

The 32nd Annual Young & Partners Senior Chemical Executive Conference

“Strategic, Financial and Shareholder Issues For Senior Chemical Executives”

Agenda and Speaker Summaries

November 12, 2019

The Yale Club at 50 Vanderbilt Avenue - New York City

- 11:45 a.m. **Welcoming Comments and Luncheon**
Peter Young, CEO and President, *Young & Partners*
- 12:00 p.m. **Luncheon Keynote Speaker**

A Fireside Chat: Creating a Blueprint for Growth and Profitability

Bhavesh V. (Bob) Patel, CEO, *LyondellBasell*
Moderator: Peter Young, CEO and President, *Young & Partners*
- 12:45 p.m. **Dialogue Luncheon Discussion**
- 1:30 p.m. **Fireside Chat: Dealing with Change – Perspectives on FMC and Agchem**
Pierre Brondeau, CEO and Chairman, *FMC Corporation*
Peter Young, CEO and President, *Young & Partners*
- 2:15 p.m. **M&A and Financial Developments – Key Trends and Their Implications**
Peter Young, CEO and President, *Young & Partners*
- 3:00 p.m. **Break**
- 3:30 p.m. **Perspectives and Update on China: Panel and Audience Discussion**
Anla Cheng, Founder and CEO, *SupChina*
Jeremy Goldkorn, Editor-in-Chief, *SupChina*
Peter Young, CEO and President, *Young & Partners*
- 4:15 p.m. **The Global Chemical Industry: Geopolitical, Market and Supply Insights**
Dewey Johnson, Vice President, Base Chemicals and Plastics, *IHS Markit*
- 5:00 p.m. **Speaker Roundtable**
Moderator: Peter Young, CEO and President, *Young & Partners*
Participants: Conference Speakers
- 5:30 p.m. **Networking Cocktail Reception**
- 7:00 p.m. **End of Conference**
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A Fireside Chat: Creating a Blueprint for Growth and Profitability

**BHAVESH V. (BOB) PATEL, CHIEF EXECUTIVE OFFICER,
LYONDELLBASELL INDUSTRIES N.V.**

PETER YOUNG, CEO AND PRESIDENT, YOUNG & PARTNERS

Young: Could you discuss your background?

Patel: I was born in Mumbai and immigrated to the United States when I was 10. My uncle sponsored our visas and we went to live with him in Cleveland. My parents divorced when I was very young. My mother had earned a Masters in English and was an administrator at a very prestigious all-girls school in Mumbai. When we moved to the United States, she was not able to obtain a teaching position as her degree was from an Indian institution. She worked as a bank teller during the day and in a convenience store at night. She ultimately saved up enough money to buy a small donut and sandwich shop. One summer I offered to run the shop so she could take some time off. She showed me a ledger book which tracked accounts for people who could not pay for their food until they received their paychecks. When I asked her if I should stop serving them if they didn't pay, she replied "No you never stop serving. You should assume if they can not pay you that they need that money more than we do." My mother and uncle instilled the value of service in me and I believe that ultimately is what my role as CEO is about.

Young: Why did you decide to join LyondellBasell when you did?

Patel: I had just moved back from Singapore where I was running APAC for Chevron Phillips Chemical. Whenever I have considered taking a new job I have always asked myself two questions, 1) Can I contribute? , and, 2) Can I learn? I had run the same business at Chevron Phillips Chemical for a number of years and I was familiar with both Lyondell and Basell as competitors and customers. At a minimum, I knew I would learn a lot about risk-taking given that the company was just coming out of bankruptcy. However, the tiebreaker for me was really the CEO, Jim Gallogly, whom I knew from his time at Chevron Phillips Chemical.

Young: Could you discuss the differences in the company's situation between when you joined and when you were made CEO?

Patel: The first five years were about cost cutting and Jim gave me a lot of independence to operate the European assets. It was very daunting to follow someone so iconic and accomplished as Jim Gallogly. When I was announced as his successor in 2014, the company was experiencing record profitability. I struggled with how to demonstrate respect for Jim's decisions while conveying my own message of progress. I analogized Jim stepping down to sports teams retiring the numbers of iconic players to convey the futility of trying to replace him. I also hoped to subtly convey the message that I was not trying to be Jim and that his chapter in the company's history had closed and a new one was beginning. At my first investor meeting with Fidelity, I focused on my accomplishments in Europe with regards to cost cutting and reactor optimization, but as soon as I mentioned growth the air went out of the room. Fidelity saw us as a capital return story and wanted us to continue buying back shares and increasing our dividend. If that was the path that I had decided to set the company on, I would be running it into the ground.

Young: Did the deteriorating business environment at the time impact your thinking?

Patel: Absolutely, our earnings peaked in 2015 and ethylene margins subsequently crashed. All of our corporate development capability was removed during the restructuring. It is very difficult to rebuild this capability from a people and culture perspective.

Young: How are you navigating all the uncertainty in the geopolitical environment today?



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Patel: I try to evaluate strategic decisions with a 20-30 year outlook, which is particularly important in a cyclical business. We try to determine how we can build a company that can be resilient under various scenarios such as plastic deselection or Oil & Gas companies moving into petrochemicals. We faced a decision when I first joined the company about converting our Channelview facility to ethane cracking and we decided against it in order to retain flexibility in case ethylene margins compressed. Recently, we walked away from a large deal that we had been working on for two years because it would have limited our financial flexibility; a flexibility we believe is particularly valuable in this uncertain environment.

Young: Could you talk about your role with the [Alliance To End Plastic Waste](#)?

Patel: I have spent the majority of my career in plastics. In 1991 we shut down three of our production lines when the McDonalds clamshell was banned. The backlash faced by the plastics industry today is far broader. In June 2018, I proposed that BASF, LyondellBasell, ExxonMobil, Royal Dutch Shell and Dow collaborate to address the issue. We agreed that the solution had to be all across the value chain and the consumer brands had to work with us. Plastics are not the problem, plastic waste is the problem and we need to capture it before it leaks into the environment. I was the Chairman at the beginning, but I eventually realized that a chemical company CEO at the helm of the initiative could be perceived as an attempt at greenwashing. I suggested that David Taylor, CEO of Procter & Gamble, take on the role as Chairman. Whereas chemical companies can communicate the benefit and economics of the use of plastics, consumer products companies are much more experienced in appealing to sentiment. We launched in January and have 50 member companies. One of the latest programs we have funded is a loan to a local Indonesian government to fund a blueprint for circularity including collection, segregation, recycling and manufacturing. Our hope is that once the blueprint is established, the model can be cut and paste around Asia. The Alliance have received commitments for \$1.0 billion over five years and I believe that success is a testament to collaboration.

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Fireside Chat: Dealing with Change – Perspectives on FMC and AgChem

PIERRE R. BRONDEAU, CHIEF EXECUTIVE OFFICER, FMC CORPORATION

PETER YOUNG, CEO AND PRESIDENT, YOUNG & PARTNERS



Young: Could you discuss your background?

Brondeau: I was born in France. My father was in the military so we moved around both France and the Middle East for most of my youth. I wanted to move to the United States. So after I finished school in France, I chose to work for Air Liquide who sent me to Chicago where I met my wife. After a few years, I moved back to France where I met Raj Gupta, CEO of Rohm & Haas, Air Liquide's largest customer. I met with him in London and he said that while it was obvious that they did not have a position for me and that I did not want to work for Rohm & Haas, he would be sending me an offer the next day and he advised me to accept that offer. I was initially put in charge of research for Rohm & Haas, working on the French Riviera. It seemed like the best job of my career. Raj then sent me to run an acrylic plant in Bristol, PA, a very different environment than the French Riviera. Later on, although Rohm & Haas was an acrylic chain company, it became interested in building a growth platform in electronic materials. I was sent by Rohm & Haas to Boston to build an Electronic Materials business. We did a lot of acquisitions, invested in technology and moved into Asia. When Rohm & Haas was sold to Dow Chemicals for ~\$16 billion, half of the value was attributed to the Electronic Materials business.

Young: What led to your decision to join FMC and what were some of the major changes you experienced in your time there?

Brondeau: I wanted to run a company with a strong specialty portfolio as that is what I knew best. FMC was in silicate, zeolite, phosphate, peroxygen, soda ash, nutrition, pharmaceutical and agricultural. It was impossible to value that portfolio. On my first earnings call, I was very prepared to talk about my plans for growth in pharmaceutical and nutrition, but all that anyone asked about was soda ash pricing in China. We examined our portfolio and determined that our strengths were in the products with heavy customer interaction and technology. For that reason, we decided to be an AgChem and Health & Nutrition company. We had a lithium business that we thought have promising prospects, but we were not prepared to invest in it. We shuttered a number of the businesses that we could not sell or turn to profitability. We bought Cheminova, a generic but international AgChems company. This was not popular with the investment community who thought that we were moving away from high technology products. By 2016, it was clear that our Nutrition business product portfolio was not broad enough as customers were moving towards clean-label, organic food and demanding replacements for many of the ingredients we had been supplying them. In AgChems, Dow and DuPont were merging, ChemChina was buying Syngenta and Bayer was buying Monsanto. As such, we realized we would be facing formidable competitors in AgChems. We had to pick between the two and we decided to sell the Health & Nutrition business and focus on AgChems. We also decided to spin off the Lithium business. I reached out to all of the CEOs of the consolidating AgChems companies inquiring as to what parts of their portfolios they would have to sell to clear anti-trust review. None of the assets were particularly attractive. In December 2017, I got a call from Ed Breen who told me that he needed to get rid of his AgChems business in order to get Dow and DuPont through anti-trust review. He suggested that it might be very expensive for FMC, but I disagreed as I suspected that his circumstances would encourage him to be open to negotiation. The European Commission had decided that they wanted 5 companies in the technical AgChems industry. As such, BASF, Bayer, and ChemChina could not buy the business and generic AgChems companies did not have the cash. I was having lunch with Ed to discuss the transaction when he told me that DuPont was in fact, building a large platform in Health & Nutrition. We decided to explore an asset swap where DuPont sold us their AgChem business in exchange for our health and nutrition business and some cash. After the deal was completed, we became the fifth largest AgChems company in the world.

Young: What were some of the challenges you faced in completing the transaction?

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Brondeau: AgChems multiples at the time were 12-14x EBITDA, whereas Health & Nutrition multiples were close to 17-20x. The magnitude of this difference made the swap challenging. Ultimately however, Ed Breen's top priority was seeing the Dow/DuPont deal through and this transaction was relatively small by comparison.

Young: How did the shareholders and market feel about the transition?

Brondeau: The market reacted very well. FMC's Enterprise Value is five times what it was 10 years ago whereas the EBITDA has only doubled. The market has rewarded us for focusing our portfolio with multiple expansion. We also gave shares in Livent, our lithium business, as a dividend to our shareholders.

Young: Did you have any inclination that the Lithium business was going to face the difficulties that it has recently?

Brondeau: I do not think anyone foresaw the difficulties in Lithium. The business is very capital intensive. The shareholder base of AgChems and that of Lithium is very different. The market almost forced us to separate the businesses such that they might realize their true values.

Young: How did you adapt your management style to managing the portfolio at FMC as opposed to growing the Electronic Materials business at Rohm & Haas?

Brondeau: I am much more comfortable in dynamic environments than I am in steady state. Growing businesses and transforming portfolios are much more of my milieu. I would not have been as successful at running a large monomers business for example, where process optimization is the priority. At FMC, I sold the businesses that were manufacturing intensive and focused on the high-growth businesses. When I was being interviewed for the CEO position at FMC, I told the Board that if I were to join, the company would likely look very different 10 years down the road.

Young: What will be the priority at FMC over the next five years?

Brondeau: The AgChems industry is a target of Non-Government Organizations and Environmentalists. It is becoming more and more difficult to bring new products to the markets. We will be spending a lot on R&D in order to maintain a 10-12% top line growth rate. Half of the spending will be on toxicology studies to make sure the products are safe. While I do not like having to spend that much, I can appreciate the importance of prioritizing health and safety. Also, we will have to penetrate into new markets and carefully assess the impact of Big Data and its impact on agriculture.

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M&A and Financial Developments – Key Trends and Their Implications

PETER YOUNG, CEO & PRESIDENT, YOUNG & PARTNERS



Stock Market Trends

- By the end of the first three quarters of 2019 the S&P 500 had more than recovered from a dismal 2018 by increasing 18.6%, while the FTSE 100 had a partial recovery, increasing by 10.0%.
- Chemicals staged a recovery as well. The Young & Partners (“Y&P”) U.S. Basic Chemicals index increased by 23.0%, our U.S. Diversified Chemicals index by 10.5%, our U.S./Canada Fertilizers index by 3.4% and our U.S. Specialties index by 23.0%.
- The Y&P European Basic Chemicals index increased by 23.2%, our European Diversifieds index by 10.7% and our European Specialties index by 19.1%.
- In terms of P/E valuations, only one of the seven Young & Partners Western chemical indices was trading at a premium to the overall market indices at the end of the third quarter.
- On an EV/EBITDA basis, only one of the seven Young & Partners Western chemical indices was trading at a premium to the market indices as of the end of the third quarter.

Mergers & Acquisitions Trends

- In the first three quarters of 2019, \$32.5 billion worth of deals closed. This compares to \$101.9 billion of deals closed in the first three quarters of 2018 and \$157 billion that closed in all of 2018.
- Without the megadeals, last year’s first three quarters total was \$24.9 billion and the full year dollar volume was \$42.4 billion.
- In terms of number of deals completed, the trend is slightly up, with 59 deals completed in the first three quarters of 2019 compared to 48 deals closed in the first three quarters of 2018 and 72 deals closed in all of 2018.
- In terms of the location of M&A targets, Asian and ROW accounted for 47.5%, the U.S. accounted for 35.6% and Europe accounted for 16.7% of deals completed worldwide.
- The number and share of commodities transactions in the first three quarters increased and specialties volume has come down. Similarly, commodity chemical M&A multiples have gone up and specialties have gone down.
- There was also in moderate increase in private equity’s share of the market. In the first three quarters, private equity represented 13.6% of the number of acquisitions and 31.6% of the dollar volume.
- This is materially higher than in 2018 when private equity represented only 10.5% of the number of acquisitions and 14.1% of the dollar volume, but still well below the historic average.
- Looking forward, the value of deals announced but not closed as of September 30, 2019 was only \$16.3 billion (25 deals). This is consistent with the pace as of the end of the first half of 2019.

Debt Financing Trends

- There was a major decline in debt issuance by the chemical industry in the first three quarters of 2019 across the board.
- Global non-bank debt financing was only \$23.6 billion in the first three quarters of 2019 compared to \$40.6 billion in the first three quarters of 2018 and \$57.7 billion for all of 2018.
- Investment grade debt was only \$19.5 billion in the first three quarters of 2019 compared to \$29.9 billion in the first three quarters of 2018 and \$46.7 billion for all of 2018.
- Only \$4.1 billion of high yield debt was issued in the first three quarters of 2019 compared to \$10.8 billion issued in the first three quarters of 2018 and \$11.1 billion issued for all of 2018.

Equity Financing Trends

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- The chemical equity issuance market was weak in the first three quarters of 2019.
- Only \$3.6 billion of equity was issued from 18 offerings in the first three quarters. This compares to \$20.3 billion of equity issued from 43 offerings in the first three quarters of 2018 and \$24.5 billion of equity issued from 57 offerings for all of 2018.
- 2018 was a particularly robust year as Bayer issued stock and sold shares of Covestro to fund the acquisition of Monsanto.
- There were 8 IPOs completed worth \$2.2 billion in the first three quarters of 2019. This compares to 13 IPOs completed in the first three quarters of 2018 worth \$2.3 billion.
- Asian companies issuing in the Asian public markets dominated both the IPO and secondary offering markets.

Economic Outlook

- Although overall global growth is reasonable, growth has been weakening in China, Europe and many of the emerging market countries and is expected to continue to weaken.
- The trade dispute between the U.S. and China has been drawn out and has damaged both countries' economies and other global economies. Even if an agreement is reached, the negative effects will last for some time. Brexit is also having a negative effect.
- The U.S. deficit and debt levels are increasing and may, at some point, along with rising interest rates and higher oil prices, create a negative tipping point for the U.S. economy.
- We expect a gradual erosion of chemical company profitability and growth overall for the rest of this year and next, but no disaster.
- The hardest hit will be the commodity chemical companies due to increases in capacity and diminished demand from China and the automotive industry.

Stock Market Outlook

- For much of 2019 the global equity markets have been unpredictable, buffeted by the increase in interest rates and a long list of economic, financial and geopolitical stresses. Chemicals will continue to lose some of their relative value versus the overall market, but will still have an overall premium.

M&A Outlook

- If there were no major weakening of the global economic/financial environment, Young & Partners believes that the number of deals in 2019 will be healthy and moderately higher when compared to 2018 at around 75 to 80 deals.
- Dollar volume, similarly, will be solid, but not spectacular at around \$45 billion.
- There will be no mega deals this year.
- Asia and ROW will continue to dominate through the end of this year as the location of businesses sold.
- Commodity M&A volume has surged and will continue to overtake specialties and will have solid valuation multiples..
- Valuations have fallen for specialties in 2019. This has allowed private equity firms to modestly pick up previously lost market share.
- Overall, the need to grow, pressure to consolidate, the divestitures coming out of previous mergers, and the availability of cash will continue to be the M&A driver for strategic buyers. This will be a reasonable time to sell either specialty or commodity chemical businesses, but at less than peak valuations.

Debt Market Outlook

- There was a stalling of the debt markets at the start of the year with the market turmoil and the U.S. government shutdown.
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- Volume will be driven heavily by issuer needs rather than investor demand, with M&A related financing driving volume.
- Investment grade and high yield debt issuance will be driven by the M&A market and not by refinancing needs since most companies have refinanced ahead of concerns about increasing interest rates.

Equity Market Outlook

- We see a continued slowdown in Asian secondary and IPO offerings as the Chinese stock market rules and valuations continue to change. Asian IPOs will continue to be very small in size.
 - Western IPOs will continue to be dormant.
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Perspectives and Update on China: Panel and Audience Discussion

ANLA CHENG, FOUNDER & CHIEF EXECUTIVE OFFICER, SUPCHINA

JEREMY GOLDKORN, EDITOR IN CHIEF, SUPCHINA

PETER YOUNG, CEO AND PRESIDENT, YOUNG & PARTNERS

Young: Could you describe the political situation in China?

Goldkorn: Politically, we are seeing a continuation of strong centralized party rule. Xi Jinping has emphasized ideology and loyalty to the communist party and consolidated his power.

Cheng: The political focus is on three things: poverty alleviation, urbanization and national security. There are still ~150,000 million people making less than five dollars a day. The GDP per capita in China is actually closer to that of the Dominican Republic or Costa Rica than it is to the United States.

Young: To what extent are the divisions within the communist party growing? What are the implications?

Goldkorn: What has been pretty clear over the past two years is that there is less and less room for dissenting opinion.

Cheng: Xi Jinping has imprisoned many of his political critics.

Young: Is there likely to be any progress from a business fairness perspective for foreign companies in China?

Cheng: Foreigners are now allowed to own up to 100% of financial and insurance companies in China. But there is less progress in other industries..

Goldkorn: It does seem that the government is serious about improving fairness in financial services. However, just because they allow you to your company, does not mean you will be able to run the business profitably. Rhetoric has not provided any indication as to whether this “openness” will apply to companies outside of financial services. It is likely that the ongoing trade negotiations are spurring action.

Young: Could you comment on public sentiment with regard to the slowing of growth in China?

Cheng: You have to question the validity of the official published numbers. Regardless of the actual numbers, growth is definitely coming down. China has lost a number of manufacturing facilities to other countries like Vietnam, Cambodia and other Asian nations.

Goldkorn: There is talk of a tech winter in China. Some of the negative sentiment is related to the Chinese equivalents of Uber and WeWork seeing slower growth and more questions about their fundamental business models.

Cheng: The venture capital market in China has been very frothy with very high valuations, but it is changing. Similar to the downward trend of the Japanese Softbank Vision Fund, the air is starting to come out.

Young: Is it true that the government has favored the State-Owned Enterprises over private business? If so, what are the implications?



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Goldkorn: That ethos originated during the Hu Jintao administration. Xi Jinping has continued to support government ownership of the largest companies.

Cheng: By any metric, private companies have been more efficient and generating higher returns than the SOE's. Private companies provide ~80% of employment and are the primary creators of wealth. The government is starting to recognize that progress on economic reform must include creating a level playing field..

Young: Could you comment on the possibility that the level of debt held by Chinese companies might reach some tipping point?

Goldkorn: There was a book written in 1999 by Gordon Chang called The Coming Collapse of China. He continues to spout his theory about an impending collapse every year but it is always getting pushed further down the road. The government has a number of strong means at its disposal to avoid a potentially catastrophic event. On the other hand, we are faced with the first generation of mainland Chinese youth who do not know how to save. They spend like American kids. I really worry about the capacity of this new generation to deal with economic hardship.

Young: Could you discuss the situation in Hong Kong?

Goldkorn: There does not seem to be a path to compromise between the two opposing forces. The government has failed to comprehend that the protestors are not motivated by economic drivers alone.

Cheng: The profile of the protestors has changed. In the beginning, there were a much larger number of protestors of all ages. It was very peaceful and organized. While most of the masses have dissipated, a younger, more radical group has remained. This group is demanding democracy, a political non-starter for the Chinese government. It really is a shame that the considerable talents of the people in Hong Kong have been wasted for the past 6 months.

Goldkorn: The government has been sending in thugs to harass protestors. They have inserted mainland Chinese residents into the Hong Kong police. They are making life difficult for companies with employees associated with the protests.

Young: Could you comment on whether or not the US has been demonizing China?

Cheng: Last year Mike Pence made a speech at the Hudson Institute demonizing China for the first time. At the time it seemed very harsh, but as US-China relations have deteriorated, anti-China rhetoric has escalated. The demonization of the Chinese government has become rampant and bipartisan. However, within China the overwhelming majority of Chinese people approve of Xi Jinping and the way his party has run the country.

Goldkorn: The consensus view in Beijing is that the United States wants to contain China's rise. Given where US-China relations are at this point, it is not an illogical conclusion to draw.

Cheng: The West has misinterpreted the Made in 2025 initiative that was declared by China a few years ago as a quest for economic dominance. The goal of that initiative was actually about making sure China participates in the technological revolution after missing out on the industrial revolution and embarrassments in the World Wars as opposed to dominating its global counterparts. This is not how it has been interpreted by the U.S. government.

Goldkorn: A lasting effect of the trade war will be the loss of the Chinese market for US farmers. China will never again buy in the same quantities that they had in the past. It has also increased China's sense of urgency for self-reliance in technology. The only bipartisan consensus in this country is around demonization of China.

Young: What are the implications for companies operating in China?

Goldkorn: The chemical industry does not suffer from much government scrutiny given the lack of general public interface. However, I would still be prepared for economic uncertainty. Despite the financial opening, I think

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Canadian and American companies need to be prepared to have their Chinese operations scrutinized more heavily than they have been historically. China is very clearly sourcing products from other countries (beef from Ireland, pork from Russia, soy from Brazil) to replace the products that were historically supplied by the United States.

Young: Do you foresee a resolution to the US-China trade dispute?

Goldkorn: I do not see how it is possible for either side to back down at this point. The Phase 1 agreement is only a cessation of hostilities. The US is worse off than it was when tariffs were first implemented. Many of the key US demands are simply politically unacceptable. The US negotiating chief is a very erratic individual who does not encourage productive discussion. None of the potential Democratic presidential candidates have expressed a lucid opinion on China yet.

The Global Chemical Industry: Geopolitical, Market and Supply Insights

DEWEY JOHNSON, VICE PRESIDENT, MARKET RESEARCH, IHS MARKIT LTD.

The global Specialty Chemicals market reached \$595 billion in 2018. No one market segment dominated the industry. Oilfield Chemicals, Nutraceutical Ingredients and Electronic Chemicals are expected to be the highest growth market segments.

IHS is projecting oil prices to trend downward by the end of 2020 before recovering in 2021. Sustained higher crude oil pricing creates sustainable advantage for ethane and propane feedstocks. While demand in China is often highlighted, global base chemical capacity is fairly distributed with both the US and China holding ~25% of the assets. Investment in base chemical capacity continues, increasing the global total to more than 600 million metric tons. Most of this new capacity is coming in China.

Global growth is slowing as international trade and manufacturing continue to decelerate as policy makers respond with monetary and fiscal stimulus. Global GDP growth will slow from 3.2% in 2018 to 2.6% in 2019 and 2.5% in 2020. In Europe, exports and capital investment are decelerating sharply as political risks are adding to the cautionary sentiment. China's economic growth will continue to slow, as restraints from deleveraging and US trade restrictions are offset by stimulus. Global base chemical demand increased to over 500 million metric tons in 2019, despite a deceleration in the rate of growth.

With refined product demand growth slowing, energy companies are increasing their focus on petrochemicals as a growth vehicle for the future. Chemicals yield from the refining process have increased from <15% prior to the 1990's to ~40-80% in the 2020's.

The stark difference in participant demographics for Olefins Producers, Polyolefins Producers, Converters and Reclaimers demonstrate scale challenge to the implementation of a circular value chain for plastics. The largest olefins producer has a capacity of ~10 million metric tons. The largest plastic pellet-to-film converter has a capacity of ~1,800 thousand metric tons and the largest plastics waste reclaimer has a capacity of ~ 250 thousand metric tons. Global operating rates for major chemicals provide extreme competitiveness in the near term. This creates an economic challenge for recycled plastics.

