



REPORT OF THE EPCA 2015

49TH ANNUAL MEETING

HYDROCARBONS AND THE CHEMICAL INDUSTRY:
SHAPING A BETTER WORLD TOGETHER

3 TO 7 OCTOBER 2015 IN BERLIN, GERMANY



THE EUROPEAN PETROCHEMICAL ASSOCIATION





TOM CROTTY
EPCA President
INEOS GROUP

SUNDAY 4 OCTOBER 2015

BUSINESS SESSION

DIVERSITY & GENDER INCLUSION

DIVERSITY AND GENDER INCLUSION:
PAVING THE WAY FOR BETTER BUSINESS



NADINE DEREZA
Moderator

Welcoming delegates to this session, EPCA president and INEOS director, Tom Crotty explained that this session's origins lay in the previous annual meeting, which had focused on talent and technology and indicated that the industry would be excluding talent if it did not embrace diversity and inclusion.

"At last year's annual meeting, we had our first session on diversity, which was really well received, and generated great feedback and enthusiasm," he continued. "So the EPCA board decided to create a Talent and Diversity Inclusion Council (TDIC), which has been established this year." Its role is to help EPCA make the business case for diversity and inclusion, identify best practices from within the chemical sector and beyond, and to support the industry in attracting the talent needed to deliver the innovative and sustainable solutions expected by customers and stakeholders.

As one of its first actions, the Council commissioned McKinsey & Company to provide a baseline survey of the state of diversity and gender inclusion in the European industry, Crotty said. This survey

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was undertaken during the summer, and the headline findings would be revealed in the first presentation of the session.

Before introducing the session's speakers, conference moderator, Nadine Dereza, reiterated the contribution that can be made by diversity and inclusion in paving the way for better businesses. "Change doesn't happen without ideas, so why exclude the talent that might have those ideas?" she asked. Far better she suggested, to embrace diversity and inclusion in order "to build innovative, resilient businesses that can withstand disruptions of all kinds."



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**DR. MIRJAM MAYER**

McKinsey & Company strategy consultant and diversity and inclusion expert

Results from the *Diversity and Inclusion Survey* commissioned by EPCA were presented by Dr. Mirjam Mayer, a McKinsey & Company strategy consultant and diversity and inclusion expert. She started by saying that the chemical industry is not alone in addressing the issue, and McKinsey has been engaged in a 10-year push to undertake research to help raise diversity and inclusion to the top of company agendas.

Mayer set out to make the business case for diversity and gender inclusion, offering key reasons why and how it adds value: **If companies want to win the war for talent, then they should not exclude 50% of the population. Diversity and inclusion also improves the quality of decision-making, and helps increase customer insight. Furthermore, it helps motivate employees and increases job satisfaction while improving both a company's global image and relevance.** Moreover, research indicates that adoption of diversity and inclusion policies drives performance and has a positive financial impact. "And diversity and inclusion is not just a gender issue, it is also an issue of ethnicity," Mayer said.

Focused on Europe, the *Diversity and Inclusion Survey* was undertaken with 19 EPCA

member companies, which represent about 30% of the European industry's employees, the McKinsey consultant said. Key aspects of the survey, which analysed the proportion of women at various levels of the workplace, were recruitment, performance and promotion, retention, and company culture.

Mayer said McKinsey found that women accounted for around 24 per cent of the overall workforce, with more in white collar roles (29 per cent) than in blue collar (10 per cent) positions, but held only between 11-15 per cent of the top 100 jobs. Mayer pointed out that when compared with other industries, broadly chemicals has a sub average to average representation of women in executive committee roles (10 per cent) and board of directors positions (19 per cent).

Looking at companies' commitment to recruiting women, the survey showed 84 per cent of senior managers being committed, but only 58 per cent of companies promoting gender equality in their hiring processes. Only 26 per cent said they had designed or revised candidate screening and selection criteria to ensure fair treatment of both men and women, whereas 58 per cent had not.

Asked whether their promotion processes were fair to both genders, 84 per cent said they thought they were, while 11 per cent admitted they were not, and 5 per cent did not know. With over half of companies stating they had not revised their performances in terms of promoting and ensuring gender equality, Mayer said it was somewhat difficult to judge the real-

"BUSINESS CASE FOR GENDER EQUALITY IS MISSING IN MOST ORGANISATIONS"



ity and forthrightness of the broad general commitment to the topic.

Maintaining the spotlight on promotion, the McKinsey specialist listed a ranking of six key factors used to make related decisions, including the potential and/or the ability of a candidate to perform at the next level and a candidate's performance at current level as the top two factors. However, Mayer noted that men tended to be promoted on the basis

of potential, whereas women were judged more on performance than potential – an imbalance that likely has consequences on gender equality.

"AND DIVERSITY AND INCLUSION IS NOT JUST A GENDER ISSUE, IT IS ALSO AN ISSUE OF ETHNICITY."

The McKinsey survey also showed that only 20 per cent of companies surveyed have gender diversity targets

that managers have accountability for working towards or meeting. Dr. Mirjam Mayer suggested that this lack of targets raises issues about the potential

**DR. MIRJAM MAYER**

*McKinsey & Company strategy
consultant and diversity
and inclusion expert*

of companies to measure progress on diversity and inclusion.

While McKinsey found that EPCA members offer, to a greater or lesser extent, a range of flexible work programmes for employees – such as parental leave, virtual office working, leave of absence/sabbaticals, eldercare leave, part-time schedules, job sharing, and schedule flexibility/switching – very few made it easy to take these up. Only just over a third (37 per cent) had adjusted performance evaluation criteria to take account of flexibility choices.

In terms of priority on management agendas, gender equality is struggling. It is not among the top three priorities for any global management teams surveyed, although 41 per cent said it was among their top 10. It was a top-three priority issue for five per cent of country management/organization teams, and among the top 10 for 21 per cent. Some 32 per cent of HR heads said gender equality is a top three issue, and 37 per cent ranked it in their top 10.

Given the above, **Mayer indicated that it is not wholly surprising that just 37 per**

cent of EPCA members surveyed have developed a business case for gender equality, while 58 per cent have not.

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The McKinsey consultant said the survey shows that the chemical industry needs to develop an appropriate ecosystem in order to

make change happen. At the top of companies, CEO commitment needs to be combined with a business case for change. The message and commitment has to be cascaded through the whole management structure, which must be buttressed by transparency, effective measurement and progress tracking. Focusing on issues of retention, promotion and recruitment, companies should look at aspects of leadership development, such as training and coaching, sponsoring and mentoring, and diversity networks. A further element of this holistic approach is an organizational awareness of bias, both at on-the-job level and in terms of evaluation and recruitment. The core enablers for diversity in terms of leadership development are flexibility and parental leave, while for organizational awareness of bias the key is an inclusive culture.

In conclusion, Mayer judged that the industry is making progress with top management commitment and in regard to training and coaching, but has a lot more work to do to make diversity and inclusion and the benefits they bring a reality and a cornerstone across EPCA's membership.



GILLIAN TETT
Managing Editor (US)
and Columnist
FINANCIAL TIMES

For her keynote address, *Silos, Silences and Diversity*, award-winning *Financial Times* (FT) journalist and author Gillian Tett, focused her attention on the subject of “The Silo Effect”: the organizational tendency towards bias or to classify, categorize or specialize, which while often increasing efficiency can also lead to tunnel vision and tribalism, and even catastrophe.

Tett, who is currently also the FT’s U.S. managing editor, holds a Ph.D. in Social Anthropology from the University of Cambridge in the UK, which has certainly given her a different perspective from which to view the world. She started by “picking up on the second point raised by Dr. Mirjam Mayer, noting that “diversity can help improve the quality of decision making, [while] lack of diversity often leads to tunnel vision or tribalism, which can be absolutely deadly for companies.”

To illustrate this point, Tett offered a story. “How many of you remember the Sony *Walkman*?” she asked, before recounting how with this series of audio cassette- and CD-playing products Sony had in the 1980s and 1990s come to dominate the market for portable personal stereo systems. When, in 1999, Sony began the move from analog to digital products for the Internet Age, it was widely anticipated that this dominance would persist. However,

Sony replaced the *Walkman* with first two new products, then three, a consequence of specialization and competition between three different departments dominated by tunnel vision, silos, and tribalism. This “octopus pot” mentality – as the Japanese term it – ended Sony’s domination in this product area: all three digital products failed as Apple, led by Steve Jobs, introduced the iPod, which captured both consumers’ imagination and their money.

At this point, Tett suggested, “Many of you may be wondering what on earth this has to do with the chemical industry, or with diversity. **But silos can be found across all companies and social groups, and they are worsened by lack of diversity,” the FT editor continued. “Silos are about bias, and bias is about classification. We all do it. We classify according to our education and our culture.”**

Silos can be structural: enclosed, self-referential, inward looking, and in competition with other internal teams. **Disconnected silos are often a feature of big, bureaucratic companies.** Silos can also be mental, with functional, geographical or product groups all having separate profit and loss responsibilities or different targets often failing to co-operate or seeing the need to co-operate beyond their own narrow operating parameters. “Silos can be social, too. For example, is Twitter a social fishbowl? You

added. We should view these silos as “intellectual and social ghettos.”

Silos have also been shown to hurt finance companies, and by way of example, Tett offered the story of Swiss-based bank, UBS: “Pre-2007, UBS... was thought of as one of the safest banks in the world. It was sober, safe and dull – all the Swiss virtues!” But in the winter of 2007, UBS suddenly realized it had accumulated \$50bn of subprime mortgage securities on its books, which would end up creating about \$20bn in losses. And nobody within the bank had noticed. The problem for UBS, Tett continued, was that management of this huge, global bank was focused on the wrong areas – primarily hedge funds, leveraged finance – while its 3,000 or so risk managers were split into three competing tribes beset by tunnel vision and lack of cross-company communication, which led to a misclassification and misunderstanding of securities. “The left hand didn’t know what the right hand was doing. Bright people behaved in ways that were almost unbelievably stupid.”

But silos are not confined to corporations, Tett said, “Professions also suffer from silo mentalities. Look at the economists, like Alan Greenspan, and the central bankers, and governments. Many of them managed to miss the impending crisis [of 2007].” This, said Tett, was because most economists and central bankers shared the same overly optimistic world-view, and had failed to grasp that the worlds of finance and economics had changed. “They ignored the grass roots of finance and failed to consider the risks of emerging trends and products that were outside their experience,” the FT editor noted.

Underlining her central thesis, Tett pointed to similar “silo effect” consequences that have wreaked havoc in some of the world’s best known corporations, from GM’s seat belt problems to BP’s Macondo oil well disaster in the Gulf of Mexico and, more recently, VW’s emerging emissions scandal.

“DIVERSITY CAN HELP IMPROVE THE QUALITY OF DECISION MAKING, [WHILE] LACK OF DIVERSITY OFTEN LEADS TO TUNNEL VISION OR TRIBALISM, WHICH CAN BE ABSOLUTELY DEADLY FOR COMPANIES.”

have to choose who to follow, but people tend to follow people like themselves. A paradox of our 21st Century world is that... we think we’re hyper-connected, but in reality our lives - our cyber existence - are increasingly fragmented,” the FT manager

"All these stories are about silos. Bright people not joining up the dots because they are beset by tunnel vision."

The good news, the FT editor said, is that a wide variety of organizations offer examples of how the negative impacts of silos can be mitigated or avoided. One such is Facebook, a growing global coding-centred giant with many specialist, technical and highly-focused teams, which works hard to avoid the creation of silos by rotating team members to extend experience and inject new thinking while fostering widespread internal collaboration and using on-boarding boot camps to build this culture among new recruits. To avoid tribalism and tunnel vision, Facebook promotes internal social networks to create multiple nodes of connectivity.

Another radically different example offered by Tett related to Cleveland Clinic, a huge Ohio-based hospital that changed its organization and modus operandi to turn the mental map of medicine upside down to better connect with patients and enhance overall performance. Despite the world-class reputation of its staff, the surgeons, physicians, nurses and other specialists it employed, Cleveland Clinic suffered from silos, tribalism, tunnel vision and competition between practitioners. However, the organization transformed itself by breaking down departmental and professional boundaries to create a culture of "caregivers" who worked more collaboratively across their specialism to offer more holistic, patient-centred and empathetic healthcare.

Another example is how, through thinking outside the box, New York City has mixed and matched the seemingly unrelated data it has collected and continues to collect to highlight, better understand and overcome the challenges it faces in delivering wide-ranging and effective services to its inhabitants. (In her recent book, *The Silo Effect*, Tett charts how city hall crunched apparently unrelated data to improve fire-fighting by more effectively identifying types of buildings - often pre-1940 - and neighbourhoods - often characterized by high levels of social deprivation or on the margins of legality - that are most at risk of sustaining fire-related incidents.)



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"ALL THESE STORIES ARE ABOUT SILOS. BRIGHT PEOPLE NOT JOINING UP THE DOTS BECAUSE THEY ARE BESET BY TUNNEL VISION."

"As human beings, we are all hard-wired to carry around classification systems in our heads," Tett insisted: we all have biases, we all have mental maps, which is how we manage to cope with a welter of data to order our world views and decide how we interact with the world at large. "For this reason, silos are both important and positive." But Tett re-emphasized that silos can easily become traps that stifle innovation and make us blind to problems that occur beyond our narrow view or understanding.

The FT manager concluded by offering a list of actions that can help to break down silos: Keep team boundaries flexible and fluid. Use cultural translators – people inside your group who can interpret what other groups are saying and doing, and to foster wider communication and connectivity. Turn your mental maps upside down, and imagine how the world looks from different perspectives. Use technology to connect with other groups. Create space to wander and collide, to gather or spark new ideas. Think about what people aren't talking about – the social silences. Imagine what it would be like to come into your organization as an outsider – try to imagine how your world would look through the eyes of a Martian or even an anthropologist! Finally, ask "Why? Why is the world like this and does it have to be like this?"

Finding the right answers is much easier when you are prepared to seek a view from a different perspective, which is why diversity is such an important factor in effective decision-making, Tett ended.

DIVERSITY & GENDER INCLUSION SESSION - PANEL DISCUSSION

For the panel discussion, the moderator and speakers were joined by Nathalie Brunelle, the Chair of the EPCA Talent & Diversity Inclusion Council, and Senior Vice President Strategy, Development, Research at Total, and also by EPCA president Tom Crotty.

First, moderator Nadine Dereza asked Gillian Tett to comment on the power of empathy, or the ability to connect with other human beings.

Using Cleveland Clinic as an example, Tett explained that while the medical services provider was always at or near the top of the tables for medical performance, and was acknowledged to be great at delivering the technical aspects, a survey carried out about 10 years ago showed that Cleveland was near the bottom of customer satisfaction leagues. The problem, the FT manager explained, was that Cleveland's surgeons saw success in the number of patients they kept alive, the patients view of the clinic's performance was based on their assessment of the complete package of care they received – from ward cleanliness to the attitude of the staff and their medical treatment and outcomes. "The surgeons were sent off to Disneyland to get a different view of customer service. It proved a real eye-opener," Tett joked.

Continuing this theme, Tett suggested that the overly technical perspective hampering Cleveland Clinic might resonate with the chemical sector, which is also

heavily technical and technology-driven. She noted that the case of BP and the Macondo incident had relevance because two highly trained groups of technologists and technical specialists – engineers, and risk and safety managers – had not worked in a sufficiently collaborative way to identify and manage the risk.

"IT'S A VERY GOOD STARTING POINT, BECAUSE IT'S DATA-BASED. AS YOU KNOW, WE ARE AN INDUSTRY THAT IS HEAVILY WEIGHTED WITH ENGINEERS AND SCIENTISTS, WHO RESPOND TO DATA."

Turning to Nathalie Brunelle, the moderator asked her to describe her role within EPCA and explain both the thinking behind the *Diversity and Inclusion Survey* undertaken by McKinsey and the next steps that will follow from the results.

Nathalie Brunelle described how EPCA's Talent & Diversity Inclusion Council had been set up in early summer and that, as



its chair, she had promoted the survey, which was carried out between June and September, to establish a baseline for the state of diversity and inclusion across the industry. "It's a very good starting point, because it's data-based. As you know, we are an industry that is heavily weighted with engineers and scientists, who respond to data." Brunelle explained that when the council first looked at McKinsey's findings, there was a clear disconnect between the results and what was coming from our [member] companies. We now need to keep looking beyond policies to measure the efficiency of those policies and the level of unconscious bias that exists.

Nadine Dereza followed up by asking Brunelle whether the council now had



NADINE DEREZA, DR. MIRJAM MAYER, GILLIAN TETT, TOM CROTTY, NATHALIE BRUNELLE

an opportunity to extend the message and reach of its diversity efforts across the industry's supply chain.

"For the council, our next question is really: what is our ambition, what do we want to achieve?" the Total Refining & Chemicals senior vice-president of strategy, development, research responded. "Having a baseline is great, but we really want to raise the issue at an industry level. That's why in our brainstorming we've asked: do we want to achieve something like *Responsible Care*, where we take in the views of our companies but also our stakeholders and those of other industries and sectors. Certainly, we want to look under the water to see what's happening, share practices and learn from other sectors, to

"AT INEOS, FOR THE PAST FOUR OR FIVE YEARS THE BEST GRADUATE RECRUITS ARE WOMEN."

assess and learn from our successes and failures, and to establish our ambitions and gather and generate ideas."

Dereza then asked Tom Crotty to wear his INEOS director's hats, and give his views on the company's progress towards greater diversity: "Have you got it right?"

"No, not at all. We're miles away," Crotty responded. He explained that as a company that has grown through acquisition, INEOS is something of a composite of the industry as a whole, which is reflected in its progress on diversity. But the EPCA president said that INEOS, like other companies in the sector, is working to improve its diversity performance. "What we are finding with our recruiting is that we're getting some fantastic talent, and some fantastic female talent." **"At INEOS, for the past four or five years the best graduate recruits are women."** He recounted how INEOS has started a quarterly internal TV broadcast, which asks sites to choose their best and brightest graduates to co-host the show along with Crotty himself. "We've made three so far, and every single time my



co-host has been female. It's a start, but we have a long way to go." Touching on a point made in the presentations about promotion criteria, Crotty said that whereas his previous experiences with big companies significant emphasis was put on potential as opposed to proven performance – which favoured men over women – he said INEOS gives equal consideration to both when recruiting and promoting staff.

"So is this top-down, top management buy-in to diversity a key to progress?" Nadine Dereza asked McKinsey's Dr. Mirjam Mayer.

Agreeing that this is indeed key, Mayer noted, however, that research across other companies and within McKinsey, indicated that many diversity initiatives are led by women, when to be really successful they needed to be spearheaded by both men and women. The issue of unconscious bias would also need to be addressed with both men and women. This helps to demonstrate full commitment from top management, while flagging diversity as a high-priority item.

Nadine Dereza then asked Gillian Tett for her views on implementing quotas to raise the profile and representation of women in the workplace. While noting that, in some cases, the number of women on boards has risen as a consequence, Dereza said that many of these women are serving on multiple boards, and questioned whether quotas were helping to increase the number of women in middle management.

Responding, Tett said: "Quotas are very controversial, and I don't know many senior women who aren't torn about the issue. On the one hand we clearly need more women in the senior ranks, but at the same time [quotas] are problematic. I think Sheryl Sandberg has produced one of the more powerful pieces of work on this issue. She points out that it's partly a question of the working environment,

and while there are some things that can be done through legislation or companies being proactive, it's also about women believing in themselves, breaking down barriers, and not opting out until they have to and realizing that they can break back in later on. It's easier said than done. Almost every company is struggling with this." But as Sheryl Sandberg has suggested, women need to look at their options, seek flexibility and push, Tett said. Concluding, her answer, the FT manager also stressed the need to raise the issue of ethnic diversity, "which is even more pressing because it is less discussed."

"GET OUT OF YOUR COMFORT ZONES." - "BE OPEN MINDED." - "ENCOURAGE AND DEVELOP THE RIGHT ROLE MODELS." - REMEMBER THAT INNOVATION OCCURS BY CROSSING BOUNDARIES."

Nadine Dereza raised the issue of role models and reinforcement of gender bias and the status quo in the media, particularly through films and television. Panellists agreed it remains a problem that needs to be challenged.

Dr. Mirjam Mayer and Gillian Tett both mentioned concerted efforts to challenge stereotyping and bias, which begins at an early age for girls. These include the ongoing media campaign, #LIKEAGIRL sponsored by the P&G brand, Always,

and the film "Miss Representation." Both challenge gender stereotypes and highlight a media tendency to portray women in a disparaging manner. They both also offer more powerful and positive representations of women and girls as strong, respected and successful role models.

Asked by Nadine Dereza how Total has responded to the diversity challenge, Nathalie Brunelle said change had begun around 2004, when the company realized that it needed to pursue equality of opportunity and increase diversity throughout the company's organization. "Diversity is a business matter, as we have heard." Total, she continued, sees diversity as an issue of both gender and ethnicity, and has established diversity officers, implementing diversity plans, created a women's network and a mentoring programme, which includes helping non-French employees when they arrive to live and work in France. Brunelle said Total's diversity efforts have helped the group to see the world differently, bringing in new ideas and fresh perspectives and questions that are enabling Total to look into and adapt for the future in different ways.

All the panellists agreed that ways must be found to encourage more girls to study more STEM - Science, Technology, Engineering and Maths – subjects at school and university level if the chemical industry is to achieve real diversity. But there was also an acceptance that the industry also needs to attract people who have studied non-STEM subjects to reflect the broader world in which companies operate.

In conclusion, the panel was asked to offer brief descriptions on how to make the changes needed to achieve real diversity and inclusion. Answers included: "Get out of your comfort zones." - "Be open minded." - "Encourage and develop the right role models." - Remember that innovation occurs by crossing boundaries."

MONDAY 5 OCTOBER 2015

BUSINESS SESSION OFFICIAL OPENING

HYDROCARBONS AND THE CHEMICAL INDUSTRY: SHAPING A BETTER WORLD TOGETHER

EPCA president Tom Crotty welcomed delegates to the 49th annual meeting, noting: "We have over 2,800 registered delegates, which is a record. If the strength of the chemical industry is measured in the attendance at this meeting, then we're doing well!"

Crotty explained that the title of this year's EPCA meeting reflected a key concern for the chemical industry: the impact of hydrocarbon feedstocks. He reflected on how the exploitation of shale gas in the USA has turned the industry on its head, but questioned whether this resource can be exploited in Europe in the face of public concerns or opposition. He also wondered how the oil price collapse will play out, and how it may impact the development of renewables, which were an economic alternative energy source while oil was trading at \$150-200/barrel but look less attractive at current oil price levels. "Will we still be prepared to subsidize renewables?" he asked. "And how will the regulators proceed in their efforts to mitigate the impacts of global warming?"

Turning the session over to the speakers, Crotty said he looked forward to hearing their insights into these questions and the

broader challenges facing the industry today and tomorrow.

"WE HAVE OVER 2,800 REGISTERED DELEGATES, WHICH IS A RECORD. IF THE STRENGTH OF THE CHEMICAL INDUSTRY IS MEASURED IN THE ATTENDANCE AT THIS MEETING, THEN WE'RE DOING WELL!"

VISION OF AN UPSTREAM INTEGRATED CHEMICAL PRODUCER

Total's president of refining and chemicals, and executive committee member, Philippe Sauquet began by presenting a picture of oil price volatility over the period since 1970, noting the three price peaks – with



oil at over \$100/barrel – in 1979, 2008 and the "plateau years" from 2011-14. "Last year, however, prices collapsed as Saudi Arabia refused to cut production in a move designed to maintain its market share. "Are we at the beginning of a new oil cycle?" Sauquet wondered. "And where do we go from here, with oil at \$45/barrel? Nobody knows."

“EUROPE’S COMPETITIVE POSITION IMPROVES UNDER THE CURRENT PRICE OF OIL, ALTHOUGH CASH COSTS REMAIN AN ISSUE”

However, the Total executive suggested that we are likely in a new cycle where oil is far less scarce than it was predicted to be 10 years ago, and in which the two key challenges are meeting burgeoning global energy demand and facing up to climate change. Sauquet said he expects fossil fuels – oil, gas and coal – which today account for around 80 per cent of global energy provision, will still be meeting 70-75 per cent of demand by 2040, although the contribution of nuclear, biomass and other renewable energy resources will increase significantly – albeit from a lower base. *“We will need all types of energy to meet long-term demand. Renewable energies have a bright future, but will only represent 5 per cent of supply by 2040, and fossil fuels will remain a key component of energy supply, although we will favour gas, as it offers the lowest CO₂ emissions,”* Sauquet said.

Total’s refining president said his company continues to invest heavily in renewables, which has made it a world leader in solar photovoltaics. *“We have the same size market contribution in solar as we do in oil and gas,”* Sauquet noted.

Sauquet pointed out that oil product demand is currently driven by transportation and chemicals, which together account for almost 70 per cent of the total, with power generation, residential demand and other uses accounting for the remaining 30 per cent. He said he expected this demand picture to largely persist through to 2030, although transportation (59 per cent) and chemicals (15 per cent) together would account for almost 75 per cent of demand. *“It makes sense for us to dedicate oil to the transportation and chemicals segments because this is where alternatives are more costly.”*

Noting that since the late 1990s world polymer demand has closely tracked global GDP growth, Sauquet predicted sustainable growth for petrochemicals

through 2025 and beyond, although annual growth – at over 4 per cent/year from 2009-2014 – would slow slightly to just over 3.2 per cent through to 2025. He said this solid growth picture reflected the positive impact made by plastics towards sustainable development in helping to save energy use via insulation products, through lighter weight vehicle parts, and through packaging that both preserves and extends the shelf life of food, for example.

“WE HAVE THE SAME SIZE MARKET CONTRIBUTION IN SOLAR AS WE DO IN OIL AND GAS.”

Against this background, a key challenge for the upstream oil and gas industry will be to provide abundant feedstocks, which is why there will be ongoing feedstock diversification, Sauquet continued. Last year, for example, naphtha accounted for 60 per cent of olefins used in polyethylene, polypropylene and polystyrene production, while LPG-based feeds provided 15 per cent, and ethane-based feeds 21 per cent. By 2025, these traditional feedstock sources will still dominate over 90 per cent of olefins production, although naphtha’s contribution will be down to 50 per cent, with methane- and coal-to-chemicals significantly increasing their contribution to around 6 per cent. Sauquet also predicted the output of world biopolymer production will increase significantly from 1.5m tons in 2014, driven by double digit annual growth through to 2020.

In terms of oil and gas supply, **Sauquet said that technology – particularly shale oil and gas extraction technology – has unlocked the huge potential of**



unconventional energy resources and extended global liquids resources to well beyond 100 years and gas resources to over 140 years.

“This is having a huge impact on petrochemicals markets and rejuvenated the North American industry,” he continued. Looking ahead, there are abundant sources of both ethane and propane in North America, with over 12m tons of new ethylene capacity expected on stream by 2020.

Of course, these developments pose significant challenges for European polymer plants, which previously faced competition primarily from the Middle East alone. With oil at \$100/barrel, both U.S. - and Middle East-based ethane crackers enjoy significant full cost and cash cost advantages over European naphtha crackers. And while a \$60/barrel oil price sees this full cost advantage greatly reduced, the cash cost differential remains a serious issue.

Faced with this competitive environment, Europe has some key decisions to make if it wants to retain a petrochemicals sector, Sauquet said. While accepting that opposition to shale gas exploitation remains a barrier to both initial exploration and eventual production – a barrier that the industry should nevertheless endeavour to challenge in pursuit of cheaper energy and feedstocks – more pressing is the need to prevent the EU further handicapping



its regional petrochemicals industry with regulations and tariffs.

“FACED WITH THIS COMPETITIVE ENVIRONMENT, EUROPE HAS SOME KEY DECISIONS TO MAKE IF IT WANTS TO RETAIN A PETROCHEMICALS SECTOR.”

Concluding with a quick review of Total's strategy to cope with a changing hydrocarbons environment, Sauquet said the group is committed to retaining its global presence in refining and petrochemicals based on major integrated platforms, and has several attractive development opportunities under review. In the Americas, Total is leveraging its competitive ethane supply and looking at development options in ethane-to-olefins. In Europe, the emphasis is on adaptation, optimization and upgrading plants in France and Belgium, while a €200m investment will transform Total's La Mede facility into a bio-refinery by 2017. In the Middle East, Total has operations

in both Saudi Arabia and Qatar, which are benefiting from expansions and upgrades to increase synergies and production. Meanwhile, in South Korea, Total and its partner Hanwha have spent \$2bn upgrading their joint venture integrated refining and petrochemicals complex to consolidate its profile in the Asian markets.

GLOBAL ENERGY OUTLOOK AND PETROCHEMICALS

After a 3-year period of apparent stability between 2011 and 2014, when oil stayed close to \$100/barrel, current prices [around \$45-50/barrel] are at levels most people never expected, said IHS vice-chairman and Pulitzer Prize winner Daniel Yergin. What's more, the market is far more volatile and the USA is now the swing producer.

Widely-acknowledged and celebrated for his global energy expertise and for his book The Prize and his new book The Quest, Yergin told the audience that he sees a shift occurring from the “BRIC¹ Era”, in which China in particular exerted a massive influence on energy markets, to a new “Shale Era”, which is having a defining impact on world energy and petrochemicals.

Today's world is beset by geopolitical risks, the IHS vice-chairman continued. He cited upheavals in the Middle East and tensions

with Russia. The IMF says Iraq is facing an existential risk due to ISIS and the price of oil.” Meanwhile, Europe is struggling to deal with a regional crisis of immigration and refugees arising from the Middle East, and significant economic challenges, which are impacting domestic politics across all members of the European Union.

Yet these geopolitical tensions and upheavals are not impacting oil prices, Yergin said. “Why not? Because currently there is a global surplus of oil and gas.” The question is: How long will this situation last? Yergin then offered a quick-fire explanation of how and why the energy market has changed. “We've moved from a tight supply and demand balance,” he continued, to a new era – driven by a ‘disruptive technology’ – shale oil and gas – in which supply outstrips demand weakened by widespread economic slowdown.

Dating the start of the BRIC Era from around 2004, Yergin recalled that China was the key driver as the country's economy grew rapidly and was marked by a massive increase in urbanization industrial growth. China was responsible for 45 per cent of the growth in oil demand during this era, and 52 per cent of the growth in basic chemicals and plastics. And across the BRIC countries, petrochemicals demand was growing at around

¹ Brazil, Russia, India & China.

“WE’VE MOVED FROM A TIGHT SUPPLY AND DEMAND BALANCE, TO A NEW ERA – DRIVEN BY A ‘DISRUPTIVE TECHNOLOGY’ – SHALE OIL AND GAS – IN WHICH SUPPLY OUTSTRIPS DEMAND WEAKENED BY WIDESPREAD ECONOMIC SLOWDOWN.”



DANIEL YERGIN
Vice-Chairman of IHS
& Pulitzer Prize winning author
of *The Prize* and *The Quest*

10%/year, compared to 2 per cent for the rest of the world. This was an era when oil prices rose from \$25/barrel to well over \$100/barrel. Today, after a 50 per cent collapse, some people are predicting the price could drop as low as \$20/barrel. IHS is not in that camp!

The BRIC Era also coincided with the “Peak Oil” period, when worries about reserves mounted, costs were rising and capex doubled.

But now much has changed, due initially to the efforts of George P. Mitchell, dubbed by Yergin as “the Steve Jobs of Energy”, who ignored years of scepticism and persisted in his company’s efforts to extract gas from layers of shale. In the late 1990s, Mitchell finally achieved the breakthrough he’d been seeking and between 1998 & 2003 the combined techniques of hydro-fracturing and horizontal drilling proved the breakthrough in the exploitation of shale for gas.

Shale gas and tight oil have transformed both the USA’s energy reserves and its economy. They were responsible for over 2 million jobs before the oil price collapse, and - according to former Federal Reserve chair, Ben Bernanke - been the most positive thing to happen to the U.S. economy since 2008. It is generating \$100 billion in new investments in the chemical sector in the United States.

In contrast, Yergin said Germany’s decision to abandon nuclear energy and focus on gas and renewables in order to meet its CO₂ emissions targets has brought about warnings of dramatic de-industrialization from non-other than the German Economics Minister and head of the SPD. Germany is

heavily reliant on imports for its natural gas energy requirements, and IHS estimates that domestic shale gas exploitation could generate up to 35 per cent of the country’s natural gas needs by the 2030’s – equivalent to current levels of imports from Norway or Russia. But popular opposition to “fracking” in Germany – which is replicated across Europe – has stalled any progress towards shale gas development. “The USA drilled 43,000 wells for shale oil and gas last year. The UK has zero,” noted the IHS vice chair.

In the recent past there has been considerable opposition to shale gas in the USA, but the current view is that if properly managed, regulated and operated, shale gas extraction will cause no environmental harm, Yergin continued. He cited the work of the task force set up by President Obama, on which he served. Today, in the USA, shale gas

is replacing coal in power generation, and oil production has increased significantly. The USA could overtake both Russia and Saudi Arabia as the world’s number one oil producer. It is already number one in natural gas, ahead of Russia. Moreover, this dramatic shift in the global balance of energy production has also had important impacts in the international arena.

Looking ahead, Yergin sees a period of slower global economic growth, as China moves from high GDP growth to medium-to-high growth, and weaker energy demand. He

notes that despite weaker demand, OPEC has not cut oil supplies, deciding instead to let the market determine price while also ending the subsidization of high cost oil production.

On the subject of Iran’s re-integration into the global energy and trade markets, the IHS vice-chairman urged caution, and pointed to a limited reduction in sanctions and the long arm of the U.S. legal system, which would penalize any business deals or projects that infringed complex and strict regulations that may not be obvious to international companies.

In terms of energy industry investment, Yergin said, “There are a lot of projects being reviewed, postponed or cancelled.”

“WHATEVER HAPPENS, IT WILL BE A VERY COMPLEX AND COMPETITIVE WORLD.”

However, the Pulitzer prize-winner sees a steady increase in energy supplies – from Canada’s oil sands to U.S. natural gas. Next year, the USA will be a net

LNG exporter and by 2020s could become the world’s biggest exporter.

Yergin also expects to see a steady increase in the use of renewable energy. “Today, solar accounts for about 1 per cent of global electric generation. But by 2040, solar could account for 5-9 per cent, and wind 9-10 per cent.”

Although developments such as car sharing, light-weight vehicles, self-driving and electric vehicles will start to change the transport



DANIEL YERGIN

sector's energy demand, with the world's population set to climb 20 per cent by 2040, global GDP could double, along with car demand. IHS expects the world auto fleet to double within about 25 years. World energy demand is expected to rise 35-40 per cent over the period.

Looking at geopolitics, Yergin pointed to events that could cause turbulence or confrontation or instability. He also recognized the potential for new rules and targets to emerge from the Paris COP 21 climate change meeting in November. However, **Yergin said he did not expect to see oil prices climbing above \$100/barrel any time soon, unless there is some major geopolitical crisis.**

For petrochemicals, the IHS vice-chairman remains optimistic. The industry will benefit from economic growth, and IHS expects to see 40 per cent more production a decade from now. The European industry has benefitted greatly from the decline in oil prices. But when oil prices go up again, the European industry will be facing lower-cost competition both from the United States and the Middle East. "Whatever happens, it will be a very complex and competitive world."

QUESTION AND ANSWER SESSION:

Following their presentations, conference moderator Nadine Dereza asked Philippe Sauquet and Daniel Yergin several questions.

"If the Republicans win the White House next year, could or would they overturn the deal with Iran," she asked Yergin. His view is that the deal could be "rocky," but acknowledged that campaign trail

rhetoric is very different to reality, and whoever wins the Presidency next year will need to weigh the options very carefully, particularly as the Iran deal has implications far beyond the USA. And other countries are already moving forward with Iran and would be unlikely to re-join any coalition.

"TODAY, SOLAR ACCOUNTS FOR ABOUT 1 PER CENT OF GLOBAL ELECTRIC GENERATION. BUT BY 2040, SOLAR COULD ACCOUNT FOR 5-9 PER CENT, AND WIND 9-10 PER CENT."

Asked about relations between Russia and the West, Yergin said it was sad to see these breaking down, and that the breach was a lost opportunity for mutual growth and co-operation.

On the subject of "fracking" – the shortened term for hydraulic fracturing – both Yergin and Total's Philippe Sauquet said the choice of this word is unfortunate. "Perhaps we should say we are 'massaging the rocks'" said Sauquet. Yergin suggested "well stimulation". Both suggestions caused much mirth in the audience. But there was a serious point, said Yergin, because "fracking" has become wrongly associated

with negative impacts: "There was a scare when residents in one area in the U.S. were getting gas from their faucets. But investigation showed that the water well had been drilled through a gas stream, and the issue was not related to shale gas extraction."

Questioned about the development of "fracking" in the USA, Yergin said that it has had a significantly positive impact on jobs, and has been welcomed by many landowners who can gain a royalty from any drilling on their land. That said, organized opposition remains and New York State's governor has banned it. However, gas will push coal out of power generation and is needed if the U.S. is to meet its climate change targets.

Philippe Sauquet noted that whereas there is no hesitation to pursue shale gas and oil opportunities in North and South America and China, Europe's people remain largely opposed. In France, some experimental work was initially licensed but then banned. "So while there is a real need to study the potential for shale gas [in France] we haven't yet made a convincing argument." The Total manager said he was not optimistic about the potential for European shale gas development over the next 20 years: "The arguments against are religious not rational." Yergin believes Europe will be using shale gas, but supplied from the U.S. in tankers. "Poland could do something, the Ukraine has potential, and the UK is most promising. But the case has to be made in terms of jobs and economic development and not just energy supply. I don't see Europe being energy independent," he said.

MONDAY 5 OCTOBER 2015

BUSINESS SESSION

EDUCATION

SOLAR IMPULSE & HYDROCARBONS: BUILDING BLOCK FOR RENEWABLE ENERGY

Back

in March of this year, an aircraft named *Solar Impulse 2* took off from Abu Dhabi to attempt to fly around the world powered

only by energy from the sun. This effort was the culmination of a project started in 2002 through the vision and determination of Bertrand Piccard, who in 1999 was the first man, with Brian Jones to circumnavigate the world in a balloon. By early July, *Solar Impulse 2* had reached Hawaii, where it was forced to halt due to battery damage sustained, according to Piccard, due to human miscalculation rather than any design fault.

In 2016, the *Solar Impulse 2* team plan to complete their pioneering, world-circling solar-powered journey. And with Andre Borschberg, the project's co-founder, Piccard will be taking turns to pilot *Solar Impulse 2*, a single seat monoplane that "would not exist without the chemical industry."

Born in Switzerland, 57-year old Piccard is from a family of explorers and adventurers: Grandfather Auguste was the first man to explore the stratosphere, and father Jacques an oceanographer and submariner who reached the bottom of the Mariana Trench, 11,000m below the sea surface, in 1960. A trained psychiatrist and hypnotist, Piccard was also

introduced to the EPCAs 49th Annual Meeting as "an adventurer and explorer of the human spirit." This is what he told the audience:

"It's not often we can thank directly the people who made something possible," Piccard began. "But the *Solar Impulse* project could not have happened 20 years ago because there wasn't the mentality or the products. *Solar Impulse* is a demonstration that industry can reconcile environmental protection with industrial development."

Continuing, Piccard said the project "represents a Clean Technology Revolution, which protects the environment, saves energy and preserves natural resources." He explained that the plane's solar powered electric engines are 97 per cent efficient, and he credited the chemical industry for providing the technical expertise and the products that helped to make constructing and flying the plane a reality. These products include the batteries, the structural elements – including "plastics stronger and lighter than steel" – and the insulation materials.

With around 17,000 solar cells on its wings, *Solar Impulse 2* stores solar power in its batteries by day so it can fly by night. It is a similar weight to a family car despite having a wingspan of 72m. "The plane can stay in the air forever, and it only lands to change pilot!" said a laughing Piccard.

Behind the sheer excitement and creativity channelled and demonstrated by the

Solar Impulse project is a serious message. "Today's world," Piccard remarked, "could halve its energy demand and emissions" through the use of more energy efficient clean technology. And it's a message he wants

to get through to the press, politicians, intergovernmental organizations and the public. "We have to stop seeing climate change as a problem for the next generation. We need to address it today! It's not a problem – it's a very profitable opportunity.

In Piccard's view, "the big 20th century achievements have not been based on new ideas. Innovation is not a new idea – it's an old belief that has been left behind."

"THE PLANE CAN STAY IN THE
AIR FOREVER, AND IT ONLY
LANDS TO CHANGE PILOT!"

“THE SOLAR IMPULSE PLANE AND PROJECT WOULD NOT BE POSSIBLE WITHOUT THE SOLUTIONS PROVIDED BY THE PETROCHEMICAL INDUSTRY”



BERTRAND PICCARD

President and Initiator of the Solar Impulse Project

“WHEN YOU ARE BALLOONING, YOU ARE A PRISONER OF THE WIND, WHICH PUSHES YOU TO THE UNKNOWN. THE ONLY FREEDOM YOU HAVE IS TO CHANGE ALTITUDE AND FIND BETTER WINDS TO TRAVEL IN DIFFERENT DIRECTIONS. SO IF THE WINDS OF LIFE ARE KEEPING US IN THE WRONG DIRECTION, THEN CHANGE ALTITUDE, AND SEEK TO FIND NEW SOLUTIONS AND ANSWERS.”

He noted that Leonardo da Vinci had plans for a machine that would fly, but could not share his vision with a world that viewed his imagination as dangerous heresy. Challenging long-standing beliefs with new combinations of existing knowledge and capabilities offers a way to overcome today's greatest threats, which are to the world's ability to obtain and sustain long-term quality of life for people and the planet.

Piccard offered ballooning as a metaphor for pioneering: “When you are ballooning, you are a prisoner of the wind, which pushes you to the unknown. The only freedom you have is to change altitude and find better winds to travel in different directions. So if the winds of life are keeping us in the wrong direction, then change altitude, and seek to find new solutions and answers.”

To change height, or stay airborne, balloonists may need to drop ballast. He suggested that we might consider what human ballast could be jettisoned: “Common assumptions: the certitudes and habits that we need to challenge or ditch in order to make change.” He urged the audience to examine, engage with and understand the paradigms that sustain our views of the world and its possibilities, and described “freedom as the ability to envisage every option and its likely consequence before taking action.” And when crises occur, they

should be used “to stimulate new ways of thinking.”

“Success,” Piccard continued, “is just when you try one more time than the numbers of failures.” And what we learn from failure, we use to succeed.” He recounted how, when ballooning around the world, he and his co-pilot in *Breitling Orbiter 3* almost failed because the fuel that kept their balloon aloft had almost run out. “It was then I began to dream of fuel-free flight.”

Solar Impulse began with the construction of a plastic model in 2004/5, but “there was no team, no technology and no money,” Piccard recalled. But inspired by “the Dumbo analogy” – the Disney cartoon elephant that used its massive ears to fly – *Solar Impulse 2* employs its huge wings that are stiff, strong and light enough to fly “thanks to the chemical industry.”

Surprisingly, Piccard noted, **“it was not aeronautical people who helped us build the plane, nor were the oil companies among the main partners who pushed development despite the fact that *Solar Impulse 2* is built from oil products.”** Among its key partners are chemicals companies, Solvay and Covestro (former Bayer Material Science), an elevator manufacturer, Schindler, a watch and timekeeping specialist, Omega, and the technology and engineering group,

ABB. And it was a shipyard that specialized in using carbon fibre that built the plane's wings, Piccard said, while noting that “it wasn't people selling candles who invented the light bulb!”

Innovation, he said, often comes from outside the system, recounting how his grandfather had a beer cask factory build his aluminium pressurised cabin. However, he suggested that innovation and exploration of the kind that his family has engaged in requires three key ingredients: Curiosity to try something new, perseverance to overcome obstacles, and respect to ensure the whole enterprise delivers something useful. If it's not useful, it's selfish.”

During a post-speech Q&A session, Piccard emphasized that the world needs incentives to change. “For example, we can't dump garbage in the outdoors, but we can dump CO₂ into the atmosphere. We need legal frameworks if we are to tackle climate change. We still build houses that are badly insulated, use old light bulbs when new ones reduce energy use and extend life. And we need to recognize that customer choice needs to be infused with knowledge and incentivised.”

“We have legal frameworks for health, education, the police, taxes. So why not for clean technology, too?”

JOHAN DEVOS

*Chairman of the EPCA Supply Chain Program Committee, Sales Manager Europe
BERTSCHI*



BLACK GOLD VOLATILITY AND CHEMICAL SUPPLY CHAINS: THE WAY FORWARD

Welcoming participants to this workshop, Johan Devos, chairman of the EPCA Supply Chain Program Committee, noted that they reflected both the global nature of supply chains – with delegates from across the world – and the increasing recognition of the importance of logistics and supply among the industry's leadership. He explained that after the keynote address, delegates would have an opportunity to engage in round table discussions before reporting their outcomes to the whole meeting. At this point, Devos, who is also European sales manager for Bertschi, introduced keynote speaker, Theo Jan Simons, a partner at McKinsey & Company, who is a chemical engineer and worked for Shell Chemicals before his 20-year career in consulting.

"SUPPLY CHAINS HAVE DEVELOPED OVER THE LAST 15-20 YEARS, BECOMING MUCH MORE GLOBAL AND INTERCONNECTED, LINKING ADVANTAGED SUPPLY WITH HIGH GROWTH AREAS. WHILE GENERALLY, THIS IS A GOOD THING BECAUSE IT INCREASINGLY CONNECTS PRODUCERS WITH CONSUMERS, IT ALSO CREATES RISKS BECAUSE A SHOCK IN ONE PART OF THE WORLD OR MARKET INCREASINGLY HAS SIGNIFICANT IMPACTS IN OTHERS."

Theo Jan Simons started by saying said he would cover three topics during his speech. First, he would look at how supply chains have developed over the last 15-20 years, becoming much more global and interconnected, linking advantaged supply with high growth areas. While generally, this is a good thing because it increasingly connects producers with consumers, it also creates risks because a shock in one part of the world or market increasingly has significant impacts in others. This, he said, would be his second main subject. And for his third and final subject, the McKinsey partner said he would suggest a multilevel approach through which logistics and supply chain managers can respond effectively to their changing business environment.

Offering a snapshot view of the chemical industry, Simons said "there is really no such thing as a chemical industry, because it breaks down into several quite different sub-segments." He pointed out that chemical supply chains are differentiated by product type – such as feedstock, petrochemicals, intermediates, specialty and fine chemicals, super premium – and by product value (price), and by the extent to which they are traded, whether it be predominantly within regions, between regions, or globally.

Over the past 15 or so years, the industry has seen a wave of investment and value creation increasingly driven by feedstock differentials. For example, he pointed to the booming Middle East investments from the early 2000s, driven by ethane, hyper-growth in North East Asia over the past 5-10 years, driven in part by coal, and more recently in North America, as a result of shale gas.

In Europe, however, investments have really stood still over this period. So what we see today, Simons continued, is that the two main advantaged regions – the Middle East and North America – are supplying the world's high-growth markets. That also means that a much higher proportion of output is being exported from region to region on a global basis.

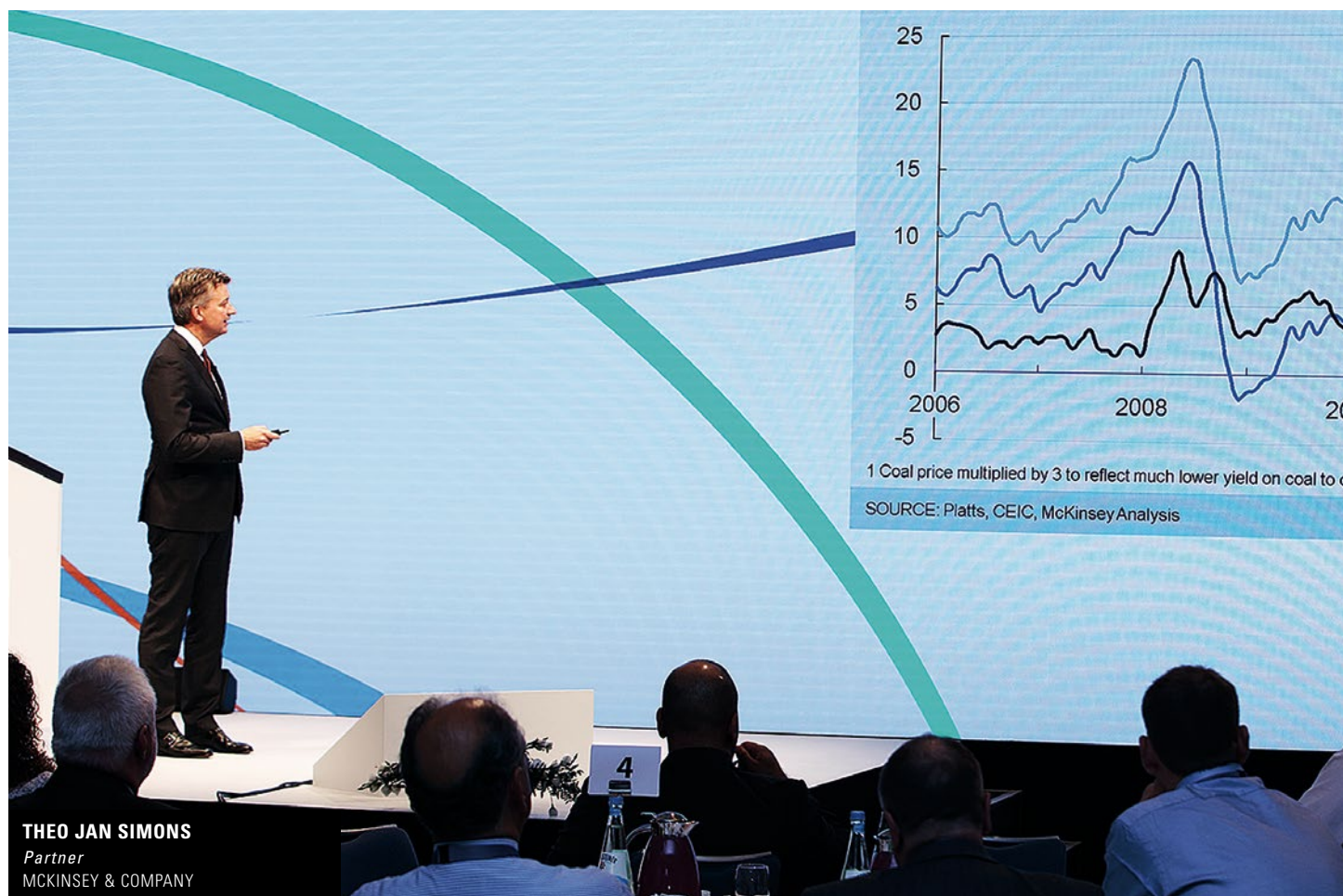
"WE ARE ALSO RETHINKING ENERGY, AND DEVELOPING NEW METHODS TO STORE ENERGY, AND EXTENDING RESOURCES WITH ADVANCED OIL AND GAS EXPLORATION AND RECOVERY, AND WITH RENEWABLE ENERGY."

However, **we are now moving into an era of significantly increased volatility. Simons added, and he outlined six factors that are changing the economic and business context facing the chemical sector. Four of them are 'disruptive forces', including: industrialization and urbanization, which are shaping emerging economies; disruptive technologies that are impacting many value chains; an ageing population that will impact productivity and slow growth; and lastly greater interconnections between regions.** The other two factors are

an increasing number of non-economic shocks – such as climate and hydrologic catastrophes, and meteorological and geophysical events – and oil price volatility, which has increased significantly since 2009.

He then showed a global chart that captured the close link between increasing urbanization – as populations move from rural areas into cities – and the parallel growth in GDP. This showed that rapid urbanization in China and India is putting them on a per capita GDP growth curve considerably steeper than those for the USA, Japan, South Korea and Brazil. The good news is that urbanization creates demand for chemical products and cities are much easier to serve than dispersed rural populations. And between now and 2025, half of the world's economic growth is expected to come from 440 cities.

Turning to technology developments, He identified what he termed the "Disruptive Dozen". Simons highlighted several under the IT banner, which he said are already changing how we understand and manage the supply chain, including the mobile internet, cloud technology, the internet of things, and the automation of knowledge work. These enable us to capture and crunch data, which then informs decision-making. He also pointed to advanced materials and next-generation genomics, which are changing the building blocks of everything, while advanced robotics, autonomous and near-autonomous vehicles, and 3D printing are providing more machines that work for us. Simons also mentioned that we are also rethinking energy, and developing new methods to store energy, and extending resources with advanced oil and gas exploration and recovery, and with renewable energy.



THEO JAN SIMONS
Partner
MCKINSEY & COMPANY

Touching once more on the issue of an ageing population, Simons said that whereas he'd previously thought of this as an opportunity to provide new products and services to meet the need of older people, he now recognized that this trend would impact productivity with less people working. **Based on past rates of productivity growth, this suggests GDP growth over the next 50 years would slow by about 40 per cent compared with the past 50 years. So this will put a brake on economic growth.**

Simons also offered concrete evidence of the expansion and increased connectivity in global trade networks, noting that while in 1990 global trade flows totaled \$1.8trn, by 2013 the total had climbed to \$17.2trn – up by over 10 per cent a year.

Noneconomic shocks have also increased significantly, roughly doubling between 1980 and 2014. These include events such as flooding, tsunamis, hurricanes, earthquakes and droughts. Who knows what the future will bring?

After a 25-year period of relative stability with an average of \$23/barrel, oil prices have shown a new level of volatility since

2005. Climbing steadily from around \$40/barrel in 2005 to around \$75/barrel in 2007, they next dipped slightly then rose sharply through 2008 to over \$120/barrel in 2009, before crashing back to \$40/barrel in 2009 in that same year. In 2010/11, prices climbed back above \$100/barrel

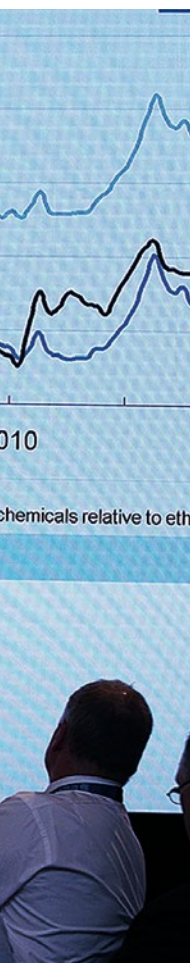
**“SO HOW CAN COMPANIES
COPE WITH THIS WORLD
“BLACK GOLD” VOLATILITY
AND ITS IMPACTS ON CHEMICAL
SUPPLY CHAINS?”**

- where they stayed for 3 years – then slumped back to current levels around \$45-60/barrel through 2014 and into this year. The problem with this volatility is that it makes it much more difficult for chemical producers who rely on oil to pass on costs to customers who are understandably nervous.

Simons said the recent drop in oil prices is a consequence of weak demand and high supply, and structural changes in the industry. Supply has grown rapidly due to unconventional resources (mainly US shale gas and oil), new offshore sources, and recovery of supply in political wild-card countries. Demand has also fallen due to low economic growth in Europe and Asia, and increased fuel efficiency. And **there is also the impact of what he described as ‘new conduct’ such as OPEC’ inaction as Middle East producers maintain high levels of supply at low prices to protect their market share and players are forced out of the North American market.**

Simons noted that the impact of the oil price drop is differentiated along the chemicals value chain. For example, a 50% increase or price drop has a higher relative impact at the start of the chemicals supply/value chain and offers potential longer-term benefits at the end of the supply/value chain.

Structural supply changes will result in ongoing volatility. We recognize oil prices are low and likely to remain so for some time. In this environment, suppliers will



"WE SEEM TO BE IN A WORLD OF INCREASED VOLATILITY, CHARACTERIZED BY LOW DEMAND GROWTH AND OIL SUPPLY SHOCKS. THERE IS LESS OPPORTUNITY FOR GAS AND COAL BASED PLAYERS AND A RENEWED FOCUS ON CONVENTIONAL OIL BASED TECHNOLOGY PLATFORMS."



fight for market share and there will be an impact on infrastructure developments, which may impact how the chemical sector invests or locates. But this development has risks, because of the levels of supply coming from politically sensitive or potentially unstable sources.

We used to be in a world where advantaged feedstock was king, Simons said. This drove North American, Middle East and China (via coal) investments. We have also seen a drive for new technologies, such as coal-to-chemicals, gas-to-liquids, and renewables, and rapid growth in China, and accelerating growth in India and Africa. This growth reduced the appetite for import barriers, and increased the importance of connectivity between regions.

But now we seem to be in a world of increased volatility, characterized by low demand growth and oil supply shocks. There is less opportunity for gas and coal based players and a renewed focus on conventional oil based technology platforms. Driven by this uncertainty, petrochemical investments are slowing down and there is a potential for supply shortages. Countries are also seeking self-sufficiency and considering protective measures,

and inter-regional transport is flattening. Simons said companies need to ensure they can respond effectively at multiple levels, which requires an understanding of the potential evolution of future business context.

"So how can companies cope with this world "black gold" volatility and its impacts on chemical supply chains?" he asked. The answer, he suggested, is by building organizational capability to respond effectively. Doing this will require three key responses.

First, companies will need strategic foresight and insight. This means careful monitoring of oil price indicators for impending shocks. It means regularly refreshing corporate understanding of the impact of volatility on a chain-by-chain, region-by-region basis. It means optimizing risk exposure via contracting, financial hedging and feedstock choices. It also means developing or fine-tuning dynamic business optimization tools.

Second, companies will need to display agility. This means implementing management processes and tools to monitor and manage, for example by creating a

company-wide control tower to oversee, connect and coordinate different parts of the business. It means designing a robust global network that can deal with medium- to long-term volatility. It also means evaluating the current pipeline of CAPEX investments and long-term innovation programs, and building a portfolio of investment options, both in-house and via partnerships, to deal with uncertainty.

Third, companies will need to achieve functional agility. This means managing financial implications of volatility, and deal with its operational consequences. It means empowering the frontline (purchasing and commercial) to defend price and margin. And it means managing the supply chain to respond to supply volatility and arbitrage opportunities.

¹ Organization of the Petroleum Exporting Countries.



THEO JAN SIMONS, JOHAN DEVOS

GROUP DISCUSSION

Following the keynote presentation, delegates to the workshop session held round-table discussions to consider the speaker's themes, raise additional concerns or issues, and address the three questions. Theo Jan Simons agreed to try to answer or comment on the tables' responses. The questions were:

- Do you agree with the alternative – volatile world – scenario? What specific elements do you agree with?
- How will the alternative scenario affect your sector – e.g.: producer, LSP, infrastructure provider?

- What have you put in place already to deal with future shocks (insight and foresight, managerial agility, functional agility)? Which are the most important? What should be done to improve your capabilities in those areas?

TABLE QUESTION: You talked a lot about the low price of oil and its volatility. Do you think the price is too low? Also, what role do you think regulation – environmental or trade – will play in future?

TJ SIMONS: I don't think the low oil price is really good for anybody. Eventually it will run out and we have pressing environmental issues to address, so we need to find alternatives which will not take place at the current low oil price. If OPEC would cut production, the price would rise. On regulation, the big concern is whether its global or regional or national, and about the impact it has on competitiveness, and whether industries have level playing fields.

TABLE QUESTION: You talked about the impact of IT, and improved productivity through

various new technologies – perhaps we'll have driverless trucks – but what about the 'cultural' issues involved in using and harnessing IT?

TJ SIMONS: To benefit from new IT opportunities stemming from big data and advanced analytics, companies need to build new capabilities and cleared responsibility for this area. Leading companies are now appointing chief analytics officers to oversee, steer and manage the upskilling of organizations to have this analytical capability to improve both the value and efficiency of IT.

TABLE QUESTION: Regional supply and demand swings impact producers and consumers and put extra pressure on supply chains. Can you say a little more about that agility in terms of the producer/consumer relationship?

TJ SIMONS: I think we need to address how the new world of volatility impacts our relationships, and problems cannot just be solved at the operational level.



GROUP DISCUSSION

We need stories for our frontline staff to explain changing circumstances to customers and partners. We need to address and solve problems jointly, e.g. based on a real-time understanding of asset use, which is made easier with the new technologies available. I think we need to look for opportunities to integrate along the supply chain.

TABLE QUESTION: Can you elaborate on your "control tower" concept?

TJ SIMONS: The key point is to have a control tower monitoring all aspects of the supply chain as it is evolving and develop action plans to meet changing challenges and opportunities. Look e.g. at costs, volatility, set up cross-functional teams, to have an end-to-end look at the supply chain. Typically this will work at the Business Unit level, but it may be necessary to have several linked control towers.

TABLE QUESTION: Do you see any disruptive technologies impacting Europe – "fracking" for example?

TJ SIMONS: Well, right now, low oil prices make the European chemical industry more competitive. But as Daniel Yergin says, shale gas has been very beneficial in the USA and is a real opportunity for Europe. For example, Germany could potentially meet 35 per cent of its energy needs via shale gas. But the cost of shale gas could be relatively more expensive to extract in Europe. We need to identify how deep the reserves are, where they are, whether there's more gas or liquids. Across the USA, there's a well-developed infrastructure for gas and for converting natural gas liquids to petrochemicals. I think it will come in Europe, but I don't know when and what the eventual impact might be.

TABLE QUESTION: Do you see trading and hedging as way to manage and or benefit from volatility?

TJ SIMONS: I think trading and hedging can both mitigate and increase volatility. It can provide producers and customers with instruments to manage volatility. More broadly, I think there's a real need

to look and understand the optionality in our businesses e.g. our contracts. For example, 3-6-month fixed-price contracts used to be norm, but now these contracts have in fact become more risky, and there's a need to reconsider their timeframes. I think this change is valid for both producers and LSPs.

TABLE QUESTION: In the relationships and discussions between producers and LSPs, who is the orchestrator?

TJ SIMONS: It depends on the strength and trust in the relationship. Some producers are happy for the LSPs to be the conductors, some aren't. The key is to work together in a more integrated fashion on a win-win basis. In this environment of increased volatility, this only has become more important.



**TUESDAY
6 OCTOBER 2015**

CLOSING LUNCH SESSION

ANDERS FOGH RASMUSSEN:
THE CHANGING GEOPOLITICAL SITUATION
AND THE IMPACT OF ENERGY

**ANDERS FOGH
RASMUSSEN**

*Secretary General
of NATO (2009-2014)
and Prime Minister of
Denmark (2001-2009)*

"SHALE GAS IS NOT ONLY A TECHNOLOGICAL REVOLUTION, BUT A GEOPOLITICAL REVOLUTION"

Former Danish Prime Minister and NATO's 12th Secretary General, Anders Fogh Rasmussen began by acknowledging the important role the chemical industry plays in geopolitics.

The former NATO Secretary General continued saying that unfortunately we live in an era of accidents, great losses and tragedies. With wars in Syria, Iraq, and Ukraine, and terrorism spread by groups such – Islamic State, Al-Qaida, the Taliban, Boko Haram, Al Shabab and the Houthis in Yemen

We live in an era of turmoil, disorder, war, conflict and upheaval. **There is a red thread linking all this violence – the information revolution. News and ideas cross borders fast, and while this digital transformation holds tremendous economic value, it also contributes to volatility and enables extremists to spread their ideologies or to interpret news and ideas to their own advantage.**

Rasmussen noted that we live in an era where the new is clashing with the old, the free world with autocracies, democracies with dictatorships.

Rasmussen then offered four geopolitical stories to illustrate the state of international affairs. He categorised them as a bad story, a good story, a very bad story and finally a very good story.

First, the bad story. Back in 2005, Rasmussen recalled, Russian President Putin had used his state of the nation address to claim that the collapse of the Soviet Union was

the biggest geopolitical tragedy of the last century. Since then, Russia has been on a drive to steadily re-establish its sphere of influence as an alternative to the European Union and also to stop the integration of its former satellites into the EU and NATO. "Russia has a reason to foment trouble," he said, "and Putin's doctrine is that Russia has a right to influence [the actions and activities] of its neighbours."

However, Russia has a problem – it is a nation in decline, according to Rasmussen. "Its population is decreasing, and forecast to fall from 145m to 121m between now and 2050, a fall of 15%. Its people have a low life expectancy, especially the male population, and the country's birth rate is low. The economy is weak, depressed by the fall in oil prices and the failure to reform the economy. It remains a 'one-crop' economy, which is over-reliant on oil and gas revenues. The investment climate is poor, due to a lack of legal protections for investors."

Despite wrestling with these issues history shows that declining nations can become 'international spoilers', Rasmussen said. Russia is fulfilling this role with its illegal absorption of Ukraine's Crimea region and its ongoing actions to destabilise eastern Ukraine. Rather than pursuing these disruptive policies, Russia could benefit far more from closer relationships with the west, which would boost its economy and improve the lot of its citizens, who are currently accepting



NADINE DEREZA
AND ANDERS FOGH RASMUSSEN

their poor economic situation in the name of Putin's resurgent nationalism.

As a counterweight and a 'good story', Rasmussen turned to China. "I am not underestimating the problems related to China's expansionism and territorial disputes in the South China Sea with Japan, Vietnam, Philippines and others. Nor am I disregarding the significant rise in China's defence spending, which will equal 10% of GDP in 2015. But by 2040, China is expected to account for 40% of global GDP, compared to 21% for the USA, Europe and Japan combined. So we have a rising China, but also a peaceful China."

Why is this? "It's in China's self-interest to integrate with international markets, and its rulers need sustained economic growth for domestic stability." That's why China is energising its own economy and investing overseas, while welcoming direct foreign investment, which boosts development and brings in new technology, including the technology the

country needs to deal with its own problems such as environmental pollution. At the same time, China can contribute to global economic growth as it becomes a bigger player and integrates into the system of international trade and investment.

Rasmussen then offered a very bad story: the Middle East. "It's hopeless! And it's going from bad to worse, and then even worse." The whole region is beset by social, religious and political tensions. Two thirds of the region's people are under 30, but they face poor life opportunities that are unlikely to improve under bad, incompetent and corrupt regimes. A key driver is the religious rivalry and battle for regional influence between the Sunnis, led by Saudi Arabia, and the Shias, led by Iran. There are proxy wars being fought in Syria, Iraq and Yemen, with the region beset by an upsurge in terrorism, with Islamic State, al-Qaeda and Hamas linked to Sunni Islam, while Hezbollah and the Houthis are Shia groups.

"Now the Russians have intervened, which will make the situation even worse," the

former NATO Secretary General suggested. "As they will discover, they won't be able to support Assad and fight Islamic State. The brutality of the Assad regime is the source of Syria's troubles, and the country's problems will only get worse. The only light at the end of the tunnel is that the importance of the Middle East is likely to decline as the United States becomes energy self-sufficient."

Rasmussen's 'very good story' is focussed on the United States. "The good news is that the USA will remain the leader of the [free] world," he said. After all, it has no borders to protect or troublesome neighbours – "just Canada, Mexico and fish!" The USA still has huge, untapped resources, and its economy is "unique and very strong," with per capita income currently five times higher than China's. The world's top 25 brands are all American, 17 of the world's top 20 universities are in the USA, and the country still has a steady influx of some of the world's most talented people. **While immigrants may account for 40% of the USA's population by 2040, Rasmussen pointed out**



“THE GOOD STORY IS THAT IT [EUROPE] IS THE WORLD’S LARGEST ECONOMY WITH 500 MILLION PEOPLE. THE BAD STORY IS THAT IT HAS A DECLINING POPULATION: IN 1900 EUROPE’S POPULATION WAS 25% OF THE WORLD’S TOTAL, BUT BY 2050 IT WILL HAVE FALLEN TO JUST 6% WITH A THIRD OF PEOPLE AGED OVER 65 YEARS.”

that today immigrants are funding 25% of the country’s start-up businesses.

Although there is concern about the build-up in China’s military spending, Rasmussen believes the country’s leadership recognizes that it can pose no credible threat to the USA, which accounts for 40% of total global defence expenditure and has huge accumulated stocks of strategic weapons: “This adds up to a 10-1 military advantage over China.”

What about Europe? Rasmussen says its story is balanced between good and bad. “The good story is that it is the world’s largest economy with 500m people. The bad story is that it has a declining population: in 1900 Europe’s population was 25% of the world’s total, but by 2050 it will have fallen to just 6% with a third of people aged over 65 years.” Europe also suffers from poor competitiveness, a debt crisis in some countries, a dependence on imported energy, and security challenges in Eastern Europe. And now, the refugee and immigration crisis have complicated matters even further.

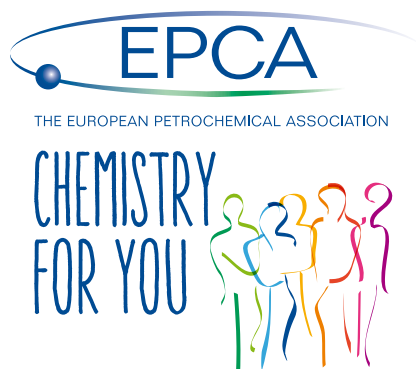
To mitigate, these challenges, Rasmussen urged the European Union to think about exploiting its own unconventional energy resources, such as shale gas, and to quickly conclude the Trans-Atlantic Trade and Investment Partnership (TTIP) currently being negotiated with the USA, to boost free trade and bolster economic growth between the partners. **“Yesterday, [12 Pacific Rim] nations¹ concluded the Trans-Pacific Partnership to lower tariff barriers and boost trade. If Europe doesn’t move quickly to approve TTIP, it may find itself left behind.”**

Turning to energy issues, Rasmussen said the current low oil price is bad for Russia, which is still using its oil and gas resources to keep Europe energy-dependent and also to maintain its influence over its bordering neighbours, such as Ukraine, Georgia, Moldova and the Baltic states. He also recognized that China’s continued dependence on imported energy poses potential risks, such as regional territorial disputes or conflict with Russia. However, his view is that China wants to

pursue opportunities for international co-operation rather than conflict and he sees the new “Silk Road” as part of the country’s efforts to engage positively. **Rasmussen also sees the USA’s energy technical revolution – shale gas and oil – as the trigger for a geopolitical revolution, and believes Europe should exploit its shale resources to reduce its own energy dependency.**

Despite the problems creating turmoil in some parts of the world, the former Danish Prime Minister remains optimistic, seeing the positives in the peaceful rise of China, and the global power of the USA in partnership with Europe and the Pacific Rim. However, he believes the USA and Europe should operate according to the maxim of the USA’s 26th president, Theodore Roosevelt: “Speak softly, and carry a big stick.”

¹ Australia, Brunei, Canada, Chile, Japan, Malaysia, Mexico, New Zealand, Peru, Singapore, United States & Vietnam.



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