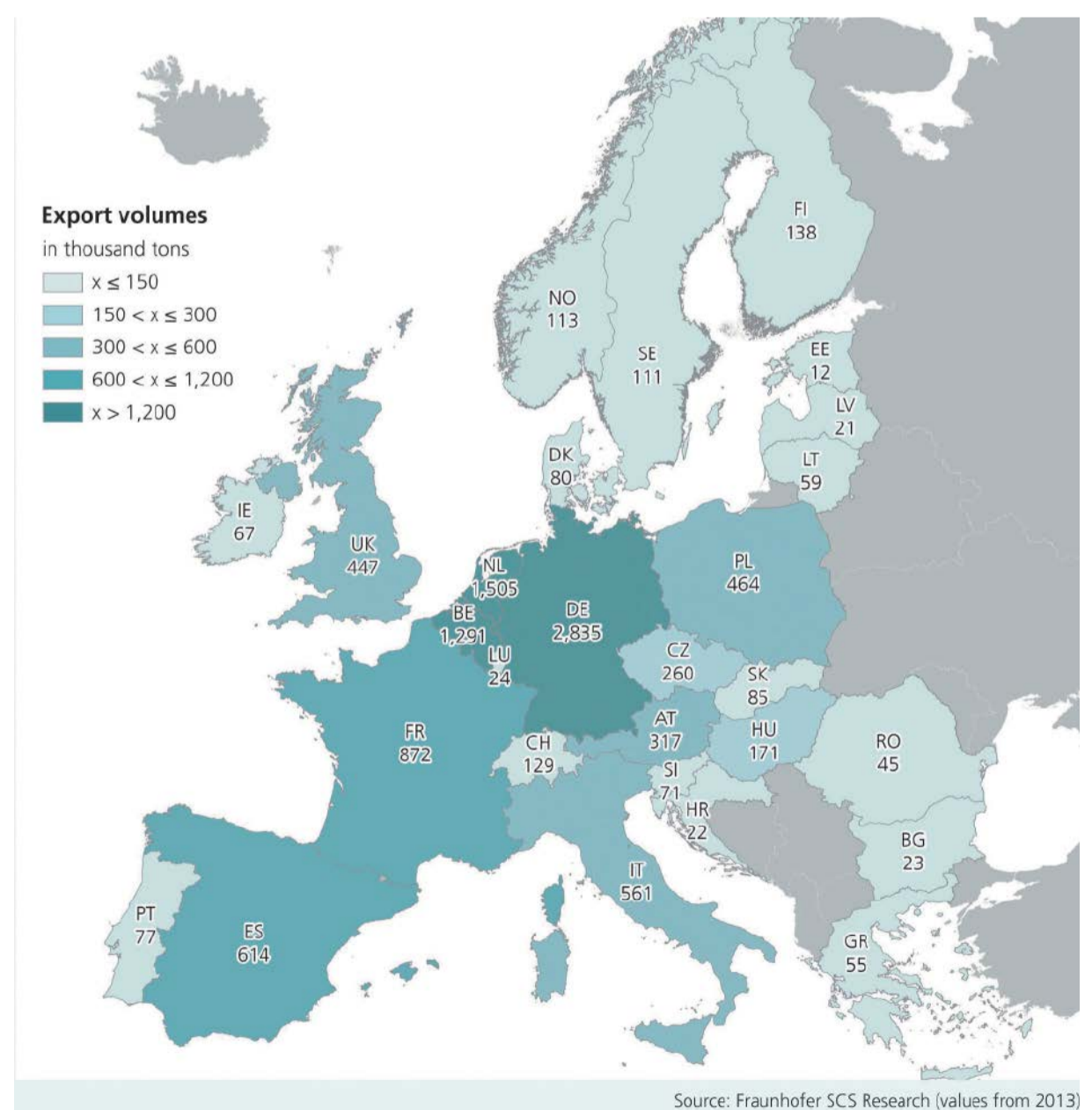
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Rank	Company	DO	Revenue 2013 in Europe in m€	Employees 2013 in Europe	Annotations	Product portfolio (i.a.)
1	BASF	***	43,335	70,977		Chemicals, Functional Solutions, Synthetics, Performance Products, Agricultural Products
2	INEOS	***	26,200	n/a		Petrochemical Products, Chemicals, Oil Products, Adhesives, Cosmetics
3	NOVARTIS PHARMA	***	15,310	62,615		Pharmaceutical Products
4	BAYER AG	***	15,086	53,600		Healthcare, Pharmaceutical Products, Material Science, Crop Science
5	DOW CHEMICAL	***	13,285	13,250	EMEA	Basic Chemicals, Plastics, Synthetics, Synthetic Rubber, Medicinal Products
6	GLAXOSMITHKLINE	***	8,886	38,785		Pharmaceutical Products, Vaccines / Serums, Sanitary Products
7	PFIZER	***	8,526	n/a		Pharmaceutical Products
8	FRESENIUS	***	8,132	85,602		Medicinal Products, Healthcare, Medical Technologies / Devices
9	JOHNSON & JOHNSON	***	8,112	n/a	Share of segments Pharmaceuticals and Consumers in European sales	Cosmetics, Sanitary Products, Medicinal Products, Vaccines / Serums
10	SANDH WINTHROP INDUSTRIE	***	7,831	53,880		Medicinal Products, Vaccines / Serums
11	ROCHE PHARMACEUTICALS	***	7,404	37,518	European sales in segment Pharmaceuticals	Pharmaceutical Products
12	EVONIK INDUSTRIE	***	7,081	24,086		Petrochemical Products, Plastics, Synthetics, Coatings, Adhesives, Pharmaceutical Agents
13	AIR LIQUIDE INDUSTRIEGASE	***	7,058	n/a		High-purity Gases, Standard Gases
14	AKZO NOBEL	***	6,832	23,200		Industrial Paints, Powder Coatings, Corrosion Protection Paints, Plastic Coatings
15	LINDE	***	6,416	21,597	EMEA	Industrial Gases, Medical Gases, Plant Construction / Engineering

Fig. 1: Top 15 chemical and pharmaceutical companies by revenue in Europe (2013)



Source: Fraunhofer SCS Research (values from 2013)

Fig. 2: Export volumes of cross-border LTL transportation

Fraunhofer SCS

One major task of Fraunhofer SCS is to make logistics markets more transparent. Since 1995, the research team has published the annual market study "Top 100 in European Transport and Logistics Services." As part of the research for this standard reference work of the logistics industry, further segments and developments on national and international logistics markets are analyzed and examined. In addition to other market surveys, the study "Less-Than-Truckload Networks" also arose. The study examines recent trends and gives a detailed overview of logistics service providers disposing a pan-European network for LTL transports. The core result is a database including more than 4,000 LTL locations of more than 800 companies throughout Europe. Besides market studies, Fraunhofer SCS also provides consulting services for customers from the logistics sector as well as the manufacturing industry.

Substance-based Supply-Chain Planning under BEPS

New Standards Will Change International Tax Practices

The agility of supply chains of multinationals driven by the globalization and continuous business changes combined with favorable tax regimes in various jurisdictions has given a lot of room for tax optimization in the last decade. As part of the initiative against base erosion and profit shifting (BEPS) and with the support of its member states and the G20 (compare figure 1, which provides an overview of the relevant countries), the Organization for Economic Cooperation and Development (OECD) is developing new international tax standards, which will change the rules for international tax planning. Key objectives are to close corporate tax loopholes and to increase transparency of the tax practice of multinationals.



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Christoph Ludwig, KPMG

Most companies in the chemical sector operate globally with different steps in their value chains spread across multiple legal entities located in different jurisdictions. The use of favorable tax regimes has been part of the tax strategy of many of them. The changing regulatory environment now makes it necessary to reassess the tax footprint of these value chains.

Challenges for Global Tax payers

In 2013, the OECD published its action plan including 15 actions to address BEPS. In the following, the OECD has published a multitude of discussion drafts and recommendations with new guidance on international tax matters. These papers address, e.g., neutralizing the effects of hybrid mismatch, countering harmful tax practices, preventing the artificial avoidance of permanent establishment status, consideration of intangible assets and documentation requirements including the newly introduced Country-by-Country Reporting. The project is planned to be finalized by the end of 2015. Several countries, especially in the European Union, are working on or have already published legislative initiatives based on the OECD papers.

The BEPS initiative can be best summarized by the following three key objectives:

- **Coherence:** Loopholes resulting from a different interpretation of facts for tax purposes in different jurisdictions will be closed through a harmonization of the tax regimes or by disregarding the tax effect in the counter party state.
- **Substance:** The allocation of taxable profit to jurisdictions will increasingly depend on where people are located and perform

demonstrably decisive functions. The principle "tax follows operations" will be strengthened.

- **Transparency:** Taxpayers will be obliged to disclose more tax-relevant data to tax authorities allowing the latter to track the allocation of taxable income and substance across the globe. This is supported by an increased exchange of information between tax authorities on the tax practice of multinationals.

The following examples illustrate what this may mean for tax and transfer pricing planning:

- Especially BRIC countries (Brazil, Russia, India and China) will use the new transparency to claim what they consider their "fair" share in multinationals' global taxable income. This will increase the pressure on transfer prices agreed with subsidiaries in the emerging market.
- Access to favorable tax rulings will become more difficult because of increased substance requirements demanding relocating qualified people to demonstrate the business rationale of a chosen structure.
- The attribution of intangible property (IP) is separated from what is contractually agreed and from pure cost-bearing. In a decentralized R&D organization, irrespective of whether R&D costs are borne by a central unit, tax authorities will claim a decentralized economic co-ownership of IP.

Substance-based Tax Planning

The regulatory changes make it necessary to redirect the thinking on tax efficient restructuring of value chains using transfer pricing as a key driver (compare figure 2,



which highlights the perceptions of tax executives on BEPS). Traditional models have already lost credibility and economic benefit. Prominent examples are the central principal company with limited substance earning the complete residual profit in the value chain and central IP companies that have completely outsourced the R&D activities to affiliates.

The sometimes rather artificial structures predominantly based on legal agreements will likely be challenged by fiscal authorities around the globe and will not prevail. They may still be valid for business reasons — even in times of BEPS — but significant care must be given to substance requirements by means of strategic and operative decision-making as well as supervisory and guidance activities at the level of the principal and the IP company. The latter need to be equipped to formally make relevant decisions, and they should have the capacities to independently prepare decisions and guidance for the other group entities. Setting up and running such a structure is likely to require relocating people and a severe intervention into existing organizational procedures and workflows.

Particularly in case of well-established value chains in a stable business, implementing a tax-efficient but substance-based structure can be challenging. Potential tax benefits expected from such a structure might also be nullified by exit taxes when converting the operating model and moving functions, risks and assets between different jurisdictions.

Nevertheless, when setting up a new business or whenever there is an internal or external triggering event making a reorganization of the existing business necessary, there can be tax-planning opportunities without giving rise to infringement of either legal or moral laws. Tax and financial departments should be aware of the tax-planning opportunities, as the efficient tax rate has become an important competitive factor.

Even if a structure is supported by substance, the traditional transfer pricing methods allocating routine profits to risk-limited distributors and manufacturers, leaving the residual with the most entrepreneurial entity, may no longer be advisable. For example, the BRICs as well as many UN countries emphasize the importance of location benefits and market access, demanding that these are reflected in the transfer prices.

Therefore, moving from rigid and stationary transfer pricing systems that provide the manufacturing and sales subsidiaries with fixed target operating margins to more flexible transfer pricing systems, which accommodate the allocation of substance among the relevant group entities, will be a core challenge of transfer pricing practitioners. A solution can be the introduction of profit (or loss) split models that are deduced from a process contribution analysis reaching across the value chain. By trend profit splits are an option in highly integrated value chains with scattered know-how and substance among several countries. Fiscal au-

thorities have proven to be open to such practical and administrable solutions in the course of mutual agreement procedures; i.e., procedures initiated between fiscal authorities to mitigate double taxation. Their experience is still limited as those structures are still rare, but being the first mover might be an advantage if the taxpayer has maintained its relationship to the tax inspectors well.

Continuous Tax and Transfer Pricing Management Reporting

Business is not static, so neither are the value chains within a multinational group when responding to external market requirements and the challenge of an optimized internal allocation of resources. The agility of a multinational's operating model requires an effective reporting. This should allow CFOs and their delegates to continuously monitor the influence of business-driven changes on transfer pricing and taxes in order to ensure good corporate governance and mitigate potential tax risks.

Tax payers will face increased digitalization of audit procedures, also driven by a demographic change. For example, a significant number of qualified and experienced tax inspectors will retire over the next decade in Germany. The BEPS action plan will result in new obligations in providing data to tax authorities, which will add to the existing reporting requirements enforced in the last couple of years (e.g., the electronic balance sheet in Germany and the Foreign Account

Tax Compliance Act in the United States).

A tax and transfer pricing management reporting looking at

- the development of key performance indicators such as operating profitability and taxable income per group entity,
- the relation between group entities' revenues and taxable income on the one hand and substance reflected by full-time equivalents (FTEs) and book assets on the other hand as well as
- the allocation of taxable income between jurisdictions with different tax rate levels,

will become a cornerstone of multinationals' tax and transfer pricing strategy to ensure global compliance and to avoid supervisory or organizational fault. Fortunately, technology has opened new opportunities, and business intelligence solutions are available at acceptable prices. These solutions allow analyzing tax-relevant data in real time using and visualizing key risk areas (e.g., high taxable income in low tax jurisdiction compared to moderate profitability in asset and FTE-intense locations).

Michael Freudenberg, partner, Christoph Ludwig, senior manager, KPMG AG Wirtschaftsprüfungsgesellschaft, Duesseldorf, Germany

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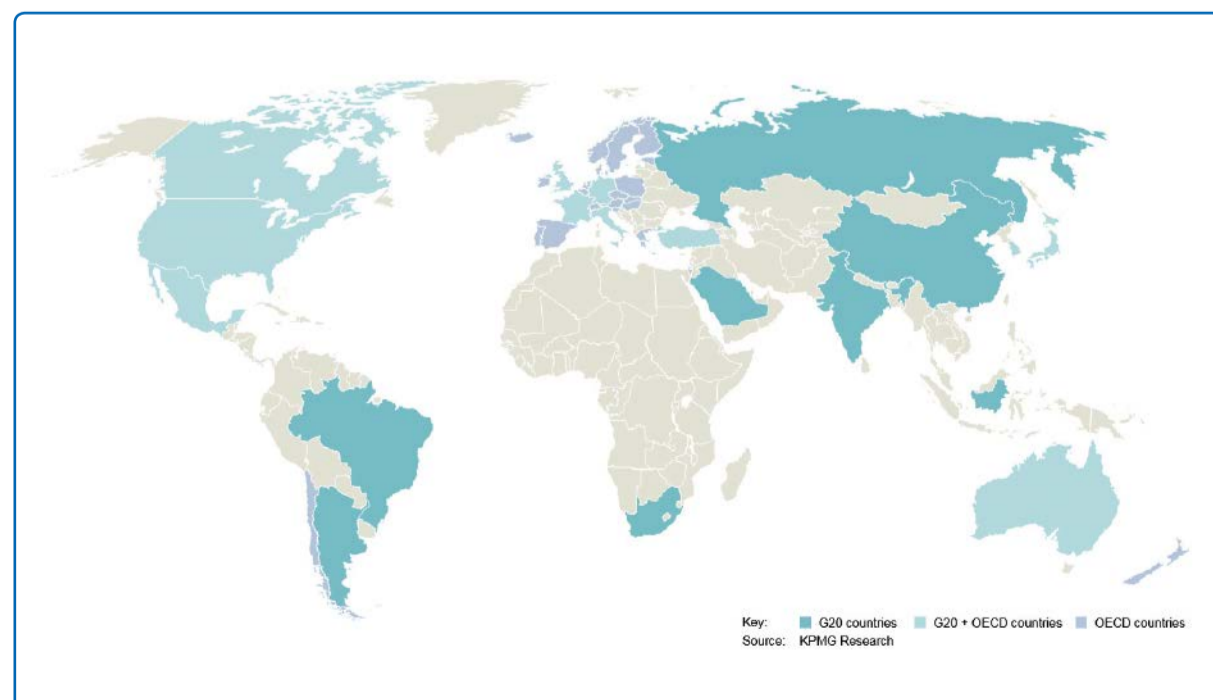


Fig. 1: Map of G20 and OECD countries.

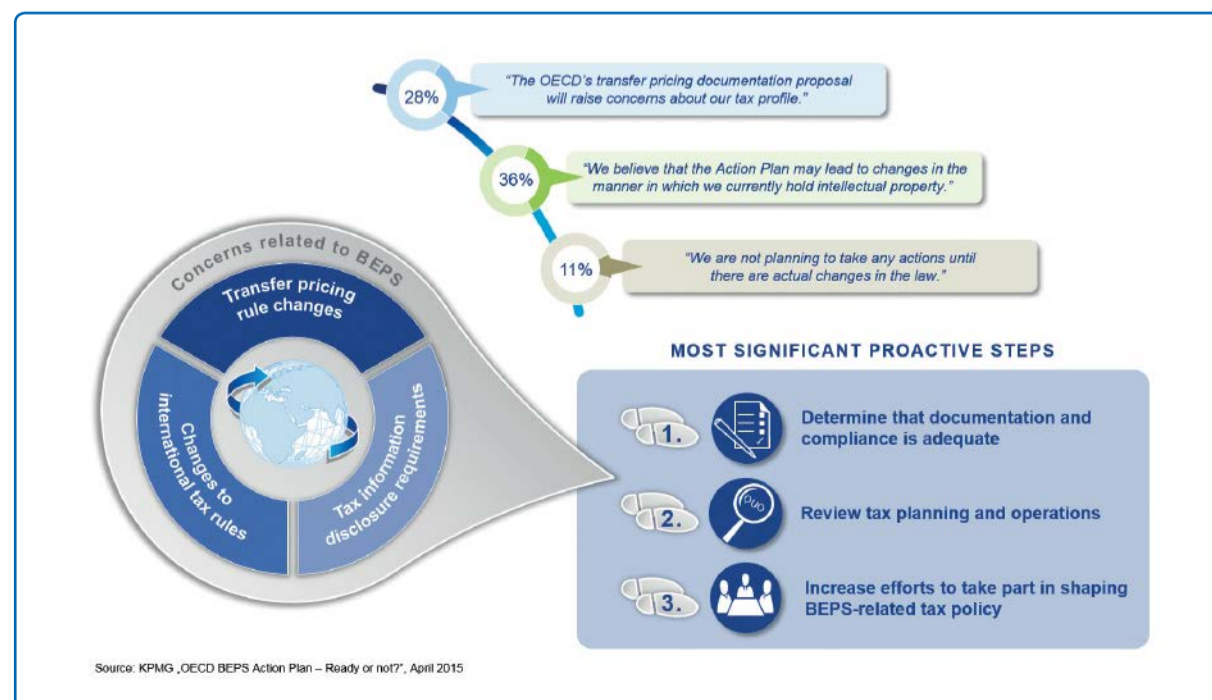


Fig. 2: Perceptions of tax executives on BEPS.

Building a Shield for Innovation

Patents are Essential for Protecting Inventions in Chemical Technology

The subject matter of patents is, in general, with the exception of a wider range of patentable subject matters in the US, directed to technical solutions in the form of devices, apparatuses, products, substances and technical methods. In the following, some basic principles of patents are discussed.

Since patents protect technical solutions, one precondition for a patent is that an invention has been made. Inventions can be made only by persons, not by legal entities. Consequently, the right to a patent always belongs to the inventor.

However, inventors can transfer the patent to anybody else, for example, their employers. The transfer of the patent can be executed in different ways, for example, by a contract or according to specific legal provisions, as for example in Germany under the law relating to inventions of employees. Accordingly, it is important to determine who is entitled to file the application, since applications made by persons not having the right to the patent may be invalid.

Exclusive Privilege

After granting or registration of the patent, the patent confers on its proprietor the exclusive right to produce, offer or use the product or method protected. However, this exclusive privilege is mainly the right to prevent others from doing something, not permission for the patent proprietor for any operation. If the use of a patent infringes rights of third parties or violates the law, the patent does not create a certificate of exemption.

Principle Of Territoriality

The exclusive privilege given by a patent is always restricted to its geographical limits. Patents can be granted only with respect to a specific territory, e.g., a state. However, some states constitute a union for filing and granting of patents based on one application for several member states, e.g., the European Patent Organization.

Period Of Protection

Patents are also limited in their duration. The exclusive right of the patent is the gratification or remuneration for the patentee or the inventor for disclosing the invention and making it available for the public. However, after a predetermined period of time during which the patentee can solely preserve the yield of his invention, the public should



benefit from the invention. Consequently, patents generally have a maximum period of protection of 20 years from the day of filing.

Ways Of Establishing Patents

Different ways of establishing industrial rights or protective rights exist.

First, one can distinguish between rights by fact and formal rights. Rights by fact are automatically generated by means of facts, e.g., by creating artificial works in the case of copyright. Formal rights are generated by formal application and registration through authorities. This group of rights comprises patents or utility patents, utility models, trademarks, and design patents.

Accordingly, patent protection cannot be obtained by simply creating something. It is also necessary to file an application. However, the further proceeding of the filing differs from country to country. Some countries do not require that the patent be examined with respect to the substantive law. Such patents are also called registered rights, since they are substantively unexamined. Contrary to that practice, in most countries, patents must pass through substantive examination. During the substantive examination, it is verified that the subject matter for which protection is sought fulfills the requirements with respect to the substantive law, i.e., novelty and inventive step, as discussed

below. The advantage of examined patents is the higher degree of legal certainty. In case of substantively unexamined and merely registered protective rights or patents, the validity must be examined in case of an infringement.

For this reason, it is recommended when facing a patent to first verify that the patent was substantively examined. For example, petty patents or utility models ("Gebrauchsmuster") in Germany are unexamined protective rights that are only registered after filing of the application. However, proprietors of the utility model are allowed to claim omission of using the subject matters of the utility model because they possess the registered utility model. But this does not provide information on the legal validity of the utility model, which must be examined in the case of an infringement.

Priority

Since it is conceivable that different persons could make the same invention without knowledge of each other, there must be a way to decide who has the right to the patent. Two

solutions have been developed: the principles first-to-file and first-to-invent.

According to the first-to-invent principle, the inventor who made the invention first has the right to the patent. This principle is used in US patent law. Because of the difficulty of proving the point of time of the invention, this can lead to very time-consuming proceedings. The first-to-file principle avoids such problems by giving the patent to the person who filed the application first. This principle applies to the patent law in most countries.

Accordingly, an early filing date for an invention is important. Although the time of filing a patent application is not as important with respect to allocation of the patent in the US, the filing date is nevertheless important with respect to the defense function of a US patent, since the US patent application forms prior art with respect to subsequent applications of third parties.

According to the first-to-file doctrine, the date of filing determines who has the better rights. For this reason, it would be important for an inventor or applicant to file

the patent application all over the world (principle of territoriality) as soon as possible. Since this would cause enormous difficulties for the applicant, some countries made an agreement as early as the late 1800s with respect to industrial property rights and established the Paris Convention. One of the rules of this convention refers to the priority of inventions and that an applicant can claim the priority of a former application in a member state of the Paris Convention if the subsequent application in a foreign country is filed within 12 months. Thus, the time of filing a first application in a member state of the Paris Convention is of great importance, not only for patent protection in this country, but also for further applications, almost worldwide.

Novelty

As a common principle for patents, it is a precondition that the subject matter for which protection is sought is novel with respect to prior art. Novelty means that the same invention or the subject matter of the invention is not known to the public. The filing date or the priority date of the first application is used as time reference. Accordingly, the novelty test, which must be carried out during substantive examination, is carried out by comparing the claimed invention to the subject matter disclosed before the priority date of the

patent application. All subject matters known or disclosed before the priority date of the patent application are called prior art.

Inventive Step/Non-obviousness

The invention must also be based on an inventive step. In other words, it should not be obvious for a person skilled in the art. The requirement of an inventive step or nonobviousness postulates that a certain inventive effort should be necessary to merit remuneration of a patent or exclusive right.

In order to assess the inventive step, it must be determined whether a person skilled in the art would have been able to find the technical solution of the claimed invention without being inventive. For this purpose, the claimed invention must be investigated in the light of prior art. If a person skilled in the art were able to easily find the claimed solution when considering the known prior art or suggested combinations thereof, the patentee or inventor should not be awarded a patent.

The person skilled in the art, who is taken as a reference for assessing the inventive step, is not a real person, but a fictive figure having average knowledge in the specific area of technology of the invention. This hypothetical skilled person is assumed to have theoretical knowledge of every prior art document or disclosure, but not to have very high other abilities.

Industrial Application

Only those inventions that are industrially applicable should be regarded as patentable matter. However, this can be construed as given in most cases. Only specific exemptions of patentability, such as methods for treatment of the human or animal body by surgery or therapy and diagnostic methods, are deemed to be not acceptable for industrial application according to the European Patent Convention, for example. Generally, the requirement of industrial applicability does not constitute a high barrier to obtaining patent protection.

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This article is an excerpt from the Ullmann's Encyclopedia of Industrial Chemistry (wileyonlinelibrary.com/ref/ullmanns), which celebrated its 100th anniversary in 2014. More about the topic can be found in the encyclopedia article on Patents. More concept articles on general interest topics in industrial chemistry and chemical engineering can be found on the Ullmann's Academy homepage (<http://bit.ly/1G5GYQC>).

Volterion, 4GENE and Ionera named Winners of the Achema Start-Up Award

The latest edition of the world's largest forum for the process industry and all related sectors, Achema, had opened its doors for five days in Frankfurt in mid-June. More than 166,000 participants saw the offerings of 3,813 exhibitors for the chemical, pharma and food industry. With respect to the Achema congress that ran simultaneously, Prof. Dr. Kurt Wagemann, Executive Director of the organizer, Dechema,

said: „Our choice of focus topics was just right — this has been proven by the number of people in the lecture halls. And the panel discussions on bioeconomy vs. shale gas and on the energy turnaround obviously hit the mark.“

A premiere in 2015, three young companies whose innovative ideas convinced a jury from both a technological and an economic point of view were granted the Achema

Start-Up Award. The award is conferred in recognition of outstanding ideas of young companies in the fields of chemistry, process engineering and biotechnology.

Volterion, 4GENE and Ionera are the three winners of the first Achema Start-Up Award in 2015 that took home the cash prize of €10,000 and — together with the other finalists Bentekk, Hydrogenious Technologies, Sumteq, Bioncure, Glyconic,

and Sciomics, — were given the opportunity to present themselves all week to an international audience of professionals and to forge vital business contacts.

Just like the Oscar Awards ceremony: right up until the opening session of Achema the names of the winners were kept strictly under wraps:

In the Energy category, Volterion's concept of a new storage technology

for private homes was the outright winner. Volterion produces and markets small-scale vanadium redox flow batteries for decentralized storage of renewable energy sources (solar) for use in private homes.

With Flavor-on-Demand, 4GENE was unrivalled in the Industrial Biotechnology section. 4GENE develops, produces and markets natural, biotechnologically engineered, activatable aroma glycosides.

Ionera, winner in the Measuring Technology/Analytics category, has developed a nanopore-supported platform technology enabling single-molecule through to DNA analysis.

The Achema Start-Up Award is jointly offered by Dechema, Business Angels Frankfurt/RheinMain and High-Tech Gründerfonds, and supported by institutions, corporations, and by CHEManager as a media partner. (mr)

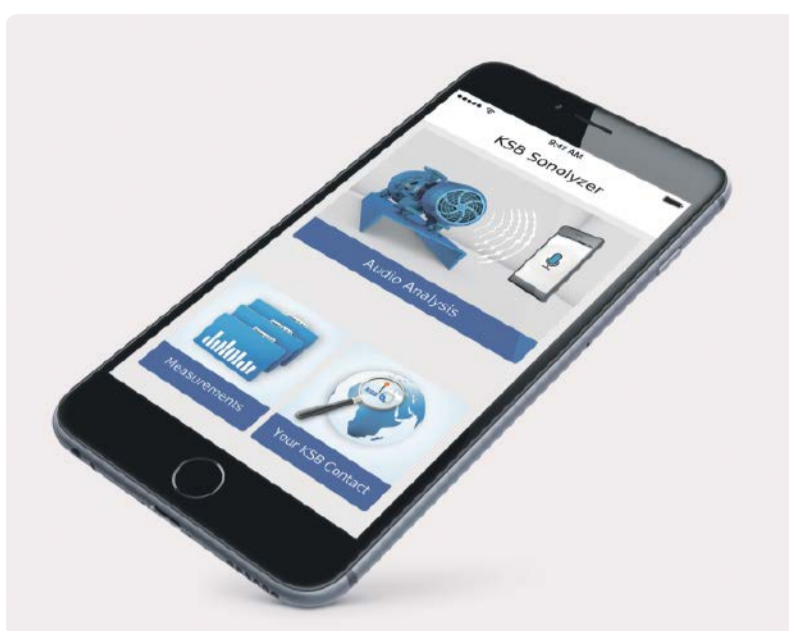
Mobile App Brings Industry 4.0 to all Pumps

To help plant operators increase productivity and transparency as well as improve competitiveness across the entire life cycle, Frankenthal, Germany-based pump manufacturer KSB has developed an app for smartphones and tablets that can determine the efficiency of fixed-speed pumps in just 20 s. The KSB Sonolyzer app is based on an algorithm that has been integrated in PumpMeter units for five years now, of which well over 30,000 have already been sold.

The smartphone-based application does not require knowledge of the individual characteristic curve or any additional technical data of the pump set to be measured, however, and can also be used with pumps from other manufacturers. Users

can utilize the app to determine the load at which each centrifugal pump driven by a fixed-speed asynchronous motor is being operated. The following data must be entered for this purpose: the motor rating, the rated motor speed, the head and the flow rate of the pump. This information can be read from the name plate affixed to every pump.

When the measurement routine starts, the microphone built into the smartphone or tablet is used for approximately 20 s to record the noise emitted by the fan of the electric motor. This noise spectrum is then filtered by the application to ascertain the exact speed of the pump set and determine the torque. By correlating the performance data entered by



the user with the hydraulic systems database developed by the manufacturer, the app can conclude whether the pump is operating at part load and lets the user know if any energy could be saved by optimizing the hydraulic system or the drive.

The KSB Sonolyzer app is available for the iOS and Android operating systems and can even be used in potentially explosive atmospheres if the smartphone or tablet PC has appropriate protection. The average life cycle of plants used in the chemical industry exceeds 30 y, which is why the pumps installed have only seldomly been connected directly with the Internet of Things. In many cases, users are not even aware of a pump's current load condition.

This, in turn, points to a considerable amount of energy-saving potential that can be tapped by optimizing existing pump installations. All analysis data that is uploaded to a secure, cloud-based environment does not reference an individual. The data serves statistical purposes and is only used to further develop and advance the analysis algorithms in the cloud application which is accessed by the app.

Should a user be in need of support or assistance from the pump manufacturer, he or she must actively contact the company. Those interested in the app can download it to their device free of charge via the App Store (Apple) and Google Play (Android). (mr)

Borealis Investing €160 million in Swedish Cracker

Vienna-based polyolefins and fertilizer giant Borealis has announced plans to invest €160 million to upgrade and revamp four cracker furnaces at Stenungsund, Sweden, to meet the highest currently available standards in process safety and energy efficiency.

Scheduled to begin in late 2016 and be completed by 2020, the upgrade entails revamping four of the six existing furnaces and permanently shuttering the two remaining older units. The plans build on an announcement last year that the company would upgrade the cracker and construct an ethane storage tank to store ethane imports.

In early 2014, Borealis signed a new long-term ethane supply agreement with Norway's Statoil. The plastics feedstock will be shipped to Stenungsund from Statoil's gas plant in Kårstø, Norway.

"Our Stenungsund cracker operations are a key strategic asset and major contributor to our success," said Borealis CEO Mark Garrett. "This investment program is especially beneficial, enabling us to secure improved reliability and operability whilst reducing plant complexity and maintenance requirements," he added. (dw)

Atotech Inaugurates Equipment Plant in China

Atotech, a leader in specialty plating chemicals, equipment and services, has inaugurated its second equipment manufacturing facility in Guangzhou, China, built in response to is growing demand for this equipment in the People's Republic.

Reinhard Schneider, president of the Berlin, Germany-headquartered subsidiary of French oil and petrochemicals giant Total, said the opening of the new plant marks a new milestone in its commitment to China.

Globally the facility, Atotech's third dedicated to manufacturing production equipment for the electronics industry, is planned to gener-

ate close to 200 local jobs over the next three years. Built on an area of 63,000 m², the new plant is said to leave space for further expansion.

Phase 1 of the investment, worth \$33 million, will ramp up production capacity of Atotech's Uniplate and Horizon horizontal systems for PCB and IC Substrate manufacturing as well as the newly introduced local platform for manufacturing equipment.

Phase 2 will further expand capacity to include semiconductor equipment part manufacture and assembly to serve the increasing demand for new advanced packaging production solutions. (dw)

BASF Petronas to Build HR-PIB Plant at Kuantan

BASF Petronas Chemicals, the joint venture of BASF and Malaysian petrochemicals giant Petronas, plans to build a new world-scale production plant for highly reactive polyisobutene (HR-PIB) at the site of its Kuantan, Malaysia, joint venture.

The plant, which is claimed to be the first of its kind in South East Asia, will have annual capacity of 50,000 t/y and is expected to start up in the fourth quarter of 2017. HR-PIB is an important intermediate product for the manufacturing of high performance fuel and lubricant additives, including additives for sludge prevention.

Christian Fischer, President of BASF's Performance Chemicals division, said the joint investment will further increase security of supply for HR-PIB, especially for the Asian market, as well as further strengthening the global footprint of BASF as the leading supplier.

Datuk Sazali Hamzah, CEO of Petronas, said the investment marks another significant milestone in the development of the Kuantan site as a leading specialty chemicals hub in the Asia-Pacific region, in line with the company's strategy to diversify into specialty chemicals and solutions. (dw)

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Evonik Expands C4 Output at Antwerp and Marl

German chemical producer Evonik has increased production capacity for C4 products at its sites in Antwerp, Belgium, and Marl, Germany.

The investment, said to be in the triple-digit million euro range, includes additional capability to produce butadiene, the plasticizer isononanol and the antiknock agent MTBE.

In announcing the plans two years ago, Evonik said the expansion would be a step toward lifting its butadiene output in Antwerp by 100,000 t/y, and its output of MTBE at Marl and Antwerp together would rise by 150,000 t/y up to 2015.

Citing market analyses that global demand is increasing by 2-5%

annually, the Essen-based company said it is "sustainably strengthening" its market positions and supporting its customers growth plans.

Evonik said it has secured raw materials supply to the new production facilities with long-term contracts. (dw)

BP Zhuhai Starts Phase 3 Chinese PTA Plant

BP Zhuhai Chemical has officially started up its Phase 3 PTA unit at Zhuhai, China.

The new plant built at a cost of more than €600 million by the 85:15 joint venture of oil and petrochemicals giant BP with China's Zhuhai Port was engineered by French contractor Technip. It increases PTA output at the site to more than

2.7 million t/y and the UK oil and petrochemicals group's global PTA capacity to 8.25 million t/y.

Phase 3 of the three-pronged BP Zhuhai production facility is claimed to be the world's largest single train unit for production of the polyester feedstock. The Chinese site is additionally the first to use the latest version of the BP process.

Compared with conventional PTA technology, BP said Zhuhai 3 is highly energy efficient, delivering 95% lower solid waste, 65% lower greenhouse gas emissions and 75% lower water discharge. Most of the output is earmarked to supply growing demand from China's polyester textile industry. (dw)

SABIC and SK Global Finalize Asian Plastics JV

A year after the initial plans were announced, Saudi Arabian petrochemicals giant SABIC and Korean petrochemical manufacturer SK Global have completed the establishment of a 50:50 joint venture, SABIC SK Nexlene Company, to produce polyethylene products. Total investment in the new Singapore-

based company will be about \$640 million.

As part of the deal, the Korean company is contributing its Nexlene technology arm. The process will be used in the first facility to be incorporated in the joint venture – a 230,000 t/y metallocene LLDPE, polyolefin plastomer and polyolefin

elastomer production at Ulsan, Korea, originally built by SK subsidiary Korea Nexlene Company (KNC).

The partners plan to set up another plant in Saudi Arabia, as well as other global production facilities in due course, said Abdulrahman Al Fageeh, executive vice president of SABIC's Polymers unit. (dw)

DuPont Technology for Chinese Cellulose Ethanol Biofuels

New Tianlong Industry Co. Ltd. (NTL) plans to license technology from DuPont for use in what will be the People's Republic's largest cellulosic ethanol manufacturing plant, located in Siping City, Jilin Province.

The licensing agreement is still subject to approval by the Beijing government. The Chinese company

produces potable alcohol, chemical reagents and corn oil, among other products.

NTL's corn refinery plants in northeast of China, one of the country's biggest, also will use DuPont's Accellerase enzymes to make renewable biofuel from the leftover biomass at Jilin Province's corn

farms, leveraging the US group's processing expertise. DuPont also will supply enzymes.

The end product, cellulose-based renewable fuel will supply the growing Chinese liquid biofuel market. Altogether, output is expected to exceed 1.7 billion gallons per year by 2020. (dw)

PEOPLE



Ralph Sven Kaufmann

Ralph Sven Kaufmann (49) was appointed as the new COO of Evonik Industries with effect from Jul. 1, 2015. He succeeded **Patrik Wohlhauser** (51) whose contract has been terminated by the company's supervisory board with effect from Jun. 30, 2015. Wohlhauser was appointed to Evonik's executive board on Apr. 1, 2011 and took over responsibility for the chemical operations as COO on Jan. 1, 2014. Kaufmann, who started his career in Corporate Controlling at Henkel, has been a managing partner of Scopein Management Consultants in Düsseldorf, Germany, since 2001. He trained in banking and studied economics and business administration at the universities of Cologne and New York. Kaufmann obtained his doctorate from the University of Cologne in 1995. He started his career in Corporate Controlling at Henkel and subsequently worked as a project manager at the strategic management consultancy Droege & Comp.



Martin Babilas

Martin Babilas (43) will become the new CEO of German chemical producer Altana upon the retirement of **Dr Matthias L. Wolfgruber** (61) on Jan. 1, 2016. Babilas took over additional responsibility for two of the Bad Homburg-based company's four divisions from the CEO in November of last year. On stepping into the new job he also will take over responsibility for Corporate Development/M&A, Human Resources, Corporate Communications and Internal Audit from Wolfgruber. Effective Aug. 1, 2015, Altana will also have a new CFO, **Stefan Genten** (46). Genten will move from German pharmaceutical producer Grünenthal, where he held the same position since 2005. Genten was also in charge of operative functions, such as the Latin American business, and was appointed chief operating officer in 2010.



Stefan Genten



Allen Ferguson

Allen Ferguson has been appointed as Clariant Oil Services Manager, Canada. Ferguson has more than 30 years of experience in key management roles for major oilfield service companies in Canada, the US, Europe, and Russia. As head of Clariant Oil Services' operations in Canada, Ferguson's task is to expand the division's market presence through the further development of specialty chemical technologies.



Jean-Claude Pierre

Jean-Claude Pierre became new group CEO of Scott Bader on Jun. 15, 2015. He succeeded **Philip Bruce** who retired at the end of June, after 10 years in the role and 41 years in industry. Pierre has over 26 years of multinational business experience in a variety of roles and diverse markets. His career to date includes technical, commercial and management consulting positions, initially with ICI, Ashland and BASF, then nine years in China since 2006. During his time in China, he became president of the global division of Beckers Group, a Partner with Hejun Management Consulting, and most recently was the managing director of EMS Group. Pierre holds a Master's degree from ITECH-Lyon engineering institute for plastics, textiles and composites in France, a PhD in organisational systems from Saybrook University, and an MBA from Hult International Business School in the USA.

Dr Chris Martin is the new CEO of ADC Therapeutics. He was co-founder of Spirogen and its CEO leading up to the sale of Spirogen to Medimmune, the global biologics research and development arm of AstraZeneca in October 2013. Dr Martin continued as CEO of Spirogen, and became both a member of Medimmune's Management Leadership Team and AstraZeneca's Senior Leaders Group. He will continue to advise Medimmune as a consultant. Dr Martin played an important role in the formation of ADC Therapeutics in 2012, and has served on its board of directors since its founding. He replaces **Michael Forer**, CEO of the Company since its formation, who became vice chairman of ADC Therapeutics, and will continue to work with the company as executive vice president.

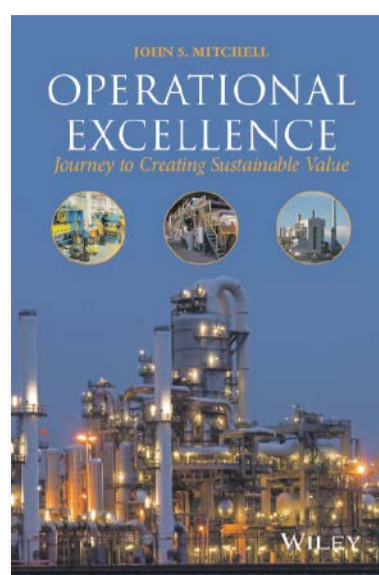
Joachim Rauhut (61), CFO of Wacker Chemie, will leave the company as planned when his contract expires on Oct. 31, 2015, the Munich-based chemical group has announced. **Tobias Ohler** (44), a member of the Wacker executive board member since early 2013, will step into the CFO slot on Nov. 1. Also with effect from Nov. 1, **Christian Hartel** (44), currently president of Wacker Silicones, will join the Wacker Chemie executive board.

Jean-François Hilaire took on the new position of Chief Strategy Officer at Recipharm on Jun. 1, 2015. Hilaire is a pharmacist and graduated from the University of Bordeaux and alumni of the CEDEP General Manager Program. He brings a broad experience base acquired in commercial as well as in manufacturing & supply leadership roles at Fournier, Solvay and Abbott.

Roeland Polet has been appointed as new Business Group Director DSM Engineering Plastics, succeeding **Roelof Westerbeek**. He joins DSM from Valspar, based in Minneapolis, Minnesota, USA, and Shanghai, China, where he led the Global Industrial Coatings division and was a member of the company's Operating Committee. In previous positions, Polet worked for DSM Engineering Plastics in the areas of R&D and Marketing and was general manager of the Celanese engineering plastics arm Ticona, then based in Frankfurt Germany. Westerbeek, who joined DSM in 1989 later became president of DSM Engineering Plastics Asia Pacific and as of 2008 business group director of the engineering plastics arm. Westerbeek, who is based in Singapore, will be engaged in various projects within DSM until Jul. 1, 2016, when he will leave the company.

Operational Excellence - Journey to Creating Sustainable Value

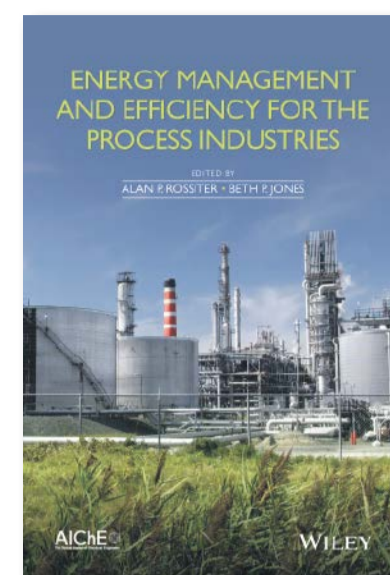
This book provides the foundation and tools that are essential for an enterprise to bring Operational Excellence into their organizational culture; gain maximum results, benefits and value. Strategies for and implementing details for enterprises at all levels of maturity from those with programs in place to those looking to improve safety, health, environment performance as well as the efficiency and effectiveness of their operations are shown. It includes topics from concept to sustainability satisfying knowledge requirements of all levels in the organization. It defines program objectives; develops improvement strategies; identifies and prioritizes improvement opportunities; implements improvement plans; monitors, continuously improves and sustains results and is applicable to a broad variety of operating enterprises, academic institutions and third party implementing organizations.



Operational Excellence -
Journey to Creating Sustainable Value
John S. Mitchell
John Wiley & Sons, 2015
Price: € 63.90
ISBN: 978-1-118-61801-1

Energy Management and Efficiency for the Process Industries

This book provides an overall approach to energy management for the process industries and places the technical issues that drive energy efficiency in context. It combines the perspectives of freewheeling consultants and corporate insiders. In two sections, the book provides the organizational framework (section 1) within which the technical aspects of energy management, described in section 2, can be most effectively executed. It includes success stories from three very different companies that have achieved excellence in their energy management efforts. Main topics are energy management, including the role of the energy manager, designing and implementing energy management programs, energy benchmarking, reporting, and energy management systems. Technical topics include efficiency improvement opportunities in a wide range of utility systems and process equipment types.



Energy Management and Efficiency
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Alan P. Rossiter, Beth P. Jones
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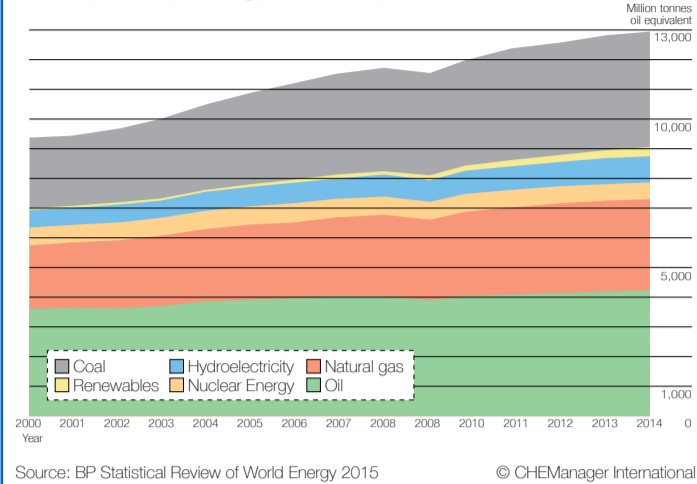
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Energy in 2014: A Year of Change

World primary energy consumption 2000–2014 Fig. 1

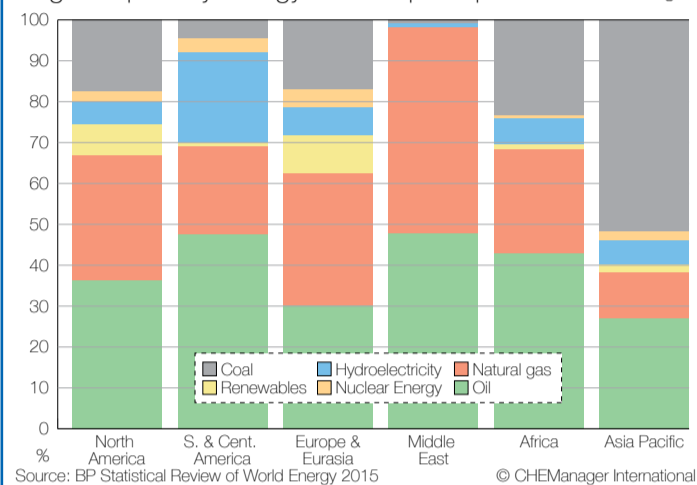


Source: BP Statistical Review of World Energy 2015 © CHEManager International

World consumption

2014 was a remarkable year in the world of energy. The eerie calm that had characterized energy markets in the few years prior to 2014 came to an abrupt end last year. According to the BP Statistical Review of World Energy 2015, global primary energy consumption increased by just 0.9% in 2014, a marked deceleration over 2013 (+2.0%) and the slowest rate of growth since 1998. Growth was below average in all regions except North America and Africa. All fuels except nuclear grew at below-average rates. Oil remains the world's dominant fuel (fig. 1). Hydroelectric and other renewables in power generation both reached record shares of global primary energy consumption (6.8% and 2.5%, respectively).

Regional primary energy consumption pattern 2014 Fig. 2

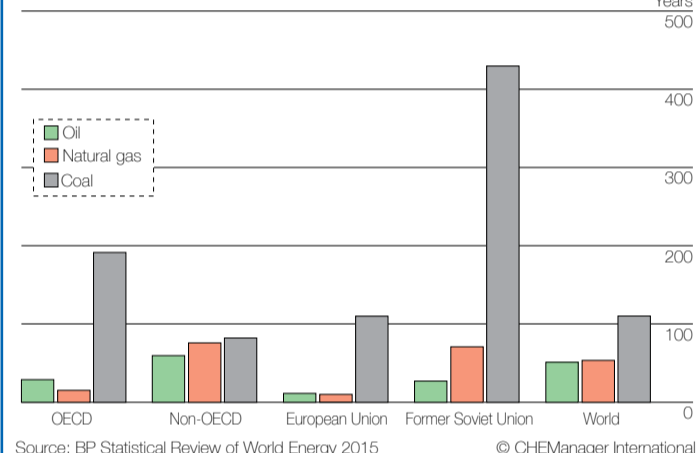


Source: BP Statistical Review of World Energy 2015 © CHEManager International

Regional consumption

Although emerging economies continued to dominate the growth in global energy consumption, growth in these countries (+2.4%) was well below its 10-year average of 4.2%. The fall in EU energy consumption (-3.9%) was the second-largest percentage decline on record. The Asia Pacific region once again accounted for the largest increment to global primary energy consumption and continues to account for the largest share (41.3% of the global total). The region accounted for over 71% of global coal consumption for the first time in 2014, and coal remains the region's dominant fuel (fig. 2). Gas is the dominant fuel in Europe & Eurasia and the Middle East, while oil is the largest source of energy in the Americas and Africa.

Fossil fuel reserves-to-production (R/P) ratios at end 2014 Fig. 3

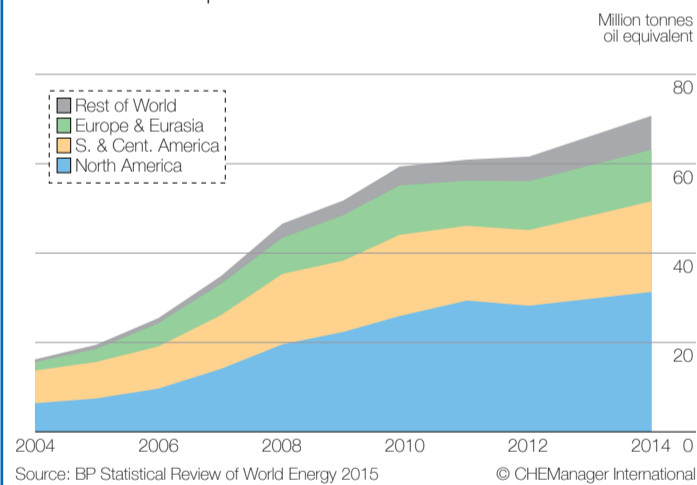


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Fossil fuel reserves-to-production ratios

Coal remains — by far — the most abundant fossil fuel by R/P ratio (fig. 3), though oil and natural gas reserves have increased over time. The slowing pace of Chinese industrialization caused the growth in global consumption of coal to be unusually weak. Non-OECD countries account for the majority of proved reserves for all fossil fuels. The Middle East holds the largest reserves for oil and natural gas, and the highest R/P ratio for natural gas; South & Central America hold the highest R/P ratio for oil. Europe & Eurasia holds the largest coal reserves and the highest R/P ratio.

World biofuels production 2004–2014 Fig. 4



Source: BP Statistical Review of World Energy 2015 © CHEManager International

Biofuels production

World biofuels production increased by 7.4% in 2014 (fig. 4). Global ethanol production increased by 6.0%, the second consecutive year of growth, led by increases from North America, South & Central America and Asia Pacific. Biodiesel production increased by 10.3% in 2014, despite a decline in production from North America. The International Energy Agency (IEA) has a goal for biofuels to meet more than a quarter of world demand for transportation fuels by 2050 to reduce dependence on petroleum and coal. Global biofuels production grew by a below-average 7.4% (+4.9 million tons of oil equivalent), driven by increases in the US (+5.6%), Brazil (+5.5%), Indonesia (+40.4%) and Argentina (+30.9%). (rk)

Improved Process for PLA Biodegradable Plastic

Biodegradable drinking cups or vegetable wrapping foil: the bioplastic known as polylactic acid (PLA) is already a part of our everyday lives. PLA is derived from renewable resources, including the sugar in maize and sugarcane. Fermentation turns the sugar into lactic acid, which in turn is a building block for polylactic acid. PLA degrades after a number of years in certain environments. If it is collected and sorted correctly, it is both industrially compostable and recyclable. PLA is also one of the few plastics that are suitable for 3D printing.

However, PLA is not yet a full alternative for petroleum-based plastics due to its cost. The production process for PLA is expensive because

of the intermediary steps. And even though PLA is considered a green plastic, the various intermediary steps in the production process still require metals and produce waste.

Researchers from the University of Leuven recently presented a way to make the PLA production process more simple and waste-free. "We have applied a petrochemical concept to biomass", says postdoctoral researcher Michiel Dusselier. "We speed up and guide the chemical process in the reactor with a zeolite as a catalyst. Zeolites are porous minerals. By selecting a specific type on the basis of its pore shape, we were able to convert lactic acid directly into the building blocks for PLA without making the larger

by-products that do not fit into the zeolite pores. Our new method has several advantages compared to the traditional technique: we produce more PLA with less waste and without using metals. In addition, the production process is cheaper, because we can skip a step".

Bert Sels, professor at the University of Leuven, is confident that the new technology will soon take hold. "Of course, PLA will never fully replace petroleum-based plastics. For one thing, some objects, such as toilet drain pipes, are not meant to be biodegradable. And it is not our intention to promote disposable plastic. But products made of PLA can now become cheaper and greener." (rk)



These boots – are made for hiking. Summer time is hiking time. Light mountaineering shoes provide hikers with comfortable lightweight equipment that lets them be quick, agile and safe. Sports specialist Salomon has chosen DSM's EcoPaXX polyamide for the "Edging Chassis" of a new mountaineering shoe. The Edging Chassis is a special plate built into the sole with a sophisticated design that provides stability for the foot, but also allows enough flexibility to accommodate the natural flexing of the foot. This requires a material with the right combination of appropriate mechanical properties and toughness and which can be processed easily. EcoPaXX has enabled Salomon to produce a chassis with an intricate design. Furthermore, it has flow characteristics needed for the design, together with mechanical properties and processes very well. (mr)

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