

MONDAY 3 OCTOBER 2016

BUSINESS SESSION OFFICIAL OPENING

50 YEARS OF GLOBAL CHEMICAL INDUSTRY EVOLUTION: WHAT'S NEXT?

EPCA president and Ineos director Tom Crotty opened the first business session of the 2016 conference by welcoming another record number of delegates to Budapest. He reminded the audience that the chemicals sector is “the industry of industries” and, with EPCA celebrating its half-centenary, looked forward to a productive and profitable next 50 years. Conference moderator Nadine Dereza then introduced a panel of speakers comprising BASF’s vice-chairman and chief technology officer, Martin Bruder Müller, Arkema’s chairman and chief executive, Thierry Le Hénaff, and LyondellBasell’s chief executive and management board chairman, Bob Patel. Together, they would offer the delegates a view of the future from the perspective of their own companies.



TOM CROTTY
EPCA President and Director
INEOS GROUP



DR. MARTIN BRUDERMÜLLER
*Vice-Chairman of the Board
 of Executive Directors & Chief
 Technology Officer*
 BASF SE

In his opening key note, BASF's Martin Bruder Müller described the petrochemical sector as the foundation of Europe's manufacturing industry – today and tomorrow. However, Bruder Müller, who is both vice-chairman of the board of executive directors and chief technology officer of BASF SE, said the European petrochemical industry faces mounting competitive challenges with respect to feedstock supply and costs, technological change and globalization in a world where new developments are occurring at a breathtaking pace.

BASF's vice-chairman praised the work of EPCA over the past 50 years. EPCA had fostered networking across the industry by successfully connecting producers, suppliers, customers and service providers: "EPCA has been creating real value for the chemical industry since 1967."

Briefly tracing BASF's own 151-year history, Bruder Müller noted the company was among EPCA's founding members, and has, since the 1950s, been an important player in the petrochemical sector. Among the landmarks he mentioned were the BASF-Shell joint venture, ROW, Germany's first petrochemical plant established in 1953, the company's first steam cracker starting up in 1965, and BASF's propylene-based acrylic acid production coming on

stream 1977. This period over the past decades also marked BASF's transition to a transnational company and a truly global enterprise.

Bruder Müller also mentioned the company's development and commitment to the "Verbund" concept, which is based on the close connection of production plants along chemical value chains – from base chemicals to specialty and performance products – making it possible to take advantage of logistics, energy and infrastructural synergies. Today, BASF operates Verbund sites in Europe, Asia and North America.

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 REAL VALUE FOR THE CHEMICAL
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BASF SE

In 2015, BASF Petrochemicals' sales to third parties were valued at €5.7bn. He also stressed that with its focus on cracker products, acrylics, alcohols and derivatives, as well as on alkylene oxides and glycols, petrochemicals is the foundation of the BASF group's Verbund.

Further to leading market positions, technology leadership, world-scale plants with their integration into Verbund sites as well as global presence with production plants in both mature and emerging markets are important success factors for BASF Petrochemicals.

Turning to the challenges the European petrochemical industry faces, Bruder Müller

used a "sandwich" analogy, with Europe caught between North America and Asia, in particular China. The European competitive positioning is decreasing between booming capacities in North America based on shale gas and China where a still relatively strong economic growth drives new investments and the development of a coal-based petrochemical industry. The Middle East, despite its diminishing feedstock advantage, remains resource-rich and an export hub for oil and gas and for base chemicals.

Against this background, Europe has to cope with high energy costs and a lack of major feedstock and raw material resources. The BASF vice-chairman also pointed out that today's temporary low oil prices support the competitiveness of Europe's naphtha crackers versus a North American ethane-based and a coal-based Chinese production. However, a medium-term return to higher oil prices would reopen the competitive gap, which will make any new European investment decisions challenging.

In addition, the European petrochemical sector faces a stagnating market growth. Whereas the European petrochemical demand in the 10-year timeframe from 2010 to 2020 is expected to stay almost constant, the global demand is forecasted to increase by about 70% over the same period.

To address these challenges, the BASF executive added that, Europe should leverage its strengths and focus on innovation to remain competitive. He offered five key levers to pull for a profitable future. First, the industry needs to increase its feedstock flexibility, by looking at a variety of options such as increased LPG-based imports. He noted that an increased feedstock flexibility already assisted European crackers in significantly improving their cash cost competitiveness between 2010 and 2015.

Second, the European petrochemical industry needs a strong and competitive value chain integration as well as a closer

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integration of customers to improve efficiencies and synergies with particular regard to energy, raw material and logistics costs. As an example of such functional European industry clusters, Brudermüller cited the Benelux chemical cluster, where BASF operates a Verbund site in Antwerp and where a broad range of upstream and downstream players are closely interlinked and integrated.

Third, Europe needs to maintain technology leadership through both incremental and radical process innovation. By means of the acrylic acid technology, Brudermüller illustrated the significant cost reduction potential of incremental improvements, where over a long period of time a combination of continuous process enhancements have been achieved. As an example of more radical technological innovation, he pointed to the recently developed hydrogen peroxide-to-propylene oxide (HPPO)¹ process which drastically reduced specific investment costs.

Brudermüller explained the fourth lever, operational excellence, regarding the unlocked

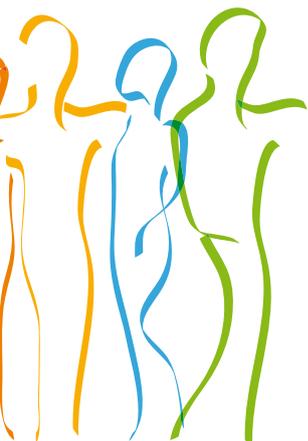
potential of digitalization for the optimization of manufacturing processes. Within its BASF 4.0 smart manufacturing initiative, the company is driving various pilot projects to lower production and specific investment costs and to improve competitiveness. Using a range of digital applications – such as augmented reality, predictive maintenance, vertical integration, process optimization, or condition monitoring to control production levers – BASF is convinced that it will take operational excellence to the next level, Brudermüller says. Predictive maintenance – anticipating operational failures to carry out maintenance timely – can increase the availability of assets and is enabled by digitalization methods.

As a fifth lever, the European petrochemical industry should consider the smart integration of bio-based feedstock as a response to the increasing focus of customers and authorities as well as societies in general on sustainability. Brudermüller explained the bio-mass balance approach which uses BASF's existing, highly efficient and sustainable Verbund structures to produce bio-based products. The cracker is fed with

bio-naphtha and the share of bio-based feed is allocated to "bio-mass balanced" downstream products. "BASF's global use of renewable feedstock is now up to 4.5% and rising", Brudermüller says.

Summing up, Brudermüller said that over the next 25 years, Europe's petrochemical sector needs to continue but accelerate its process of transformation. Technological diversification to flexibly integrate inter-regional feedstock flows should be pursued. Interconnectivity between plants, sites and clusters should be further strengthened. Innovations and digitalization to enhance asset competitiveness as well as a continuously improving environmental footprint to maintain the license to operate are key. The BASF executive concluded that then Europe can remain a strong and competitive production centre with the petrochemical industry as its foundation, and he believes EPCA should facilitate and accompany the European manufacturing industry on this way forward.

¹ Hydrogen Peroxide to Propylene Oxide (HPPO)



"SMART PHONES BEING MADE IN 2016 ARE A WORLD AWAY FROM THOSE PRODUCED IN 2000, AND THEY CONTAIN MORE COMPUTING POWER THAN WAS USED TO TAKE APOLLO 11 ON MAN'S FIRST JOURNEY TO THE MOON."

THIERRY LE HÉNAFF
Chairman & CEO
ARKEMA



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Arkema chairman and chief executive officer, Thierry Le Hénaff, offered EPCA a vision of a global specialty business, and underlined the need for innovation and flexibility in responding to evolving challenges in the future. He said that in the ten years since its formation, Arkema has adopted a disruptive strategy to match today's rapidly changing and volatile world. The company has also transformed itself from a commodity player into a leading global specialty chemicals and advanced materials producer and supplier. "We are a designer of high performance materials and innovative solutions, with a balanced global footprint," Le Hénaff said. Today, Arkema is France's largest chemical

company with sales of €7.7bn, of which 38% are in Europe, 34% in North America, and 28% across Asia, the Middle East and the rest of the world. High performance materials account for 44% of sales, industrial specialties 32%, and coatings 24%. With 19,000 employees, Arkema has a presence in 50 countries, and operates three R&D hubs.

Arkema's chairman also highlighted the company's strong internal focus on occupational safety performance and reducing greenhouse gas emissions, and its emphasis on robust product stewardship in response to public concerns.

Looking at recent developments of the global chemical industry, Le Hénaff noted the extraordinary pace of change in the global chemical industry. He highlighted the evolution in global demand, which has seen the share of Europe, NAFTA and Japan shrink from 68% in 2004 to 41% in 2014, while China's share has boomed from 9% to 34% over the same period. At the same time, industry sales have more than doubled from €1.5tn to €3.2tn. Arkema's chairman said that the disruptive impact of China's economic development is set to continue as the current leadership focuses on developing self-sufficiency and accelerating the shift towards new technologies.

We are also seeing significant changes in key end markets for our products, Le Hénaff said. For example, the smart phones being made in 2016 are a world away from those produced in 2000, and they contain more computing power than was used to take Apollo 11 on man's first journey to the Moon. Similarly, we are seeing huge changes in weight-to-performance ratios, with for example today's soccer boots weighing two-thirds less than in the 2000's.

The energy landscape has also gone through a transformation, with a combination of increasing volatility and rapid change, which can be seen in the price volatility in the oil and gas market and in



sizeable increases in the generation of renewable energy using solar and wind power in response to climate change. Even in Texas, the home of the US oil industry, wind is now generating 16% of electricity whilst solar power is expanding rapidly. Regulators have also begun to roll out new pricing mechanisms that aim to encourage energy conservation and discourage new demand.

“These developments,” said the Arkema chief executive, “provide important clues about potential key industry drivers for our industry in the coming years.”

One key area will be sustainability, which was given a major boost at COP 21 in Paris recently, and is creating governmental interest in the circular economy. For the chemical industry, a key opportunity is recycling which requires innovation. For example, Le Hénaff suggested that by 2035, there could be 1mmt² of windmill blades to be recycled as a consequence of the growth in wind power. But this will be a difficult challenge as they are made of thermoset materials. So, Arkema has developed a new Elium® product to produce blades made from thermoplastic composites, which can then be recycled. “Another opportunity lies in material processing itself where new technologies – such as 3D printing – have major potential for reducing waste, and which can also bring production much closer to the customer.”

Demographics are already and will continue to be a driving change in historical demand patterns, Le Hénaff continued. For example, increasing life expectancy means that by 2025 1-in-5 people will be in the lower earning and lower spending 55+ generation, twice the percentage in 1950, which will impact demand. Global fertility rates are also in decline. Whereas North America and Europe birth rates have been averaging at 2 babies per woman since the 1960s, birth rates in Asia have fallen from 6 babies per woman in 1950 to just 2 babies today. On a global basis,

fertility rates have already halved to just 2.5 babies per woman since 1950, which led to a reduction in the relative number of people in the Wealth Creator 25-54 generation. By 2020, only African women will still be having more than the replacement rate of 2.1 babies per woman.

Finally, geopolitics is also becoming a disruptive force, with tensions rising around the world, the uncertainty caused by “Brexit,” the UK’s decision to leave the EU, and a rise in protectionist sentiment, as we can see from the current US election, in a country that has previously championed trade agreements.

So, what key conclusions can be drawn from these developments? The first, Le Hénaff suggested, is that GDP is becoming a less reliable guide to future growth potential. In the US, for example, services such as healthcare, travel and entertainment already account for two thirds of personal expenditure. Secondly, digitalization is set to play a role in accelerating disruptive trends around the world. The music industry, where



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“IN A WORLD OF VOLATILITY AND INCREASINGLY SHORT-TERM FOCUS OF FINANCIAL MARKETS, I BELIEVE THE BEST WAY TO SURVIVE AND PROSPER IS TO KEEP A LONG-TERM VIEW!”

² Million Metric Tons

streaming technology has replaced CD sales, has transformed the market and our concepts of ownership while promoting the idea of the sharing economy, which is extending into areas such as car sharing. These are developments which are likely to affect chemicals demand in the future.

However, Le Hénaff said the industry must see every challenge as an opportunity. Our view at Arkema is that in the coming years we will see a continuum develop, and the chemical industry, which is very large, has the potential to develop a wide range of different value propositions. Some companies will maintain an upstream focus on supply-driven business models, while downstream companies like Arkema will be more asset light and market driven.

Nevertheless, these paradigm shifts and discontinuity generally create winners and losers. "The question," Arkema's chairman asked, "is who will be the winners in this new landscape and what does the changing environment imply for companies?" We will do better to rely on our own resources to achieve success, he continued.

In his view, implementation skills will continue to be a critical differentiator, particularly because companies often adapt similar generic strategies. Le Hénaff also sees soft skills as another important differentiator, because they enable companies to respond to today's challenges with creativity and innovation. Within Arkema over the past decade, we have come to appreciate that a company is fundamentally about developing these soft skills internally while also developing relationships externally with a range of business partners and customers.

"SCENARIO PLANNING IS NOW ESSENTIAL, BECAUSE AN ABILITY TO MANAGE THROUGH CHALLENGES SUCH AS CONSOLIDATION, SUPPLY BASE CYCLES AND ENERGY CYCLES WILL BE KEY TO REMAINING COMPETITIVE"

BOB PATEL

CEO & Chairman of the Management Board
LYONDELLBASELL

"This is key to inspiring our own staff while also building trust with the wider public," the chairman stated.

For Arkema, there are five critical areas, he continued. "Talent: which is about our people, their passion, and their ability to work in a team. Partnerships: which is about the ability to build external relationships that will enable companies to develop new offerings. Agility: which implies quick communication and less hierarchy for quick decision-making. Global: how to leverage our diversity by integrating the different national and regional silos within a global culture. Finally, the corporate values, which in this very complex world an 'idée fixe' point."

"This is the soft strategy that we have adopted and developed in Arkema over the past decade," the chief executive added. "In ten years, we have come from being a supply driven company to being a designer of solutions, and now we intend to expand our market-led strategy to become more of a service provider, with the aim of achieving genuine customer intimacy. The mega trends – water, food, health, mobility and sustainability – highlight the potential for growth. An example is that more people have access today to smart phones than to clean drinking water. And, one-in-five people have no access to electricity. This means significant development opportunity for our industry, which experts suggest could double in size by 2030."

Concluding his remarks, Arkema's chairman said: "The chemical industry has a key role to play in future societal and economic development. It has a great capacity for

innovation, and is one of the world's largest employers of highly skilled and highly educated people. Looking to the future, what we know is what we don't know! That's why scenario planning is key to our understanding and anticipating the future. What we do know is that pressure from environmental issues and the circular economy, from changing demographics, and from digitalization, present us with opportunities as well as challenges. The world relies on us to respond to these challenges, with new products and services for today's more demanding and informed consumers. We need to be more flexible, locally based, and keep close to the consumer. And we need an adaptable mindset, that's looking forward and changing rather than sitting back and content to polish the stone. This is where developing soft skills can make the difference and move us beyond our traditional focus as a material-oriented industry. My last thought may sound counter intuitive: in a world of volatility and increasingly short-term focus of financial markets, I believe the best way to survive and prosper is to keep a long-term view!"



BOB PATEL

CEO & Chairman of the Management Board
LYONDELLBASELL

LyondellBasell CEO and management board chairman, Bob Patel, offered a view of the future from the standpoint of a downstream, integrated commodity chemical and polymer producer. His aim, he said, was twofold: first, to explore how the evolution of demand for polyolefins, propylene oxide and derivatives,

in tandem with the availability and supply of feedstocks, will inform where future investments will be targeted; and, second, to review the likely impacts of innovation and environmental issues on the future shape of the industry.

Offering a quick overview of his company, Patel said LyondellBasell – one of the world's largest petrochemical companies – has a truly global footprint. It currently operates 55 manufacturing sites in 17 countries worldwide – with 50% of employees based outside the US – and has product sales in over 100 countries. Although 2015 revenues at \$33bn were lower than in other recent years, he explained that this was largely a result of wide fluctuations in oil and gas prices rather than company performance.

One of the world's largest polyolefin and PO producers, LyondellBasell currently markets over 10m tonnes of polyolefins each year. It is also the world leader in oxy fuels and polyolefins technology, both of which take the company closer to end-consumers, who have a decisive influence in shaping demand in terms of both product volumes and product performance.

Patel noted that LyondellBasell is an example of the evolution that has occurred in the chemicals industry over the past 50 years, and he mentioned some of the legacy companies – including BASF, Hoechst, Shell, Montedison, Cain Chemical, Millenium, Arco, Lyondell – from whose that are part of LyondellBasell's pedigree. Indeed, LyondellBasell has been a consolidator in both the US and Europe, and

its current footprint provides a particular perspective on global demand, and how that might evolve.

Over the last 50 years, LyondellBasell, like the industry as a whole, has been faced with many challenges that were not easily predicted, such as wide variations in oil and gas prices, recessions, geopolitical crises, and other events, Patel noted. For this reason, scenario planning is now essential, because an ability to manage through challenges such as consolidation, supply base cycles and energy cycles will be key to remaining competitive.

Turning to global trends, Patel pointed out that while significant population increases are anticipated in North America (from



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“WE SEE ENERGY CYCLES, WE SEE SUPPLY CYCLES. THE KEY IS TO LOOK THROUGH THE CYCLES AND INVEST IN THE LONG-TERM FOR MARKETS, SCALE AND COMPETITIVENESS.”

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484m to 597m), Europe (from 707m to 738m), and South America (from 634m to 784m) between 2015 and 2050, the biggest increases by far will be in Asia Pacific (from 4.4bn to 5.2bn) and Africa (from 1.2bn to 2.5bn). For this reason, he said, the industry must pay attention to what these new consumers in Asia and Africa will want and need, while also satisfying demand in the more mature markets of Europe and North America.

Today, annual polyethylene consumption per person per year is between 30-35kg in North America and Europe, compared with 15-20kg in Northeast Asia and the Middle East, and around 10kg in Southeast Asia, South America and the CIS & Baltic states, and less than 5kg in Africa and the Indian subcontinent, the LyondellBasell chief executive pointed out. And, for every 1kg per person increase in Asian demand, an additional 7-8 world scale PE plants will be needed. “In fact, the kind of growth that’s forecast will require around 50 new PE plants in the next six years. It’s clear that the demand will be there. The question is where will the supply come from?”

A key determinant will be feedstock costs, Patel continued, and where producers sit on the supply curve. When oil prices were sky high – up at \$110/bl – and gas was at \$3-4/mmbtu, the US enjoyed a huge feedstock cost advantage – the so-called shale gas advantage. But as oil prices have declined, that advantage has dimin-

ished, and, in Patel’s view, some of the planned investments in new plants could be scaled back. Indeed, as the gas cost advantage has diminished, Europe has been able to become more competitive again. “We see energy cycles, we see supply cycles. The key is to look through the cycles and invest in the long term for markets, scale and competitiveness.”

In terms of where to invest, an important factor is capital costs. “The cost of construction has risen by about 67% in the last 15 years, which is a tremendous increase in investment capital to build new capacity. But the costs in different parts of the world are quite different. So if construction costs in the US were at 1.0 on an index basis, it costs about 40% less – or 0.6 – to build similar capacity in China.”

By contrast, costs in Western Canada are at 1.25, or 25% higher than the US. So when you add lower oil prices to lower construction costs, then building outside the US or North America looks like a potentially attractive option.

Where’s the market? What do the local consumers need? How will feedstock competitiveness evolve over time? What are the investment costs? All of these factors impact return on investment.

So what is LyondellBasell doing? Patel said he considered it important to separate where you produce and where you sell.

Sometimes it may go together, but you really have to consider those separately, because today, as many of the logistics service providers in the room will tell you, global trade is increasing. It’s very easy to move PE, polypropylene, styrene, oxy fuels and so on all over the world at very low cost. Now it’s a bit more expensive to move ethane and natural gas and so on, but many companies are showing that can also be done.

“In the past five years, LyondellBasell’s approach has been to grow through debottlenecks and not so much by greenfield developments in the US, because we could see capital costs were rising. We’re about to commission one of our last debottlenecks in Corpus Christi, Texas, and once that is done we will in total have added capacity equivalent to one world scale cracker, but at half the cost of a new plant,” Patel said. For any future greenfield projects, the company would weigh all the factors to decide whether these should be in the US or elsewhere in the world.

LyondellBasell has also announced a new high-density PE investment, which illustrates the value of integration, Patel added. The plant will be built in LaPorte, Texas, a location where the company has in the past increased ethylene capacity and which offers value chain integration. The plant will also deploy a new PE technology, which was developed in Frankfurt, Germany and Ferrara, Italy, where the

company has heritage research facilities, and complemented by product research in Cincinnati. The company has also involved its global marketing network in order to better understand future market needs. So we're building the plant in Texas to serve the global marketplace, and to do so in the long term. The other big feature of this plant is that it will be able to produce multimodal polyethylene products, which will enable downstream converters to consume less resin per unit, and thereby gain an environmental advantage.

Segueing into environment aspects impacting the industry, Patel showed a chart, based on Pew Research, highlighting public environmental attitudes and concerns that are driving government regulations. Every nation surveyed said that we should make efforts to protect the environment despite the potential cost. Over half believe climate change is a very serious problem, while all

agree it is a problem. Almost 80% think changes in climate policy are needed to make a difference. There is also pressure for increased recycling of plastics, which is currently at 8.8% in the US. In response to these concerns and attitudes, the LyondellBasell chief executive noted that recently national governments have together reached climate agreements – COP 21 – while in the US and elsewhere there have been plastic bag bans, a microbead ban in the US, and a range of auto emission and chemical safety regulations across the world. However, in the face of these challenges, Patel believes his company can provide solutions to all these concerns through products that meet the needs of consumers.

Addressing the future of the European chemical industry, Patel said that it has managed its way through what seemed like dire circumstances, through tight cost

controls, focused investments and great technological development. He also noted the global leadership shown by Europe in terms of environmental protection and regulations, to which the industry has responded. For this reason, he believes the future remains bright but challenging.

So what are the key points to address for future competitiveness? In Patel's view, to focus on feedstock flexibility and feedstock advantage, maintain investment in R&D and new technology, always remember the end customer, and play a role in the responsible use of products. Underlying all these imperatives is the need to remain innovative, and to match products to customer needs in different regions. The petrochemical sector needs to work harder to alter public perceptions. Rather than being viewed as a polluter, we should work towards being perceived as an industry that society can't do without."

PANEL DEBATE

Q: HOW MUCH INNOVATION IS POSSIBLE, AND WILL IT BE INCREMENTAL OR RADICAL?

Martin Bruder Müller believes there is a big opportunity, for both types of innovation. Incremental innovation can make a big difference to profit and loss accounts, but if the industry wants to remain successful as a technology leader responding to global challenges then radical innovation is essential. He suggested that digitalization will enable both types of innovation through modelling and simulation, which will provide insights into how different catalysts, reactor systems, or molecules will perform.

Q: WHAT IMPACTS ARE COSTS AND PRICES HAVING ON INNOVATION WITHIN BASF? YOU MAY HAVE DEEP POCKETS, BUT THEY CANNOT BE ENDLESS?

Bruder Müller agreed with the second part of the question, and said that BASF had achieved an automatic 5% increase in R&D spending in the past five years. In the future, with the use and advantages of

digitalization, he feels that R&D departments will be able to run a mixture of virtual and lab experiments to shorten R&D times and do more with less money, while boosting both creativity and efficiency.

Q: HOW IMPORTANT IS INNOVATION TO LYONDELLBASELL?

Bob Patel said innovation is about products, manufacturing processes, and "doing what we do today better." He agreed that



NADINE DEREZA, THIERRY LE HÉNAFF, BOB PATEL, DR. MARTIN BRUDERMÜLLER

digitalization and big data offered innovation opportunities in many areas – from predictive maintenance to product development – but insisted that the key to success is remaining focused. It is easy to become over focused on day-to-day issues, but it is important to seek step-change opportunities and ensure that any successful development will create value.

Q: HOW SUCCESSFUL HAS ARKEMA'S STRATEGY BEEN IN PROMOTING INNOVATION AND HAS THE FINANCIAL BACKDROP HAD AN IMPACT?

Thierry Le Hénaff said that for him “innovation is first a mindset. But also before spending money, we need to focus on potential gains.” He said Arkema puts 15% of its total R&D budget into a corporate pot managed by the executive committee with a long-term view. This is to keep an eye to the future in times when markets are more challenging and divisional R&D is capped in response. Investing in R&D for the long term requires patience, because it can take up to 15 years to develop a new blockbuster technology and bring it to market, the Arkema chairman added.

Q: WILL SOFT SKILLS BE INCREASINGLY IMPORTANT IN ATTRACTING YOUNG RECRUITS TO THE INDUSTRY?

Le Hénaff said soft skills are and will remain essential, particularly in a world that is increasingly globalized and complex. He said Arkema would continue to emphasize the importance and talent of its human assets, and promote their ability to co-operate across the company and with external partners, particularly to develop new ideas and innovate.

Brudermüller said that young people don't necessarily want to work in big companies, and may feel smaller companies and start-ups offer more freedom and quick results, which makes them more attractive. He said the chemical industry needs to improve its image, should look to develop both internal start-ups and external partnerships, and try to provide more freedom to employees.

Patel suggested that the younger people may have a greater sense of purpose, and want to feel they can make a difference through the work they do. He said the industry needs to tap into this enthusiasm, while accepting balances must be struck between wanting to specialize and contributing to a greater whole, and between entrepreneurial spirit and the need for corporate discipline.

Q: WILL EUROPE REMAIN A FORCE IN CHEMICALS, AND HOW IMPORTANT WILL CROSS-COMPANY AND CROSS-INDUSTRY CO-OPERATION BE IN FUTURE? HOW MUCH CO-OPERATION IS POSSIBLE GIVEN THE IMPACT R&D DISCLOSURE OR SHARING INTELLECTUAL PROPERTY CAN HAVE ON COMPETITIVENESS?

Thierry Le Hénaff believes co-operation will help Europe's industry remain a force, and suggests that companies will increasingly need to build and extend their partnerships. Accepting that there will be R&D and IP issues to be addressed, he said that companies need to build trust in order to lay the ground for knowledge sharing and for developing win-win relationships.

Bob Patel agreed that IP is a very delicate area when it comes to partnerships and knowledge sharing, particular regarding step-change innovation. However, he also noted that co-operation within organizations such as EPCA, Cefic and the American Chemistry Council provides an important lever for enhancing the industry's image and reputation, with the public, with consumers, and with regulators. “We need to help people understand what the industry does and contributes. We need to be more positive and less defensive!”

Martin Brudermüller echoed his fellow panellists in emphasizing the need to protect IP while also looking for opportunities to co-operate with external partners “because companies can't do everything in house.” He suggested that there are opportunities to co-operate with universities and start-ups, which may lack funds but have some great ideas or developments. The way forward may be to share IP or look at royalty payments to foster co-operation.

Q: IN VIEW OF BASF'S RECOGNITION IN RECENT GARTNER [SUPPLY CHAIN] RANKINGS, HOW IMPORTANT IS INVESTMENT IN SUPPLY CHAIN DEVELOPMENT AND INNOVATION?

Brudermüller said BASF welcomed the recognition, but said it is important to maintain a focus on constantly enhancing supply chain efficiency by reducing segmentation and increasing integration, particularly in view of the cost implications: “We need an interlinked ecosystem, and digitalization is helping us to do this.” He said the industry is already sharing information via ERP³ systems and the cloud, enabling more product to get to the right place at the right time, and shipment tracking has improved. But he urged further co-operation with customers and suppliers, and emphasized the need for producers to work more closely with logistics service providers.

Q: HOW WILL CHINA'S AGEING POPULATION IMPACT BUSINESS?

Bob Patel said people don't realize what's been happening to China's demographics: “China needs another baby boom. But it will take time for these young people to become productive, so we do need to think about how this will impact business in China, and how these trends will affect business across Asia and elsewhere.” He said China's labour force is not unlimited and noted that labour costs there are already rising. “We are constantly re-evaluating trends in China. For example, auto-sharing could grow in China. That will have an impact and we need to focus on the future not on the past.”

Q: HOW IMPORTANT IS FLEXIBILITY?

Le Hénaff suggested that alongside economies of scale, production flexibility and global reach, chemical companies need to be able to act locally and understand local cultures in terms of both doing business and attracting talent.

Q: WILL CHINA BE A DISRUPTIVE FORCE IN MARKETS IN ASIA AND FURTHER AFIELD?

Brudermüller noted the revitalization of the 'Silk Road' and said there is now a railway connection between China and Germany,

³ Enterprise Resource Planning



NADINE DEREZA, THIERRY LE HÉNAFF, BOB PATEL AND DR. MARTIN BRUDERMÜLLER

“50 Years of Global Chemical Industry Evolution: What's Next?”

3 October 2016

which can move product in about 15 days compared to 50 days by ship. But he suggested this was a two-way street. China is on one end of the Silk Road, but Europe on the other end, and it is up to companies wherever they operate to be competitive and look for market opportunities. However, we have to accept that China will have an increasing regional and global impact in the future. This emphasizes the need to work on our competitiveness.

Q: HOW SHOULD THE CHEMICAL INDUSTRY RESPOND TO THE CLIMATE CHANGE AGREEMENTS OF COP 21 AND ADDRESS CO₂ EMISSIONS?

Martin Brudermüller suggested that the industry should challenge the view that energy intensive industries are bad guys, whereas less energy intensive sectors are good guys. He believes increased integration and co-operation will enable companies to work together to reduce emissions, but also said that the industry as a whole must work harder to get across the benefits it provides and the solutions it can offer to the broader issue of climate change. Today it is not possible to just stick only with fossil

fuels, instead the industry should try to increase its use of renewable energy and feedstock. In time, he foresees CO₂ costs impacting industry in Europe, but the BASF vice-chairman expects renewable costs to fall and storage issues to be overcome. The answers lie in new technologies.

Bob Patel said the industry should work to persuade governments that regulations need to be framed in a global context, should be based on good science, and should target less energy per tonne of product.

Thierry Le Hénaff agreed that the chemical industry can provide many of the solutions to climate change and that the sector should use COP 21 and similar agreements to communicate its value to society and the global environment.

Q: PANELLISTS WERE ASKED IF THEY COULD SAY WHAT THEY VIEWED AS THEIR COMPANY'S OR THE INDUSTRY'S GREATEST SUCCESS OVER THE PAST 50 YEARS?

Bob Patel picked two areas: safety, which he said had improved tremendously over the period through a combination of focus,

innovation and co-operation. The second is the industry's resilience through both economic and energy cycles. This has been achieved through a combination of creativity and collaboration, particularly through clustering, along with drive and determination.

Thierry Le Hénaff said he thought the chemical industry had made a true contribution to all aspects of society, and in personal terms he was pleased with the success Arkema had achieved since its formation in 2006.

Martin Brudermüller said that people in the industry should be proud of its achievements, adding that in spite of the European sector's age, it was still vital to all other sectors and a tremendous source of ideas and creativity.

Asked for their thoughts on staying successful for the next 50 years, the panel suggested focussing on transformative technology, enhancing energy efficiency, and convincing the public and politicians of the industry's value.