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.

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TOM CROTTY
EPCA President
INEOS GROUP

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"

PHILIPPE SAUQUET
President Refining & Chemicals,
Member of the Executive Committee
TOTAL

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 CO_2 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.

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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 "BRIC[1] 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.

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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 CO_2 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 on this subject 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.

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

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."

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.

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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.