GLOBAL BUSINESS REPORTS

INDUSTRY EXPLORATIONS

UNITED STATES CHEMICALS

2016

Economy - Chemicals - Energy Reforms - Petrochemicals - Agrochemicals
Paints and Coatings - Specialty Chemicals - Distribution

Dear Readers,

As we enter 2016, it is worth taking a look back at the progress our industry has made, and where we think American Chemistry will be in the years to come. There is no doubt that this is a transformative time for the U.S. chemical industry. Access to vast new supplies of American natural gas from shale deposits is one of the most exciting domestic energy developments in decades, particularly for the business of chemistry. The revolution in shale gas has fostered renewed competitiveness for U.S. basic chemicals, and positively impacted specialty chemical markets as well. In fact, chemical production grew in 2015 by 3.6%, and we anticipate that growth will continue, rising nearly 3% in 2016 and surging through 2020.

Increased production means increased jobs and, as new capacity from the more than 250 announced chemical projects comes online, chemical industry employment will continue to grow. And, because employees of the business of chemistry make 47% higher wages than the average manufacturing pay, growing payrolls will continue to strengthen local economies.

Our industry is committed to the creation of ground-breaking products that make our lives healthier and safer. That means that our companies' investment in innovation is also continuing to grow, with more than $60 billion invested in research and development in 2015 alone.

Put simply, the business of chemistry is flourishing and, with momentum building, our industry will continue to grow for the next several years.

To safeguard the continued growth of the business of chemistry, the United States must ensure that common sense policies and regulations are enacted. That is why ACC and our members have supported reform of the outdated Toxic Substances Control Act (TSCA). Last year was a milestone year for these efforts, with passage of landmark legislation in both the House and Senate, due in part to the combined efforts of our industry and numerous environmental, public health, and labor groups, as well as the strong, bipartisan support for TSCA reform in Congress.

While the House and Senate legislation must now be consolidated through a Congressional conference, these breakthrough bills will create a strong national regulatory system, providing a consistent and workable program for industry, and giving Americans throughout the country greater confidence in the safety of chemicals. We are committed to seeing TSCA reform cross the finish line this year, and will continue our efforts to ensure that the necessary reforms protect health and the environment, advance public confidence, and protect our industry's ability to create and innovate.

Cal Dooley
President and CEO
American Chemistry Council (ACC)

This research has been conducted by Laura Brangwin, Harriet Bailey, Irina Negoita, and James Hogan

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Exclusive Interviews

Government officials, association heads, and industry executives discuss their organizations' strategies and provide insight into the U.S. Chemicals Industry.

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Editorial Content

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Quantitative Data and Maps

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The Gulf Coast

GBR takes a closer look at the locus of the chemical industry, and its recent resurgence, in the Gulf Coast states of Texas and Louisiana.

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Future Outlook

The U.S. chemical industry comprises players large and small, established and emerging, all of whom share their visions for the future of the industry.

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Image: Thinkstock

INTRODUCING THE CHEMICAL INDUSTRY IN THE UNITED STATES

"The future is promising for the chemical industry as a whole. The consensus is that U.S. chemical output will improve during 2016 and the second half of the decade. As a result, following the 3.6% gain during 2015, chemical production will rise 2.9% in 2016 and then surge through 2020. Most segments will grow and prosper over the next five years. We are projecting 3.5% specialty chemical growth next year, followed by 4.1% for the following year. Strong growth is expected in inorganic chemicals, organic chemistry, plastic resins, and synthetic rubber, as export markets revive and domestic end-use markets further improve."

- Kevin Swift,
Chief Economist,
American Chemistry Council (ACC)

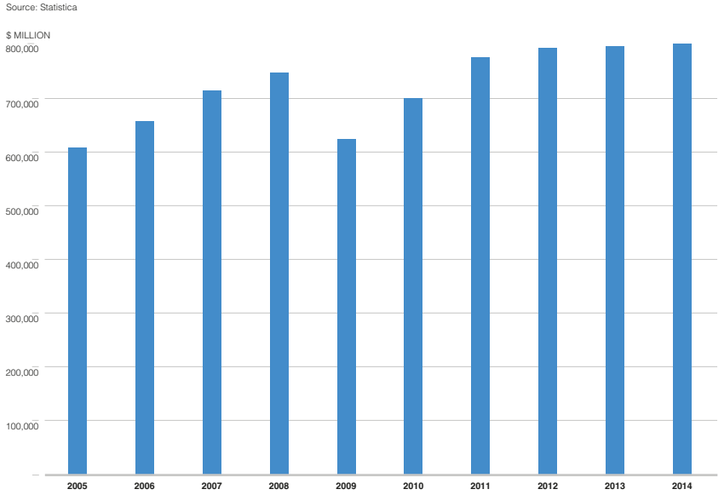
SHALE STATE OF MIND: AN INTRODUCTION TO THE U.S. CHEMICAL INDUSTRY

Journalist: Harriet Bailey

The outlook for the chemical industry in the United States has shifted dramatically in the space of only a few years. Revenues currently stand at approximately $820 billion, and are expected to exceed $1 trillion before the end of the decade. Accounting for more than 80% of the overall chemicals market in the North American Free Trade Agreement (NAFTA) region, comprising Canada and Mexico as well as the United States, the space is seeing what is being dubbed by the Boston Consulting Group as a "once-in-a-lifetime renaissance."

VALUE OF U.S. CHEMICAL SHIPMENTS (2005-2014)

Source: Statistica



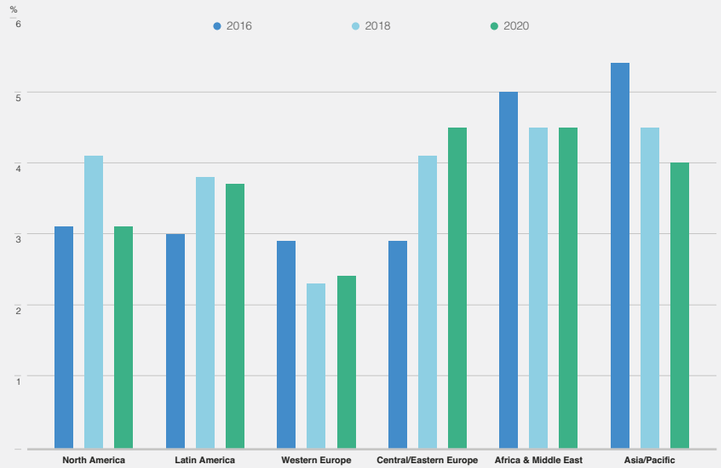
The driver behind this reversal of fortunes is the shale gas revolution, which has provided the United States with a low cost feedstock to rival its main competitors in China and the Middle East, as well as helping to offset the decline in production from conventional gas reservoirs. Advancements in hydraulic fracturing and horizontal drilling technologies, more commonly known as fracking, have facilitated significant productivity increases. Although it was estimated that the United States was sitting on a host of untapped shale deposits during the time of the global financial crisis, it took another five years for the impact of the country's abundance of natural gas reserves to make its way downstream: wells drilled in January 2014 produced more than nine times as much gas per day as five years previously, according to the U.S. Energy Information Administration (EIA).

The EIA's most recent projections for U.S. proved natural gas reserves are at a record high of 388 trillion cubic feet, with Texas, Pennsylvania, and Oklahoma taking the top three positions respectively. Texas' own Barnett shale play is not only the largest in the country, but was also the first deposit to be drilled horizontally; Pennsylvania's Marcellus shale reserve, which also runs through West Virginia and New York, saw an increase of 10.4 trillion cubic feet of proved reserves added in the last year, out of an additional 50.5 trillion cubic feet in total. The deposits in the Appalachian basin, which were previously thought to have been depleted, have the potential to satisfy demand for natural gas in the entire northeast of the country. Across the United States, shale gas reserves are expected to support requirements for almost a century.

The phoenix rises

From being a high-cost manufacturing destination a decade ago, the United States is now the most cost-advantageous region for chemical production outside of the Middle East. The chemical manufacturing sector, having undergone a mass re-location to Asia when the industry was in free fall, is now rejecting China and India in favor of the United States. In the first five years of the decade, companies injected $135 billion of capital expenditure for new facilities and plants; as a result, the chemical industry is now one of the top exporting industries in the country, accounting for 15% of all global chemical shipments and around $189 billion in trade, according to KPMG.

PROJECTION OF ANNUAL CHEMICAL PRODUCTION GROWTH BY REGION



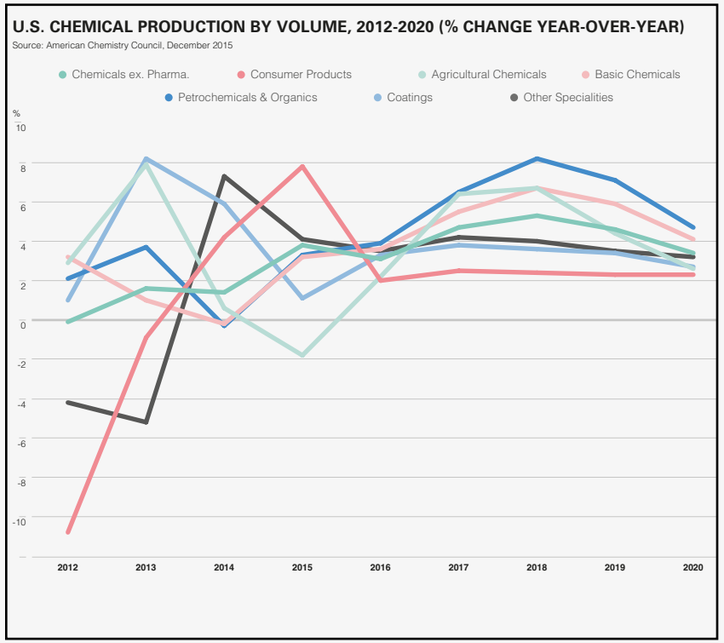
The two petrochemical giants Chevron Phillips Chemical and ExxonMobil Chemical were the first to take advantage of the developments in shale gas, with both announcing their plans for new 1.5 million metric ton (mt) ethane crackers in Texas in 2013. Since then, a further six plants have been announced along the Gulf Coast, and a further two for the northeast of the country from Shell Chemical and Brazil-based Braskem, bringing the total announced cracker capacity to ten in the space of less than two years. Furthermore, ten sites on the Gulf Coast have undergone expansions and upgrades to capitalize on the feedstock advantage, including the BASF TOTAL Petrochemicals LLC steam cracker in Port Arthur. In 2013, the cracker was revamped to process the lighter shale gas, while a tenth furnace was added a year later. Overall processing capacity is set to more than double to 41 million mt per year, according to analysis by market intelligence company ICIS, if all 20 projects come to fruition. Yet Braskem is currently re-evaluating its West Virginia project, in part due to current high construction costs in the United States.

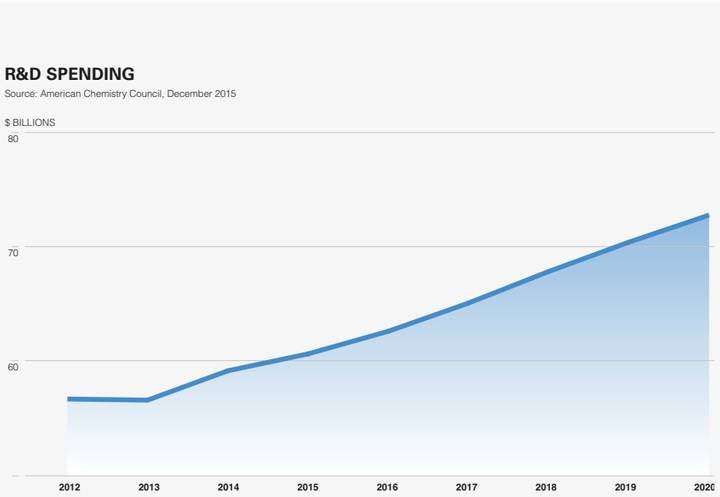
Two decades of stagnation and decline between 1990 and 2010 created a vast hole in the availability of qualified personnel not only to build the new facilities, but also to provide the expertise required to staff them in the future. With limited manufacturing capacity in the country and no prospects of it ending, a generation of young people saw limited prospects in studying for the technical skills the chemical industry might require. Between 2010 and 2014, however, job growth increased 10% in industrial engineering and by one-third in the petroleum engineering space; the market was woefully ill prepared for such a draw on human resources.

The issue is compounded by the fact that the two fields have a higher proportion of their workforce nearing retirement than other areas. A quarter of workers are in the 55-years-and-older bracket, compared to 19% across all occupations. Although the ten years to 2013 saw engineering graduate numbers increase by almost 44%, petroleum engineering in particular is still suffering a shortfall. Economic Modelling

U.S. CHEMICAL PRODUCTION BY VOLUME, 2012-2020 (% CHANGE YEAR-OVER-YEAR)

Source: American Chemistry Council, December 2015





Specialists International (EMSI) figures suggest there were around 3,500 jobs on offer in 2013, for a graduate class of just 1,600 people.

Companies have, however, recognized the problem and are taking steps to improve the situation. BHS Specialty Chemical, headquartered in Nampa, Idaho, and local school Boise State University have created a partnership enabling Ph.D. students to gain applied experience in the food chemicals niche. Netherlands-based DSM is highlighting the opportunities within the chemical industry to an even younger personnel base, promoting the benefits of Science, Technology, Engineering & Math (STEM) education at high schools and community colleges.

East meets West

Currently, the U.S. chemical industry directly employs more than 800,000 people and, according to estimates by the American Chemistry Council, affects a further 5.9 million jobs indirectly. With that figure set to rise dramatically, combined with an increase of around $10 billion to $21 billion in domestic demand for chemicals across a host of industries, the regulatory burden could prove a sticking point. Although fracking has been allowed to advance relatively unimpeded, to the great benefit of the U.S. economy, the chemical industry overall faces a host of compliance issues from manufacturing to distribution.

A hot topic for day-to-day operations is the impact that a potential carbon cap may have as the industry experiences a rapid resurgence in activity. While the U.S. Environmental Protection Agency (EPA) plays an important role in safeguarding the health of the population, chemical companies fear restrictions on activity at a decisive moment in their future operations. Were this to be implemented, the additional costs in adhering to regulation would create a chain reaction effect, rendering the current cost advantages from shale gas redundant.

Regulators have also been dragging their heels on reform of the Toxic Substances Control Act (TSCA), which was first brought into law in 1976. As the key piece of legislation governing public health with regards to the safety of new and existing chemicals, both the EPA and the chemical industry are united in their aim to implement improvements to the outdated ruling; a finalized version is expected to be put in front of Congress and President Obama in 2016, bringing the 40-year-old law in line with twenty-first century operating procedures. Yet to ensure no legislation without representation, industry associations such as the American Chemistry Council and the Society of Chemical Manufacturers & Affiliates aim to educate and lobby lawmakers on their members' behalf.

Although domestic demand for chemicals is set to double, research by management consulting firm A.T. Kearney shows consumption of plastics, such as polyethylene, polypropylene and polyvinylchloride, has already reached its peak in the United States and Europe. Thus an increase in the western world's wealth as they emerge from recession will not spell an uptick in consumer demand. Globally, however, the middle class is still on the increase, with U.S.-headquartered Chemours Co. estimating almost five billion people will fall into that bracket by 2030, up from two billion people at present. This will be seen most strongly in Asia, particularly in highly populated China and India, as well as the emerging Association of South-East Asian Nations (ASEAN) region.

Formerly, the majority of the chemicals produced in the United States were destined primarily for use by domestic companies; exporting product was the exception rather than the rule. As traditional supply and demand markets invert, supply chains must also adapt to the new world order. Companies must now examine their distribution methods and impose greater product stewardship from beginning to end. The ports of both New Orleans and Houston are evolving in line with the increased traffic expected from the Gulf Coast's new and existing chemical operations. Their expansion projects, which will see a new 500,000 square-foot facility at the former and $275 million injected into upgrade work at the latter, will coincide with the completion of the Panama Canal's expansion in 2016. The installation of a third set of locks will double the capacity of the link between the Atlantic and Pacific oceans and enable supertankers and modern container ships to traverse the canal.

The U.S. chemical industry has seen a dramatic reversal in its fortunes during the first half of this decade. Chemical companies have quickly recognized the opportunities available to them and invested in both modernizing their existing capabilities and constructing new ones. But two decades of neglect are not easily rectified and, in order to fully capitalize on the advantages that shale gas is bringing, industry, government and local communities must work together to solve infrastructure and personnel problems in the near term for long-term benefit. •

Kevin Swift

Chief Economist
AMERICAN CHEMISTRY COUNCIL (ACC)

Can you provide a brief background to the American Chemistry Council (ACC), its Economics & Statistics Department, and the specialty chemicals segment of the wider chemicals industry?

The ACC is an advocacy organization for companies engaged in the business of chemistry and is America's oldest trade association of its kind. The association supports public policies that drive the creation of world-class products to improve lives and the environment, as well as enhance the economic vitality of communities and protect public health. The Economics & Statistics Department provides economic analysis of policy initiatives, business trends and changing industry dynamics.

Specialty chemicals are one of five areas of production within the wider chemicals industry, also comprising basic chemicals, agricultural chemicals, pharmaceuticals and consumer products. Specialty chemicals differ from commodity chemicals. They may only have one or two uses, while commodities may have multiple or different applications for each chemical. Commodity chemicals make up most of the production volume in the global marketplace, while specialty chemicals make up most of the diversity in commerce at any given time, and are relatively high value with greater market growth rates. Some areas where specialty chemicals are used include: adhesives, cleaning materials, cosmetic additives, construction materials, food additives, fragrances and detergents. Specialty chemicals are essentially performance-enhancing materials that enable customers to reduce overall system costs and to enhance the process of manufacturing products and creating solutions. This is a $150-billion segment in the United States, which amounts to 20% of the world total of $922 billion.

To what extent are we seeing a return to the United States for manufacturing and what are the influencing factors?

There certainly is a manufacturing renaissance occurring in the United States, especially due to the ongoing increase in oil and gas production here, which affects any industry that uses energy. The revolution in shale gas has fostered renewed competitiveness for U.S. basic chemicals (inorganic chemicals, petrochemicals, plastic resins, synthetic rubber, and manufactured fibers). The effect of this on specialty chemicals has also been positive. In total, we monitor 28 key specialty chemical segments, including coatings, adhesives, and oil-based compounds, to ascertain how the increase in manufacturing here in the United States will affect all these segments. Furthermore, China has become more expensive, negating any cost advantage we may have seen in terms of outsourcing to the region. Crucially, the 2011 Fukushima nuclear power plant disaster in Japan has led to the relocation of numerous manufacturing plants due to disruption of the supply chains. However, we are also seeing an increase in near-shore sourcing, with many manufacturing plants being relocated to Mexico. This lowers the labor cost in a significant way but, with plants around 100 miles from the United States border, also enables U.S. companies to have oversight of operations.

Where are we seeing pockets of activity in this market and how is this affecting growth?

Basic chemicals are projected to grow strongly in the next three to four years because of the renewed competitiveness of shale gas. Nearing the end of 2015, we have been able to identify 255 projects valued at nearly $160 billion tied to this renewed competitiveness. Fully 64% of this is foreign direct investment. Many products that will be produced thanks to this growth will be exported and sent overseas, so this will benefit specialty chemical producers. Many fertilizer projects are occurring in the Midwest, and a cluster of projects is sprouting in the Appalachian region, which is an economically depressed area in general. During 2015 the highest growth was seen in the Northeast, Mid-Atlantic and Ohio Valley regions, reflecting strong gains in certain specialties and consumer chemistry produced in those regions.

What are some indicators used to measure activity in the chemical industry?

The ACC Global Chemical Production Regional Index (CPRI) measures the production volume of the business of chemistry for 33 key nations, sub-regions, and regions, all aggregated to the world total. The index is comparable to the Federal Reserve Board production indices and is developed from government industrial production indices for chemicals from over 65 nations accounting for about 98% of the total global business of chemistry. The Global CPRI measures a variety of downstream products as well as the chemicals segments, including specialty chemicals. We also monitor government data, obtained from real production data for all the industries, and have several market sources to ensure consistency of information.

What can we expect to see in the future of the chemicals industry?

The consensus is that U.S. chemical output will improve during 2016 and the second half of the decade. As a result, following the 3.6% gain during 2015, chemical production will rise 2.9% in 2016 and then surge through 2020. Most segments will grow and prosper over the next five years. We are projecting 3.5% specialty chemical growth next year, followed by 4.1% for the following year. Strong growth is expected in inorganic chemicals, organic chemistry, plastic resins and synthetic rubber as export markets revive and domestic end-use markets further improve. There will also be strong growth in plastic additives, plastic compounding, construction chemicals, electronic chemicals and cosmetic additives, to name a few areas. •

Lawrence D. Sloan

President and CEO
SOCIETY OF CHEMICAL MANUFACTURERS AND AFFILIATES (SOCMA)

Can you talk about some of the recent developments within SOCMA and tell us how the association has evolved since we last met with you in 2012?

One major step for us since 2012 has been to take our ChemStewards® program, which celebrated its 10th anniversary in 2015, to 'the cloud.' ChemStewards®, our environmental, health, safety and security (EHS&S) program, is similar to Responsible Care. ChemStewards® was launched at the request of our members and tailored to meet the unique needs of batch chemical companies. By taking this program to "the cloud," it allows every SOCMA member who participates in the program to have a web portal specific to their company that can be accessed from anywhere in the world. This move has been successful in making program compliance easier for our members and in facilitating the third-party auditing process. We are also making updates to our chemical operator training program, which is an overview course used both within industry and now being promoted to community colleges for people who have little to no knowledge of the chemical industry. Changes include additional content for process formulators that do not practice reaction chemistry, as well as enhancements to the process safety management and process controls chapters.

Can you outline the key areas on which SOCMA is focusing today as a legislative advocate for its members?

Last fall we saw the successful passage of the Chemical Facility Anti-Terrorism Standards program, which was reauthorized in its current form. Today, we are focusing on a number of legislative areas, three of which are Toxic Substance Control Act (TSCA) reform, free trade and the Miscellaneous Tariff Bill (MTB).

We feel true meaningful TSCA reform is within reach, and we are very pleased with efforts from both the U.S. Senate and the U.S. House of Representatives on this issue. In late June, the House passed the TSCA Modernization Act of 2015 (H.R. 2576) by a 398-1 vote, which is almost unprecedented for any legislation, much less legislation that governs our nation's chemical control law. With significant support from both Democrats and Republicans, the Senate passed the Frank R. Lautenberg Chemical Safety for the 21st Century Act (S. 687) in December 2015. We are still hopeful a TSCA reform bill will be passed in 2016 because there is strong consensus now across the chemical industry and across non-governmental environmental groups, and these are certainly the best chances of seeing some tangible change that we have had in more than a decade.

With regard to free trade, we are actively advocating for passage of the Transatlantic Trade Investment Partnership (TTIP) between the United States and the E.U. and the Trans-Pacific Partnership (TPP), which involves countries in the Asia-Pacific region. The specialty chemical industry has more to gain than any other manufacturing sector from the pending free trade agreement with the E.U. The U.S. chemical industry spent more than $1 billion in export tariffs in 2011, and $600 million was spent by organic chemical manufacturers. Congress passed Trade Promotion Authority (TPA) in October 2015, which paved the way to finalize TPP negotiations – now being considered by Congress. Negotiations for TTIP are continuing, and SOCMA has been an active participant by, for example, informing our government about barriers to trade for specialty chemical companies.

We are in the beginning stages of a grassroots campaign to convince Congress to renew duty suspensions. The MTB expired in 2012 and has yet to be reauthorized. Currently, any company importing a raw material of which there is no domestic supplier is obliged to pay a tariff of up to 6.5 percent. According to SOCMA's recent Business Outlook Survey, conducted in conjunction with UBM, owner of the InformEx trade show, 80 percent of respondents reported they import raw materials for which there is no duty suspension procedure in place. Of those who utilize the MTB, nearly 30% saved between $500,000 to more than $1 million per year on duty suspensions. For more than 30 years, Congress had supported American manufacturers by suspending duties on imported products that are not made in the United States. These savings allowed the U.S. specialty chemical industry, as well as a number of other U.S. manufacturing industries, to keep their products at globally competitive prices and pass the duty suspension savings along to their customers. Needless to say, Congress' inactivity on the MTB is hurting SOCMA members, underscoring the need for SOCMA to play a leading role to advance the MTB in Congress.

The chemical industry is set to perform better than the overall GDP this year. On what industries does its fate lie?

The automotive industry is continuing to perform better than GDP, and this is an industry that is heavily reliant on chemicals. Housing is also continuing to rebound slowly. There is ongoing concern with our general infrastructure and, as the transportation fund continues to be in question, we will need a comprehensive infrastructure reform bill. With regards to fine chemicals, the pharmaceutical industry is certainly a driving force, as there is an increased demand for customized medicine. The Affordable Care Act will also usher in an increased demand for medications in general, which will favorably impact the chemical industry. One other area that is driving the U.S. chemical industry is the export business. Burgeoning middle classes in countries such as India or China has meant more call for durable goods for people wanting to live a Western lifestyle. •

Robyn Duda

Brand Director
INFORMEX

Can you give us a brief introduction to the InformEx brand and talk about some of your recent milestones?
InformEx has been around for 31 years and is the global home of the fine and specialty chemical industry. It was originally run by the Society of Chemical Manufacturers and Affiliates (SOCMA) and it was their flagship event for around 20 years. UBM took it over 10 years ago from the association in order to expand the brand beyond just SOCMA members and open it up to the entire industry. The industry itself has changed considerably, certainly over the 31 years that it has been around, but also within the 10 years it has been under UBM, and InformEx constantly has to evolve and adapt accordingly. We aim to be the location at which newcomers to the industry and legacy companies are both able to learn something new about their field.

Why is it important for a company to exhibit at InformEx and what are the principle benefits they will stand to gain?
InformEx is very much the home of innovative chemistry. Through our platform companies are able to meet with potential clients and vice versa, thus advancing the industry as a whole. From an exhibitor standpoint, it is a first quarter event and a place for them to do business at the beginning of the year. Companies will conduct multiple meetings at the event and gauge the success of exhibiting based on how many meetings they are able to arrange.

What are the main sectors within the industry that this event aims to represent?
Our largest percentage is from the specialty chemical sector. The other major areas from which companies choose to exhibit are pharmaceuticals, personal care and energy. Other sectors, such agrochemicals and biotechnology, also exhibit but form smaller segments. The breakdown of those attending more or less marries up to that of those exhibiting. Currently our exhibitors are predominantly based in the United States, but we also have a growing international presence, with China being the second largest exhibitor and India the second largest country represented in attendees.

What recent trends within the industry have you noticed and how is InformEx keeping pace with them?
There is an immense amount of innovation happening in the fine and specialty chemical industries today. The companies who are here at InformEx are creating unique solutions to a broad spectrum of society's needs, from energy and food to medicine and electronics. These are markets that matter to everyone, and that's where we see the growth.
Because the industry is so dependent on the changing needs in these various end markets, our event is absolutely essential—not only for staying on top of important trends and regulations that affect profitability, but also for connecting with the right business partners.
That's what InformEx is all about. Over the next three years, we're going to continue to emphasize innovation across these verticals through our conference programming and educational initiatives. We are committed to bringing in the foremost experts in various end markets to share insights and trends with our attendees and exhibitors.

The companies who are here at InformEx are creating unique solutions to a broad spectrum of society's needs, from energy and food to medicine and electronics. These are markets that matter to everyone, and that's where we see the growth.

Looking ahead what are your key strategy in expanding your exhibitor portfolio?
The first key has been to recognize where the future growth lies for our exhibitors. We have effectively done that and are building programs around verticals like energy, biotechnology, electronics and agrochemicals to drive business partnering and commercialization for our audience.
We are focused on bringing in new attendees from these growth markets, which will not only give our existing exhibitors more opportunities, but also bring in new exhibitors from these verticals. We have really prioritized education and content, and have taken big strides in bringing in thought leaders to address some of the hottest industry trends. Our conference program really drives excitement and creates a buzz that will bring in more attendees and exhibitors alike.
Finally, we have also seen growth in our international exhibitor portfolio, and are set to build on the strides we've made in India and China.

Do you have a final message for our GBR readers?
I never end one of these interviews without making sure to thank the industry. 31 years is a long time to have an established brand in any form, let alone an event. If it were not for the loyalty of the companies within this industry, InformEx would not be here today. The entire InformEx team looks forward to not only making an event that completely satisfies all of our participating companies' needs, but also being part of an organization and brand that is on the cusp of where this industry is heading.•

STRIVING TO SET THE STANDARD: REGULATIONS AND SUSTAIN-ABILITY

"It is extremely important for the United States to be seen as a leader in chemical safety. However, it is an extraordinary challenge in the commercial chemicals space because other developed economies, such as Europe and Canada, have moved ahead in terms of comprehensive chemical standards. This has left us behind, and we have not been able to provide the kind of leadership that we would like."

- Jim Jones,
U.S Environmental Protection Agency (EPA)
Office of Chemical Safety and Pollution Prevention

GLOBAL STEWARDS: FINDING A BALANCE IN CHEMICAL REGULATION

Insights Into the Activities of U.S. Trade Associations and Their Member Companies

Journalist: Harriet Bailey

As activity ramps up and the spotlight refocuses onto an area of U.S. manufacturing that had flown relatively under the radar in recent years—emphasized by the lack of reform to the Toxic Substances Control Act (TSCA) since it was enacted in 1976—associations uniting their members' voices are now more important than ever.

Despite TSCA woes, the United States does not shy away from its responsibilities as one of the largest chemical-producing countries in the world, as attested to by Altivia Chemicals' CEO, J. Michael Jusbasche: "From a regulatory standpoint, the United States is at a disadvantage with Asia. We do have more regulations, but the reality is that as an industry we understand the need for regulations. The American chemical industry has acted responsibly even when competition from foreign countries has been severe."

Chemical companies are aware of the need for regulation, to protect both employees and the public alike from environmental and safety issues posed by the very nature of chemical manufacturing processes, but have highlighted some concerns with the potential for over-regulation, particularly in comparison with other jurisdictions. "The bottom line is that we need a balance between good stewardship of products, the environment, and economics," commented Deltech Corp.'s vice president and general manager Daniel C. Rutherford. "Industry associations such as the ACC and SOCMA are needed now more than ever to bring that balance into the debate," he said.

The United States' oldest trade association of its kind, the American Chemistry Council (ACC), advocates for chemical companies' interests in Washington D.C. and educates its members about relevant legislation. It also conducts its own scientific and economic research, providing key data and statistics on the effectiveness of policy initiatives and changing industry trends. One of the most recent additions to ACC membership is The Chemours Co., having been spun out from DuPont's performance chemicals business in July 2015. CEO Mark Vergnano attributes the importance of associations such as the ACC to the fact that "they facilitate the pooling of the best thinking of their member companies. It also enables us to have a louder voice as an industry when advocating our views to government agencies."

> *"There should be a standardized way of measuring risk so that we regulate those chemicals which are hazardous and could be used in an unsafe manner, while recognizing which chemicals do not require such strict oversight."*
>
> *- Mark Vergnano, CEO, The Chemours Co.*

ACC member companies commit to the Responsible Care initiative, which has been implemented in more than 60 countries worldwide and is overseen by the global trade association for the chemical industry, the International Council of Chemical Associations. Responsible Care aims to improve performance in areas such as environmental protection, occupational safety and health, product stewardship, and logistics. According to the ACC, its member companies are three times as safe as non-member chemical companies, and almost five times as safe as the U.S. manufacturing sector as a whole, reducing process safety incidents by 53% since 1995. "The frustration that persists is that we would like everybody to be working from the same Responsible Care platform worldwide," said Deltech's Rutherford.

Regulating for reputation

While the ACC represents U.S.-based companies across the spectrum of the chemical industry, the Society of Chemical Manufacturers and Affiliates (SOCMA) is an international trade association representing companies in the batch, custom and specialty chemical arena. "With so many complicated regulations and laws governing our industry, we are a resource our members can turn to for guidance," said Larry Sloan, SOCMA president and CEO. "We are their voice on Capitol Hill, advocating for laws and regulations that are based on sound science, where our members can continue to operate their facilities and be good corporate citizens."

SOCMA also created ChemStewards, an environmental, health, safety and security program specifically designed for its members, which was launched in 2005. To celebrate its 10th anniversary, ChemStewards was made a virtual asset. "This allows every SOCMA member who participates in the program to have a web portal specific to their company that can be accessed from anywhere in the world. This move has been successful in making program compliance easier for our members and in facilitating the third-party auditing process," continued Sloan.

As far as petrochemical companies are concerned, their representative body is the American Fuel & Petrochemical Manufacturers (AFPM), established in 1902 as the National Petroleum Association. The AFPM claims its member companies support almost two million jobs across the fuel and petrochemicals space, providing the building blocks for thousands of vital products used in everyday life.

One goal of these associations is to increase public awareness of the chemical industry and help to dispel negative perceptions surrounding it. "One of the challenges that we face is that most individuals know very little about the petrochemical industry and how our products positively impact their daily lives. Since 95% of all manufactured goods are touched by the business of chemistry, we want to ensure that people understand the positive role our industry plays in their daily lives and why our industry is important to them," said Melissa Hockstad, vice president of petrochemicals at AFPM.

The association wants to highlight the use of petrochemicals in areas ranging from food packaging to medical devices, and even in alternative energy sources such as solar panels. The AFPM has a number of educational tools and methods of communicating with the public, including its Petro Primer blog, social media outlets and its outreach with federal, state and local officials.

As the name suggests, the National Association of Chemical Distributors is the trade body for companies involved at the distribution end of the chemical supply chain. Over the last three years, the number of members has grown from 85% to around 93% of eligible distributors. "It becomes increasingly difficult to improve this further. So many of these outlier companies are small operations that are concerned about their ability to implement the program," said NACD's chairman, Mathew Brainerd.

The program in question is Responsible Distribution, which was unveiled in 1991 as the distribution sector's response to Responsible Care in manufacturing. Companies such as Basstech International, a New Jersey-based chemical distributor, gain credence with clients for being third-party verified with a globally recognized compliance program. "The NACD works hard to ensure a correlation between Responsible Care and Responsible Distribution – this makes it easier for the big chemical companies to feel confident distributing through NACD members," explained Ben Gutmann, Basstech's CEO.

Although companies are required to conduct monthly and annual audits in order to remain current, the standardized program ensures conformity across the board.

In 2015, the NACD launched its online training university NACD U which, by 2020, will have a fully stocked curriculum

Focus on TSCA and REACH

The piece of legislation that has dominated talk in the U.S. chemical industry in the past three years is the Toxic Substances Control Act (TSCA) and its meaningful—and long overdue—reform. Following the approval of the TSCA Modernization Act of 2015 by a 398-1 vote in the U.S. House of Representatives in June 2015, and the safe passage of the Frank R. Lautenberg Chemicals Safety for the 21st Century Act through the U.S. Senate six months later, there is hope that 2016 – the fortieth anniversary of TSCA's implementation in 1976 – will be TSCA's year. When the two acts are unified, final legislation will be put before both Congress and President Obama, creating guidelines fit for a new era of manufacturing activity.

There is also hope that TSCA modernization will end the current trend for individual states to implement their own laws regarding chemical manufacturing as a response to growing concerns about new chemicals and a lack of action by the U.S. government. "For many years, states have perceived a vacuum at the federal level and have viewed the EPA as ineffective in regulating chemicals that are of concern to them," explained Mark Duvall, attorney-at-law at boutique law firm Beveridge & Diamond. "The state-specific requirements tend to be inconsistent and lacking the scientific review process normally conducted by the EPA."

Additional levels of bureaucracy have created a quagmire of red tape for chemical companies that are forced to manufacture products to a number of different standards to suit states' individual needs. State-specific regulation, however, tends to be simplistic, based on the lowest common denominator, when chemicals are anything but. "TSCA legislation is risk-based, but it is much easier to administer a hazard-based program," said Duvall, explaining the prevalence of this type of rule making at the state level.

Hazard-based programs only account for a chemical's presence on a binary basis, rather than actual amounts of a chemical present and whether it would have any health or environmental impacts at that level.

Chemical companies themselves are in desperate need of a resolution to the TSCA issue after years of uncertainty and particularly considering the European Union implemented its chemical laws in 2007. "It may be unusual for an industry to support further regulation, but this regulation from a federal perspective will provide clarity and consistency across the United States in much the same way that REACH has done across Europe," suggested Craig Rogerson, CEO of specialty chemical company Chemtura.

At a global level, chemical companies are focused on the European Union's Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH) regulation. This legislation requires every chemical that a company manufactures to be registered with a Substance Information Exchange Forum on its health and environmental effects.

Registering with REACH is initially very costly; at a distribution level, the E.U. requires a SIEF dossier for moving more than one metric ton of a chemical per year and costs between $75,000 and $500,000 depending on the chemical. "You have to identify which are your key chemicals and what is viable," explained Carlos Restrepo, senior vice president of performance chemicals at Aceto Corporation, which currently distributes 700 eligible chemicals.

Although many specialty chemicals are crucial to the formulation of a product, they are likely to only make up a small percentage of it. Suppliers may therefore choose to discontinue that product rather than pay for registration. "If we do REACH right for one or two items with a customer, our feeling is that Aceto can be seen as a supportive supplier and take over any business that might fall away from other suppliers," said Aceto's vice president of specialty chemicals, Keith Wilkinson.

In order to ensure the supply chain for these products in the future, companies across the spectrum will have to work ever more closely and end-users may need to contribute towards the costs associated with REACH, while some chemicals may only be manufactured and distributed by certain suppliers, limiting consumer choice on the one hand but benefiting individual companies on the other.

Some companies, such as chemical distributor BassTech International, have found ways to maneuver within the additional regulatory requirement, for example by opening a European office.

> *"It may be unusual for an industry to support further regulation, but this regulation from a federal perspective will provide clarity and consistency across the United States in much the same way that REACH has done across Europe."*
>
> *- Craig Rogerson, CEO, Chemtura.*

"We do see opportunities in the future as certain product lines are forced out of Europe. The world demand for a product will not change and, as production becomes increasingly automated, China has less of an advantage," said COO Alan Chalup. "We see the opportunity for supply growth in the coming years as some production exits Europe due to the constraints imposed by REACH and moves to the United States."

Specialty chemical company Omnova Solutions, on the other hand, welcomes regulation such as REACH: "We see REACH as an advantage for U.S. and European companies, as it provides a standard framework under which all companies must operate. Despite the additional cost, it levels the playing field and, from a compliance perspective, regulation is very positive for our portfolio," explained Anne Noonan, president of performance chemicals. "Stricter regulation forces us to think differently and advance the specialty chemicals industry on a global level." Such regulation also seems to align with customer thinking, and adherence to greater environmental and health controls has the ancillary effect of creating greener products with enhanced performance attributes.

on the thirteen different codes within Responsible Distribution. "Rather than leaders having to learn about these codes for verification review in person, we are bringing the training to them," outlined president Eric Byer on initiatives to encourage all U.S. chemical distribution companies to become NACD members. "If we can minimize the compliance burden on our member companies, ensuring fewer regulations while maintaining a safe environment that leads to good economic growth, then we will have had a very successful three years."

The importance of unified compliance programs such as Responsible Care, Responsible Distribution and ChemStewards to economic growth and a positive global reputation is not only felt by the industry associations themselves, but also by their member companies. As part of the global chemical market, companies find the additional layers of regulation for each jurisdiction particularly challenging: "It makes it very difficult for businesses to operate and grow when so much capital is deployed toward completing compliance matters rather than on our R&D programs," commented Hugh C. Welsh, president, general counsel and secretary of DSM's North American operations.

Extra costs picked up along the way are also passed onto the consumer, without increasing the value of the chemical.

Companies are also concerned about over-regulation and inconsistent attitudes towards certain chemicals, stemming from a lack of knowledge about the risks involved at certain concentrations. "There should be a standardized way of measuring risk so that we regulate those which are hazardous and could be used in an unsafe manner, while recognizing which chemicals do not require such strict oversight," said Chemours' Vergnano.

> *"With so many complicated regulations and laws governing our industry, we are a resource our members can turn to for guidance. We are their voice on Capitol Hill, advocating for laws and regulations that are based on sound science, where our members can continue to operate their facilities and be good corporate citizens."*
>
> *- Larry Sloan, President and CEO, Society of Chemical Manufacturers and Affiliates (SOCMA)*

This will most likely be achieved by countries working together to share best practices and create global standards, suiting a global economy and ensuring consumers the world over are protected. "Worldwide stewardship and best practice is critical to the reputation of the global chemical industry. Incidents in one country have ramifications worldwide and could be prevented with the correct processes," said Brainerd, formerly president of the International Council of Chemicals Trade Associations before his role at the NACD.

With proven programs already in place around the world, global uniformity cannot be far off. •

Mark N. Duvall

Attorney at Law
BEVERIDGE & DIAMOND P.C.

Could you introduce Beveridge & Diamond and explain more about the areas in which you work?
Beveridge & Diamond is a boutique law firm focusing on environmental and natural resource law, litigation and alternative dispute resolution. Our 100 lawyers are based in seven offices across the United States. In addition to the traditional environmental areas of air, water and waste, we work in a wide variety of related areas, including product restrictions, design and disposal. Furthermore, we work with companies on their sustainability efforts. In the chemicals area, we have been working with the Environmental Protection Agency (EPA) regarding the implementation of the Toxic Substances Control Act (TSCA). We have played a significant role in the efforts to modernise this piece of legislation, which dates from 1976.

How important will the imminent TSCA reforms be for the chemical industry and what impact will they have on the way the EPA operates in future?
At present, the EPA has 90 days to review a pre-manufacture notification for a new chemical; if it takes no further action, the chemical can subsequently be manufactured commercially. Under the TSCA legislation currently under discussion in the Senate, the EPA would have to make an affirmative determination that a new chemical is likely to meet the safety standard. High-priority chemicals would be reviewed against certain scientific criteria in a set timeframe. If the chemical does not meet the required standard, the EPA would be required to regulate that chemical until it does.
The preferred outcome for the chemical industry is that individual states would feel less pressure to adopt state restrictions on chemicals in products. For many years, states have perceived a vacuum at federal level and have viewed the EPA as ineffective in regulating chemicals that are of concern to them. The state-specific requirements tend to be inconsistent and lacking the scientific review process normally conducted by the EPA.
Even more significantly, in a country where products are sold both nationally and internationally, any state restriction on the content of a product has, at the very minimum, national implications for companies that make and distribute products. Thus, if it is understood that the EPA is addressing chemical issues on a prioritized basis, the requirement for them to spend their limited resources on the adoption, implementation and enforcement of product regulatory programs lessens.

The TSCA reform effort began in 2005. Could you outline activity in attempts to reform the TSCA legislation during the last 10 years and explain what is happening at present?
The Act applies to tens of thousands of chemicals, used in a number of different ways but predominantly in industrial activity with minimal consumer exposure. The safety standard in the earlier legislation was one of 'reasonable certainty of no harm', which was widely considered by the industry to be inappropriate for the chemicals under consideration. Until 2013, no compromise bills addressing various issues in the wording of the legislation achieved bipartisan support. Beginning in 2013, a fresh approach was launched which has now resulted in legislation that is close to final approval. The House of Representatives passed its version of the legislation in June 2015, and the Senate passed its version in December. Once the two versions are reconciled, final legislation will be passed by both Houses of Congress and sent to President Obama for signature. He is expected to sign it.

What will be the consequences for manufacturers and distributors on a nationwide level?
They will face more challenges regarding regulation and greater scrutiny on new chemicals. However, manufacturers and distributors may have the opportunity to influence the EPA's selection of high priority chemicals and to have input into their subsequent evaluation or restriction. Additionally, manufacturers and potentially processors will face increased fees for a wider variety of activities in order to help pay for TSCA administration; limited fees are currently in place, but these are capped at $2,500 and are only applicable if certain conditions are met.

Looking towards the future, what are the principal sustainability issues you will be tackling and how is this area of the industry regulated?
Sustainability considerations have been a major stimulation to innovation in the industry, highlighting the importance of removing any unnecessary barriers to innovation. The EPA has been promoting greener technologies through its 'Design for the Environment' Program. This is, however, a hazard-based program that does not take exposure into account, eliminating risk as a decisive factor. The mere presence of a chemical that has toxicological issues associated with it at some level renders it ineligible in that program, regardless of whether the low levels of use would create risk. If it can be detected in the parts per trillion level, it is unlikely to have any significant health or environmental impact, but at this level of disclosure many chemicals are affected. TSCA legislation is risk-based, but it is much easier to administer a hazard-based program and explains why this approach is favored at the state level. •


MS


PH

Mike Shannon & Paul Harnick

MS: Global Chair
PH: Global COO
CHEMICALS AND PERFORMANCE TECHNOLOGIES, KPMG

Could you introduce us to KPMG's Chemicals and Performance Technologies segment on a global level?
MS: We provide audit, tax and advisory services to the chemicals sector. KPMG has professionals in every major market worldwide focusing solely on providing services to our clients. Paul and I spend a lot of time travelling to different parts of the world to meet with our clients and to gain first-hand understanding of the sector.
PH: The energy practice within KPMG, of which the Chemicals and Performance Technologies segment is a part, is a strategic priority to the company. We are extremely strong in areas such as transfer pricing, international tax and tax optimization, while key areas of focus on the advisory side would be mergers and acquisitions; working capital optimization; cost reduction and process efficiency; and supply chain management. As a company, we perform external audit services for 32% of chemical companies around the world worth more than $1 billion, and we provide either tax or advisory services for the vast majority of the remainder.

What are the main differences between the chemical industry in the United States as it stands now versus other regions worldwide?
MS: The United States is now the number one strategic focus area in the world. Although China is bigger in terms of output, the focus is on the United States from a strategic and investment perspective. Although the sudden drop in the price of oil has somewhat levelled the playing field, the low price of natural gas means the United States is still the most cost-advantageous region for the production of chemicals outside of the Middle East. We are also seeing the return of manufacturing, taking advantage of cheaper raw materials.
PH: If you had asked us three years ago if we would ever see a world-scale commodity chemical plant being built in the United States again, we would have categorically said no. Our expectations for growth lay in the emerging markets of China, India, and Brazil, in that order. Now, although China remains at the top, India and Brazil have fallen off the list, to be replaced by the Association of South-East Nations (ASEAN) region in particular, and Europe. Brazil has been teetering on the brink of recession for the last 18 months, while India continues to be constrained by a lack of feedstock and very weak infrastructure. Both countries really struggle from a legislative standpoint, with Brazil in particular having one of the most complex tax regimes globally. As such, we are not seeing global chemical companies prioritize investment in either of these regions. Combined with the $135 billion worth of new capacity under construction in the United States, this is causing a fundamental shift in the world chemical marketplace.

Considering the chemical industry is now one of the strongest areas of the U.S. economy, what challenges does the uptick in production spell for companies themselves?
MS: The reality is that the U.S. economy will likely not be able to absorb all of the molecules coming out of the ground, and the country will have to increase its exports. Since the chemical industry has not needed to focus heavily on export procedures for the last 15 years, this will prove a significant challenge.

In the search for new end markets for the chemical industry, which industrial segments and geographies may prove able to absorb this extra capacity?
PH: There are a number of traditional end markets for chemical products, but we also need to look at what is happening in the automotive and construction industries, for example. The U.S. automotive industry is fairly strong at present, unlike its Chinese counterpart. More broadly, global mega trends tend to drive demand for chemical products, as does population growth and urbanization in emerging markets. Geographically, China continues to be a substantial end market for chemicals, despite its current woes. Many of our clients are looking at the ASEAN region as the next growth area; Indonesia for example has a potential 250 million consumers, while Vietnam has a low-cost manufacturing base and is benefitting from companies withdrawing their operations from China to take advantage of low wage rates.
MS: Even the traditional end markets for chemicals are undergoing change. Cars today require far more chemicals than 15 years ago, with for example carbon fiber replacing steel and plastics and other composites replacing aluminum. The transformation within those subsectors will have an extraordinary impact on the chemical industry. With urbanization, newer housing is more energy efficient and sustainable technologies are required.

Petrochemicals are seeing a resurgence in the United States. How are the dynamics between low oil prices globally and high volumes of feedstocks playing out?
PH: The U.S. petrochemical industry is booming, which will have a severe detrimental impact on petrochemical production in Europe. Currently, the decline in the price per barrel of oil has contributed to a small but perceptible renaissance among European manufacturers; they remain cost disadvantaged to the United States, but less so than 12 months ago. Yet it remains to be seen how long oil prices remain at this level. •

Vijay Sarathy

Partner
PwC

but there are a handful of themes that have emerged consistently across multiple client feedback surveys over the years: the ability of our consultants to connect with and work at multiple levels within the client organization, a reputation for coming up with practical, implementable solutions and, above all, our credibility and trustworthiness. BrandFinance has ranked PwC as the world's most valuable professional services brand for the past two years. IDC, a key industry analyst, has positioned PwC as a Leader in three Worldwide Digital Strategy Consulting services reports.

How has the U.S. shale gas revolution along with current low oil prices affected chemical market dynamics across the globe?
The shale revolution in the United States has upturned the world of petrochemicals. The impact varies by region: Japanese and Korean companies, which rely on crude oil-derived naphtha as a feedstock, are looking for ways to become involved in the United States; Middle Eastern players, while still competitive, are looking to broaden their product slates by adding more downstream products and also expanding beyond ethylene derivatives; the European industry is looking to remain competitive, and the current lull in crude oil prices provides a temporary reprieve. The large players are well diversified, both in terms of product slate and geographic distribution of their assets, but many of the 'stranded' players could fall by the wayside.

Innovation is seen as a catalyst for growth in the chemical sector. How should companies therefore approach innovation across their businesses?
Innovation is the lifeblood of all industry and it is no different for chemicals. Over the years, much of the focus in the chemical industry has been around inventing new molecules and developing new process technologies to make them. The pace of introduction of new molecules has slowed over the past couple of decades, but there is still room for new materials due to a couple of big trends: sustainability and additive manufacturing – also known as 3D printing.
There is another revolution unfolding right before our eyes that promises to drive a lot of innovation in the coming years, which we term 'the digital revolution'. We see this playing out in the chemical industry in four ways: performance and agility, customer interface, innovation and organization. Nearly all the equipment employed in the manufacture, storage, and transportation of chemicals can be retrofitted or redesigned with digital technologies to improve performance. Frontline, customer-facing staff who are able to access and integrate the massive flows of data that digital technologies provide can become business partners with customers rather than mere sales personnel. Digital technologies are creating structural changes in the ecosystem of most of the sectors that the chemicals industry serves, such as automotive and electronics. These shifts will favor chemicals companies that can innovate quickly, draw accurate customer insights, and manage complexity. Finally, many internal processes of chemicals companies — such as human resources and supply chain planning — are fragmented and scattered across different geographies, reducing efficiency. To counter this pattern, companies are increasingly using collaboration platforms to coordinate global activities and to drive more seamless employee and customer experiences. However, the potential for organizational transformation goes well beyond better collaboration. The ubiquitous availability of data can flatten organizations — devolving decision rights to local regions and creating new forms of organization that will make chemicals companies nimbler, leaner and more exciting workplaces for a new generation of employees.

How can we expect the U.S. petrochemical industry to develop and how will PwC support its clients into the next decade?
The United States is once again one of the most competitive locations for manufacturing petrochemicals and that is not about to change, despite the recent decline in oil prices which has simply reduced the magnitude of cost advantage between the United States and other regions. There will be challenges ahead in 2017/2018, when the next wave of new plants comes online; however, by the end of the decade additional demand should ensure a rebalancing of the market. By offering a full suite of services, PwC is industry-cycle agnostic. We listen to our clients to find which service is most relevant for them and, going forward, we will continue to invest and support companies in embracing digital innovation to bring the U.S. chemical industry into the twenty-first century. •

Andy Walberer

Partner, Chemical Industry Practice
A.T. KEARNEY

A.T. Kearney was founded almost a century ago. Could you explain how the company has evolved during that time?
A.T. Kearney started in 1926 and is now a firm of 3,500 consultants and 350 partners worldwide serving all major industries in the areas of strategy, operations, information technology and transformational work. Our chemicals and energy practice is our second largest practice, covering the oil and gas segment from upstream exploration and production to refineries and petrochemicals downstream. We have more than 50 energy industry experts worldwide focused on the sector and feel confident in our knowledge base.

Ethylene capacity will grow by up to 40% by 2020. How is the return of manufacturing to the United States affecting the strategies of global chemical companies?
The industry in 2016, compared to 2012, has much more of a medium- to long-term focus versus the previous near-term focus. In 2012, many companies were still focused on recovering from the recession in 2009. Looking at chemical output and stock prices, recovery was good in 2010 and companies started to grow in confidence; 2011 was a weak year and led to a focus on cost cutting and improving margins. This pressure on performance and atmosphere of caution continued into 2012, when capital spending became limited.
Regarding shale gas, it was beginning to have an effect in 2011 but many in the industry, especially those outside the United States, did not fully believe it was real. At that time, only two cracker projects had been announced; there are now 14 projects in the pipeline, with seven under construction. Performance-wise, chemical companies did well in 2013 and 2014, and it was in 2015 that we saw the beginnings of a longer-term focus by company leaders. Companies are concentrating on their portfolio and what aspects of their businesses are core, looking to invest in big capital projects in those areas and divest from businesses where they have neither scale nor capability.

What other industry trends are we seeing on a global level?
It is helpful to think about the chemical industry trends in three areas: feedstock trends, internal industry dynamics, and customer trends. The majority of change is taking place at the boundaries with inputs (feedstock) and outputs (customer) trends. Regarding feedstock trends, a lot has happened with shale that has clarified the situation globally about the feedstock basis of competition for each region. North America will compete with natural gas liquids, China is shifting from naphtha to coal, while the Middle East and Europe will both compete based on naphtha, with the former having a cost advantage. Also, margins have migrated upstream, meaning that if you are non-integrated, the gap between pure downstream players and their competitors with cracker assets has become wider over time.
On the output side, two interesting things are happening. First, chemical companies that are more solutions-focused have a much higher enterprise value multiple on their margin than broad-base players, such as Dow or BASF, and in turn have a higher multiple than pure feedstock players such as LyondellBasell or Sabic. Shareholders are rewarding these solutions-based players. Second, consumption per capita appears to be peaking in developed economies while still growing in developing economies. But it is not yet clear whether developing world per capita consumption will approach the levels in the West, or peak at a lower level.

As capacity increases, will we see more working partnerships between the United States and China or other Asian countries?
Foreign investors will likely continue to have an interest in investing in the United States due to its favorable feedstock, capital expenditure, and demand environment. This could be via direct investment – a number of Chinese companies have built methanol plants in Louisiana – or through partnerships. Mitsui for example has been a co-investor in new Gulf coast projects. An additional partnership dimension is U.S. companies partnering with or acquiring Chinese companies to get access to the Chinese market. Despite having a relatively more fragmented and competitive market than the West, U.S. companies remain interested in China as it is the largest and among the fastest growing markets for chemicals.

How will increasing regulation impact the United States' rapidly growing chemical industry?
In the United States so far, regulators have been balanced in their approach to regulating fracking based on its relatively positive operational track record and the economic benefits from growth and jobs. One area to watch is carbon regulation. If the United States were to put in place, for example, a carbon tax, this would likely cause a significant shift in power production investment from coal to natural gas, and the subsequent increase in natural gas demand would raise prices for natural gas and natural gas liquids, key petrochemical feedstocks. Outside the United States, another key area to watch is trade policy among major chemical importing countries. If China, for example, were to impose meaningful import tariffs on petrochemicals and plastics, that would impact planned U.S. export flows from the many Gulf Coast capacity-expansion projects. •

SUSTAINABLE SOLUTIONS: ENVIRONMENTAL DEVELOPMENTS IN THE U.S. CHEMICAL INDUSTRY

Re-asserting the United States' Position on the Global Stage

Journalist: Harriet Bailey

Image: Thinkstock

When thinking of the chemical industry's impact on the environment, the image that comes to mind is of sprawling petrochemical plants spewing noxious gases into the atmosphere. Issues surrounding sustainability and the implementation of green chemistry practices have become increasingly important to the chemical industry in recent years.

Environmental consulting companies such as Spirit Environmental, which celebrated its 10-year anniversary in 2015, have sprung up to advise chemical firms on an increasingly regulated sector of the industry. "Sustainability is a media in which we will be consulting in the future because the industry as a whole, and especially the large global players, are most certainly moving towards more sustainable operations," claimed Spirit co-founder Brad Herrin.

As countries move towards limiting global warming, primarily by reducing greenhouse gas emissions, the chemical industry's image needs to change.

The Environmental Protection Agency (EPA) came into being in 1970 following the implementation of the National Environmental Policy Act. Its aims were to protect human health by reducing pollution in the air, water and on land, and it began its task by setting national air quality standards in the Clean Air Act in 1970. New air quality standards were passed in 1997, and strengthened further in 2006. The Clean Water Act was initially passed in 1972, with the purpose of preventing pollution in U.S waters; this was updated in 1977 with further importance placed on toxic pollutant control. New standards for chemical plants, intended to reduce toxic air pollution by more than half a million metric tons each year, were issued in 1994, while the first air pollution regulation aimed at refineries came roughly one year later.

In addition to developing and enforcing regulations and standards in response to environmental laws set by Congress, the EPA provides compliance assistance by way of grants and sponsored partnerships with state environmental programs, non-profit organizations and educational institutions. It also conducts its own research into environmental challenges, informing both its own and other countries' decision-making processes. The EPA then uses its knowledge to carry out educational programs in schools and businesses, as well as via written materials and its website.

In terms of its work with the chemical industry, the Office of Chemical Safety & Pollution Prevention (OCS&PP) evaluates chemicals for use in the United States via the Toxic Substances Control Act (TSCA). All new chemicals have to be approved via information provided in a pre-manufacture review. Assistant administrator of the OCS&PP Jim Jones explained: "We use specific modeling to evaluate chemicals based on their structure, which is why pre-manufacture notices, containing the structure of chemicals and health and safety data, are so valuable to us. If we can pinpoint risk from this, we will then ask the manufacturer to provide more specific data, enabling us to carry out further assessment on that chemical."

OCS&PP takes into account both how hazardous a chemical is, as well as the degree of exposure to that chemical. "This enables us to have a fair amount of influence over the chemical industry in the United States. With our approach to innovative pollution prevention and sustainability programs, we are helping to lead the way for consumers and companies in being sure of the ingredients and products they are using," he continued.

Although OCS&PP has taken steps to reduce the administrative burden felt by companies, such as starting a series of webinars and issuing step-by-step guidance to its electronic reporting system, consultants such as Spirit are still contracted by chemical firms struggling with outdated processes in a time of rising reporting requirements. "Workers go into refineries and plants and help with monitoring, inspecting, record keeping and reporting. Using men instead of machines for manually feeding in data and keeping a track of it is inefficient and laborious, and this needs to change within the industry," said Herrin. "Processes need to be improved in terms of controlling emissions, especially by the medium and smaller players. A huge market exists here for our personnel to help improve the efficiency of these companies and their systems."

However, companies are reluctant to allocate further capital for dealing with regulatory requirements, and this looks set to remain a challenge for the foreseeable future.

The sheer scale of the chemical industry within the United States, as well as flaws in key regulation such as TSCA, has caused the United States to lag behind other jurisdictions in terms of chemical safety. "It is an extraordinary challenge in the commercial chemicals space because other developed economies, such as Europe and Canada, have moved ahead in terms of comprehensive chemical standards," said Jones. "This has left us behind, and we have not been able to provide the kind of leadership that we would like."

Emission control

Chemical companies are often motivated by client needs to incorporate sustainable processes and eco-friendly products into their operations. By incorporating fewer gas- and naphtha-based raw materials into their production, companies choosing this option will secure themselves a competitive advantage. "When we have the opportunity to replace raw materials with sustainable substitutes, we implement it with our clients," said Dean Cordle, president and CEO of AC&S, Inc. These measures can, in some cases, improve the efficacy and performance of products. "We are also committed to employing sustainable business practices, continually looking for ways to incorporate sustainable manufacturing techniques in our operations," he continued.

Furthermore, the EPA also sets the Renewable Fuel Standard, which requires the oil and gas industry to blend a certain amount of biofuels into gasoline. The latest annual volume requirement has increased the amount of ethanol to be included to more than 10% of final transportation fuel, benefitting those chemical companies looking at their sustainability operations in this area. "This is a very positive development for both DSM and the environment," said Hugh C. Welsh, president, general counsel and secretary at DSM North America. "This makes sense for the country considering we have both the biomass available and advanced technologies. It will also reduce our dependency on foreign oil, sending fewer of our dollars to the Middle East and investing more here at home."

This is a particularly positive development for chemical companies operating in the bio-renewables space, as current low oil and gas costs have made the market for biofuels less competitive. In line with DSM's core value of sustainability and the fact that ethanol-based fuels emit 95% fewer greenhouse gases than their petroleum-based counterparts, the Dutch company opened its first commercial-scale cellulosic ethanol plant in the United States in 2014.

Brazil-based Braskem, meanwhile, is the largest biopolymer player globally, thanks to the low cost of biomass in its home market. However, bio-renewable feedstocks are more of a niche market in the United States, where shale gas is king. "Our choice of materials is based on minimizing conversion costs for users and is the reason behind our decision to start with green polyethylene, which is the same as a gas- or naphtha-based polyethylene, but sourced from a renewable feedstock. This is a more sustainable strategy as opposed to developing new chemistry and new polymers that would require clients to convert their equipment," stated Fernando Musa, CEO of Braskem America.

Although the availability of low-cost hydrocarbon resources has not helped the global quest toward harnessing alternative raw material options, bio-renewables will still have their place in the U.S. chemical industry as a result of federal sustainability goals and the actions of chemical companies from overseas markets that lack low-cost feedstocks. •

Jim Jones

Assistant Administrator
U.S ENVIRONMENTAL PROTECTION AGENCY (EPA) OFFICE OF CHEMICAL SAFETY AND POLLUTION PREVENTION

Could you explain the overall role of the Office of Chemical Safety & Pollution Prevention (OCSPP) within the U.S. Environmental Protection Agency (EPA)?
We are different from other parts of the EPA because we are evaluating products in the chemical industry. Pesticides for example have a structure that means any U.S.-based company is required to come to us for a license of approval before their products can be sold here. We then reevaluate every pesticide license every 15 years. In the commercial chemicals arena, we have jurisdiction over chemicals under the Toxic Substances Control Act (TSCA). We run a pre-manufacture review for any chemical that is not already being sold in the United States, but are not required to reevaluate any chemicals already on the market. The fundamental nature of the work is similar in that we assess the safety of chemicals and pesticides. If we determine that they are not safe, we take every measure to ensure human health and environmental safety. We were given the lead for pollution prevention 25 years ago, so we have an active group in our toxics program that focuses on pollution prevention activity.

Could you provide a brief overview as to where TSCA needs to be modernized to fit the current environment?
When TSCA was passed, there was a general sense that EPA did not need to be concerned with any potential adverse effects of chemicals already on the market. However, there are at least 1,000 chemicals that we know could pose a hazard and, within the agency, we therefore need some scope for evaluation of existing chemicals and their safety. Conducting assessments on these chemicals to ensure that they are safe is imperative; this is the fundamental flaw in TSCA as it currently stands.

Could you explain how the OCSPP evaluates new chemicals and how you provide administrative support for companies submitting pre-manufacture notices?
Regarding new chemicals, there are two elements to analyzing chemical safety: one is hazard, and the second is exposure. Exposure is a function of where, how and how much the chemicals are used. The production data that we require every four years from manufacturers on chemicals already in commerce helps us understand the degree of exposure of a chemical and helps inform our decision-making about where we should focus our attention. When reviewing new chemicals, we use specific modeling to evaluate chemicals based on their structure, which is why pre-manufacture notices, containing the structure of chemicals and health and safety data, are so valuable to us. If we can pinpoint risk from this, we will then ask the manufacturer to provide more specific data, enabling us to carry out further assessment on that chemical. In terms of reducing the administrative burden, we have started a series of webinars and provide step-by-step guides. The reporting system has been set up electronically, which highlights any errors and makes it easier to submit accurate data.

Could you explain the OCSPP's initiatives to promote green chemistry within the industry and how they benefit both the producer and the consumer?
We have sponsored a Presidential Green Chemistry Challenge award for the last 20 years. This allows us to recognize chemical companies, as well as people, in the academic, innovation, or engineering space for green chemicals. We work collaboratively with the American Chemical Society Green Chemistry Institute® and other members of the chemical community including industry, trade associations, academic institutions, and other government agencies. We make efforts to ensure that these award-winning chemistries are known and published and explore potential barriers to implementation. We also have a consumer-oriented program known as Safer Choice, which is fundamentally about green chemistries and products that are evaluated by EPA and follow rigorous health and safety standards.

How important is it for the United States to be the leader in setting standards that can be a benchmark for global environmental regulation?
It is extremely important for the United States to be seen as a leader in chemical safety. However, it is an extraordinary challenge in the commercial chemicals space because other developed economies, such as Europe and Canada, have moved ahead in terms of comprehensive chemical standards. This has left us behind, and we have not been able to provide the kind of leadership that we would like.

How important is it to collaborate with industry associations, manufacturers and environmental consultants on issues affecting the chemical industry and how do you envision the OCSPP evolving?
Collaboration across all stakeholder groups is how we solve problems and eliminate transaction costs. We are currently focusing on our main work of routinely evaluating chemicals for safety; this enables us to have a fair amount of influence over the chemical industry in the United States. With our approach to innovative pollution prevention and sustainability programs, we are helping lead the way for consumers and companies in being sure of the ingredients and products that they are using. •

Brad Herrin

Co-Founder
SPIRIT ENVIRONMENTAL

Can you provide a brief introduction to Spirit Environmental and the firm's relationship with the chemicals and petrochemicals sectors?
The company was founded in Houston, Texas, in 2005, primarily for air quality consulting for the chemical and petrochemical industries with some refining, oil and gas. Currently, we are continuing to grow in air and water, and are strong in the National Environmental Policy Act (NEPA) and waste management. When clients require it we contract out safety, TSCA-related cases, soils and groundwater. Much of our growth was fueled by oil, gas, and shale gas. We generated $6 million in revenue in 2014. While we saw a loss of $1.5 million in oil and gas revenues in 2015, we replaced it with refining and chemicals, which should see us make a similar amount in sales overall.
We help companies stay compliant by sharing air quality regulations. We do not test operations; rather, we help them find a stack-testing company that assists them with their emissions and, when they are looking to expand, we help them compile their paperwork for the Environmental Protection Agency (EPA). We are starting to get into transactions, due diligence and management systems. Our role is to partner with the industry more than the government because it is part of our business to defend companies when the EPA or the state has brought legal action against them. We therefore also cover audits, legal support, and expert witness testimony.

How has Spirit achieved 'Houston's Best and Brightest Companies to Work For' award two years in a row?
We care very much about people's careers and recruit in alignment with our core values: people, integrity, excellence and continual improvement. We started as four seniors and were very project-driven. From about 2010 onwards, I started recruiting and training employees and we moved into new offices. The team grew to 25 people, many aged between 22 and 26. We believe in servant leadership, in that you have to provide a team member or client with the tools for the task first. Our employees are very loyal to Spirit, and we have never lost an employee to another consulting firm, although we have exported talent to industry players that are now clients.

How has the industry's focus on safety and sustainability developed over the last decade?
Safety and sustainability is about protecting people and the environment. Safety has been an important factor in the industry for a very long time, especially with the presence of OSHA. If we had branded as a sustainable green company ten years ago, it would not have been well-received. Sustainability is a relatively new concept that is becoming imperative to our clients' process when selecting a firm for their consulting purposes. In 2015 we formed a sustainability committee within Spirit, comprising members of the team who are passionate about sustainability and becoming involved in local associations and clients' sustainability programs. Sustainability is a medium in which we will be consulting in the future because the industry as a whole, and especially the large global players, are most certainly moving towards more sustainable operations.

How have U.S regulations on air quality evolved and what can be done to improve emission control going forward?
We have been using point sources since 1970 when the Clean Air Act was formed. In 1990, the Clean Air Act amendments were really effective in lowering emissions by significantly improving air quality in terms of toxics, VOCs and NOx. There is an enormous regulatory burden on the industry and we are at the law of diminishing returns, because we are not going to spend billions more in capital. With smog, the EPA cannot control mobile sources as much as they can point and area sources.
We have workers that go into refineries and plants and help with monitoring, inspecting, record keeping and reporting. Using men instead of machines for manually feeding in data and keeping a track of it is inefficient and laborious, and this needs to change within the industry. Processes need to be improved in terms of controlling emissions, especially by the medium and smaller players. A huge market exists here for our personnel to help improve the efficiency of these companies and their systems.

What are Spirit's future goals?
Spirit has just launched the 3.0 growth mode, which has seen us form five major programs, including chemicals/petrochemicals and covering regional zones. Each program will now be looked at for controllable profit and loss factors to support our growth strategy. Our goal is to help sustain the environment and do the right thing, especially given that the United States is behind Europe and Canada in conserving the environment because we have a large carbon footprint and considerable wastage of resources. •

Image: Thinkstock

COMING HOME: CHEMICAL MANU-FACTURING

"North America is important to us for many reasons: it has an abundance of great universities, including six of the ten highest-ranked universities in the world; nine of the ten most active cities in the world for start-ups are here, drawing in the brightest minds from around the world; and the United States spends more than any other country globally on research and development."

- Teressa Szelest-Shah,
President, Market and Business Development North America,
BASF Corp.

GLOBALLY POSITIONED: GROWTH STRATEGIES OF MULTINATIONALS

Focusing on Core Competencies and Sustainable Innovation

Journalist: Harriet Bailey

The shale gas renaissance has given the United States a new lease of life in terms of its attractiveness to global chemical companies. More affordable and abundant feedstocks, particularly in comparison to Europe, have affected the strategies of household names such as The Dow Chemical Co., BASF Corp., and DuPont, resulting in increased investment in North America and even company-wide shake-ups.

While spin-offs are nothing new – GenCorp, Inc. spun out Omnova Solutions in 1999, while LANXESS Corp. was formed from Bayer's chemical division in 2004 – companies are increasingly looking to divest non-core business units in order to focus on their strengths. The second half of 2015 saw two high-profile, standalone companies formed from peripheral divisions: The Chemours Co. was previously DuPont's performance chemicals segment before being cut loose in July, while Covestro emerged from what had been Bayer MaterialScience in September. W.R. Grace & Co., meanwhile, will complete the spin-off of its construction chemicals and packaging business units in early 2016, creating two public companies.

Multinationals have also stepped up investment in their U.S. operations, with the availability of shale gas as the cherry on top of a densely packed cake. "North America is important to us for many reasons: it has an abundance of great universities, including six of the ten highest-ranked universities in the world; nine of the ten most active cities in the world for start-ups are here, drawing in the brightest minds from around the world; and the United States spends more than any other country globally on research and development (R&D)," explained Teressa Szelest-Shah, president of North American market and business development at BASF, which has decided to increase investment in the region from around $500 million per year in 2012 to $1 billion in 2015.

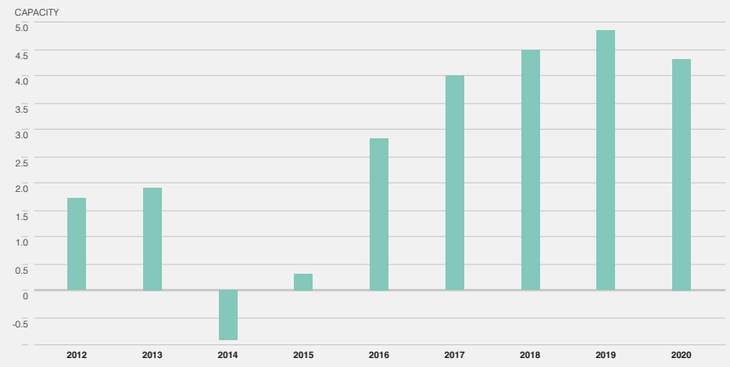
> *"Cars today require far more chemicals than 15 years ago, with for example carbon fiber replacing steel and plastics and other composites replacing aluminum. With urbanization, newer housing is more energy ef cient and sustainable technologies are required."*
>
> *- Mike Shannon, Global Chair, Chemicals and Performance Technologies, KPMG*

In addition to relying on the hydrocarbon resource, global chemical producers have to innovate in order to remain at the top of their respective markets; new solutions are a differentiator as far as clients are concerned. "Innovation remains a significant competitive advantage, as well as the ability to provide tailor-made solutions," said Anne Noonan, president of performance chemicals at Omnova. "We are seeing the specialty chemical industry develop around consumer-driven industries, such as the automotive, personal care, construction and electronics markets. Specialty chemical growth is also driven heavily by the trend for sustainability and eco-friendly products."

Large chemical companies are increasingly focusing on developing

U.S. CHEMICAL PRODUCTION CAPACITY 2012-2020 (% CHANGE YEAR-OVER-YEAR)

Source: American Chemistry Council, December 2015



U.S. CHEMICAL PRODUCTION CAPACITY UTILIZATION (2015)

74.6%

Source: American Chemistry Council, December 2015

chemicals with high value-added properties and departing from their previous strategies surrounding bulk industrial chemicals. Both DSM and Dow are following this path, with DSM having divested its polymer intermediates and composite resins business to private equity firm CVC Capital Partners in 2015, in order to focus on its nutrition and performance materials businesses. Joe Harlan, vice chairman and chief commercial officer at Dow, said: "Some chemicals may have begun their lives as specialty products, but have commoditized over the last couple of decades. Since 2005, Dow has divested $15 billion in revenue of products that had commoditized, including for example polycarbonates, styrenes and polystyrenes, chlorine and epoxy."

Dow was forced to exit these businesses due to the dramatic increase in production of these chemicals by companies in typically low-cost markets, such as India and China. Here, operations are generally subsidized by the state and have different return on capital requirements, leading to over-production and a subsequent critical loss in value. To replace depleted revenue streams, the company has since acquired $17 billion in specialty offerings.

Growth trends

As well as having rich shale plays across the country, the United States also plays host to certain industries seeing growth on the back of chemical innovation. The automotive industry is seeing a resurgence, thanks to slow growth in the Chinese automotive industry and a return of manufacturing to the country, while the construction industry is expanding to keep up with growing demand on both housing and new industrial sites. "Cars today require far more chemicals than 15 years ago, with for example carbon fiber replacing steel and plastics and other composites replacing aluminum. With urbanization, newer housing is more energy efficient and sustainable technologies are required," said Mike Shannon, global chair of KPMG's chemicals and performance technologies segment.

More broadly, multinationals tend to look at global megatrends for R&D inspiration, with population growth underlying many developments, such as climate change and scarcity of resources.

Agriculture is also an area where specialty chemical innovation can have a significant role in protecting crops and improving harvests. Dow's Harlan claims that yields in the United States have doubled since 1980 due to agricultural chemicals, in spite of challenges such as drought and lack of arable land. Many fertilizer projects are taking place in the Midwest and Appalachian regions; service provider Tecnimont has returned to the United States to work on a $1.8 billion ammonia plant in Iowa.

Innovation also highlights issues surrounding a company's competitiveness in the marketplace. With multinationals such as BASF ramping up operations in the United States, it makes sense to move R&D activities to the country as well. "By 2020, 25% of our R&D activities will be done here under the global Bioscience Research platform, which is headquartered in Research Triangle Park, North Carolina," explained Szelest-Shah.

BASF also recently completed a $25 million investment to its R&D site in Ohio, adding new chemical and process engineering capabilities.

The Germany-based company has globalized its R&D function to leverage insights from the best research institutes worldwide. "These collaborations are at the epicenter of our focus on innovation. The ability to find the right partners both for long-term and short-term research aligns with how BASF thinks. We can tap into the best solutions for some of the global challenges we are currently addressing, on urban living, smart energy and food supply, much faster than if we just looked internally," continued Szelest-Shah.

In March 2013, the company launched a collaborative research initiative with Harvard University, the Massachusetts Institute of Technology (MIT) and the University of Massachusetts (UMass) Amherst to create the North American Center for Research on Advanced Materials (NORA).

Going green

While global megatrends help drive innovation, the chemical industry also recognizes the role that sustainability and eco-friendly measures can play in R&D opportunities. Although viewed by many outsiders as the cause of environmental issues, the chemical industry considers itself maligned. Chemtura's CEO Craig Rogerson said: "The continuing improvement of a product relative to its sustainability is a key driver for a lot of the innovation within this industry. The message that many companies want to broadcast is that specialty chemicals are really part of the solution in meeting the requirements for making our environment cleaner and safer."

Covestro, for example, tests all products in its pipeline against sustainability measures to ensure that they will have a reduced environmental impact compared to their predecessors. "One example of this sustainable innovation is our Dream Production proj-

ect, which is turning carbon dioxide from a waste greenhouse gas into an ingredient for producing premium polyurethane foam – the type of foam that is found in many everyday items, including upholstered furniture, shoes and automotive parts, and is also used to insulate buildings and refrigeration equipment."

It is not only R&D at the start of the chemical chain where sustainability measures are being taken into consideration. Distributors are also looking at ways to dispose of the waste products associated with raw material production in order to differentiate themselves from their competitors and provide client companies with added-value solutions. "We have termed this '100% utilisation' – 100% of the materials that go in produce 100% viable materials coming out, whether it is for the initial application it was designed for or something else. What we have done, using our laboratories, is to find a secondary application for the material, which we sell to other industries. This does not detract from the producers' primary sales and turns by-product, which had been a liability, into an asset," explained Alan Chalup, COO at Basstech International.

In this case, a problem surrounding sustainable operations has been the driving force behind innovation and has had a positive impact across the supply chain. Basstech's clients initially sold the waste product to their existing customers, negatively affecting sales of its main products. By providing this solution, Basstech is able to take this problem out of its clients' hands as well as create an additional revenue stream.

The combination of negative perspectives of the chemical industry and the benefits to companies across the supply chain by solving sustainability issues indicates "green chemistry" will continue to push innovation into the future. Increasingly, sustainability is underlying companies' daily operations, such as at BASF: "Our commitment to sustainability is embedded in our purpose: We create chemistry for a sustainable future. The whole company has assessed its portfolio of products and technologies to identify which are advancing sustainability solutions. Those which are not then become the focus of our research," stated Szelest-Shah.

In addition to company growth resulting from internal strategies, the external needs of a number of end markets will also serve as a catalyst of the chemical industry's expansion. •

Teressa Szelest-Shah

President, Market and Business Development, North America
BASF CORP.

Overall, BASF continues to see the specialty chemicals market as a whole as attractive and in line with our core values and strengths such as innovation. With globalisation of our research and development (R&D) function, we now have in North America more than 1,800 people at 27 R&D locations, including six major hubs. With this set-up, we are uniquely situated to support development of products and services for our customers and partners in the specialty chemicals market.

How do your facilities in the United States play a part in BASF's global corporate strategy for the specialty chemicals segment?

A key element of our strategy is to be present where the demand is. North America is important to us for many reasons: it has an abundance of great universities, including six of the ten highest-ranked universities in the world; nine of the ten most active cities in the world for start-ups are here, drawing in the brightest minds from around the world; and the United States spends more than any other country globally on R&D. By 2020, 25% of our R&D activities will be done here under the global Bioscience Research platform, which is headquartered in Research Triangle Park, North Carolina. We opened our new North America Headquarters building in Florham Park, NJ in 2012. This building is our showcase for sustainable construction, in which many BASF-enabled products are used.

We also have nearly 100 manufacturing sites in North America, including two integrated Verbund sites in Freeport, Texas, and Geismar, Louisiana. We have made significant investments in new plants over the last few years, including a new dispersions plant manufacturing acrylic emulsion polymers for the coatings, constructions chemicals and adhesives industries, which began operating in Freeport this year. We made upgrades to the BASF TOTAL Petrochemicals LLC steam cracker in Port Arthur, Texas (one of the world's largest), adding a tenth furnace and improved feedstock flexibility to take advantage of lighter, natural gas-based feedstocks. Our R&D site in Beachwood, Ohio, completed a $25-million investment to add new cathode materials research and chemical and process engineering capabilities.

How is BASF progressing in the targets for sustainability that it set itself in 2010?

Our commitment to sustainability is embedded in our purpose: 'We create chemistry for a sustainable future.' Sustainability for BASF really represents the balance between three key areas: environmental, social and economic, and understanding how they come together in any single situation. Our headquarters building embodies our sustainability mandate, being one of New Jersey's largest sustainable buildings. We have also received two Leadership in Energy and Environmental Design Platinum (LEED) certifications from the U.S. Green Building Council for both the exterior of the building and the indoor environment. Sustainability is also the topic of some of our corporate social responsibility work in North America. For example, we recently gave $1 million to the Louisiana State University to conduct forward-thinking research on sustainable living.

Could you talk about some of your partnerships with companies, research institutes and universities?

These collaborations are at the epicenter of our focus on innovation. The ability to find the right partners – both for long-term and short-term research – aligns with how BASF thinks. We can tap into the best solutions for some of the global challenges we are currently addressing, on urban living, smart energy and food supply, much faster than if we just looked internally. In March 2013, for example, we launched a collaborative research initiative with Harvard University, the Massachusetts Institute of Technology (MIT) and the University of Massachusetts (UMass) Amherst to create the North American Center for Research on Advanced Materials (NORA).

Looking forward, you plan to invest around $5 billion in North American capital projects over the next five years. Where do you expect to see BASF by 2020?

BASF will continue to innovate and drive sustainable solutions with our customers and partners and further strengthen its raw materials and feed stocks and innovation throughout our value chains. It will leverage the abundance of talent in this region. In 2015, BASF celebrated its 150th anniversary because of its ability to continuously reinvent itself, innovate, and collaborate, and we plan to continue in this fashion for the next 150 years – creating chemistry for a sustainable future! •

Could you explain how BASF has refined or expanded the focus of its specialty chemicals segment since the industry falter of 2012-13?

Much has changed in the last three years, both within BASF and also within the industry as a whole. What we see continuing to drive change is the impact of shale gas. For a company such as BASF, the recent affordability of some of the base chemicals that feed down into our specialty chemicals segment has seen us step up our investment here. Three years ago, we were investing approximately $500 million per year in North America capital; today that has risen to $1 billion.

The specialty chemicals market itself is developing in line with the North American market as a whole. Some segments, such as those related to the automotive industry, are doing very well, but industries that may be supported by high oil pricing may not be doing as well today in a low-priced market.

Joe E. Harlan

Vice Chairman and
Chief Commercial Officer
THE DOW CHEMICAL CO.

Could you explain to us the importance of specialty chemicals within Dow's new corporate strategy, particularly considering your recent streamlining?
It is absolutely imperative that Dow sell specialty products. Some chemicals may have begun their lives as specialty products, but have commoditized over the last couple of decades. Since 2005 Dow has divested $15 billion in revenue of products that had commoditized, including for example polycarbonates, styrenes and polystyrenes, chlorine and epoxy. Furthermore, companies in markets such as China and India had moved into these commoditized markets and scaled up their production, essentially draining these markets of value.
Dow has since grown or acquired $17 billion of specialty offerings to provide to our customers. This sector both serves Dow's customer requirements and adds value, as the products are higher value and higher margin. Specialty chemicals can be used in a variety of industries, such as in agriculture for crop protection, in wafer production for the semiconductor industry and in personal care and pharmaceutical products, to name a few.

What are the challenges faced by local manufacturers from foreign, low-cost markets?
As emerging economies develop, they begin to advance their own infrastructure and, by so doing, build capacity in commoditized markets or commoditize a product themselves. It results in a saturated market. Taking chlorine as an example, its production creates the by-product caustic soda, which is needed to produce steel and aluminum. China has added 90% of the global chlorine capacity over the past few years and, in addition to using it for caustic, it also used it in epoxy production to manage the excess. The epoxy market then became flooded and prices and associated margins declined as a result of oversupply. As a result, Dow divested its chlorine business and shifted focus to specialty chemicals.

Which markets for specialty chemicals does Dow find attractive and why?
Dow chooses to be in certain specialty chemicals markets where value and differentiation are rewarded. In addition, we choose an area where we are positioned competitively in the value chain, and where the products are participating in faster growth markets. Agriculture, for example, is a huge specialties market. U.S. crop yields have doubled since 1980 because of agricultural chemistry. It is very important, as there is less land and water available for a growing population. In the building and construction industry, Dow has developed an application called Cool Roofs, a coating that cools roofs in hot climates, which keeps the insides of buildings cooler and decreases the need for air conditioning. Dow aims to be in any market that is surrounded by mega trends, which tend to increasingly be related to sustainable concepts.

Can you explain how innovation assists Dow with its sustainability efforts, particularly in the more niche market of specialty chemicals?
Dow has goals and action plans around what we call a footprint, a handprint and a blueprint. The footprint is about saving energy, conserving resources and reducing and recycling waste. In the previous ten years, Dow invested $1 billion but gained $5 billion to $6 billion in benefits. The company reduced waste by 1.6 billion pounds, which saved 900 million British thermal units of energy. Since 2005, 7,000 truckloads of waste have been converted into product streams, while Dow's sales of sustainable chemical products have increased from 1.7% of sales to 10% of sales since 2007.
The handprint sees Dow gearing its innovation towards breakthrough, sustainable solutions. For example in the food segment, the company's packaging component adds value by maintaining freshness, preventing spoilage, or enabling more efficient transportation. In the automotive segment, Dow's crash durable adhesives bond dissimilar materials. This has been utilized in the Ford F-150, enabling the manufacturers to remove 700 pounds of weight from the vehicle and making it more fuel-efficient.
The blueprint looks to ensure that Dow is a good corporate neighbor. Sustainable responsibility has become the market trend, and Dow aims to be a leader in this area.

What are some of the areas of innovation that Dow is working on?
Carbon fiber is an area of growth in a number of industries, including automotive and infrastructure. In agriculture, Dow will have generated another $1 billion in new product sales by 2018. The company's new Enlist herbicide technology uses much less product than traditional herbicide, as well as preventing drift. In the canned-food segment, Dow has come up with a new coating technology based on polyethylene that does not contain BPAs and still keeps the product fresh.

What is in the pipeline for Dow in the near future and what would be your final message to GBR readers?
Our pipeline is very rich in products that serve a sustainable world. Food production, energy efficiency, consumer healthcare, electronics, and water filtration are just a few of the innovations that we are providing the world. We are committed to our future by continuing to fund our growth investments, which include our $20-billion Sadara JV in Saudi Arabia, our continued investments in the U.S. Gulf Coast, and our $1.7-billion investment in research and development programs every year. All investments go toward supporting our contributions to a sustainable planet. •

Mark Vergnano

CEO
THE CHEMOURS CO.

Could you talk about the decision behind spinning off the performance chemicals segment of DuPont and how Chemours has fared since July 1st 2015?
We have only been a public company for a short time, but we have a 200-year history from our former parent company DuPont. The performance chemicals segment, which has become Chemours, no longer fit with DuPont's future in advanced materials, biosciences and agricultural spaces, so the decision was made to become a standalone company. Our three business units are global leaders in their respective areas. Regarding the spin-off itself, we emerged with a significant amount of debt and at a time when market conditions were tough. However, we are implementing our Five-Point Transformation Plan, which has very distinct elements to improve the company and significantly reduce our leverage by 2017. This amounts to a significant reduction of costs by streamlining the company and becoming more efficient. In 2017, we will have reduced our cost structure by $350 million and added $150 million in growth, resulting in an improvement of $500 million of earnings. We are also going to focus on the businesses that hold strong investment potential for the future; these are our titanium dioxide (TiO2), fluoroproducts and our sodium cyanides business.

Could you provide us with more detail about your three business segments and any flagship products?
The TiO2 business turns over $2.5 billion annually and sees very strong returns and margins. TiO2 is a pigment used to deliver brightness, opacity and whiteness, specifically in the coating industry for paints, the plastics industry and the paper industry. We have four manufacturing locations, with two in the United States and one each in Mexico and Taiwan. The fluoroproducts business has a $2.3 billion turnover and can be split into our fluorochemicals and fluoropolymers units. These products are used for refrigerants in air conditioners and refrigeration, as well as in propellants and foam expansion agents. Our latest fluorochemical product Opteon™, with zero ozone depletion and very low global warming potential, is currently used in the European Union to help automotive manufacturers comply with new regulations. This regulation requires that any vehicle sold after January 2017 will use a low global warming potential refrigerant. More than anywhere else, the European Union is driving the requirement for such environmentally friendly products. Teflon™ is our most well known brand in the fluoropolymers segment, and is used in a variety of applications to reduce friction, resist chemicals and temperature and deliver good dielectric properties. Chemours is the world leader in fluoropolymers and fluorochemicals. Our chemical-solutions business comprises six discrete product lines with primarily intermediate chemical applications. The one we highlight is the sodium cyanide business, where we are the number one player in the Americas.

How important is innovation and how is it a catalyst for growth?
Innovation is the lifeblood of the chemical industry. Its role in the development of key products in our daily lives, going back to the inventions of polymers such as nylon and polyester, is not fully recognized. Furthermore, advances made by the chemical industry have created the building blocks for innovation in a host of other industries. For Chemours, it is our job to come up with chemicals that will enable us to stay ahead of both new regulation and our competitors. Our research and development program has made us one of only two manufacturers of certain refrigerant products worldwide.

How important are associations such as the American Chemistry Council (ACC) in representing the industry?
Associations such as the ACC facilitate the pooling of the best thinking of their member companies. For members such as ourselves, we have the opportunity to be paired with other, similar companies in the same space. It also enables us to have a louder voice as an industry when advocating our views to government agencies.

With the recent increase in U.S. manufacturing, more products are being exported. Could you explain the importance of the global supply chain?
The chemical industry is a global industry with global capacity and opportunities. Our manufacturing facilities provide us with economies of scale and therefore a distinct competitive advantage. We now have to think on a global scale in terms of distribution and, rather than manufacturing localized products in each jurisdiction, we have to focus on setting up local facilities that allow us to tailor product at its final destination.

How important is it for the United States to be perceived as a global leader in terms of regulation?
No matter where you are in the world, both local populations and local companies benefit from chemical regulation. However, allowing each market to have its own protocols is neither efficient nor effective and leads to oversight difficulties and an extra layer of cost. Countries need to share ideas and create global standards based on risk, which will be beneficial for both consumers and manufacturers. There should be a standardized way of measuring risk so that we regulate those that are hazardous and could be used in an unsafe manner, while recognizing which chemicals do not require such strict oversight. •

Kevin McMullen & Anne Noonan

KM: CEO
AN: President of Performance Chemicals
OMNOVA SOLUTIONS


KM


AN

Could you tell us about Omnova's development since it was established in 1999 as a spin-off from GenCorp Inc. and any recent major milestones the company has undergone?
KM: Omnova Solutions is a $1-billion revenue company and an innovator of performance chemicals and engineered surfaces. We have manufacturing facilities and technology centers on three continents to serve customers in more than 90 countries around the world. Our focus is on high-performance, specialized products. Typically, we provide critical ingredients or components that significantly enhance the performance of our customers' finished products, while representing a small portion of the finished product cost. The company was spun off from GenCorp in 1999. Since that time, we have significantly expanded our global capabilities and diversified the markets that we serve. In 2008, Omnova acquired the remaining 50% ownership of joint ventures in China and Thailand, which increased global capabilities in our engineered-surfaces business. Two years later, Omnova acquired Eliokem International, significantly enhancing the global reach and capabilities of our performance chemicals business. The broad range of chemistries that came with the Eliokem purchase were very complementary to Omnova's technology portfolio.
Omnova leverages a deep knowledge of various polymer systems, other chemical additives, and material science to create value-added solutions for our customers. Through both innovation and the development of close working relationships, we develop differentiated products and services for our customers based on a thorough understanding of their needs and the challenges and opportunities they face. Omnova's science-based solutions provide critical functional performance that helps our customers' brands stand out in the marketplace.

Could you tell us about your operations across the United States, Europe and Asia and explain the importance of your U.S. operations to the overall corporate strategy?
KM: North America, and in particular the United States, is a critical market for Omnova. It represents 60% of our revenues and is the location of our World Headquarters and Global Technology Center, although we have strong regional offices, technology centers and manufacturing in both Europe and Asia. Our solid base in North America enables us to take advantage of opportunities worldwide by applying best practices in terms of product development and compliance, process efficiency, quality and consistency to grow with our global customers.

"Our solid base in North America enables us to take advantage of opportunities worldwide by applying best practices in terms of product development and compliance, process efficiency, quality and consistency to grow with our global customers."

- Kevin McMullen, CEO, Omnova Solutions

The specialty chemicals industry has fluctuated over the last decade. Could you tell us about the external factors affecting the industry and provide us with Omnova's perspective?
AN: Over the last ten years, the specialty chemicals industry has experienced significant fluctuations in annual growth. The global economic crisis saw the industry down in double digits but rebounded at the turn of the decade. Another slowdown occurred in 2012. Since 2013, the industry has seen a steady 4% to 5% growth rate. Excluding any macro-economic impact, the specialty chemicals industry will always grow at the rate of global manufacturing and construction industries. We have seen the specialty chemicals industry develop from being mainly based in North America, Western Europe, and Japan, to the emergence of the Middle East and China as significant players in the specialty chemical arena.
Something Omnova hears consistently from its customer base is a requirement for specialization and differentiation. Innovation remains a significant competitive advantage, as well as the ability to provide tailor-made solutions. We are seeing the specialty chemical industry develop around consumer-driven industries, such as the automotive, personal care, construction and electronics markets. Specialty chemical growth is also driven heavily by the trend for sustainability and eco-friendly products.

Regarding regulation, REACH in Europe has had mixed reactions. As a globally operating company, what is Omnova's perspective on the various regulatory frameworks in place worldwide?
AN: We see REACH as an advantage for U.S. and European companies, as it provides a standard framework under which all companies must operate. Despite the additional cost, it levels the playing field and, from a compliance perspective, regulation is very positive for our portfolio. The sustainability push is also important with Omnova's customers requesting products that not only adhere to regulatory requirements but also have enhanced performance attributes. For example, in Omnova's specialty coatings business, the United States uses primarily water-based coatings; customers are now pushing for a move to zero volatile organic compounds as well. Construction materials, which have traditionally been solvent based in our field, are now being requested to be water-based or made from bio renewables. Stricter regulation forces us to think differently and advance the specialty chemicals industry on a global level.

As we approach Omnova's 20th anniversary, where do you expect to see the company by 2019 and the end of the decade?
KM: We are very focused on a couple of key priorities. One is to accelerate growth in our specialty businesses, such as coatings, nonwovens, construction materials, oil & gas chemicals, elastomeric modifiers, laminates and coated fabrics. These are businesses in which we have strong and differentiated value propositions. They serve large and growing global markets that embrace innovation. Five years from now, these businesses and others with similar characteristics will comprise a greater share of Omnova's portfolio.
Another area of focus for the company is to generate higher margins and cash contributions from our traditional core businesses, which are not necessarily in high-growth markets. This is primarily our paper coatings business. We are taking aggressive actions to right-size our manufacturing footprint and cost base in order to improve our profitability and continue to be a sustainable supplier. From this, we look forward to reinvesting in the business and creating more value for our customers.

THE NEW RULES PENDING TRADE AGREEMENTS SIGNIFICANT TO COMPETITIVENESS OF SPECIALTY CHEMICAL MANUFACTURERS

Lawrence D. Sloan,
President and CEO,
Society of Chemical Manufacturers and Affiliates (SOCMA)

With the recent completion of Trans-Pacific Partnership (TPP) negotiations with the Asia-Pacific and continuing talks with the European Union on the Transatlantic Trade and Investment Partnership (TTIP), international trade continues to be at the forefront for not only Congress but also for our SOCMA member companies and the specialty chemical industry.

Trade is a two-way street for our industry; based on SOCMA's Business Outlook Survey, 80% of our members import items that are not domestically made[1], and 37% cited expansion to new markets as a major part of their growth strategy in the next one to three years.[2] Continuing to strengthen and build trade partnerships will be key drivers for America's future economic growth and creating a new standard in efficiency and transparency.

As Congress and the U.S. Trade Representative (USTR) continue moving forward on both agreements, it is unfortunate that Congress failed to find a solution for the Miscellaneous Tariff Bill (MTB) in its conference on the Trade Facilitation and Trade Enforcement Act of 2015 in early December. This was mostly due to the fact that rules set by the House wrongly define duty suspensions as earmarks, which are banned by Congress. All of these trade issues are crucial to job creation, and failure to take action on the MTB 2015 was not only a missed opportunity but a self-inflicted wound.

Small and medium-sized enterprises (SMEs) make up 95.5% of known chemical manufacturing exporters, and more than 85% of SOCMA members fall into that category. Based on 2013 chemical exports, more than half of the top 20 export markets are currently a part of TPP or TTIP negotiations.

Free trade agreements (FTAs) are not only important economically, they are also important geopolitically and strategically. For example, TPP countries make up nearly 40% of the global economy, and chemical exports to TPP countries have increased by nearly $11 billion since negotiations began in 2010. Of all U.S. chemical exports in 2014, 48% went to the TPP region.[3]

TPP would streamline international customs laws and cut burdensome customs procedures, helping the 170,000 U.S. SMEs that are currently exporting to TPP countries, according to the USTR. Importantly, it also puts into place rules around technical barriers to trade and encourages good regulatory practices in a region that is developing chemical-control laws on a yearly basis. Providing for protection and criminalizing of trade secrets, as well as opportunities to be notified and comment on emerging regulations, will remain extremely important.

TPP partner countries represent some of the fastest growing middle class economies in the world. A trade agreement that increases access to the nearly 500 million consumers in TPP countries would benefit the United States.

TTIP is especially important for our specialty chemical exporters because together the United States and the European Union accounted for almost half of the world GDP, and it is the largest FTA ever negotiated.

Economically, the chemical industry would gain the most of any U.S. manufacturing sector on tariffs with passage of TTIP. The U.S. chemical industry spent more than $1 billion in export tariffs in 2011 and, of that, $600 million was spent by organic chemical manufacturers.

TTIP also seeks to eliminate all tariffs, allowing U.S. exporters more broadly to avoid an estimated $6.4 billion in annual duties paid on goods exported to the EU.

Below is a breakdown of the most current developments for TPP, TTIP and the MTB.

Trans-Pacific Partnership (TPP)

The text of the TPP was made public on November 5, and President Obama officially made known his intent to enter into the agreement. The proposal is now in the hands of Congress, which has a minimum of 90 days to consider it.

Overall, SOCMA is happy with the majority of the proposal, especially the reduction in tariffs with key trading partners like Japan. With current FTA partners, 86% of tariff lines will go to zero, up from 60% today. Of the five countries where we do not have FTAs, Brunei, Japan, Malaysia, New Zealand and Vietnam, chemicals will have significant reduction once in force:

- Japan will immediately eliminate import taxes on 100% of U.S. chemical exports.
- Brunei will immediately eliminate import taxes on 95.8% of U.S. chemical exports, and 100% within 11 years or fewer.
- Malaysia will immediately eliminate import taxes on 88.7% of U.S. chemical exports, and 92.8% within four years.
- Vietnam will immediately eliminate import taxes on 87.5% of U.S. chemical exports, and 99.7% within four years.
- New Zealand will immediately eliminate import taxes on 83.2% of U.S. chemical exports, and 89.5% within four years.

At present, chemical exports face up to 35% tariffs in these markets.[4]

TPP also includes several changes in the rules of origin that differ from the U.S.- Korea FTA, which is the gold standard.

Other chapters that we are reviewing in the agreement concern market access, technical barriers to trade, regulatory coherence, and intellectual property (IP) rights.

The technical barriers to trade chapter in the TPP text includes new transparency and public consultation requirements, and includes a to-be-determined committee and mechanism to have information exchange and technical discussions to resolve issues. And for our members who manufacture pharmaceuticals or cosmetics, there are product-specific annexes.

As for IP, this is the first time trade secrets have been part of an FTA, including both criminal procedures and cyber theft. There are also guidelines on exclusivity of test data for agricultural chemicals and pharmaceutical market approval, as well as IP enforcement.

SOCMA does have some concerns regarding enforcement and compliance. Currently, there are trade agreements already in place with six of the countries that fall within the TPP economies. We would like to see clarity as to which agreement would take precedence when various trade issues arise within those countries. For SMEs in particular, trying to understand and determine the right rules within these complicated legal texts can be difficult. SMEs need the tools to make sense of the agreement to ensure that businesses of all sizes see the benefits of trade.

Also, once in place, we urge the countries that are part of TPP to enforce the agreement, or all of this time and hard work will have been for nothing. There are provisions in the Customs bill to bolster U.S. trade agreement enforcement and advance global IP protection. The Enforcing Orders and Reducing Customs Evasion (ENFORCE) Act provides basic due-process and time-limited procedures subject to judicial review for Customs and Border Protection to investigate allegations of the evasion of trade remedy rules. It also contains a reauthorization of the State Trade and Export Promotion program for small business exports.

Transatlantic Trade and Investment Partnership (TTIP)

TTIP negotiations are continuing, and a very aggressive and potentially unrealistic timeframe has been implemented for completion of the trade talks. The USTR would like to see this agreement completed prior to the end of the Obama presidency, but that short timeframe may be unrealistic for such a comprehensive agreement.

While TTIP would greatly benefit the specialty chemical industry with tariff reductions, there are many challenges to this effort as well, including REACH – the EU chemical control law – which is the single-largest export barrier for small and medium-sized U.S. chemical manufacturers, adding an average of 22.2% to U.S.-EU bilateral chemical trade.

Both countries recognize the differences between the Toxic Substances Control Act, the U.S. chemical control law, and REACH, but we would like to see more alignment on the way risk assessments are completed, as well as sharing of technical processes.

Miscellaneous Tariff Bill

SOCMA is disappointed that Congress failed to include a solution to the MTB in its conference on the Trade Facilitation and Enforcement Act of 2015. While the bill includes many important outcomes on customs enforcement and intellectual property, there is continuing frustration on the part of our members that there is no way forward for the MTB. Our member companies have been unable to take advantage of the benefits that the MTB provides since Congress failed to renew the bill in December 2012, and many have essentially been locked out of the process.

Failure to pass the MTB has cost our members business opportunities, incurred higher prices for raw materials that they cannot purchase in the United States, and reduced their competitiveness in the global marketplace. The MTB allows for duty-free imports of materials that are not domestically manufactured. Not having a process in place creates additional hurdles to domestic manufacturing.

We urge the U.S. House of Representatives and the U.S. Senate to quickly fulfill their pledge, included in the conference report, to find a way forward that is consistent with House and Senate rules.

Looking ahead

From tariff relief to market access for U.S. products, to labor and environment, to intellectual property rights and investment protections, to currency manipulation, human rights and rule of law, SOCMA strongly supports the pending FTAs with the Asia-Pacific and European Union that will help level the playing field for our specialty chemical manufacturers.

These agreements will bring jobs to our member companies and ultimately improve the overall U.S. economy. That said, we also urge negotiators and Congress to do their due diligence in negotiating and considering these agreements, ensuring that they have the proper protections and enforcement that will strengthen supply chains and trade relations for everyone involved. •

[1] SOCMA/UBM Business Outlook Survey, Question 37, 2014.

[2] SOCMA/UBM Business Outlook Survey, Question 35.

[3] http://trade.gov/fta/tpp/industries/chemicals.asp

[4] http://trade.gov/fta/tpp/industries/chemicals.asp

Laurent Thomas

VP Strategy
SOLVAY NOVECARE

sential chemicals. Part of advanced formulations, Solvay Novecare is one of the company's 18 global business units and a global leader in specialty surfactants and natural and synthetic polymers, such as derivatized guar. Solvay Novecare serves the oil and gas, home and personal care, agricultural, industrial and coatings markets.

What trends are driving the specialty chemicals market in terms of research and development (R&D) and innovation?
In almost every market that Solvay is present our customers expect sustainability, not only in the context of the final product but across the entire value chain. It is now expected and demanded by customers that sustainability be integrated across platforms and into R&I technology.
For example, Solvay Novecare in partnership with L'Óreal is leading the Sustainable Guar Initiative to help implement sustainable agricultural practices and improve the way the guar is farmed in India. This initiative will not only improve yield and performance of the farms but also have a social impact by improving farmers' living conditions. To this end, Solvay Novecare is working alongside global non-profit Technoserve to provide farmers with nutritional advice and other means of social support.

Sustainability is a recurring theme in today's market. Do you perceive this trend as a challenge or an opportunity for economic growth?
Sustainability is embedded in our strategy and lies both at the core of Novecare and Solvay as a whole. To illustrate this, we are currently analyzing our portfolio and the impact of both the use and manufacture of our products. Solvay Novecare conducts workshops and has ongoing projects with our customers to map the sustainability profile of our products in order to identify alternatives to improve our product profiles. On the sourcing side we are working to ensure our suppliers utilize correct sustainability practices. Furthermore we are working on our formulations to achieve the right balance between natural and synthetic compositions. Lastly, with regards to corporate practices Solvay has instituted the Solvay Way in all our sites to promote sustainable practices. Solvay promotes sustainability in the way we work, in our products, with its customers and outside of Solvay—thanks to the social impact of our initiatives.

A large percentage of Solvay's business stems from oil and gas, a sector that has undergone many changes recently. Strategically positioned on the Gulf Coast, what effects will these shifts have on Solvay Novecare?
The oil and gas industry is very important for Solvay, and will continue to play a strategic role moving forward. To strengthen our commitment to the sector and expand our portfolio, Solvay acquired the U.S.-based Chemlogics in 2013. We see this industry as a very important one for the future and, as a chemical company in the oil and gas field, we are pioneering improvements including the use of more sustainable products and recycling water. The oil and gas sector has to adapt to a new economic context. And while we have been impacted by the downturn, there remain many opportunities for Solvay and we have continued to gain market share. For example we are working with our customers to reduce costs-in-use by identifying new formulations and optimizing performance to obtain a maximum possible return on investment. At Novecare, we continue to be committed to this market and are ready to evolve with it in the coming years, maintaining our leadership position.

What kind of progress can we expect from Solvay Novecare in the near future?
The outlook for Solvay Novecare is positive. We have a very promising innovation pipeline across all markets. As well as Chemlogics' addition, the Solvay Group's recent acquisition of composites and specialty leader, Cytec, further strengthens our presence in North America. In addition, we recently opened a new alkoxylation plant in Pasadena, Texas, which will provide long term sustainability and competitiveness to our business.
Solvay will continue working to meet the challenges facing the world and society at large. If we are going to arrive at a better and greener world, we will have to utilize sustainable chemistry to do so. •

The speciality chemicals market is said to be currently experiencing a 'renaissance' in the United States. Given its immense growth, long history and recent acquisitions, Solvay is a leader in this market. To begin please introduce our readers to Solvay Novecare and its North American presence.
The Solvay Group was founded more than a century and a half ago in 1863, following Ernest Solvay's discovery of the ammonia-soda process. This method, otherwise known as the Solvay process, laid the foundation for our company and rooted Solvay in sustainability for years to come. The Solvay method was a breakthrough, emerging as a more sustainable alternative to the Leblanc method, which had contributed to major deforestation in Europe.
Today the group is organized around four clusters: advanced materials, advanced formulations, specialty chemicals and es-

Jerry MacCleary

President North America
COVESTRO LLC

Could you explain the decision behind spinning off Covestro from Bayer MaterialScience and the company's vision for the future?
It was just over a year ago that Bayer announced its intention to float the material science business on the German stock market and focus exclusively on the life sciences. This was a big change for us at Bayer MaterialScience, but it also presented a tremendous opportunity. Becoming an independent company meant that we could compete on a global scale with greater speed, flexibility and efficiency. On Sept. 1, 2015, we officially separated from Bayer and celebrated the beginning of our new company with a new name – Covestro. The name is derived from a combination of words reflecting our new identity: collaboration, well-invested and strong.
In some ways, we are a brand new company. We have a new name with a colorful identity to match. It will take some time to build the brand recognition we had with Bayer, but we will get there. Our new vision is to make the world a brighter place. We fulfill this vision by inspiring innovation and driving growth through profitable technologies and products that benefit society and reduce environmental impacts. But in some respects, we have not changed at all. I like to say that we have kept what makes us great. We are still the same team of industry-leading scientists, engineers and innovators and are building our future on a rich history of groundbreaking discoveries in the chemical industry.

Could you tell us more about the three business units within Covestro and the end markets for its products? What importance does the United States play within your broader global operations?
We are a leading producer of high-tech polymers globally, creating material solutions that push the boundaries of sustainability and innovation. Our three business units include polycarbonates; polyurethanes; and coatings, adhesives, and specialties. Our products and solutions are used in a wide range of industries, including automotive, building and construction, electronics and medical. Our materials can be found in mattresses and pillows, refrigerator insulation, paint coatings and LED lights, among other things. With operations in 11 locations and approximately 2,700 employees, we have a strong U.S. presence. Pittsburgh, PA, is home to our North American headquarters as well as the region's premiere technical center, spanning all three business units. The United States, Canada and Mexico account for approximately 22% of our global sales.

How are the unmet needs of today fuelling Covestro's innovation drive and could you provide examples of products that the company is developing?
With our unique portfolio of products and technologies, we are well positioned to tackle the challenges of an ever-changing world, including climate change, resource scarcity, population change and urbanization. We will to continue to look for ways to improve the energy efficiency of buildings through our insulation materials. We will also continue to work with automakers, providing them with new materials that can help take their concepts for safe, lightweight and attractive vehicles from the drawing board to the showroom floor. Our R&D community includes around 900 researchers and developers working at innovation centers around the world – from Leverkusen to Shanghai to Pittsburgh. We have a strong history of innovation at Covestro. We invented polyurethane and polycarbonate and continue to push the boundaries of what is possible in the chemical industry. Innovation is embedded in our DNA.

Could you explain the importance of sustainable business practices to Covestro and how they enable the company to achieve its goals?
Sustainability sits at the heart of our growth strategy and goes hand-in-hand with innovation. Every single project in our R&D pipeline is tested on sustainability grounds and must have less impact on the environment than whatever it is replacing. We are constantly developing materials that are more eco-friendly, and applying these materials in such markets as building and construction, transportation and alternative energy – to name just a few. One example of this sustainable innovation is our Dream Production project, which is turning carbon dioxide from a waste greenhouse gas into an ingredient for producing premium polyurethane foam – the type of foam that is found in many everyday items, including upholstered furniture, shoes and automotive parts, and is also used to insulate buildings and refrigeration equipment. We continually invest in process technology to improve safety, reduce our environmental impact and increase efficiency.

What areas are you focusing on for growth?
In the United States, our key growth opportunities are in automotive and building and construction. Buildings consume approximately 40% of the nation's total energy, so energy efficiency is vital to reducing energy use. Our polyurethane insulation products for commercial buildings play a vital role in reducing energy consumption and preventing greenhouse gas emissions.
The automotive industry presents an opportunity for us as manufacturers continue to seek greater fuel efficiency through lightweighting. Our polycarbonate is a smart substitute for metal and glass parts in cars. It is lighter – reducing weight and subsequently, fuel consumption – and we know that increased miles per gallon is a key selling point for today's consumers. Replacing glass with plastic also makes it possible to achieve styling elements that were impossible before. •

Hugh C. Welsh

President, General Counsel and Secretary
DSM NORTH AMERICA

States and could you enlighten us as to DSM's global strategy?
DSM's business is pretty evenly split between western, developed economies and the rest of the world. Europe remains a challenging environment; the economy is growth challenged and manufacturing remains costly from both an energy and labor arbitrage perspective. In the United States, labor costs remain flat while productivity increases, and feedstock prices continue to decline. DSM has fairly robust goals in terms of increasing sales globally. Revenue in the BRIC countries accounts for 43% of our overall sales, although we are aiming to increase our product mix, and therefore our profitability, in these countries.

How effective are associations such as the American Chemistry Council and their Responsible Care Program?
The Responsible Care program is extremely effective, hence we strive to get this certification for our large-scale manufacturing plants worldwide. Having this certification is a pre-requisite for many of our customers because it communicates that we are manufacturing in a responsible way and reinforces with our own employees and vendors the DSM way of doing business. Having one unified program is also far preferable to having a patchwork of regulatory frameworks both domestically and globally. It makes it very difficult for businesses to operate and grow when so much capital is deployed toward competing compliance matters rather than on our research and development programs. Additionally, having product travelling through six different regulatory schemes only serves to raise the cost of the product without increasing the value.

How can innovation be a catalyst for growth in the chemical industry?
As a company, we are constantly trying to find new and sustainable products, with a lower carbon footprint but with the same efficacy and utility, to replace existing, petroleum-based ones. Going forward, we think there will be a price on carbon, and the companies that have a low carbon footprint will have a sustainable, competitive advantage.

DSM's core value is sustainability. With the low cost of non-renewable feedstocks, what sort of a market is there for biofuels in the United States?
The low cost of gasoline and oil has had a near-term adverse impact on our cellulosic biofuels business, with advanced biofuels becoming less competitive than fossil fuels on a price basis. Although there is unanimous agreement that the current price of oil is not sustainable, it has nevertheless had an adverse impact in terms of attracting investment. We opened our first commercial-scale cellulosic ethanol plant in the United States last year and are looking to continue to out-license our technology here.
The Renewable Fuel Standard drives the biofuel industry by requiring the oil and gas industry to blend a certain amount of biofuels into gasoline. The U.S. Environmental Protection Agency has the responsibility for setting the annual volume requirements for biofuels in transportation fuel and has recently mandated for an increase in the ethanol to be blended into gasoline, and has required a blend rate of greater than 10% breaking the so called 'blend wall'. This is a very positive development for both DSM and the environment. We stand ready to expand here in the United States and we think this makes sense for the country, considering we have both the biomass available and advanced technologies. This fuel produces 95% less greenhouse gas emissions than gasoline and will play a key role in our commitment to cut carbon emissions globally.
We also have a rapidly growing advanced-surfaces business for improving the efficiency of photovoltaic cells; we have created a product that reduces glare on solar cells, enabling them to absorb more of the available light. In December 2014 we opened a 50-acre solar field in New Jersey that produces 50% of the electricity required to run the adjacent 880-acre vitamin manufacturing plant. We view solar and wind energy as tremendous opportunities for the United States and, by 2025, DSM has committed to be powered 100% by renewable electricity. This is not just the right thing to do, but increasingly the competitive thing to do, and we were thrilled to be in the White House at the invitation of President Obama to discuss this commitment in October 2015. •

Antonis Papadourakis

President and CEO
LANXESS CORP.

Could you talk about the decision behind spinning off the chemicals and polymer businesses from Bayer 11 years ago and how LANXESS has developed since 2004?
The LANXESS group was founded with the spin-off of the chemicals division and parts of the polymers segment from Bayer in 2004, as part of a major realignment of the group. The core business of LANXESS lies in the development, manufacturing and marketing of plastics, rubber, intermediates and specialty chemicals. LANXESS is the ninth largest chemicals group in Germany in terms of sales. After the spin-off, the company underwent a major transformation phase, divesting big parts of its business. Within the following years, LANXESS strengthened its business and product portfolio with targeted investments. It became a solid and strong company that was even able to successfully manage the global financial crisis.
After the market for synthetic rubber, which represents around 40% of our revenues, became increasingly characterized by oversupply and resulting pricing pressure, we initiated a three-phased realignment program in August 2014. Through a reduction in costs, the optimization of our production platform and product portfolio, we are aiming to overcome market challenges.
Since then, we have achieved a lot. We have concluded the first phase, aiming at the optimization of our business and administrative structures, and will achieve annual savings of €150 million by the end of this year. We are also progressing rapidly with the second phase related to operational competitiveness. Savings from this phase of another €150 million will be achieved progressively over the coming years and will be fully realized by 2019.
In September 2015, LANXESS concluded the third phase of the realignment with a milestone: We announced our plan to establish a 50-50 joint venture for synthetic rubber with Saudi Aramco. With the setup as a backward-integrated entity, we intend to address the market challenges and participate in the consolidation of the market that will intensify in the coming years. Through our rapid realignment and, in particular, the agreement with Saudi Aramco, we have now established the basis for our new strategic focus to achieve growth.

LANXESS has three segments – Performance Polymers, Performance Chemicals and Advanced Intermediates. Could you tell us more about these business segments?
Within Performance Polymers, we offer high-performance materials for a wide range of end markets. Apart from manufacturing several rubber types, we produce engineering plastics in our plants in Belgium and Germany and have manufacturing sites for compounding worldwide, in countries such as China, India and Brazil, as well as the United States. Our Performance Chemicals segment is strongly positioned in a broad range of niche markets and includes products such as resins, additives with material protection technologies, and inorganic pigments. This is a segment comprised of businesses that we hope to expand. Advanced Intermediates are fine chemical products with high barriers to entry. This business is divided into two parts: chemical formulation and custom manufacturing for the agricultural and pharmaceutical markets.

Your North American headquarters is located in Pennsylvania, with a number of other sites across the United States. Could you tell us more about your facilities?
Our presence in the United States is an important part of our business and we currently have 10 manufacturing sites in the United States and Canada. The United States and NAFTA region in general is a growth area, and we are willing to invest more in the United States in order to grow, both organically and via acquisition. North America is our second biggest area in terms of number of manufacturing sites after Europe.

What impact is the uptick in activity in the U.S. chemical industry having on the chemical industry and its end markets?
The resurgence of chemical manufacturing in the United States due to fracking technology in the shale gas space had led to multi-billion dollar investments for new crackers primarily on the Gulf Coast, but also in the Marcellus Shale play in Pennsylvania. The United States and NAFTA region thus provide a favorable environment for growth. But, as the market grows, we expect the growth rate itself to shrink. The automotive industry has a lot of potential, as does the building and construction industry. In the consumer market, we are seeing trends towards green, sustainable products and this is an area where the chemical industry can, and does, provide solutions.

LANXESS has recently celebrated a decade in operation. What can we expect from the company in future?
We have defined our strategic cornerstones for future growth and will focus on mid-sized markets. We are targeting growth in North America, China, and Southeast Asia and hope to grow both organically and through acquisitions. Our new growth platform includes the businesses with chemical intermediates and additives, agrochemicals, color pigments and high-tech plastics, as well as specialty chemicals for water treatment, material protection and the leather industry. In these businesses, we have leading positions in diversified, less cyclical markets, which we plan to expand. We will thus be able to increase our profitability and simultaneously become more resistant to cyclical fluctuations. •

Matthew Hellstern

Vice President and General Manager
GRACE SPECIALTY CATALYSTS

by closely partnering with many of its customers through joint development agreements, as well as acquiring manufacturing assets in various technologies. Recent acquisitions include our Albany, Oregon site in 2012, which is currently used for the development of next-generation metallocene-based polyethylene catalysts. In 2013, Grace acquired the UNIPOL® polypropylene licensing and catalyst business, which includes SHAC® and CONSISTA® PP catalysts.

What are some recent developments in your product line and technologies?
Specialty Catalysts employs a customer-centric business model offering customized technical services. Some customers want a lifelong partner who has the skills and resources to provide them with ongoing process, product, and/or application support to help them grow and increase the value of their business. Other customers maintain extensive in-house expertise, so they may only need occasional or highly specialized support for trouble-shooting or to exploit a new business opportunity. Grace's research and development laboratories, pilot plants, and process and product experts help our customers execute their strategies. Many of our technical services are particularly valuable to customers when they look to shift to a next-generation offering, or they are seeking significant operational efficiency improvements. For example, we help some clients optimize the production of their polypropylene plants through automated control system software and data analysis.

How does Grace approach innovation and what advantages can Grace's scale-up services offer customers?
Innovation is key to our customers' growth, as many of our customers look to improve profitability through differentiation and material substitution. Our customers constantly seek differentiated offerings for their customers that provide greater value and enhanced performance. The customers' value is derived from the quality of the resin produced, and our catalysts play a major role in optimizing those performance properties.
Our catalysts and polypropylene pilot plants are highly valued by customers as they scale up new products and technologies. It can be very expensive for resin manufacturers to implement product changes in a commercial unit. As such, we collaborate with our customers to understand their strategic direction and desired resin properties. We then work closely with them to develop and trial new catalysts for the production of new resins. Bench-scale reactors are useful, but lab results may not be consistent with results from commercial industrial plants. Therefore, use of a pilot plant as an intermediate step can help predict commercial results and minimize the risk of the scale-up process when customers operate their commercial reactors with new catalysts.

What measures does Grace have in place for sustainability within Specialty Catalysts?
Specialty Catalysts plays a major role in Grace's overall sustainability goals. In addition to making progress on various corporate-sustainability initiatives, we recognize that our customers and consumers are increasingly focused on sustainability and seek alternative solutions that are friendlier to our planet. As consumers drive these market trends, Specialty Catalysts is working collaboratively with our customers on next-generation product lines, such as non-phthalate polyolefin catalyst solutions.

How has the shale gas revolution affected the growth of polyolefin manufacturing in the United States compared to global markets?
As we know, the shale gas revolution has been a significant growth driver for the chemical industry in the United States. For many years, there was little investment in polyolefin manufacturing in the United States but, currently, we are experiencing a renaissance due to cheap feedstocks, which in turn provide an economical path to manufacture polyolefin resins. As such, multiple polyolefin producers are executing expansion plans in the United States and selling the resin into both domestic and international markets. Many producers see shale gas as a way to differentiate and secure low-cost positions into the future.

What is the next milestone for Grace?
In early 2016, Grace will complete the earlier-announced spin-off of our construction and packaging businesses. Each independent, publicly traded company will retain its industry-leading positions, exceptional brands and reputations, and talented employees and leaders. This will make Grace more agile, more responsive, and more committed to our catalysts customers and to the investments that we make to meet their future needs. •

Craig Rogerson

CEO
CHEMTURA

Having met with you in 2012, how is your five-year plan playing out and how has the company developed over the last three years?
What we have been working on most throughout our five-year plan and since exiting from Chapter 11 has been portfolio management. Our plan was to reduce our eight individual business segments down to a more manageable number and focus on those businesses in which we had strong leadership positions, either in products or market technology. Over the past three years we divested three of our initial businesses, including most recently our Chemtura AgroSolutions segment. We now have a more refined, pure-play, industrial specialty chemical focus and will look to steadily expand in our remaining business segments.

Can you tell us more about the facilities you have invested in since 2012?
Our largest investments over the past three years have been overseas. We now have a plant in the Netherlands that manufactures synthetic lubricants and have acquired a full ownership position in DayStar, Korea, which produces ultra-high purity precursors for the LED market. Additionally, we have made significant process improvement and capacity expansions at numerous locations across the globe. Furthermore, we have built our largest facility since emerging from Chapter 11 proceedings in Nantong, China. Unlike the plant in the Netherlands, or DayStar, which were built to meet existing market needs, this facility was constructed with sufficient capacity to better serve growing demand in the Asia-Pacific region. At full capacity, the Nantong facility will provide cost competitive local production with strong economies of scale, which will allow us to not only be more competitive, but also to better service customers in the fast growing markets of this region.

Having refined your focus over the past three years, what would you now say are the company's main competitive advantages in the market space?
The businesses we retained are ones in which we have key leadership positions. Each is positioned among the top three for the markets that we serve and the products we offer. One strength of Chemtura is our innovation in application development, which is supported by our global network of laboratories, with locations in China, Europe, and the United States. We work closely with our customers to develop the next generation of products to consistently meet their needs. Another important strength is our service capability. Not only do we sell a product, but we also offer a range of technical services that support our customers' products in their specific end-use applications, making us a valued partner to customers.

Can you talk about the factors that have led to your recent significant growth in earnings?
In some areas, innovation and continuing to upgrade our product portfolio have been large contributors. We have certainly improved our overall cost structure and our commercial excellence initiatives have also been important. We have been much more successful at achieving a selling price based on the value that can be delivered to the customer, rather than solely based on the cost of production.

How important are the TSCA reforms for the chemicals industry?
They are critical; TSCA reform is something that has been needed for a number of years. It may be unusual for an industry to support further regulation, but this regulation from a federal perspective will provide clarity and consistency across the United States much in the same way that REACH has done across Europe. It will put the overall chemical industry in a better position to safely and responsibly serve the public.

How important is sustainability in today's specialty chemicals industry?
Sustainability is key. Chemtura has certainly excelled in terms of sustainability as evidenced by our Emerald Innovation™ 3000 product. Its polymeric structure makes it much less bioavailable, thus addressing the environmental concerns that threaten the sustainability of other commercially available brominated flame retardants for polystyrene foams. The continuing improvement of a product relative to its sustainability is a key driver for a lot of the innovation within this industry. The message that many companies want to broadcast is that specialty chemicals are really part of the solution in meeting the requirements for making our environment cleaner and safer.

Over the next five years, what direction do you see your corporate strategy taking?
We continue to think globally, and our investments over the next few years will be in expansions of our current capabilities and footprint. The next five years will be dedicated to reaching full capacity at our plant in China. We also have a new facility in Korea which produces ultra-high purity precursors used in the production of high-brightness LEDs and other semi-conductor applications. That is in start-up phase now, but it will become an important part of our portfolio to supply that fast growing market in Asia Pacific. More importantly, as we have focussed our portfolio to these two industrial business segments, we must now concentrate on scale and become part of something bigger. •

Image: Thinkstock

SMALL SCALE, BIG IMPACT: U.S. SPECIALITY CHEMICALS

"In addition to federal, state and local regulatory requirements, our industry is committed to continued implementation of best practices, continuous improvement of safety procedures, and the responsible management of chemicals. This isn't just being a good environmental steward; it's good for business."

- Dean Cordle,
President and CEO,
AC&S, Inc.

FINDING YOUR NICHE: THE U.S. SPECIALTY CHEMICAL SECTOR

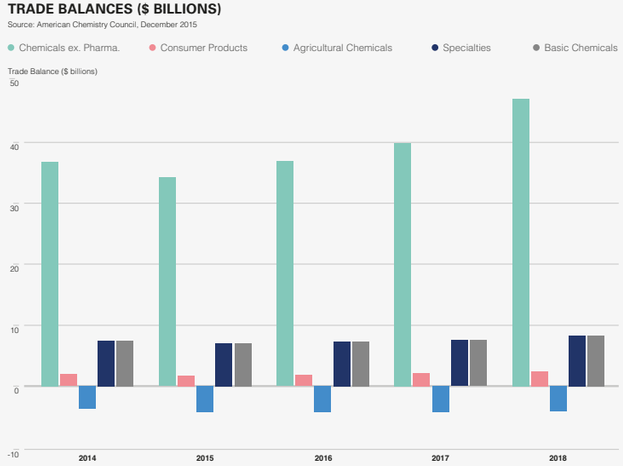
Journalist: Harriet Bailey

The backbone of the U.S. chemical industry is its small- and medium-sized enterprises, representing more than 50% of the American Chemistry Council's (ACC's) regular membership. Particularly prevalent in the specialty chemical sector, these companies are typically one of a small number producing certain niche chemicals. In a market dominated by multinational corporations manufacturing large-batch molecules, the tactic of regional companies has been to focus on small-batch chemicals with high barriers to entry.

According to ACC estimates, the specialty chemicals sector in the United States accounts for $150 billion, or 20% of the world total of $922 billion. Specialty chemicals are projected to grow at a higher rate than overall chemical production, at 3.5% in 2016 compared to 2.9% for the industry as a whole. This will then rise to 4.1% in 2017, according to the ACC.

Specialized capabilities

Specialty chemical companies play a vital role in the overall chemical landscape in the United States, producing chemicals which have a small market but a large impact and focusing on innovation in these areas. "In the case where larger corporations cannot see a product line expanding into a business of substantial enough size, then the opportunity can best be carried forward in the market by a company such as Deltech," commented the corporation's vice president and general manager Daniel C. Rutherford.



Deltech began by purchasing an asset producing two specific products, paramethyl styrene and divinyl benzene, from Hoechst Celanese in 1989, adding a competing vinyl toluene business from The Dow Chemical Company two years later. "We are well suited for producing and servicing markets needing these relatively smaller volume products that are equally as important to the industry," he continued.

During the late 1990s and early 2000s, North American chemical manufacturing was fairly defensive, with much activity relocated to other global markets. This allowed companies to improve best practice and diversify their product offerings abroad, while focusing on certain niches in the United States. VanDeMark Chemical acquired Hungary-based Framochem in 2014, tripling the size of its product basket. "Some of the products we manufacture in Hungary are more towards a commodity type of product that we would not manufacture in the United States. Here we have a higher degree of manufacturing of custom products," said Michael A. Kucharski, president and CEO. Kucharski also noted the recent move away from cost cutting and towards higher quality products, as U.S-based manufacturers are perceived as low risk, reliable providers with strong environmental and safety mandates.

The uptick in activity as a result of shale gas discoveries, combined with advances in various end-markets requiring higher purity and performance, has also seen specialty chemical companies increasingly relied upon for contract manufacturing using highly technical processes. Deltech has chosen to invest in pilot plants rather than move to laboratory environments for research and development (R&D) as its larger competitors have done, providing it with a significant value-add proposition for clients. The resource is available for companies to work with Deltech on producing new products and solutions, as well as leveraging its unique technologies. As demand for individual products grows, pilot plants enable companies to ensure consistency when scaling up production, by mimicking their own operations.

"Some of the products we manufacture in Hungary are more towards a commodity type of product that we would not manufacture in the United States. Here we have a higher degree of manufacturing of custom products."

- Michael A. Kucharski, President and CEO, VanDeMark Chemical Co. Inc

Unable to rely on global brands for revenue generation, smaller companies are seeing the importance of innovation to remaining a relevant manufacturing partner in an increasingly competitive environment. "Transforming ideas into products demands innovation and R&D from our side and this is crucial to the custom business," continued Kucharski.

Being able to adapt to new developments is also critical, particularly the opportunities associated with new shale gas plays across the United States. AC&S, Inc., a toll manufacturer based in West Virginia, is preparing for further outsourcing contracts for oil field chemicals as a result of the new gas deposits found in the Appalachian basin.

Although not as directly affected by the shale gas resource as the commodity chemicals segment, and having been less susceptible to the threat of low-cost markets abroad for manufacturing, the renaissance in the U.S. chemical industry will nevertheless impact specialty chemicals. According to the ACC's Swift: "Specialty chemical volumes have been high since 2014, with an annual growth of 6% to 8%."

Increased investment will have an effect across the board, whether through an uptick in manufacturing at home and the subsequent export of this product abroad, or through the consolidation activity of larger players. "While big companies are increasingly focusing on their core business, we have the scope to evaluate and take appropriate risks in new applications and markets," said Deltech's owner and president, Robert P. Elefante. "There will be more opportunities for us to make acquisitions and our forte will be in developing smaller applications and growing them."

As the chemical industry expands, there will continue to be room for those players with a focus on advancing technological processes and creating high performance molecules, whatever the requirement. •


RE


ZL

Robert P. Elefante, Zachary I. Levine & Daniel C. Rutherford

RE: Owner and President
ZL: Vice President, Commercial
DR: Vice President and General Manager
DELTECH CORP.

Could you give us a brief overview of Deltech since its founding in 1988 to the present day?

RE: Deltech started in 1989 with the purchase of this facility in Baton Rouge from Hoechst Celanese, producing paramethyl styrene and toll manufacturing divinyl benzene. We bought a competing vinyl toluene business from The Dow Chemical Co. in 1991. The rest of the decade was spent in expanding our footprint in the United States, before we acquired a resins business in the UK in 2000. One of the main things we look for in a new acquisition is the opportunity to take our specialty monomers downstream. Over the years, we have built up a broad base of unique technologies that customers find nowhere else in the world.

DR: Our acquisitions over the years have expanded our participation in specialty monomer offerings. We are able to acquire non-core assets from companies such as Dow because we are geared towards servicing small- to medium-size markets. In the case where larger corporations cannot see a product line expanding into a business of substantial enough size, a company such as Deltech can best carry the opportunity forward in the market. Our products serve a breadth of market applications, including coatings that extend a product's lifespan to unsaturated polyester resins for oil field well management and ion exchange resins for water purification. This presents us with opportunities not only in the United States, but worldwide.

Deltech expanded into Brazil in 2005 and opened a sales office in Shanghai in 2008. Could you tell us more about your experiences working in these jurisdictions?

RE: South America in general is a challenge. Brazil has high taxes and governmental control over businesses has made it difficult for entrepreneurial businesses. The market in general is more geared towards global companies. India has potential, but is not currently a good environment for business. Brand new chemical plants are not being maintained. With Prime Minister Modi taking the helm, I expect greater economic development and, as such, an increased need for specialty chemicals.

DR: In India, there is less appreciation for the true value-add of a product and therefore an unwillingness to pay for it. This, however, will improve as the market matures. It is evolving at a different rate than China, which has shown a more rapid maturation. In order to export abroad, Chinese manufacturers had to adopt the specifications that were in use in the Western world. India is currently undergoing that kind of evolution. The fact that we have a footprint in and a channel into those markets is important, enabling us to both support our global customers in those regions and grow into the market.

What are some of the challenges in working with reactive monomers and how does regulation affect the chemical industry?

RE: Regulation in the chemical industry here is completely out of control. We are competing with countries such as China, which still use coal-burning reactors, while we are adhering to ever-more stringent regulations on emissions. The chemical industry in the United States has changed dramatically over the years and it is a much more environmentally friendly industry than in the past. However, it is getting to the point where additional regulation is no longer useful and is actually impeding our ability to operate. This could lead to a significant impact on the industry and the availability of products in the United States.

DR: Appropriate regulation and good environmental and product stewardship are fundamental for the North American chemical industry. The frustration that persists is that we would like everybody to be working from the same responsible care platform worldwide. We also have to examine how many people are employed by the U.S. petrochemical industry; if excessive restrictions are put in place in some regions and not others, it will have significant impact on the economies and employment of those regions. The bottom line is we need a balance between good stewardship of products, the environment, and economics. Industry associations such as the ACC and SOCMA are needed now more than ever to bring that balance into the debate.

Looking ahead, what is the future for Deltech as it approaches its 30th anniversary?

RE: With the way things are progressing with consolidations among larger players, there will be more opportunities for us to make acquisitions. Our forte will be in developing smaller applications and growing them. While big companies are increasingly focusing on their core businesses, we have the scope to evaluate and take appropriate risks in new applications and markets.

DR: Many of our downstream customers are not expanding their research and development (R&D) capabilities, which provides us with opportunities to increase our own R&D capabilities. We are also looking to adopt new technologies and advancements. At Deltech, we want everyone to feel they are in a job where they are adding value and I think we do that here. •

Michael A. Kucharski

President and CEO
VANDEMARK CHEMICAL CO. INC.

Can you provide a brief history explaining the evolution of VanDeMark and outline any major milestones?

VanDeMark Chemical was founded in 1951 as a family-owned business evolving from Niagara Chlorine Products and focusing on chlorine chemistry. In the early 1980s, VanDeMark was receiving inquiries for manufacturing downstream products using the phosgene that was being generated at our site. We decided to take on a few key clients and it was at this point that the business began to transform away from being just a chlorine derivatives company by continuing to grow the portfolio and to buy phosgene businesses from our customers as opportunities presented themselves. Currently, only approximately 5% of our revenue comes from phosgene, whereas 30 years ago it was 75%.

Until the late 1990s, the business was growing continuously and we were eventually sold to SNPE, based in France. During that period of ownership, between 1999 and 2007, SNPE wanted to expand its global presence by opening facilities in China, Hungary, and the United States. We were then sold to Buckingham Capital, followed by Uni-World Capital and our name was restored. The board wanted fast-tracked growth with VanDeMark, so I brought them an opportunity for the acquisition of Framochem. They were receptive to the idea, and thus we had a chance to expand our manufacturing capabilities into Europe.

Can you elaborate on your line of solid and liquid products and their applicability?

We have transformed our portfolio over the years. We started with solid derivatives in 1989 and increased this in 2001. Many of our products are also on the liquid side. Phosgene is used in agrochemicals, coatings, sealants, adhesives, plastics, pharmaceuticals and personal care, to name a few industries. One of our key objectives in the last ten years has been to diversify our portfolio, specifically for the products that we want to channel through numerous markets. Nevertheless, if we have a focus initiative we want to look at it from a point of diversification. We have about 50 different products that we produce on a regular basis, and approximately 20 products on an irregular basis.

How do your facilities in different regions serve your market presence worldwide?

We have facilities in the United States and in Hungary. While phosgene is part of our core competency, our portfolio has very little overlap between the two facilities, perhaps less than 5%. Some of the products we manufacture in Hungary are more towards a commodity type of product that we would not manufacture in the United States. Here we have a higher degree of manufacturing of custom products.

How did your acquisition of Framochem affect your business in terms of revenue and geography?

Our U.S. turnover is $35 million, and our turnover in Europe is about the same if not more. Our business doubled in size with the acquisition. We tripled the size of our product offerings, adding about 30 to 40 new products that we could supply to the market after the acquisition. Looking at geographic diversification, about 40% of our business is in Europe, 35% is in the United States, and the remaining 25% is distributed all over the world, including Japan and India.

What role does innovation play in the expansion of VanDeMark and how do you stay ahead of the curve?

Our products are in a competitive market environment, so we have to be on the cutting edge of improving our technologies and processing techniques. We are always striving to improve our manufacturing and quality. The research and development and innovation side is very important for proprietary and custom work because many of our customers come to us with an idea that has been constructed in the laboratory. It is our job to make this into a feasible commercial product.

What is your opinion of the regulatory environment and lobbying efforts within the industry?

We have memberships with the American Chemistry Council and SOCMA, which are capable of handling this aspect. The regulatory environment has changed dramatically for the better, although the global regulatory framework needs to change because there is no level playing field, which puts a burden on small to medium-sized companies.

Looking ahead, where will VanDeMark be in three to five years?

The focus will continue to be with diversification of the portfolio and an emphasis on the markets we serve with products where we have a strategic advantage. When customers are dealing with us, they are dealing with a low-risk organization and supplier source in terms of safety, quality, environment, manufacturing, logistics and language. Because our acquisition is fairly recent, we are looking to capitalize on best practices across both our platforms. We are also trying to optimize and integrate while running our businesses well. In the future, we will grow both inorganically with acquisitions, as well as organically, by expanding our portfolio and capacity. •

Phil Johnson

Chairman and CEO
BHS SPECIALTY CHEMICAL PRODUCTS

Can you provide a brief history explaining the evolution of BHS Specialty Chemicals and some major milestones along the way?
BHS was founded in 1998 in Salt Lake City as an entrepreneurial venture. From a core competency in the distribution of soda ash, the owners began to expand the business into different markets such as food processing and water treatment due to the company's location in the Pacific Northwest and the prevalence of agriculture in the region. The original task of distribution expanded to formulation and synthesis but, lacking a core knowledge in this area, the decision was made to seek partners with technical expertise. When a private equity firm purchased BHS six years ago, our focus expanded to cover the manufacturing of specialty chemicals in the food space. We have achieved the certifications necessary to be a direct food chemicals contract manufacturer, such as Safe Quality Foods Level II and ISO 22000. Our annual sales revenue is from $80 million to $100 million, with approximately 80 employees. The five key markets that we serve are dairy, potatoes, sugar, seafood, and fruits and vegetables. Of our three business segments, the manufacturing of food chemicals is the largest, but we also provide synergistic contract manufacturing and distribution services.

BHS is a member of various industry organizations including the American Chemistry Council and the National Association of Chemical Distributors. How important are programs such as Responsible Care and Responsible Destruction?
We feel strongly about advocacy and even as a small, private company we choose to participate. Programs such as Responsible Care set out the standards and expectations for quality we all share, both within the chemical industry and in our local communities. They also provide us with a representative, united platform. We deal with materials that are hazardous by nature and therefore need to be represented by people who can understand this and put together programs for us. These organizations have been particularly effective in representing the industry's interests to regulatory bodies and providing decision makers with proven scientific information and education to inform their decisions.

As the industry faces increasing regulation, why has BHS chosen to maintain its own distribution lines rather than relying on an external provider?
Our products go into the food chain, so we aim to take a cradle-to-grave approach because of the propensity for these products to be adulterated. We have strong quality control measures in place in order to ensure that our products are properly packaged and meet regulatory standards, with specific attention paid to the potential for chemical, physical and microbial adulteration. From a public health standpoint, BHS exceeds the standards for food and water safety.

What are some of the challenges that you face both as a distributor and in the chemical segment in general?
One of the main positive challenges is the substantial increase in activity in the industry, which is putting a strain on our human resources. The reduction in gasoline and diesel prices has resulted in rising demand for deliveries by truck, so finding the right personnel is an industry-wide challenge. Not only this, but finding people to replace those who are at retirement age across all areas, from chemists to engineers, is a struggle. Our headquarters is in the vicinity of Boise State University and we are working in partnership to offer internships and training to their students. We have also been in receipt of a government grant to conduct research and development activities with their Ph.D. students in the chemistry of food science.

Where is the chemical industry headed, given the recent resurgence in manufacturing?
The shale gas revolution has made U.S. manufacturing more competitive, regardless of the industry. Basic costs have been reduced across the spectrum due to low feedstock prices. Overall, the shale gas revolution is seeing the United States reassert its leadership as the most competitive chemical manufacturing region in the world. We have not been this bullish around our long-term competitiveness for at least 30 years, if not longer. The two-decade period between 1990 and 2010 saw the chemical industry go through significant structural reductions in order to reduce costs: facilities were shut down and hiring freezes were imposed. Businesses relocated their assets abroad, and China and India in particular became the markets of choice. Manufacturing in the United States was relatively defensive. With the fundamental building blocks of the industry having created such a dramatic shift, we are now undergoing a renaissance period.

As BHS approaches its 20th anniversary, where can we expect to see the company by 2018?
We are currently reinvesting in our business and looking to expand our footprint. We are moving eastwards across the United States, from our stronger presence on the West Coast. We are also reinvesting in the food and water space and our grassroots facilities, as our business model has been very successful so far and is poised for positive growth. •

Dean Cordle

President and CEO
AC&S, INC.

To set the scene, could you provide us with a brief overview of AC&S, Inc from its inception and how it has developed to be the company it is today?
AC&S began operations in the late 1980s as a railcar service company. In the early 1990s we started manufacturing specialty chemicals under a toll or contract manufacturing basis. The company grew very quickly throughout the 1990s and focused on the synthesis of petroleum additives. AC&S manufactures, labels and distributes products to more than 50 countries worldwide. We ended our railcar service in 2012, concentrating our efforts on chemical synthesis, blending, repackaging, and distribution. Recent milestones include receiving our ISO 9001 certification in 2012. In 2014, we became certified in the American Chemistry Council's Responsible Care program and ISO 14001. These management systems have been instrumental in providing us with a foundation for growth, focusing on continuous improvement.

How do your facilities in West Virginia enable AC&S, Inc to cater to the domestic market in the United States as well as internationally?
We are strategically located on major interstate routes and rail corridors. Our proximity to the Midwest and the East Coast markets is very important to existing and potential clients. Our facility has multiple specialty chemical manufacturing units, as well as bulk storage and warehousing facilities. The majority of our products are delivered to the North American market. Our customers range from the very large to small- and medium-sized chemical manufacturers and distributors. Our Responsible Care certification has opened the door to larger corporations and enabled us to become an integral part of their supply chain.

How does each one of your main services play out in your operations and, given the increase in activity in the chemical industry, is AC&S, Inc experiencing a boost in demand as a contract manufacturer?
Our main focus is to provide contract chemical manufacturing, chemical blending and distribution services. Chemical manufacturing comprises 75% of our activities, while blending, warehousing and distribution cover the remainder. We are seeing an increase in business from larger chemical companies that recognize the value in outsourcing manufacturing to a Responsible Care® certified company dedicated solely to contract manufacturing. I also see opportunities to contract manufacture oil field chemicals, particularly given our location within the Appalachian basin.

How does regulation play a role within the wider chemical industry and what are some of the challenges it presents?
In addition to federal, state and local regulatory requirements, our industry is committed to continued implementation of best practices, continuous improvement of safety procedures, and the responsible management of chemicals. This is not just being a good environmental steward; it is also good for business. For example, chemical manufacturers that are members of the American Chemistry Council are required to adhere to Responsible Care®, the global chemical industry's world-class environmental and safety performance initiative.

What are some of the sustainable business practices adopted by AC&S?
When we have the opportunity to replace raw materials with sustainable substitutes, we implement it with our clients. In 2008, we built a biodiesel manufacturing unit by repurposing a former pesticide production unit. At the time, we were the only renewable fuel manufacturing facility in West Virginia. We are also committed to employing sustainable business practices, continually looking for ways to incorporate sustainable manufacturing techniques in our operations.

You testified on behalf of the American Chemistry Council in front of a joint committee hearing in Congress in 2013. As a key advocate for the U.S. chemical industry, could you explain the recent growth we have seen?
In the last five years, we have had almost 250 announced chemical industry projects nearing $153 billion in investments as a result of the shale gas resource. Hydrocarbon resources in North America - namely shale gas and oil - are hugely advantageous for the chemical industry in the United States. We enjoy a decisive competitive advantage in the cost of producing basic chemicals and the key is the incredible supply of petrochemical feedstocks found in shale formations. The shale gas resource will drive growth in U.S. chemical manufacturing for years to come.

Looking ahead to the company's 30-thirty year anniversary, where can we see AC&S, Inc heading in future?
I am very optimistic of our future because of the foundation provided by Responsible Care®. We distinguish our company in the world of contract chemical manufacturers by investing the effort and resources to raise the bar across all our operations to continuously strive for excellence and improvement in all aspects of safety, security and environmental stewardship. •


KD


MW

Kate Hampford Donahue & Mike Wyrostek

KD: President
MW: Director of Marketing
HAMPFORD RESEARCH, INC. (HRI)

Can you explain how both Hampford Research, Inc. (HRI) and the specialty chemicals industry have developed over the last three years?
MW: Over the past several years, Hampford Research has transitioned from an 'everything for anybody' mentality to a more deliberate focus on our core competencies. This includes specialty chemicals for electronics, printing and personal care, and most recently the coatings market. There have also been important developments in the ultraviolet/electron beam (UV/EB) industry that shifted the focus away from cost and more towards high purity and ultra-high performance. This is in direct alignment with our core competencies and values, and has resulted in considerable growth.

What are the industries in which UV/EB is used and what are its practical applications?
MW: UV/EB refers to anything that reacts with light. This includes electronics, printing and imaging, holographic, coatings and adhesives. One of our fastest growing market segments is the printed circuit board industry, which is unusual as the total market size has actually shrunk over time. Through close collaboration with our strategic partners, we have been able to successfully differentiate ourselves, allowing us and them to gain considerable market share.

Another high growth area for us is in the light-emitting diode (LED) market. This is a much more cost-effective energy source as compared to traditional UV lamps. These changes in technology have resulted in new, more rigorous demands on the additives themselves, which have also allowed us to enjoy a steady increase in sales.

What are some of the challenges you have faced in manufacturing these products in terms of scaling?
The single biggest challenge associated with scaling up is consistency. Many of our products are specified and sole sourced by our customers, based on relatively small-scale production. As demand grows, we are tasked with transitioning from small, laboratory-scale vessels to larger production reactor systems. Through the implementation and execution of a comprehensive stage-gate system, we are able to meet our customers' demands with no drop off in quality.

How important is it for you to act as a partner rather than as a vendor with your clients, and could you elaborate on the dynamics you try to foster?
KD: We are fortunate to enjoy long working relationships with our customers. Once a company works with us they tend to stay with us because of our reliability, quality and responsiveness.

MW: Our materials typically represent approximately 5% of the overall cost of our customers' raw materials costs, but our materials also represent 90% to 95% of the functionality. Most of our customers have a global presence, so their sourcing is international. Our customers are typically international with a United States presence, which leads them to use companies like us for manufacturing the key component of their products. The three reasons that clients choose HRI for their chemical manufacturing needs are: market knowledge and consistency of the materials, intellectual property (IP) protection, and our responsiveness. When we make mistakes, we do not run from them but rather face them and correct them. We have true vendor partnerships and benefit when our clients benefit.

What measures do you have in place to ensure IP protection as a contract manufacturer?
KD: We take protection of the IP of our customers very seriously. We have seen some of our customers burned in overseas relationships where their IP was stolen and a competitor began manufacturing their product. We sign non-disclosure agreements with our clients, restrict employee access and have a comprehensive electronic security system in place to ensure the safety of our formulas and the IP of our customers.

To what extent does sustainability pose an opportunity rather than a threat to the chemicals industry in the United States?
MW: From a market-opportunity standpoint, energy saving and sustainability are having a positive effect on us because these activities drive our innovation. Our customers are constantly looking for ways to improve their product sustainability and, through close collaboration, we are often able to help them meet these demands.

Looking ahead, what can we expect to see as the major milestones in HRI's future operations?
MW: In addition to enjoying double-digit sales growth, we hope to begin moving out of this facility and into our other, much larger building located approximately one-mile away. •

Prem Jain

President and CEO
SPECTRUM CHEMICALS

With more than 40 years of experience, Spectrum Chemicals is an industry veteran. Could you give us an overview of the company and key milestones in its history?
Over 40 years, Spectrum has seen many changes. It was originally established in Gardena, California by Paul Burg, our current chairman and director, in 1971. A chemist exiled from Eastern Europe, he saw that there were very few chemicals suppliers on the west coast of the United States at that time and, of those that were there, many were leaving because of a chemical embargo implemented by other countries. He initially went into buying and selling surplus chemicals, which enabled him to develop relationships with manufacturers. He also developed his own quality-control system, which has underpinned all our activities ever since.
This led to Spectrum being selected as the sole distributor for Janssen, a Belgian specialty chemicals manufacturer, in the 1990s. This helped our business grow exponentially. Several other events occurred during the decade, including the opening of our New Jersey facility and the introduction of two further product lines. We began stocking laboratory supplies, coming to be seen as a one-stop shop for chemical companies, as well as handling controlled substances and Schedule I-V narcotics. The types of products we have are among the most regulated in the industry but, unlike many suppliers, we have advanced knowledge of the chemicals we supply, their entire supply chain, and the requirements of regulatory bodies.

As an international player, could you go into more detail about your global facilities and the role they play in the make-up of Spectrum's operations?
Our U.S. operations are mainly focused on the east and west coasts, but we also have a sales support office in Arizona, which has a staff of 15. In 2011, our New Jersey site took over from California as our headquarters. In the early 2000s, two-thirds of our business could be found in California, but now only accounts for around 40%. However, our New Jersey headcount is only around 75 people, while we have double that on the west coast.
In 2003 Spectrum expanded into China, opening an office in Shanghai. Many of the APIs we used to import from China would fail our tests and, once rejected, they were very difficult to return. This site enables us to test material in country before importing it. By 2010, we had a mirror image of our offices in New Jersey and California set up in Shanghai, where we employ a total of 40 people.

Can you outline your product basket and tell us more about your flagship products and their applications?
Spectrum's product basket is unique in that it has a very broad product offering. We have about 50,000 chemicals overall, including 23,500 organic chemicals for research and science and 1,200 pharmaceutical ingredients. This is where our focus lies, with many of our USP, NF and FCC products being truly multi-compendial. We can supply products to meet the pharmacopeial conventions of any country worldwide in the areas of food and beverage, personal care, cosmetics, academia, research, waste water treatment, biotech, aerospace and automotive, among others. Apart from our APIs, we have more than 200,000 products in the lab supplies and equipment range and we distribute all DEA-controlled substances from Schedules I-V, as well as listed class I chemicals.

As a smaller player, how does Spectrum compete both within the domestic U.S. market and on an international level?
With increasing regulation for handling and manufacturing chemicals in the United States, much of this aspect of the industry is facing challenges from emerging markets in India, Korea, China and Brazil, which are shackled by fewer controls. U.S.-based companies of course need these chemicals and are forced to import them, but the products lack that quality guarantee. Spectrum is therefore competitive in the domestic marketplace because we cater to quality-oriented customers. Internationally, we are able to buy raw materials from India and China and sell the same materials back to India and China because of the reputation we have established.

What does the future hold for Spectrum?
In the next five years, we expect Spectrum to at least double its revenue, with 2015 and 2016 seeing us conduct expansion into new business segments and geographies. We will be returning to Spectrum Pharmacy, a space we left five years ago. We sold this division, which we had built up in the 1990s, to a competitor in 2010. Five years later, and with a no-competition agreement having expired, we are going to resurrect that business, which we believe should be up and running within a year. This will lead us to growth of around 20% to 25% in one year.
We have also acquired additional office space next to our New Brunswick headquarters and will have moved part of our operations into that building by June 2016. We are also going to manufacture our own products in the areas of organic chemicals and aqua solutions; we will however be continuing our distribution partnerships in these spaces as well. Lastly, we are looking to increase our international presence; we have signed an agreement with VWR, who will become our distributor across Europe. •

J. Michael Jusbasche

CEO
ALTIVIA CHEMICALS

Could you provide us with a brief overview of the company since its founding?
Altivia was founded in 1986 as a manufacturer of water-treatment chemicals. We subsequently formed a partnership with the Aluminum Company of America to manufacture sodium aluminate, thus entering into the catalyst and titanium dioxide industry. Over the years, the company has evolved into a number of different areas – mostly into water treatment chemicals – from aluminum chemistry to the more sophisticated polymers, as well as expanding into wastewater treatment. We also moved into the area of production and drilling oil field chemicals. The majority of our our water treatment and commodity chemicals business was sold to Brenntag in 2012; we retained the aluminum polymers business and an iron salts chemicals production facility. At the time of the sale to Brenntag our goal was to expand into a different chemical space, and we retained the management team to implement our acquisition strategy.

Altivia acquired assets of Axiall Corporation's Specialty Phosgene Derivatives business in April 2015, and completed the purchase of Haverhill Chemicals in November 2015. Could you explain the impact that these recent milestones will have on the business?
The two businesses are quite different. The first is a highly specialized business that supplies the organic peroxides, agricultural and pharmaceutical markets and operates globally; one third of our products are exported to Europe, Asia, Africa and South America. The commodity business that we acquired is a petrochemical plant in Southeastern Ohio and, although it too is a global business, the plant's location limits its product distribution to North America.

What is the strategy behind starting as a specialty chemicals company and subsequently entering into petrochemicals?
The two businesses comprise similar management structures. The differences comes in as far as technology and commercialization is concerned and we therefore have different employees to manage these businesses. Our iron salts facility is also within a segment of its own that is more region-specific. In terms of dividing our time between the three different areas of Altivia, we are currently focusing our attention on our petrochemicals plant. As it was idle for five months, we are in the midst of implementing the startup of this plant and fostering customer relations.

What is your typical client profile and how do you deal with local versus multinational players?
There are differences in customer requirements in terms of their needs. The iron salts business provides a commodity with some technology to supply to municipal and industrial water plants. The petrochemicals business comprises world-class products, driven by global economic market forces. The product has to meet specifications and is driven by price and supply dynamics.
The phosgene derivatives business is more focused on quality and safety, and in some cases we jointly develop products with the customers. It is a delicate play and requires a high level of safety on the manufacturing side. Quality and responsiveness to customer needs is also important, while product stewardship is higher than in our other two businesses.

The extension of your operations into the petrochemicals space comes at a time when the industry is seeing a complete resurgence thanks to the shale gas revolution. What is your view on the petrochemicals industry at present?
The development of products and technology has given the United States an advantage in the chemicals industry for around half a century, and we have been the global source of a variety of products. As this technology began moving overseas, European and Asian markets were able to produce chemicals at a lower cost. With our current low energy prices, in comparison to Europe and Asia, we are seeing the return of our competitive advantage.
From a regulatory standpoint, the United States is at a disadvantage with Asia. We do have more regulations, but the reality is that as an industry we understand the need for regulations. Safety and environmental standards cannot be compromised in order to stay competitive.

As the company reaches its 30th birthday, where do you see Altivia today and where do you expect it to be by the end of the decade?
We are processing the two businesses we have recently acquired and are cautiously optimistic about the future. Our specialty chemicals business has the most scope for innovation, and we have invested heavily in research and development. We are the largest producers of phosgene derivatives in North America and need to take advantage of this position by investing in innovation. Our recently acquired petrochemical business has state-of-the-art production technology and we expect it to grow organically as global commodity markets recover, as well as through acquisitions to expand our footprint in global markets. Altivia's acquisitions will be fueled primarily by the redistribution of commodity business caused by asset redistribution and divestitures by large petrochemicals companies. In ten years, we will see a very different commodity-supplier landscape than today, as Asia and North America compete to supply the rest of the world. •

K'Lynne Johnson

Co-founder and Former CEO
ELEVANCE RENEWABLE SCIENCES

Can you provide a brief history of Elevance Renewable Sciences, including some key milestones along the way?
I founded the company in 2007, along with a small team and some venture investment groups, to focus on specialty chemicals that perform better with renewable feedstocks. Much of our technological development occurred as the result of grants that we received from the U.S. Department of Energy in 2004 and 2008. In that period, we demonstrated several early milestones related to the potential viability and competitiveness of our technology targets, producing a set of novel, desired chemicals, and using a proprietary catalyst system that had not been deployed or scaled industrially. A subsequent milestone was to scale the technology so it could be economically competitive. Building a commercial plant, deploying our technology and commercializing the target products were the next steps. In 2010, we formed a joint venture partnership to build our first asset, which was completed in 2013, and has since been commissioned, scaled and operated. We are in the growth phase of commercially scaling the products and building the business.

What does innovation mean to Elevance?
Innovation is the overall essence of Elevance. The agriculture and chemical industries have suffered from a lack of fundamental innovations in the past few decades. Innovation is fundamental to our business, as we are innovating across all of the technologies and products that we work with, in terms of how we develop processes and catalyst technologies and how our products can perform better for our customers. Being economically competitive is imperative to successfully commercialize products, so we have to come up with solutions to make this possible.

What are Elevance's flagship products and the drivers behind their development?
Our novel building blocks and ingredients let our customers achieve either the same end product more efficiently or enhance performance of their products. To date, we have principally commercialized products in the solvents industry, and have introduced commercial products for personal care and lubricant applications and for making polymers. We have a marketing partnership with Stepan Co. using our building blocks to make unique solvents through the same process they use for their current chemicals. With the di-functional nature of our building blocks, they are seeing an improvement in solvency performance and with lower volatile organic compounds compared to competing products. As a result, their clients can use far lower concentrations of active ingredients and see equal or better performance as well as a cost reduction. Within personal care, it is clear that premium products composed of natural ingredients are being demanded more strongly.
In the polymer arena, the underlying driver for our products is performance, which in turn allows our customers more flexibility when formulating their products. Our products are able to achieve strong performance characteristics and lower costs, in part due to increased purity levels. We also ensure cost-effective products, which can increase efficiency and capital intensity. Finally, the theme of sustainability is consistent and growing, and is being incorporated in product development. In our experience, we have not seen any price premiums available for sustainable products. It works as more of a deciding criterion, not a driver.

What advantages do Elevance's products offer to chemical companies in terms of environmental standards?
The inherent nature of our production process entails a very low carbon footprint without toxic waste streams and very little energy and water usage. Typically, our customers use the same processing that they currently use, which passes on the advantages of our smaller environmental footprint. We also offer companies an opportunity to improve the performance of their products, which can result in the ability to use fewer chemicals, and to diversify their feedstock supply to one that is more renewable and globally available.

How has the U.S. chemical industry evolved since Elevance's inception in 2007?
Some key characteristics have changed given the low oil prices, but the cyclical nature of the industry remains the same. The shale gas revolution has revived the U.S. chemical industry, especially in terms of making certain geographic locations more attractive and cost competitive, and has caused a surge in manufacturing, which has had a ripple effect on ancillary industries.

What measures need to be taken in order to prepare for the projected increase in supply?
Firms should be seeking consolidation opportunities, increasing efficiency and looking for ways to improve their supply chain and business portfolio. As soon as there is an oversupply, costs create pressure for firms. Consolidation is necessary for efficiency, because the industry is commodity-driven, and the cycle will not correct itself unless the market is balanced. Seeking opportunities and places for profitable growth is another intelligent strategy in times of oversupply.

Where will Elevance be by the end of the decade?
We expect to continue seeing commercialization growth and to move into broader sectors, where Elevance's products are reaching more end markets. We anticipate that the benefits our products offer our customers and a solid global economy will facilitate this growth. •

Image: Thinkstock

THE SHALE-MANU-FACTURING COMPLEX: PETRO-CHEMICALS

"More than 50% of our polypropylene production takes place outside of Brazil, with the majority being in the United States. This market is far more sophisticated in terms of product development and technology than our home market."

- Fernando Musa,
CEO,
Braskem America

REDEFINING REFINERIES: THE U.S. PETROCHEMICALS INDUSTRY

Journalist: Harriet Bailey

At the start of the decade, the world was recovering from a global economic crisis. Although the United States was faring better than others, its petrochemical industry was not a specific area of focus; building a new plant was an unthinkable proposition, as manufacturing had been steadily migrating to the lower-cost markets of China and the Middle East.

Two years later, however, the situation was wholly different. Oil prices had jumped in price by $40 per barrel to peaks of $120 per barrel, leading the United States to produce more oil and minimizing its reliance on imported feedstocks. This coincided with the widespread implementation of hydraulic fracturing and horizontal drilling technologies, which unlocked new shale gas plays across the country. Almost overnight, the United States became the destination of choice for petrochemical companies.

The latest figures from the American Fuel & Petrochemical Manufacturers (AFPM) highlight how quickly global petrochemical companies have committed to the United States for their manufacturing operations. "Over the last few years, the chemical industry has announced over 256 industry projects with a cumulative investment of $158 billion," said Melissa Hockstad, vice president of petrochemicals at AFPM. This includes around ten new feedstock crackers, mainly based on the Gulf Coast, and plans to build another ten.

Companies have wasted no time in taking advantage of the fresh potential for the United States. Yet this has undermined chemical industries in other parts of the world, particularly Europe, Brazil and India, which are losing their export markets to the United States. The resounding impression of Europe among petrochemical companies is of a stagnant market with expensive labor and energy costs. Germany's BASF cited these reasons when announcing a strategic cutback in its European operations in 2014. Switzerland-headquartered INEOS, meanwhile, confirmed its profits in Europe had halved between 2011 and 2014, compared to a tripling in the United States. In an open letter to the president of the European Commission, INEOS chairman Jim Ratcliffe expressed his concerns about the future of the petrochemical industry on the continent, predicting "much of it will face closure within the next 10 years."

> *"The decline in the price per barrel of oil has contributed to a small but perceptible renaissance among European manufacturers. They remain at a cost disadvantage to the United States, but less so than 12 months ago."*
>
> *- Paul Harnick, Global COO, Chemicals and Performance Technologies, KPMG*

According to KPMG's Global COO for the Chemicals and Performance Technologies segment Paul Harnick, however: "The decline in the price per barrel of oil has contributed to a small but perceptible renaissance among European manufacturers. They remain at a cost disadvantage to the United States, but less so than 12 months ago."

Although 22 chemical plants closed their doors in the UK in the five years between 2009 and 2014, INEOS recently committed around $677 million to the construction of a new ethane port terminal at its Grangemouth facility in Scotland, which will enable U.S. gas imports to reach ethylene plants owned by companies such as ExxonMobil Chemical and Shell Chemical. Low-cost feedstock availability combined with its global positioning and the comparative ease of doing business have been significant factors in the growth of the U.S. chemical industry and its importance on the world stage. Not content with importing low-cost U.S. ethane gas to Scotland, INEOS is also executing a bold plan to use U.S. feedstock in its European cracker complexes via a $1-billion project that will see around 800,000 metric tons (mt) of gas transported to Norway via a network of pipelines and new shipping vessels.

Braskem America's CEO Fernando Musa also highlighted how the United States' reputation and cohesiveness have played to the company's advantage during this period of rapid expansion: "More than 50% of our polypropylene production takes place outside of Brazil, with the majority being in the United States. This market is far more sophisticated in terms of product development and technology than our home market."

Like Europe, Brazil is no longer a priority for investment. "If you had asked us three years ago […] our expectations for growth lay in the emerging markets of China, India and Brazil, in that order," explained KPMG's Harnick. "Brazil has been teetering on the brink of recession for the last 18 months [and] really struggles from a legislative standpoint."

Brazil's complex tax structures are also proving a deterrent, as companies shun the nation in favor of easier U.S. operations.

Texas two-step

As the United States switches its position from a net importer to a net exporter of natural gas, a host of new construction and expansion projects are underway on the Gulf Coast to double the nation's polyethylene capacity by the end of the decade. Braskem is the third largest company worldwide in terms of polypropylene capacity, but is currently investing in a small specialty polyethylene plant in Texas, aiming to capitalize on the export market. "Our supply chain concerns are therefore very different depending on the product," explained CEO Musa. "Polyethylene requires a greater focus on port access and exporting challenges in the Gulf Coast region, while polypropylene concerns cover rail infrastructure nationwide."

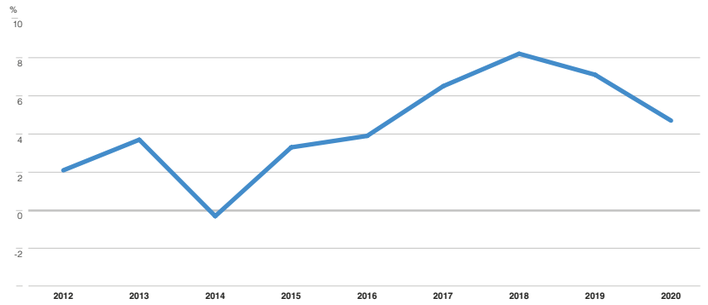
ExxonMobil Chemical is building two, new 650,000-mt per year (mt/y) polyethylene plants in Texas, without any access to the rail network. This suggests that they will be used in large part to service their overseas gas supply contracts, rather than for the domestic market.

Houston-based petrochemicals manufacturer LyondellBasell is planning to inject up to $4 billion into construction and expansion projects along the Gulf Coast by 2020. Three existing ethylene projects are set to expand the capacity of their facilities by roughly 360,000 mt each, while the company's large Channelview complex is building an entirely new plant. Projects already in progress when oil prices dipped will all reach completion by around 2017, which could have a significant impact on service companies, as expansion efforts make themselves felt downstream. "We expect to see a significant increase in maintenance work as a direct result of the increase in the number of plants," outlined Tony Spencer, CEO at third-party personnel company CertifiedSafety. "But these better-designed facilities should be able to run for longer between maintenance events. So with the new generation of plants the frequency of turnarounds will decrease, but the overall project volume should increase."

Projects that had not yet broken ground were mostly postponed and those in the planning stages were shelved. Once oil prices return to the $60 to $80 per barrel price range, a second wave of project announcements will be on the cards. This two-step process may prove beneficial to the industry in the long run, allowing it the time to adapt to increased capacity and space out a rise in demand over a longer period.

U.S. PETROCHEMICAL PRODUCTION BY VOLUME, 2012-2020 (% CHANGE YEAR-OVER-YEAR)

Source: American Chemistry Council, December 2015



The shake-up in the petrochemicals space and demand for product has even seen new players enter the market. Altivia, a specialty chemical company focused on iron-based salts and phosgene derivatives, ventured into the petrochemicals space with its acquisition of Haverhill Chemicals in November 2015. Haverhill, the third largest producer of merchant phenol and acetone after Ineos and Shell, was forced into bankruptcy after being cited by OSHA for 23 safety violations following the death of a worker in 2014. Altivia CEO J. Michael Jusbasche stated that he expects the business to grow organically as global commodity markets recover, and inorganically through acquiring the non-core assets of larger petrochemical companies.

Asian persuasion

The resurgence in the U.S. chemical industry has also opened up the market to foreign investors like never before. AFPM's Hockstad said: "More than 60% of the announced investment is coming from companies outside of the United States."

"Foreign investors will likely continue to have an interest in investing in the United States due to its favorable feedstock, capital expenditure, and demand environment," said Andrew Walberer, partner in A.T. Kearney's chemical industry practice. "[Japan-based] Mitsui, for example, has been a co-investor in new Gulf coast projects."

With North America competing globally with natural gas liquids, China shifting from naphtha to coal, and the Middle East having access to low-cost naphtha, countries outside of these regions will look to tap into one or more of these areas. According to PwC partner Vijay Sarathy, the Japanese and Korean chemical industries are not faring as well as neighboring China. "They are looking for ways to become involved in the U.S shale revolution to mitigate the effect the temporary lull in the price of oil has had on their crude oil-derived naphtha sources," he said.

On the flip-side, Asia's exceptional demand for chemicals for its growing middle-class has also seen Chinese companies directly investing in their own chemical projects in the United States. The Shandong Yuhaung Chemical Co., for example, held a groundbreaking ceremony at a $1.85-billion site in Louisiana in September 2015. Crucially, the company claims that it is cheaper to ship methanol from the United States to China than using more expensive natural gas sources on its home turf. Taiwan's Formosa Petrochemical Corp. is considering plans for a $9.4-billion petrochemical complex at an adjacent site. Increased Chinese investment into the United States also opens the door to two-way trade partnerships.

The U.S. petrochemical industry is now switching to long-term thinking as a result of the shale gas revolution. The first wave of projects may have been built at a premium, but will still benefit from being the first movers in the market, having had the pick of location and taken advantage of low-cost feedstock years ahead of their competitors. Slower movers, on the other hand, have had the opportunity in 2015 to re-group and focus on their financials, while still seeing new plants come online before the end of the decade. The unpredictability within the industry is consistent with such a dramatic direction change. Yet as AFPM's Hockstad makes plain: "The shale manufacturing boom will help the United States continue to redefine its energy future." •

Melissa Hockstad

Vice President, Petrochemicals
AMERICAN FUEL & PETROCHEMICAL MANUFACTURERS (AFPM)

Could you provide us with a brief history of AFPM and any recent milestones the association has undergone?
This organization has successfully worked on behalf of American fuel manufacturers since 1902. Beginning as the National Petroleum Association, it was founded to serve the interests of independent oil refiners in Pennsylvania and Ohio. Since then we've gone through a number of name changes. In 1998, we became the National Petrochemical & Refiners Association, to reflect the important role of petrochemical manufacturers in our association and in America.
Most recently, we changed our name to the American Fuel & Petrochemical Manufacturers (AFPM). This name emphasizes more than ever what we stand for – American manufacturing and jobs; proven and reliable products for your life every day; economic and national security; and a commitment to serve our nation and the American people.
In addition, in May 2015, AFPM named a new president, Chet Thompson. Chet brought more than 20 years of experience in the energy and environment sector to the organization. We look forward to working with him in the years ahead to advance the refining and petrochemical industries.

What are the principle benefits for AFPM member companies and how do they contribute to the overall running of the association?
Members of AFPM receive a number of benefits, including AFPM advocating for our industries in dealings with government and the media, informative meetings and conferences contributing to business success, networking opportunities, and access to AFPM electronic publications.
AFPM members are active contributors to the organization and the Board of Directors relies on the counsel and support of the experts within our membership to accomplish specific Association functions and to plan our future. Members contribute through 20 standing committees.

It is claimed there is a general lack of understanding about the chemical industry. How can AFPM change popular perceptions?
One of the challenges we face is that most individuals know very little about the petrochemical industry and how our products positively impact their daily lives. There is a general lack of understanding that petrochemicals are used to make a range of products including those used in building and construction applications, transportation, food packaging, textiles, military goods, medical devices, electronics, paints, and alternate energy such as solar panels.

The decrease in oil prices may slow the flow of new investment in the United States as it increases the competitiveness of companies in Asia and Europe, where oil-based feedstocks are used. By contrast, natural gas-based feedstocks are primarily used in the United States.

Over the past several years, AFPM has focused on increasing the public's knowledge of our industry through educational tools including AFPM's website, the AFPM Petro Primer blog, Twitter, educational videos and outreach with federal, state, and local officials. We anticipate our educational efforts will continue to grow in 2016. Since about 95% of all manufactured goods are touched by the business of chemistry, we want to ensure that people understand the positive role our industry plays in their daily lives and why our industry is important to them.

The United States has seen a resurgence of its domestic chemical manufacturing industry as a result of the development of shale gas. Should the industry be concerned about a pending shortage of qualified personnel?
In agrochemicals, the registration process is very different. The resurgence of the domestic petrochemical manufacturing industry has led to exciting times for our industry. However, a shortage of qualified personnel, especially craft professionals such as welders, electricians, and ironworkers, continues to be a top issue impacting our members. The shortage is the result of both new plants and plant expansions that need employees, in addition to an increasing number of individuals who will retire over the next five to 10 years. To address this issue, AFPM has increased its workforce development efforts to attract individuals to careers in the petrochemical industry. In addition to launching a new workforce development website -- workforce.afpm.org, we have partnered with EdVenture Partners, an organization that creates innovative industry-education programs, to activate the "AFPM Recruitment Challenge." The program tasks students in two- and four-year schools with developing and implementing a program to promote our industry and the range of career opportunities. This program has been very successful connecting with the millennial generation (individuals between 18 and 34 years old).

"One of the challenges we face is that most individuals know very little about the petrochemical industry and how our products positively impact their daily lives. There is a general lack of understanding that petrochemicals are used to make a range of products including those used in building and construction applications, transportation, food packaging, textiles, military goods, medical devices, electronics, paints, and alternate energy such as solar panels."

Where do you expect to see the petrochemicals industry by 2020?
The United States has become the world's top producer of oil and natural gas, a fact unfathomable just a few short years ago. This reality has resulted in positive growth for the industry. Over the last few years, the chemical industry has announced over 256 industry projects with a cumulative investment of $158 billion with more than 60% of the announced investments coming from companies outside of the United States. We anticipate a peak construction period in 2017 or 2018, with many of the new projects being completed by 2020.

However, the decrease in oil prices may slow the flow of new investment in the United States as it increases the competitiveness of companies in Asia and Europe, where oil-based feedstocks are used. By contrast, natural gas-based feedstocks are primarily used in the United States. Although this situation may result in some companies postponing projects until after 2020, we anticipate overall growth for the industry between now and 2020. One thing is certain, the shale-manufacturing boom will help the United States continue to redefine its energy future.

Image: Thinkstock

LyondellBasell

LEADERSHIP

Bhavesh V. (Bob) Patel – CEO.

ABOUT THE COMPANY

LyondellBasell is one of the world's largest plastics, chemical and refining companies and a member of the S&P 500. LyondellBasell manufactures products at 56 sites in 19 countries. Its products and technologies are used to make items that improve the quality of life for people around the world including packaging, electronics, automotive parts, home furnishings, construction materials and biofuels.

HISTORY

LyondellBasell emerges from Chapter 11 protection a stronger organization, with a significantly de-levered balance sheet and an improved cost structure. LyondellBasell is listed on the NYSE as a publicly traded company (Ticker symbol: LYB).

2009: LyondellBasell voluntarily files for Chapter 11 of the U.S. Bankruptcy Code.

2008: LyondellBasell completes acquisition of Solvay Engineered Polymers, Inc.

2007: Basell and Lyondell merge to become LyondellBasell Industries, one of world's largest polymers, chemicals and fuels companies.

2006: Lyondell acquires CITGO's 41.25 percent ownership interest in LCR. As a result of this transaction, Houston Refining LP(formerly LCR) becomes a wholly owned subsidiary of Lyondell.

2005: Access Industries, a privately held industrial group with long-term holdings around the world purchases Basell.

2004: Lyondell acquires Millennium Chemicals Inc. As a result, Equistar becomes a wholly owned subsidiary of Lyondell.

2002: Lyondell increases interest in Equistar to 70.5 percent with acquisition of Occidental's share.

2001: Basell completes start-up of the world's largest low density polyethylene plant (LDPE) in Aubette, France, with a single line capacity of 320,000 tons per year.

2000: Basell is formed through the merger of Montell, Targor and Elenac; a 50/50 JV between BASF and Shell.

1998: Occidental becomes the third partner in Equistar. Lyondell acquires ARCO Chemi Co.

1997: Equistar Chemicals, LP is formed as a joint venture between Lyondell and Millennium Chemicals Inc.

1993: LYONDELL-CITGO Refining (LCR) is formed as the Houston Refinery becomes a JV with CITGO Petroleum Corporation.

1990: Lyondell acquires low-density polyethylene (LDPE) and polypropylene (PP) businesses from Rexene.

1989: Lyondell is spun off from ARCO, becoming a public company listed on the New York Stock Exchange (Ticker symbol: LYO).

1985: Lyondell Chemical Company is formed from selected chemical and refining assets of Atlantic Richfield Company (ARCO).

1982: Spheripol process, currently the most widely used polyolefins process technology, first introduced by predecessor company Montedison.

1975: Start-up of the first Hostalen high density polyethylene (HDPE) process plant.

1969: The PO/TBA process, invented by Atlantic Richfield Company. (ARCO), produces propylene oxide with tertiary butyl alcohol (TBA) as the co-product.

1963: Natta and Ziegler jointly awarded the Nobel Prize in Chemistry for their discoveries in polyolefins technology and catalysts.

1954: LyondellBasell predecessor company scientist Giulio Natta polymerizes the first crystalline polypropylene.

1953: LyondellBasell predecessor company scientist Professor Karl Ziegler discovers the first linear polyethylene (PE) chain.

PRODUCT BASKET

Chemicals

LyondellBasell is a leading producer of basic chemicals for the chemical Industry including ethylene, propylene, propylene oxide, ethylene oxide, tertiary butyl acohol, methanol, acetic acid and their derivatives. Intermediates and derivatives from LyondellBasell find use in numerous applications including fuels, automotive fluids, furniture and household goods, coatings, adhesives, cleaners, and even cosmetics and personal care products.

Polymers

LyondellBasell is the world's largest producer of polypropylene and polypropylene compounds, as well as a top worldwide producer of polyethylene. We also produce significant quantities of high-value specialty polymers, such as Catalloy process resins, Wire and Cable grades, Plexar tie layer resins and Polybutene-1 (PB-1). LyondellBasell works diligently to bring innovative resins to the market. We are continuously develop new opportunities for polyolefins to replace other polymers and alternative materials.

SUSTAINABILITY

LyondellBasell's long-term business success is underpinned by a commitment to sustainability principles. By developing products that address global challenges such as water scarcity, energy efficiency, and mobility, we are helping to solve the world's toughest problems.

We strive to create better environmental and social outcomes in the way we do business. In June 2014, The American Chemistry Council (ACC) named LyondellBasell a Responsible Care Company of the Year, in recognition of the company's outstanding achievement in environmental, health, safety and security (EHS&S) performance. •

ExxonMobil Chemical

FOUNDER & LEADERSHIP

Rex W. Tillerson – Chairman & CEO

ABOUT THE COMPANY

ExxonMobil Chemical is one of the largest chemical companies in the world. Its unique portfolio of commodity and specialty businesses generates annual sales of more than 24 million metric tons (mt) of prime products. It has world-scale manufacturing facilities in all major regions, and its products serve as the building blocks for a wide variety of everyday consumer and industrial products. It processes feedstocks from ExxonMobil's upstream and downstream operations, supplemented with market sources, to manufacture chemical products for higher-value end uses. It focuses on product lines that capitalize on scale and technology advantages, building on our strengths in advantaged feedstocks, lower-cost processes, and premium products.

REVENUE AND GROWTH

2014 Results & Highlights

• Achieved best-ever safety performance

• Delivered earnings of $4.3 billion and return on average capital employed of 19.4%, averaging 23.5 percent over the past 10 years

• Sold 24.2 million mt of prime products, including record sales of metallocene products

• Invested $2.7 billion, with selective investments in specialty business growth, advantaged feedstock capture, high-return efficiency projects, and low-cost capacity debottlenecks

• Started construction of a major expansion at our Texas facilities, including a new world-scale ethane steam cracker and polyethylene lines to meet rapidly growing demand for premium polymers

• Commissioned a world-scale manufacturing facility in Baytown, TX, to produce synthetic basestocks for automotive and industrial applications.

U.S. LOCATIONS

Baton Rouge, Louisiana

This plant has world-scale manufacturing capacity, producing nearly all of its commodity and specialty products. It is home to the world's largest production facilities for halobutyl rubber and isopropyl alcohol, and is the company's primary oxo alcohol production site. The complex also includes two nearby polymer plants. In 2015, the company will start up a new advanced synthetic basestock unit to meet the growing global demand of high-performance finished lubricants.

Baytown and Mont Belvieu, Texas

This plant is the largest integrated refining and petrochemical complex in the United States and the company's largest ethylene production facility in the world. It is closely integrated with the nearby Mont Belvieu Plastics Plant, which produces premium metallocene polyethylene. Baytown also produces aromatics, polypropylene, halobutyl rubber, and a wide range of premium hydrocarbon fluids. In 2014, facilities were added to produce metallocene-based synthetic basestocks for use in automotive and industrial lubricant applications. The complex generates its own low-cost electricity and high-pressure steam via high-efficiency cogeneration plants.

Beaumont, Texas

This plant is a large producer of aromatics, with significant steam-cracking and derivatives capacity. The site also produces proprietary synthetic basestocks used in high-performance motor oils and industrial lubricants.

KEY PRODUCTS AND PROCESSES

Balanced Global Portfolio of Commodity and Specialty Products

Efficiently produced, high-volume commodity chemicals, such as many general-purpose plastics, capture upside earnings when margins are strong, and provide a low-cost structure for co-located specialties production. Specialty products, including high-end polymers and synthetic lube basestocks, command a margin premium due to their attributes in higher-value applications. They also provide a more stable earnings base.

Commodity Products

The company holds leading positions in some of the largest-volume and highest-growth commodity petrochemical products in the world. It is among the largest global manufacturers of aromatics, including paraxylene and benzene, as well as olefins, such as ethylene and propylene. It is also the largest producer of polyethylene. These products are the basic building blocks used to make many everyday products including packaging film, automotive parts, and polyester fiber.

Specialty Products

The company has a diverse set of specialty businesses, all of which rank first or second globally by market position. Specialty products are produced by upgrading a range of commodity petrochemicals typically produced at the same manufacturing site. Multiple projects are under way around the globe to increase capacity.

Specialty Polymers

The company is among the top producers of butyl polymers, specialty elastomers, and adhesive polymers. Several of its premium and specialty product lines are used extensively by the automotive industry. It also has a broad product offering of specialty resins and polymers used in the hot-melt adhesives industry for packaging, woodworking, and nonwoven fabrics.

Other Specialties

The company offers hydrocarbon fluids with high-performance characteristics for applications such as water treatment, coatings, and oil-drilling fluids. Rapid growth in hydraulic fracturing and extended-reach drilling are driving demand for hydrocarbon fluids. We also supply synthetic basestocks to the aviation and marine sectors and has the broadest portfolio of synthetic basestocks in the industry to meet the increasing high-performance requirements and strong demand for advanced lubricants. •

Fernando Musa

CEO
BRASKEM AMERICA

With our partnership with Idesa in Mexico on an integrated petrochemicals complex, we have managed to increase our scale and become a more international company. In 2012, we commissioned a new PVC plant and acquired the polypropylene assets of Dow Chemical that gave us two new plants in the United States and an industrial footprint in Europe. Today, we are the third largest company in terms of capacity in the polypropylene business globally and the number one in the Americas for thermoplastic resins.

Braskem appears to have entered the market at the right time to take advantage of the shale gas revolution. How important is the United States to Braskem's global corporate strategy?
With the shale gas revolution, we view the United States as a priority market for Braskem. More than 50% of our polypropylene production takes place outside of Brazil, with the majority being in the United States. This market is far more sophisticated, in terms of product development and technology, than our home market. We are also looking at other opportunities beyond polypropylene. Currently, we are investing in a small specialty polyethylene plant in Texas. We have also been evaluating the possibility of replicating our complex in Mexico in West Virginia, as this would be an opportunity to leverage the competitiveness of shale gas. This would involve building an ethane cracker and polyethylene plants.

Braskem was formed in 2002 as a consolidation of six Brazilian companies. Could you explain how the company has developed since that time and in particular its decision to establish itself in the United States?
After our inception, we continued to develop our presence widely in South America, as well as in the Brazilian market. During the following six years, we focused on consolidating our presence in Brazil in order to become more competitive worldwide. In the process, we began focusing on acquisitions and building new assets. We also began our renewables business in 2010 and continued to take on projects in Brazil, Venezuela, Bolivia, and Mexico. The year also marked a series of important developments in Braskem's history: we acquired the second-largest petrochemicals company in Brazil, Quattor, and increased our footprint in the United States with the purchase of the polypropylene assets of Sunoco Chemicals.

Could you tell us more about your various facilities on the East Coast and the Gulf Coast?
We have five polypropylene plants, three in Texas and two in the northeast, in Pennsylvania and West Virginia. Two plants produce between 400 million pounds per year (lbs/y) and 500 million lbs/y, while the remaining three are larger and produce between 750 million lbs/y and 900 million lbs/y. We have a good balance of assets, including a research and development center in Pittsburgh, Pennsylvania, which has mainly been focused on polypropylene.

With production levels now exceeding U.S. consumption requirements, could you talk about the importance of having a robust supply chain?
Polypropylene is mainly distributed in domestic markets and the vast majority of product stays in the United States. However, a relevant share of polyethylene produced in the United States is exported and this has increased over the years. Our supply chain concerns are therefore very different depending on the product. Polyethylene requires a greater focus on port access and exporting challenges in the Gulf Coast region, while polypropylene concerns cover rail infrastructure nationwide. There has been a growth in demand for both products domestically, and our clients are talking about further investment in the United States.

Can you elaborate on Braskem's position as a leader in biopolymers and the focus on sustainable chemicals within the company?
Braskem is the largest biopolymer player in the world. The space itself remains a niche market in the United States, whereas biomass is priced competitively in Brazil, which works to our advantage. Our choice of materials is based on minimizing conversion costs for users and is the reason behind our decision to start with green polyethylene, which is the same as a gas- or naphtha-based polyethylene, but sourced from a renewable feedstock. This is a more sustainable strategy as opposed to developing new chemistry and new polymers that would require clients to convert their equipment. We are also investing in new, biotechnology-based production processes. Working with biomass is a priority, but is not going to change the world supply scenario any time soon considering the abundance of shale gas in the United States at present.

As Braskem approaches its 15-year anniversary, what can we expect to see for Braskem America's development in the next few years?
We believe in the petrochemical market and we believe that we are successful operators possessing a good understanding of this market. We will continue to seek opportunities for growth in the Americas by building new plants and leveraging distribution channels. There is plenty of scope for growth in the United States for both polypropylene and polyethylene. While Brazil remains a priority, the country is suffering under a challenging economic environment. This will impact our investment decisions for new plants. Our overall expectation for Braskem America is for continuous and organic growth. •

Ajey Chandra

Vice President
MUSE, STANCIL & CO.

Could you provide us with a brief overview of Muse Stancil and the services you provide to clients?
Muse Stancil was founded in 1984 by Tom Muse and Ray Stancil with headquarters in Dallas, TX. We have additional offices in Houston, London, and Singapore. We cover the worldwide energy industry downstream of the wellhead, reaching into the petrochemicals segment. Muse Stancil looks into how products are processed, priced, refined and marketed, while also assisting with logistic, terminal, pipeline, refinery, petrochemical-feedstock, and electrical-generation questions.
Our services cover areas such as mergers and acquisitions, business evaluations and strategy, asset performance, commercial development, independent engineering, litigation and expert witness work, both in the United States and throughout the world. Our consultants are primarily chemical or mechanical engineers, and most have advanced degrees or MBAs. Our key skill is bringing together the engineering and the financial aspects of a project or business, using our own deep industry experience and knowledge of operations and finance.

How have client needs changed with the recent resurgence in the chemical industry?
The United States has gone from being a major importer of oil to running a surplus due to the shale revolution. From a petrochemical standpoint, the country is now the lowest-cost producer of ethane and propane in the world and manufacturers which previously avoided building new plants here are seeing a new attractiveness to the market. Currently, if all the announced ethylene projects made it to production, we would still be running a surplus in ethane and propane production. To produce one billion pounds of ethylene for example, it takes around 30,000 barrels of ethane per day. At current North American prices, recovery of the ethane is not economic in many parts of the country, and this ethane is being 'rejected' back into the gas stream. Current estimates for this rejection are that 500,000 barrels per day of ethane are being left in the natural gas stream. This can be a major advantage for petrochemical companies if they are able to lock in long-term contracts to buy ethane at attractive prices.

Gas-to-liquid (GTL) technology makes use of gas that would otherwise be flared. What trends are we seeing around GTL now and in the future?
The energy industry tries to avoid flaring as much as possible, and the World Bank, the United Nations and many other such organizations are looking to fund GTL initiatives to reduce it. It is possible to convert and use methane in various chemical forms, but economically this does not make sense in many places. The recent advances in GTL technology and the ability to build smaller, modularized plants allows this technology to be deployed in new areas. Historically, many producers have looked to liquefied natural gas (LNG) as the solution, but these plants require very large investments. While GTL may not compete currently with LNG, increased construction of LNG plants today will lead to an oversupply in the market by the time these plants are built, driving down prices. Therefore, building a GTL plant could be a good long-term strategy for producers.

Transportation remains an important issue for the U.S. chemical industry. What impact will the expansion of the Panama Canal have on the movement of product worldwide?
At present, only ships of a certain maximum size can use the Panama Canal; therefore larger ships have to travel via another route, typically around South America. With the expansion of the Panama Canal, larger ships will be able to reduce their voyage time by up to 50%. As a result, the cost of shipping decreases by approximately the same percentage. The larger ships also increase economies of scale; for example, larger shipments of propane, increasing from 375,000 barrels per ship to 525,000, barrels will be possible. Buyers in Japan, which is a large importer of propane, as well as India and China, will probably try to negotiate for lower end prices as a result, but ultimately both sides will benefit from Panama Canal expansion due to lower transportation costs.

Looking to the end of the decade, what can we expect for the petrochemical industry in the United States?
The next few years should be a 'golden age' for petrochemicals in North America. We will probably encounter higher demand due to a growing global population and rises in disposable income. For North American production, the lower cost of feedstocks such as ethane and propane should help drive higher profitability. Petrochemical demand is growing for cars and other products, along with the rising demand for transportation fuels as more cars are purchased in developing economies. While the percentage of renewable fuels in the world's energy mix will likely increase from current levels, the demand for hydrocarbon-based fuels and petrochemicals are expected to increase. With the low cost and abundant feedstock availability, the United States is in a good position to serve intensifying demand in the petrochemicals space. •

INEOS

LEADERSHIP
Jim Ratcliffe - Chairman

ABOUT THE COMPANY
INEOS is a young company. It has grown to become a leading chemical company with sales today of around $54 billion. Most of our employees have spent all their working lives in the chemical or oil industry. INEOS is a global manufacturer of petrochemicals, speciality chemicals and oil products. It comprises 15 businesses each with a major chemical company heritage. Its production network spans 65 sites in 16 countries throughout the world.

PRODUCT OVERVIEW
LINEOS products make a significant contribution to saving life, improving health and enhancing standards of living for people around the world. Our businesses produce the raw materials that are essential in the manufacture of a wide variety of goods: from paints to plastics, textiles to technology, and medicines to mobile phones - chemicals manufactured by INEOS enhance almost every aspect of modern life.

Solvents used in the production of insulin and antibiotics.

Efficient and effective biofuels to improve the sustainability of modern transport.

Chlorine to purify drinking water.

Synthetic oils that help to reduce greenhouse gas emissions from road transportation.

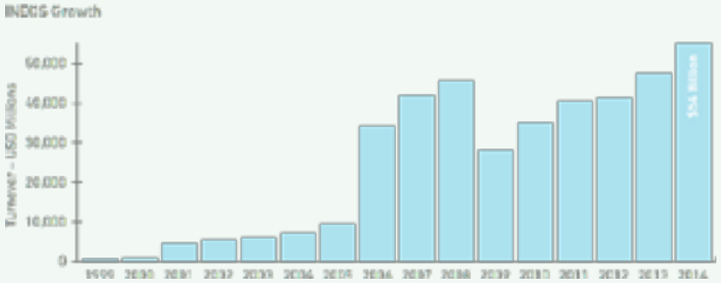
Modern plastics to package, protect and preserve food & drink.

Materials to insulate houses, offices, electrical and telecommunications cables.

Products transformed into automotive parts, used in medical applications, mobile phones, and construction.

END MARKETS
INEOS has a diversified product portfolio with a wide range of end market applications. Our chemical intermediates businesses, with leading global positions and differing industry cycles, provide earnings strength worldwide.

GLOBAL LOCATIONS
INEOS operates 65 manufacturing facilities in 16 countries supplying markets around the world. A broad geographic earnings base provides our business with security and opportunity. •



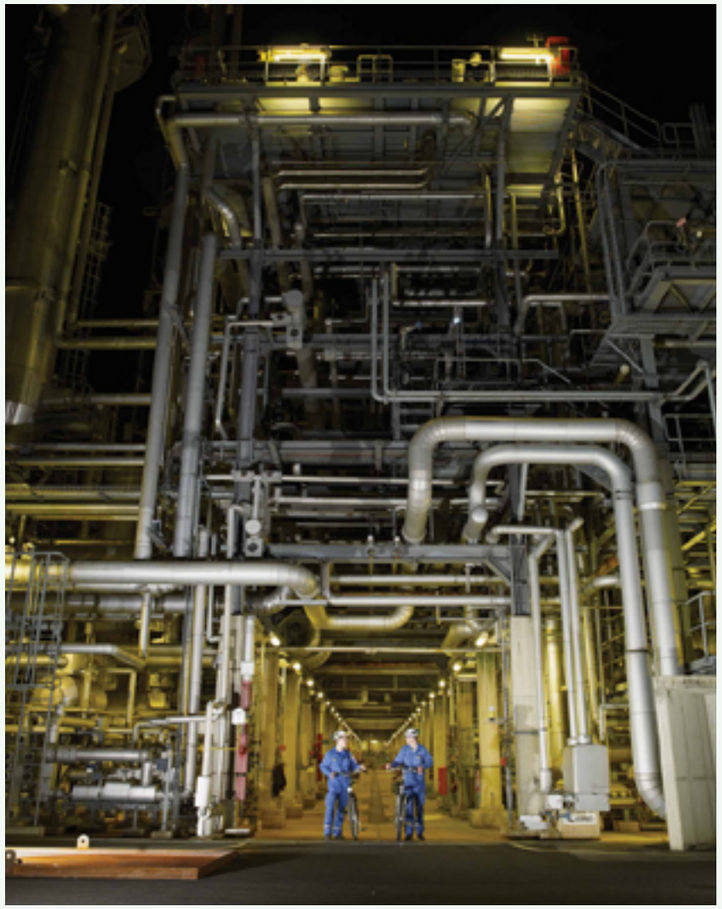


Image: Thinkstock

Chevron Phillips

FOUNDER & LEADERSHIP
Peter Cella - President and CEO

ABOUT THE COMPANY
On July 1, 2000, Chevron Corporation and Phillips Petroleum Company, now Phillips 66, combined their worldwide petrochemical businesses, excluding Chevron's oronite additives business, to form Chevron Phillips Chemical Company LLC. Chevron and Phillips 66 each own 50% of Chevron Phillips Chemical.

Chevron Phillips Chemical is one of the world's top producers of olefins and polyolefins and a leading supplier of aromatics, alpha olefins, styrenics, specialty chemicals, piping, and proprietary plastics. Chevron Phillips Chemical produces chemical products that are essential to manufacturing over 70,000 consumer and industrial products.

GLOBAL LOCATIONS
Chevron Phillips Chemical, with its joint venture partners, currently has 34 production facilities located in the United States, Colombia, Singapore, China, South Korea, Saudi Arabia, Qatar and Belgium.

KEY PRODUCTS AND PROCESSES
Chevron Phillips Chemical's product offerings are divided into two business units.

Olefins & Polyolefins

Ethylene, Polyethylene, Normal Alpha Olefins, Polyalphaolefins, Propylene and High-Density Polyethylene Pipe, Conduit and Pipe Fittings.

Specialties, Aromatics & Styrenics

Cyclohexane, Styrene, Polystyrene, Benzene, K-Resin® styrene-butadiene copolymers (SBC), Mining Chemicals, Soltex® Drilling Mud Additive, Scentinel® Mercaptans, Specialty Organosulfur Compounds, Racing Fuels, Ryton® polyphenylene sulfide (PPS), E-Series™ Acetylene Hydrogenation Catalysts.

PRIMARY BRANDS
Aromax® benzene production technology is the lowest cost process for on-purpose production of benzene.

K-Resin® styrene-butadiene copolymer (SBC) is the number one brand of SBC in the world.

Marlex® polyethylene is a premium extrusion and rigid packaging resin.

MarFlex® polyethylene is a superior flexible packaging resin.

Ryton® polyphenylene sulfide (PPS) is a high performance engineering polymer known for dimensional stability and resistance to corrosive and high-temperature environments.

Soltex® drilling mud additive is a high-temperature/high-pressure fluid loss control additive for water-based muds.

Scentinel® Gas Odorants are added to natural gas to give it a distinctive smell.

MARKETS SERVED
Adhesives and sealants, agricultural, appliances, automotive, building and construction, chemical manufacturing, drycleaning, electronics, healthcare and medical, household, imaging and photography, industrial, oil - gas and mining, packaging, paint and coatings, personal care and cosmetics, pharmaceuticals, pipe, plastics and rubber, textiles.

RESEARCH & DEVELOPMENT
Chevron Phillips Chemical has two research and development centers worldwide. These facilities provide full-scale petrochemical and polymer research including new catalyst development, product and process development, and commercial process support. The company employs more than 250 scientists, researchers, and engineers in its research facilities, which conduct a full range of research activities, including laboratory/bench and pilot scale experimentation, analytical and mechanical testing, patent support, and technical and service support for customers worldwide. Chevron Phillips Chemical currently holds more than 2,400 patents and patent applications.

CORPORATE SOCIAL RESPONSIBILITY
At Chevron Phillips Chemical, we believe that real benefits can be gained by establishing effective relationships in our communities. That is why the corporation donates funds to worthy causes and we encourage employees to similarly make a positive impact. Since the company's inception, Chevron Phillips Chemical has invested more than $15 million (and countless volunteer hours) in communities where we live and work. In all, we recognize that establishing sound partnerships with our neighbors – in our international, national, and local communities – provides for a lasting relationship built on trust and goodwill.

Goals of company support and involvement:

- Preserve and strengthen the economy and our economic system, and encourage private enterprise and individual initiative
- Promote a healthy community environment – including viable civic, cultural, educational, health and human service institutions and undertakings
- Enhance international understanding and cooperation
- Assist colleges and universities that contribute to the success of the company
- Encourage educational excellence and promote a favorable educational environment
- Assist in recruiting well-qualified personnel and encourage increased student enrollment in science, engineering and other disciplines related to the company's interest
- Promote basic research related to the various interests of the company and the community

Promote educational opportunities for women and minorities in professional disciplines utilized by the chemical industry.•

Image: Thinkstock

THE BUOYANT BAYOU: TEXAS AND LOUISIANA

"The reason that a lot of the industry came to Texas, specifically to the Texas Gulf Coast, was for companies to be able to operate year round in a temperate climate with access to resources, skilled workforce, and efficient transportation, with water and rail transportation as well as access to pipelines."

- Hector Rivero,
President,
Texas Chemical Council (TCC)

THE U.S. GULF COAST: THE CHEMICAL INDUSTRY'S NATURAL HOME

Journalist: Harriet Bailey

The Gulf Coast region has particularly benefitted from the shale gas revolution, with a third of the overall investment that has come to the United States finding a home in Texas; furthermore, of the 77 projects considering a site in the greater Baton Rouge area in neighboring Louisiana, one third are chemical companies.

Good transportation links are vital to chemical companies, with the ports of Houston and New Orleans both undergoing modernization to satisfy increasing demand as well as to support the Panama Canal's expansion, allowing super tankers to dock along the Gulf Coast. The Mississippi River links New Orleans with its sister city, and capital of Louisiana, Baton Rouge, reaching 31 U.S. states and 2 Canadian provinces in total.

The Baton Rouge Area Chamber (BRAC), responsible for leading economic development and growth strategies in the capital region, along with its counterpart Greater New Orleans, Inc., have joined forces to promote the Baton Rouge-New Orleans area to companies involved in the chemical industry as an alternative to the Houston metro area. The neighboring conurbations are approximately equal in size, with Greater Houston spanning an area covering The Woodlands in the north (home to companies such as Chevron Phillips Chemical and Huntsman) to Freeport in the south (location of The Dow Chemical Co.'s first manufacturing plant in Texas, among others). Yet while Houston is the fifth largest U.S. metropolitan area in terms of population, home to around 6.6 million people, the Baton Rouge-New Orleans area has only around a third of that figure, at 2.2 million.

"The Louisiana Economic Development creates customized workforce solutions, entirely free of charge to the companies. This includes a mix of training and recruitment, as well as the intellectual property rights to any training platforms that were created. It wins Louisiana more projects than any other initiative."

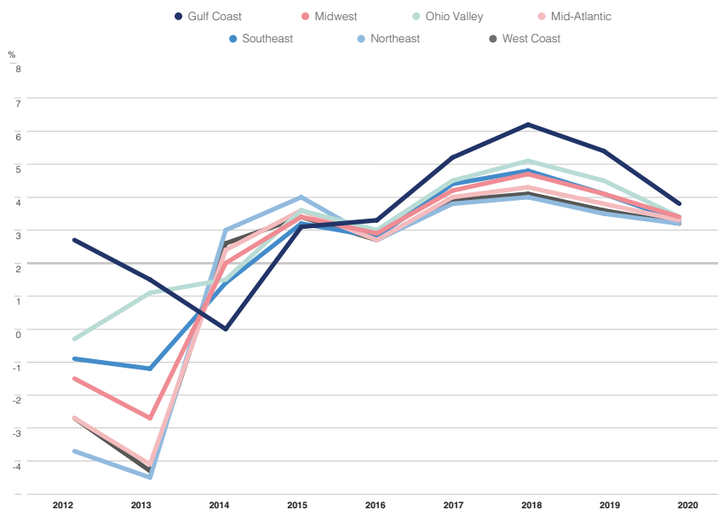
- Adam Knapp,
President and CEO, Baton Rouge Area Chamber (BRAC)

"The reason that a lot of the industry came to Texas, specifically to the Texas Gulf Coast, was for companies to be able to operate year round in a temperate climate with access to resources, skilled workforce, and efficient transportation, with water and rail transportation as well as access to pipelines," explained Hector Rivero, president of the Texas Chemical Council (TCC).

Founded in 1953, the TCC was the first state industry association in the nation and now represents 70 companies operating 200 manufacturing and research facilities statewide.

With the additional 84 projects that have been announced for Texas alone, the chemical industry is looking for a further 153,000 permanent and temporary employees. This comes on top of the 75,000 people already working directly in the sector, and the approximately 500,000 workers in roles that support it. Those who are qualified to work in the sector are already in high demand. "There is enough work along the Houston ship channel to attract the required qualified laborers," stated Martin Siddle, chief commercial officer at Ventech Engineers International LLC. "Our concern is that the workforce of

U.S. CHEMICAL PRODUCTION BY REGION 2012-2020 (% CHANGE YEAR-OVER-YEAR)
Source: American Chemistry Council, December 2015



qualified welders is aging and has reduced by half over the last 20 years. The U.S. government needs to focus on supporting skilled labor programs to meet continued demand."

Other companies echo Ventech's concern, and action is being taken by state-sponsored organizations and educational institutions to address the problem. "We have been actively engaged with ensuring that there is a qualified workforce in our state," said Rivero. "Texas had some needed education reforms that were a tremendous success; we created flexibility so that school districts across the state could design their curricula to meet both the needs of their community employers and the interests of the student population."

The TCC's member companies also participated, investing capital into universities and schools to upgrade facilities and provide equipment, and succeeding in increasing numbers of students pursuing these areas of study.

Louisiana, meanwhile, has a number of initiatives in place to solve a company's workforce needs. Louisiana Economic Development (LED) and its FastStart program has been ranked the number one workforce program in the United States six years in a row. "[LED creates] customized workforce solutions, entirely free of charge to the companies. This includes a mix of training and recruitment, as well as the intellectual property rights to any training platforms that were created," explained Adam Knapp, president and CEO of BRAC. "It wins Louisiana more projects than any other initiative."

The program is funded by the state of Louisiana and is available to any company committed to creating jobs in the state. In 2014, for example, LED FastStart designed a program for Chinese petrochemical company Yuhuang Chemical's $1.8 billion methanol plant on the Mississippi River between Baton Rouge and New Orleans, creating 400 new jobs.

The state also hosts the engineering-focused Louisiana State University (LSU), as well as a number of other higher education institutions influenced by the presence of the chemical industry, resulting in around 8,000 students studying for qualifications linked with the sector in the Baton Rouge area alone. According to LSU College of Engineering's interim dean, Judy Wornat, the university maintains close links with corporate partners, connecting students with internships and research projects with industry professionals: "As a result, employers often tell us that our students hit the ground running when they begin their careers; they do not have to undergo extensive and time-consuming training at the employer's expense. This gives our students a real edge in the job market and would say that LSU particularly excels at preparing those students for practical jobs related to their field upon graduating."

As well as looking for a strong pipeline of qualified personnel, corporations also have to consider economic factors when locating new facilities. An anomaly of the United States is that each state has jurisdiction over its own taxes, resulting in two different structures in neighboring Texas and Louisiana. The former has no personal income tax, but does tax property and sales. In order to alleviate any negative effects on new and expansive facilities currently under development, corporate business tax was cut by 25% at the beginning of 2015, while further measures to attract new investment were also implemented. TCC's Rivero expected Texas to gain a further $1.8 billion in local and state tax revenues from the $46 billion in planned investment in the state, in addition to the $2.9 billion that Texas currently makes from the $75 billion in physical assets already located there.

Although Louisiana has a range of taxes, its tax incentive program is geared towards easing the financial burden on industry. "It is surprising to most companies to learn that Louisiana is the lowest cost state in the United States from a tax standpoint," explained Knapp. "KPMG and the Tax Foundation conducted a joint project, that was verified independently, that evaluated the complexities of the various tax and incentive structures and Louisiana came out on top."

While the two states may be rivals in terms of attracting investment, one thing they can both agree on is the importance of safety within the chemical industry. Both states have had their share of fatal incidents in recent years: in 2013, an explosion in West, Texas killed 15 people in April, while two incidents over two consecutive days in southern Louisiana killed two people that June. Both states united to host a four-day environmental, safety and health seminar that has been held annually since 1987. "We have in the region of 100 education sessions, 150 trade show exhibitors and more than 1,000 attendees that share best practices," said Rivero.

With the prevalence of shale gas across the Gulf Coast, increased spending on transportation and infrastructure, and the huge amounts of foreign capital to be invested, both states seem poised for growth in the coming years. •

Hector Rivero

President
TEXAS CHEMICAL COUNCIL (TCC)

Can you provide a brief history of the Texas Chemical Council (TCC)?
During World War II, there was a lot of activity in the U.S. chemical industry, followed by a downturn in the economy. The legislature was seeking to tax our industry, which lacked representation in Texas; the TCC was therefore founded in 1953. It was the first state industry association in the country. Today, we serve as the voice for the chemical industry, representing 70 companies operating more than 200 manufacturing and research facilities across the state.

What impact does the chemical industry have on Texas and why do chemical companies find Texas an attractive place to do business?
Our industry members have $75 billion in physical assets in Texas, nearly 75,000 direct employees and are responsible for 400,000 to 500,000 indirect jobs in the form of suppliers and other vendors to the industry. We are one of the state's major economic engines. Our industry generates $2.9 billion in state and local taxes. The reason that a lot of the industry came to Texas, and specifically to the Texas Gulf Coast, was for companies to be able to operate year round, in a temperate climate and with access to resources, a skilled workforce, and efficient transportation, with water and rail transportation as well as access to pipelines. We have chemical manufacturing taking place all over the state; in fact, the largest chemical plant in the Western Hemisphere is located in Texas.

How has the shale gas revolution affected the state and the country as a whole?
The shale economy has propelled a chemical renaissance and a tremendous economic boom for our industry. An abundant supply of clean-burning, low-cost natural gas has enabled Texas-based companies to compete globally. Texas does not levy a personal income tax and, while we are a property tax and sales tax state, there is a fairly balanced tax structure that allows companies to compete nationally and globally. To date, 84 projects have been announced for Texas as a result of the shale economy, for an estimated $46 billion in investment. These projects are projected to generate 153,000 jobs, both permanent and temporary, as well as $1.8 billion in local and state tax revenues. A third of the overall investment that has come to the United States due to shale gas has been in Texas alone.

What initiatives are ensuring the supply of qualified personnel in the industry?
We have been actively engaged with ensuring that there is a qualified workforce in our state. Many of our member companies have invested large amounts in universities and the public school system to upgrade facilities, provide equipment and improve curricula, to provide education and training to the future workforce. Texas had some needed education reforms that were a tremendous success; we created flexibility so that school districts across the state could design their curricula to meet both the needs of their community employers and the interests of the student population. We have seen an increase in students pursuing these areas of study.

What challenges does the chemical industry face and how is the Texas Chemical Council overcoming these challenges and advocating for its members?
We work closely with the American Chemistry Council on many federal regulations that are vital to maintaining our competitiveness globally. We try to share with our congressional delegation the importance of nurturing the growth of the economic output we are seeing so that we can preserve it for as long as possible. We engage directly with EPA on all proposed rules in order to advocate for our members. TSCA reform, for example, is one of the most proactive legislations that would help bring some certainty to the chemical industry. We support this initiative 100%, but some budding regulations we see with the current administration are potentially detrimental to all U.S. investments in the chemical sector. Clean power regulations will result in significant price increases in the cost of electricity, which will offset the viability and competitiveness of the chemical industry in the United States. Our state legislature, however, has been very supportive of the economic growth in our industry. There was a 25% cut in our corporate business tax at the beginning of 2015, and additional measures were adopted to both attract new investment and provide some relief on property taxation.

What does the Texas Chemical Council plan to focus on in the future?
We will continue helping our companies complete the current build out in Texas by working with our friends at the national level. We hope to ensure that the ozone standards being determined give our companies the assurance that they can maintain their competitiveness while also operating in an environmentally friendly manner. We will continue to work at the state level to make new investment in Texas more competitive and overcome issues that the oil and gas industry might pose for the U.S. chemical sector. •

Judy Wornat

Interim Dean
LOUISIANA STATE UNIVERSITY COLLEGE OF ENGINEERING

Could you provide us with a brief overview of the programs at LSU related to the chemical and petrochemical industries and the facilities available to students?
The College of Engineering has 11 academic departments, including chemical engineering, mechanical engineering and industrial engineering, electrical and computer engineering, computer science, petroleum engineering, civil and environmental engineering, biological and agricultural engineering and construction management. The Cain Department of Chemical Engineering, specifically, is among the programs most closely related to the chemical and petrochemical industry. That department is a leader in research, teaching and service in a field that is crucial to the economy of the Gulf South, and with nearly 900 undergraduate students and 60 graduate students, it is the largest and most active chemical engineering department at both the undergraduate and graduate levels in the state. The facilities are just as great: we are currently renovating and expanding our entire engineering complex, and adding brand new, state-of-the-art laboratories and learning spaces for Chemical Engineering.

How is LSU adapting its programs to the current jobs market and collaborating with chemical companies to produce the best results?
The LSU College of Engineering connects its students with internships, co-ops and opportunities to network with industry professionals. As a result, employers often tell us that our students hit the ground running when they begin their careers. Our departments also maintain close relationships with our industry and corporate partners to stay abreast of real-world changes and needs. The Cain Department of Chemical Engineering, for example, has an Industrial Advisory Committee primarily composed of principal chemical engineers who are employed by global companies with major facilities in Louisiana. The committee has input in curriculum changes to ensure graduates are meeting the current needs of the industry, allowing us to stay in tune with the employment market on our doorstep. Moreover, the Department of Mechanical Engineering gets local engineering companies to sponsor design projects that task the students with solving real-world company problems.

What sort of initiatives are in place to promote degrees in engineering to younger students?
The College of Engineering has a recruiting and outreach team dedicated to inspiring younger students to pursue careers in science, technology, engineering, and mathematics and to recruiting them to study engineering at LSU. The team visits high school classrooms to give presentations and demonstrations, attends career days, and organizes on-campus tours and events, among other things. They also host three unique summer programs—REHAMS (Recruiting into Engineering High-Ability Multicultural Students), XCITE (Xploration Camp Inspiring Tomorrow's Engineers) and Encounter Engineering (E2)—to strengthen students' interest in engineering. Each program is different. The XCITE camp, for example, is specifically targeted at young women considering a career in science and engineering. But all three camps aim to get students excited about engineering through hands-on activities, such as robot design competitions, and interactions with students, faculty and professionals in the field.

How is LSU assisted by both the state of Louisiana and local chemical companies?
LSU has received much support from chemical companies, financially and otherwise. Historically, they have donated funding for scholarships and professorships, attended career seminars and expos, and provided opportunities for our students in the form of internships and co-ops. Most recently, many of these companies helped support the $110 million project to renovate and expand our facilities. The construction project was financed jointly by the state of Louisiana and donations from local chemical and engineering companies. This money was not only spent on design and construction, but also on outfitting our facilities with state-of-the-art equipment and investing in our research programs to ensure their continued growth and productivity.

A particular area of research focus for you is environment and pollution prevention. What efforts are we seeing in the chemical industry to achieve more sustainable operations?
Much of the energy consumption in the country is due to chemical manufacturing. This has led companies to look for ways to intensify their processes, become more energy-efficient, and make useful products out of what once might have been considered unwanted byproducts or even waste. LSU faculty members are conducting research on how best to meet these sustainability needs by streamlining processes and reducing energy consumption. The limited nature of the Earth's resources including water means that it is imperative that we find responsible and sustainable ways of using them. Louisiana is naturally blessed with surplus rainfall and a large river, but this water must be used efficiently in industrial processes, such as cooling.

Looking ahead, what can we expect for the College of Engineering?
What you can expect is a continued effort to expand our faculty, the further promotion of collaborative research efforts between our departments to try and meet the engineering demands of a growing market and, as always, a focus on refining our curricula to meet the current and future needs of both the industry and our graduates. •

Adam Knapp

President and CEO
BATON ROUGE AREA CHAMBER (BRAC)

Could you provide us with a brief overview of the Baton Rouge Area Chamber (BRAC) and its goals for the future of the chemical industry in Louisiana?
BRAC is the organization responsible for leading economic development and growth strategies for the state of Louisiana's capital region. Over the last decade, we have been more aggressively building up a program of work to attract firms to enter the region, as well as to assist existing companies in the region with expansion. We have been deliberate in identifying the sectors of the economy that would have a natural advantage here, and particularly assessing sectors that represent the best opportunity to gain foreign direct investment. We are focusing on three countries in particular: Germany, the UK, and Canada, with Japan as a close fourth. The local business community provides 80% of BRAC's funding and also plays a key role in developing the organization's strategies for economic growth.

What makes the Baton Rouge region, and Louisiana as a whole, a competitive location for chemical companies?
It is surprising to most companies to learn that Louisiana is the lowest cost state in the United States from a tax standpoint. KPMG and the Tax Foundation conducted a joint project, which was verified independently, that evaluated the complexities of the various tax and incentive structures and Louisiana came out on top. Although Texas has no income tax, it has a very high property tax, which has huge implications for companies looking to make capital investments for new sites on a grand scale. Louisiana also has a very well received tax incentive program.
We also work to ensure we have taken the risk out of decision-making for companies interested in our greenfield industrial sites. We went from having three sites that had been certified as 'shovel ready' in 2012, to more than 30 now. This is thanks to our huge push to find suitable locations and then focus our efforts and funding on their development and certification. Many of these sites are located on the Mississippi River, but others are connected to rail and interstate infrastructure. The focus areas in which we strive to be experts are available sites, the workforce pipeline and support infrastructure, or the relative cost of doing business here. Today, around one third of the 77 projects considering a site in the region are chemical companies.

As the two biggest cities in Louisiana, could you explain the partnership between Baton Rouge and New Orleans?
Very few people have heard of Baton Rouge internationally, whereas many companies already know about Houston's location on the Gulf Coast. The brand identification of New Orleans is global and therefore we are looking to leverage that to help us get across the message of the chemical industry in Southeast Louisiana. Our combined workforce is 2.2 million, compared to the Baton Rouge region alone, which has a population of 820,000. The Baton Rouge-New Orleans area also spans an area approximately the same size as the Houston metro area, so it makes sense to see them in a combined way. Moreover, a project in metro New Orleans is just as important to us from a personnel and economic perspective as a project in the Baton Rouge area is for New Orleans. By building a relationship of trust, it will support both the super-region's international reputation and each company's success in Louisiana. This is not a new model and works for the Dallas-Fort Worth region, as well as San Francisco and San Jose, which together make up Silicon Valley. It also makes more sense to think about transportation systems, such as railroads and highways, in a unified way.

What initiatives are in place to ensure a steady stream of qualified personnel to satisfy the chemical industry's growing demands?
Many companies choose Baton Rouge because of the higher education presence in the region; we are a capital city with the major research university of Louisiana State (LSU), as well as two community colleges. That combination is very attractive. LSU has evolved as an engineering-centric university due to the presence of the chemical industry here over a number of decades and it has recently made commitments to double the capacity of its engineering programs. There are currently around 8,000 students in some way associated with the chemical industry in the metro area. Despite this, demand will continue to outstrip supply, and we need to recruit talent from elsewhere. We will work together with organizations such as Louisiana Economic Development and Louisiana FastStart to create customized workforce solutions, entirely free of charge to the companies. This includes a mix of training and recruitment, as well as the intellectual property rights to any training platforms that were created. This program has been ranked as the number one workforce program in the United States for the last five years in a row due to its responsiveness and wins Louisiana more projects than any other initiative. •

Image: Thinkstock

A BIG TASK AHEAD: SERVICE COMPANIES

"Tecnimont has a long track record of experience in the United States. During the 1980s and 1990s we developed a number of petrochemicals projects, with a focus on polymers. During the downturn in the mid-1990s, Tecnimont focused on growth elsewhere, particularly in the Middle East, Russia and Europe. After the advent of low-cost shale gas, we decided to open the new Houston office in 2013, not only for commercial reasons but also to support operations at our ongoing project in Iowa with Orascom Construction Industries."

- Luca Pracchi,
President and CEO,
Tecnimont USA Inc., Maire Tecnimont Group

A CHANGE OF PACE: SERVICING THE U.S. CHEMICAL INDUSTRY

Journalist: Harriet Bailey

There is plenty for chemical service companies to do in the coming years; new chemical plants are in the process of being built, while existing facilities are in need of both modernization and upgrades to cope with the lighter shale gas, as well as expansion to cope with increased demand. This is on top of normal turnaround and recovery projects, which provided service companies with the bulk of their workload for a number of decades.

As industry demand increases by means of the abundant hydrocarbon resources that are now available in the United States, the focus will be on service providers coming up with innovative solutions to bring new plants online as efficiently as possible. According to Emerson Process Management, 65% of all capital expansion projects in excess of $1 billion fail, with 25% coming in over budget and 50% suffering delays. This led the company to launch "Project Certainty," a program to improve project execution performance, in late 2015. Jeff Householder, vice president of process systems and solutions, described it as a "technology and engineering-based approach designed to help customers re-think their strategy for projects."

Emerson aims to automate production, processing and distribution services and develops new technologies to address specific issues, such as its Electronic Marshalling with CHARMs (CHARacterization Modules), which facilitates the implementation of last-minute design changes without impacting schedules.

> *"Having fewer seasoned engineers and operators has made reliability programs more crucial than ever. A comprehensive reliability program with condition monitoring and analysis-based maintenance can save the typical $1 billion plant $12 million or more in maintenance costs each year."*
>
> *- Jeff Householder, VP Process Systems & Solutions, Emerson Process Management*

Although less directly affected by global trends such as declining oil prices, the impact on a service provider's revenue streams if their client reduces its operations can be substantial. Italy-based Maire Tecnimont, an engineering and construction company, has not always found U.S. operations easy, closing its U.S. office for around two decades. "Tecnimont has a long track record of experience in the United States. During the 1980s and 1990s we developed a number of petrochemicals projects, with a focus on polymers. During the downturn in the mid-1990s, Tecnimont focused on growth elsewhere, particularly in the Middle East, Russia and Europe," explained Luca Pracchi, president and CEO of Tecnimont USA Inc. As with many of its competitors however, the shale gas revolution has improved the image of the U.S. chemical industry to overseas players. "After the advent of low-cost shale gas, we decided to open the new Houston office in 2013, not only for commercial reasons but also to support operations at our ongoing project in Iowa with Orascom Construction Industries."

With the return of manufacturing to U.S. shores, service companies will follow, particularly European companies as domestic projects dry up.

Potential clients are looking strategically at the long-term benefits of manufacturing in the United States and planning for the inevitable uptick in oil prices. New cracker projects are in the works, but their impact on a service company's fortunes will be delayed. Furthermore, once in operation, they will not require immediate servicing. "We expect to see a significant increase in maintenance work as a direct result of the increase in the number of plants," explained Tony Spencer, CEO of third-party safety personnel provider CertifiedSafety, "but these better-designed facilities should be able to run for longer between maintenance events. So with the new generation of plants the frequency of turnarounds will decrease, but the overall project volume should increase."

Service providers will face many challenges in the future as they adapt to the increase in activity. For years, the chemical industry was seen as unchanging, with projects limited to turnarounds and the upkeep of a finite number of plants; the expansion of existing facilities and commissioning of a number of others will require considerable flexibility, as well as the ability to maintain oversight over a significantly wider spread of projects.

Constructing the future

With such a rapid increase in the pace of construction, there are concerns surrounding the availability of some key items in the

Focus on SAFETY

The year 2016 marks the 45th anniversary of the Occupational Safety and Health Administration (OSHA), following the enactment of the Occupational Safety and Health (OSH) Act in April 1971. The agency oversees working conditions, sets and enforces standards, and provides training, outreach, education and assistance to employees nationwide.

The OSH Act itself requires the agency to seek public comment on proposed rules before they come into force. The Directorate of Standards and Guidance, an office within OSHA headed by director William Perry, often chooses to seek comment on its guidelines as well as standards, although only the latter are legally binding. The four stages to setting standards involve issuing a proposal that can be commented upon, holding a public hearing at which both the agency and members of the public discuss the proposal, followed by further public comment. OSHA then assimilates this information and amends its proposal accordingly, before issuing its final standard.

In terms of the chemical industry, OSHA currently only has permissive exposure limits (PELs) in place for around 470 chemicals, mostly stemming from the time of its inception when all chemicals in use at the time were assumed to be safe and granted grandfather rights. The American Chemistry Council estimates there are around 8,300 chemicals in commerce, though not all of these chemicals may be hazardous.

"We have publicly recognized that many of our PELs are not adequately protective," explained Perry. "For many years, we have been regulating one chemical at a time. Although this has resulted in some very important standards, we realize this does not go far enough. There are several hundred outdated permissible exposure limits left on our books, while several thousand chemicals in commerce are not regulated by us at all."

OSHA is looking to implement more effective measures for chemical risk management and may replace outdated PELs with guidelines. It is currently seeking public comment on the issue, particularly from companies that have already had success in this area.

Rapid Response

The safety of the chemical industry came under increased scrutiny following an ammonium nitrate explosion at the West Fertilizer Company's storage and distribution facility in West, Texas in April 2013. The explosion, following a fire at the location, killed 15 people and injured a further 160, as well as causing damage to or destroying 150 buildings, including homes and a school. An investigation by the U.S. Chemical Safety and Hazard Investigation Board found that the events were preventable; the company itself used unsafe storage practices, while both federal and state safe handling regulations for hazardous materials were inadequate. President Obama responded by issuing Executive Order 13650, which charged a number of federal agencies, including OSHA, with improving chemical safety and security at U.S. chemical facilities.

As a result of this, OSHA sought to clarify its position on its Process Safety Management of Highly Hazardous Chemicals standard, which listed the minimum threshold concentration of only 11 chemicals, out of a total of 137. In a memorandum issued in June 2015, OSHA stated it had considered EPA's procedures for a number of similar rules and was acting in accordance with its findings, which established a 1% concentration cut-off.

This outcome has proven problematic with both industry associations and companies. "OSHA did not allow stakeholders to provide input on the changes to the PSM standards since the agency was just issuing a memorandum and not launching an official rule-making process. We were therefore unable to communicate the true hazards associated with certain chemicals," stated Mathew Brainerd, chairman of the National Association of Chemical Distributors (NACD).

The NACD stated that it wishes to see a fair and legal process for the implementation of new regulation, according to the provisions of the OSH Act. It also highlighted the successful implementation of Chemical Facility Anti-Terrorism Standards following the events of 9/11, which saw regulators and industry bodies working together to implement new rules. OSHA responded by saying updating PSM is an ongoing process.

Setting Records

Final responsibility for safety rests with plantowners according to OSHA and, despite currently disputed safety legislation, the industry is supported by service providers aware of their responsibilities to implement safe practices and procedures. "Our campus is often used by other companies to demonstrate safety procedures and for special training," said Eric Vaillancourt, president of Garlock Sealing Technologies. "It is testament to our training and safety measures that [our parent company] EnPro has been named one of the safest companies in America twice in the last five years."

The company offers various training sessions, as well as specific events such as its week-long Fluid Sealing Academy in the United States and China. U.S.-based companies can also improve best practices by collaborating with their European counterparts. Tecnimont USA brings with it a safety record from parent company The Maire Tecnimont Group that surpasses international standards: "Of approximately 45 million hours worked on site in 2014, we have a 0.02 lost time injury frequency rate and a 0.29 total recordable injury rate," stated Luca Pracchi, president and CEO of Tecnimont USA.

The average rate for these benchmarks is 0.06 and 0.45 respectively, not only highlighting Tecnimont's performance, but also the high safety levels demonstrated by the industry on a global scale.

United States. "In terms of construction, there are no manufacturers in the United States for some major items required to build petrochemical plants," said Tecnimont's Pracchi, who sees cooperation between U.S. and overseas companies as vital to ensuring the supply of vital product to where it is needed. "As an Italian company, we have a large vendor base in Italy for steel and high-tech equipment, and Europe as a whole has a high level of technological skill that can be exported abroad. Although Europe is not doing as well as the United States in terms of feedstock production, products manufactured there are vital for use by EPC contractors such as Tecnimont in our global operations."

As a result of a lackluster chemical industry for a period of around two decades, there was little incentive to manufacture large items destined for new chemical plants when none were on the horizon, leading to the United States' current reliance on European technology.

This failure to prepare for the future can also be seen in the impending personnel problems the industry is set to face. Although companies such as CertifiedSafety already struggled to find enough additional manpower for maintenance events, due to the fact chemical companies schedule these during the same two periods each year, the combination of new and existing plants has placed extra pressure on the skilled workforce available. Furthermore, those retiring over the next decade will leave a skills gap in the leadership of companies that will be difficult to fill. "The challenge to maintain the current levels of safety, or to improve on them, are being complicated by the retirement of the baby boomer generation. This depletion of experience has increased demand for outsourcing project safety, as it has with most other technical needs," said Spencer.

Associations and companies have recognized the issues and are coming up with ways to solve the problem. The Association of Fuel and Petrochemical Manufacturers (AFPM), for example, has launched a website dedicated to developing the workforce of the petrochemicals industry, as well as joining forces with several organizations to promote a career in petrochemicals. "We have partnered with EdVenture Partners, an organization that creates innovative industry education programs, to activate the AFPM Recruitment Challenge," said Melissa Hockstad, vice president of petrochemicals.

This program is aimed at the 18 to 35-year-old age group and outlines the range of opportunities available within the industry. "We are also working with several veterans-based organizations, including American Jobs for America's Heroes, to connect our nation's veterans to the industry," she continued.

According to the U.S. Bureau of Labor Statistics, there were around 223,000 unemployed veterans between the ages of 18 and 44 in 2014.

Service companies also see their client companies facing personnel shortages, and are taking this opportunity to come up with new solutions and services to set them apart from their competitors. "Having fewer seasoned engineers and operators has made reliability programs more crucial than ever," said Emerson's Householder. "A comprehensive reliability program with condition monitoring and analysis-based maintenance can save the typical $1 billion plant $12 million or more in maintenance costs each year. These are the kind of integrated programs that our customers are increasingly seeking." •

William Perry

Director, Directorate of Standards and Guidance
OCCUPATIONAL SAFETY & HEALTH ADMINISTRATION (OSHA)

Could you provide us with a brief history of the administration and an overview of OSHA's current work, in particular focusing on the Directorate of Standards and Guidance?

For the past several years we have been hard at work on several initiatives, in particular completing a revised standard governing exposure to crystalline silica dust, which is the cause of silicosis and a number of other diseases. This standard will improve protections for almost two million workers in the United States and will be issued in early 2016. We recently issued draft guidance aimed at small and medium-sized enterprises (SMEs) to show them how they can implement effective occupational safety and health (OSH) programs in the workplace in a step-by-step way. We are receiving public comment on that now and will issue our final guidance in 2016. These guidelines are a major update of our 1989 OSH program guidelines, and will be even more impactful.

We have also publicly recognized that many of our permissible exposure limits are not adequately protective; we have therefore published a request for public input on how we can better assist employers in dealing with chemical risks in the workplace. For many years, we have been regulating one chemical at a time. Although this has resulted in some very important standards in areas such as asbestos and lead, which has greatly contributed to the reduction of diseases associated with these agents, it does not go far enough. There are several hundred outdated permissible exposure limits left on our books which we know from current science are not sufficiently protective, while several thousand chemicals in commerce are not regulated by us at all.

Could you explain how the directorate sets its standards for chemical safety?

There are legislative mandates, including our own OSH Act, which require the agency to seek public comment on proposed rules. We have to open a public record and allow the public, which is often the chemical companies themselves, to submit comments. We may then hold a public hearing to allow participants to question both the agency and each other, and is also an opportunity for us to ask questions. We gain a lot of new information and data from these events. Following the hearing, the public is allowed to comment again. OSHA then takes all of this information and makes adjustments to our proposal, before issuing our final standard. We often choose to seek public input in issuing important guidance, although we are not mandated to do so as the end result is not legally binding.

Would you like to comment on recent revisions made to the Process Safety Management (PSM) legislation?

This began following the explosion in West, Texas in 2013 which killed 15 people and destroyed more than 150 buildings. Subsequently, President Obama issued Executive Order 13650 charging a number of agencies with improving chemical safety and security at U.S. chemical facilities. Since then, OSHA has worked with the Departments of Homeland Security; Transportation; and Agriculture; the EPA; and other federal agencies in implementing the requirements of the executive order such as rule making, developing guidance and stakeholder engagement. We began by issuing a request for initial public comment on what areas of our existing PSM standards we should be updating. We also held a number of stakeholder meetings and are now preparing for the process of soliciting information from SMEs on our options for modifying our PSM standards. It is an ongoing process.

How important are sustainable business practices to OSH issues?

We have been working with a number of organizations involved in green chemistry and environmental protection, and often find that OSH issues are left out of that conversation. Many of the concepts and tools used to transition to safer chemical alternatives to produce safer consumer products and improve environmental protections can make workplaces safer as well. To this end, OSHA has developed a step-by-step toolkit to help businesses apply safer processes and find safer chemical substitutes to reduce workplace risks. We have also developed a one-day course now being taught at a number of OSHA education centers nationwide to learn how to implement green chemistry and sustainable practices.

How is the United States involved in encouraging improved worker safety globally?

We have issued our revised hazard communications standard to implement the Globally Harmonized System of Classification and Labelling of Chemicals (GHS). A number of countries have adopted GHS and we have been working closely with them throughout the process. It is a much more systematic classification scheme now than we had before. Maureen Ruskin, our deputy director, also chairs the United Nations Expert Sub-Committee on GHS. Considering our mutual stakeholders and the level of trade between our two countries, we have been working very closely with Canada as they implement GHS. We have also provided technical assistance to China in recent years on both chemical regulation and PSM. Moreover, international delegations frequently talk to us about various aspects of our operations, from setting standards to compliance assistance. •

Luca Pracchi

Managing Director
TECNIMONT USA INC.

Could you provide us with an overview of Tecnimont USA and the services and solutions it provides?
Tecnimont, the main subsidiary of the Maire Tecnimont Group, has a long track record of experience in the United States. During the 1980s and 1990s we developed a number of petrochemicals projects, with a focus on polymers. During the downturn in the mid-1990s, Tecnimont focused on growth elsewhere, particularly in the Middle East, Russia, and Europe. After the advent of low-cost shale gas, we decided to open the new Houston office in 2013, not only for commercial reasons but also to support operations at our ongoing project in Iowa with Orascom Construction Industries. This is a world-class fertilizer project where we have two areas of focus: an ammonia plant built by Tecnimont, with our sister company Stamicarbon licensing the urea plant. Although we are smaller than other major EPC players, with a workforce of around 4,400 skilled professionals worldwide, we believe in maintaining a high level of commitment and loyalty in our personnel.
Regarding our services, we have two layers of excellence. One is our knowledge of technology: we have a deep understanding of fertilizers and petrochemicals. This partly stems from the discovery of polypropylene in 1954 by Giulio Natta, who worked for Tecnimont's predecessor Montecatini, which was founded in 1888. Our company's expertise in this area dates back more than 100 years. Our second layer of excellence lies in our robust delivery model, leveraging our highly loyal workforce, and flexibility, as we can react quickly to customer needs of any size.

As an engineering, procurement, and construction (EPC) contractor, safety is paramount. Could you tell us about Tecnimont's global environmental, health, and safety strategies?
The Maire Tecnimont Group has a world-class safety record; of more than 45 million hours worked on site in 2014, we have a 0.02 lost time injury frequency rate and a 0.29 total recordable injury rate. Considering the bulk of our operations take place in the Middle East and the international oil and gas producers' average rate for these benchmarks is 0.17 and 1.14, respectively, we take great pride in the fact that our results are significantly higher than international standards.

From an EPC standpoint, how do the chemical and construction industries in the United States compare with their counterparts globally?
The United States, and Houston in particular, is a marketplace for the world's major engineering firms. We are in talks with potential partners, as most major projects are built through partnerships. It is also important to maintain good relationships between European and U.S. companies, as these relationships can be mutually beneficial. In terms of construction, there are no manufacturers in the United States for some major items required to build petrochemical plants. Although manufacturing is returning here as a result of the shale gas revolution, it is so capital intensive that the United States will still have to import some items from abroad. As an Italian company, we have a large vendor base in Italy for steel and high-tech equipment, and Europe as a whole has a high level of technological skill that can be exported abroad. Although Europe is not doing as well as the United States in terms of feedstock production, products manufactured there are vital for use by EPC contractors such as Tecnimont in our global operations. Plastics such as polypropylene are under ever-greater demand from a host of industries, such as the automotive industry, where manufacturers are aiming to streamline new models. Whereas previously around 30-40% of a car would be made of plastic, we are now expecting a significant increase due to advances in technology. The U.S. chemical industry is vital in manufacturing those chemicals.

Although manufacturing is returning here as a result of the shale gas revolution, it is so capital intensive that the United States will still have to import some items from abroad. As an Italian company, we have a large vendor base in Italy for steel and high-tech equipment, and Europe as a whole has a high level of technological skill that can be exported abroad

What trends do you expect to see in the petrochemical industry in the coming years?
Most of our clients have taken 2015 to refocus their business plans. All of them are acting now to build a sustainable industry by being more selective with their projects. The most successful companies are paying particular attention to their investment costs. We believe that our business model is focused on efficiency and that we can therefore be successful in this environment; we are of particular relevance to those companies focused on improving and expanding their existing facilities in order to increase production rates. Those who find themselves in the second wave of construction will have improved chances of completing their projects within budget and at the right time, when the oil price cycle is expected to be more favorable.

Looking ahead, what can we expect for Tecnimont USA Inc. by the end of the decade?

"Regarding our services, we have two layers of excellence. One is our knowledge of technology· we have a deep understanding of fertilizers and petrochemicals...Our second layer of excellence lies in our robust delivery model, leveraging our highly loyal workforce, and flexibility, as we can react quickly to customer needs of any size

We believe that Tecnimont USA Inc. will attain the results we want because we have been very selective with our opportunities, choosing to focus on where we can deliver strongly and meet client expectations. We have a large number of opportunities that will translate into contracts and projects in the coming year.

Image: Tecnimont, Fertilizer Complex, Wever (Iowa)

Jeff Householder

VP Process Systems & Solutions
EMERSON PROCESS MANAGEMENT

troduced Emerson's 'Project Certainty' and technology and engineering-based approach designed to help customers re-think their strategy for projects given the reality that 65 percent of all projects over $1 billion are significantly late or over budget. Our focus is to provide robust project services and automation solutions that help our customers operate their plants safely, efficiently, and reliably.

In the U.S. chemical industry, has Emerson Process Management seen an increase in service demand from new investments?
Our solutions business in North America has seen a steep increase in demand from the large-scale projects. The customers building these facilities face a number of challenges; many have parts of their organization that are energy-related, and are seeing revenue decreasing. We are also seeing an increase in foreign investment in the U.S. chemical sector. These customers are facing additional pressure due to the increased strength of the U.S. dollar. Therefore, our challenge is to create solutions that are put into service quickly and cost-effectively. We work early in the project cycle with our customers to ensure that we are aligned on strategies and expectations.

Do customers seek an integrated service approach from Emerson or are independent services more in demand?
This depends on the client, as customers have differing levels of internal capability and expertise in terms of applying technology. There have been shifts within the industry in how engineering resources are being used and where they are employed. As the solutions business has matured over the last 25 years, we have seen how the distribution of automation engineers working within the industry has changed as well. There has been a consolidation of automation resources within the supplier companies. Emerson is an attractive place to work for engineers because we offer a multitude of services that fit a wide range of engineering capabilities, however there is a scarcity of labor resources today. This scarcity has compromised the ability of end-user companies to recruit to previous levels, thus lending us a larger role in providing services and solutions to these customers. Having fewer seasoned engineers and operators has made reliability programs more crucial than ever. The costs of unplanned downtime add up quickly, but a comprehensive reliability program with condition monitoring and analysis-based maintenance can save the typical $1-billion plant $12 million or more in maintenance costs each year.

How does Emerson support chemical companies faced with environmental, health and safety challenges from a technological and consultancy standpoint?
The consulting side is the leading edge for this purpose. We hire industry experts and put them in leadership roles along with our industry marketing solutions groups. These experts understand the laws and regulations, and they also have knowledge of how plants function, hence a deep understanding of the impact of new regulations and challenges within operations. We have developed some technologies to specifically address certain customers, for example, Emerson's Electronic Marshalling with CHARMs (CHARacterization Modules) is a technology that brings unprecedented flexibility to accommodate last-minute design changes without impacting schedule. Adapting to late changes, eliminating unnecessary wiring and self-documenting the installation reduces errors as well as the commissioning and startup time. This device can help reduce errors and improve documentation and the efficiency for start-up activities. The importance of self-documenting cannot be overstated; keeping plant documentation up-to-date as the plant ages is a challenge that spans all industries.

What is the main driver for Emerson's innovations? What role do Emerson's innovation facilities play?
We have a number of sites that we refer to as innovation centers where new product innovations can be demonstrated and tested. In Austin, Emerson's innovation center also includes an integrated operations (iOps) command center. The iOps center simulates a control room environment that consolidates and displays data for remote and local sites while performing diagnostics monitoring and data analytics for the operator. At other Emerson innovation centers we have facilities where we run large-scale flow systems that enable clients to see how their equipment performs in real-world operating conditions. Our innovation centers are thus technology-oriented and are centered on process control and measurement, visualization of data, and data integration. •

Can you provide an outline of Emerson Process Management's services and your own experience in processing industries?
We are an automation technologies and services provider with subject matter experts that consult and develop operational solutions for customers within each industry we serve. We perform front-end work collaboratively with our customers, shaping ideas and developing operational strategies. We also work with project delivery organizations, conducting systems and solutions engineering work globally. We have a project engineering services organization that carries out the implementation phase and a support organization that provides ongoing service at customer sites. We have a broad portfolio of products that are developed specifically for the industries we serve, whether that's helping our partners with modernization, upgrading or expanding existing facilities. We serve as an integrator for all the Emerson Process Management technologies. We also just in-

Martin Siddle

Chief Commercial Officer
VENTECH ENGINEERS INTERNATIONAL LLC

modules were containerized for shipment overseas and ultimately rail-transported through the Ural Mountains to the project site.

Bill's entrepreneurial spirit and foresight has driven Ventech to where it is today, a full-service engineering, procurement, fabrication, and construction (EPFC) company. Our headquarters in Pasadena, Texas boasts 175,000 square feet (sq ft) of engineering space, and we have over 400 employees. We also have our satellite engineering office in Alabang, Philippines, which is a great regional springboard.

How does Ventech serve the fabrication needs of the U.S. chemical industry?
We have our 32-acre fabrication facility in Pasadena, Texas, right on the Houston ship channel, which is the shortest supply chain in the world to support the chemical and petrochemical sectors. The facility has 14 bridge cranes and is climate-controlled in a space of 120,000 square feet. Some of the benefits of indoor shop fabrication are Ventech's better than 98% weld-acceptance rate and enhanced productivity, with just five lost-weather days in the past seven years. It is a quality-controlled, safe environment with no vehicles inside and no lost-time incidents in four years. We also have a 200-acre manufacturing facility, with 900,000 sq ft under roof in Sealy, Texas, which is ready for our fabrication service expansion to accommodate the growth of gas-to-liquid (GTL), refining and the petrochemical sector. We still sub-contract out some activities; however, the more services we do ourselves the more control we have over quality and delivery times.

What differentiates Ventech's EPFC services to market competitors?
Our niche is in finding bankable business solutions for our clients. Many EPC companies are looking for increasingly larger projects with the major players. Ventech's focus is on small- to mid-sized projects; we are geared to think more nimbly and our clients are developers that do not necessarily have the luxury of time and large capital budgets of the majors: for example, we provided all the processing units for the Dakota Prairie Refinery, which took two years from start to finish.
We also support clients in phased builds; a more affordable option which gives developers the chance to gain credibility in the market. We can carry out the designs, steel fabrication and build of modularized process units here in Pasadena and ship it to sites globally. Thankfully, the U.S. Export-Import Bank (Ex-Im Bank) was reinstated in December 2015. The Ex-Im Bank gives U.S. manufacturers, fabricators and suppliers like Ventech the ability to compete against international manufacturers who are backed by their governments.

The abundance of natural gas in the United States has opened up opportunities in GTL. Could you elaborate on Ventech's work in the space and the future of this market?
In 2005 we moved into GTL, as Bill had the foresight for the industry's need for smaller-scale, modularized GTL projects. Last year we formed a joint venture with Velocys plc, Waste Management, Inc., and NRG Energy, Inc. for a small GTL project based on landfill gas. Velocys has the micro-channel GTL reactor and catalyst technology, while we did the design, procurement and fabrication here in Pasadena to ship to Oklahoma City. We are now in the construction stage and hopefully next year will have the plant operating with commercial demonstration. The shale gas revolution has created a niche for small-scale GTL projects inland. The economics are not there to drive the GTL market right now; hopefully, crude prices will rise and people will want to take further advantage of the low gas price. By then, we will be positioned with a proven technology and off-the-shelf modularized designs to get plants online quickly and cost effectively.

Going forward, how will Ventech continue to support the growing chemical industry?
Many facilities are aging and require replacements and updates. Specialty chemical manufacturers are also producing new products and want to reach new markets quickly without stop time or risks to safety standards. Ventech's future focus will be in add-on units. We can design a fast way to modularize the required processing add-ons, build off-site, guarantee delivery and install units without affecting existing operations. We will also continue to partner with license holders to offer packages to deliver and install processing technologies in a cost-effective manner. •

Founded in 1967 as a process equipment refurbishment workshop, how has Ventech become the full EPFC company it is today?
The founder, Bill Stanley, saw that East Coast companies were buying used processing equipment, so he started a profitable business refurbishing equipment for the refinery sector. Next, he supported many companies that were relocating refinery facilities to overseas locations, when many contractors were shying away from this process due to the high risk and unknown costs. When the Soviet Union collapsed in 1991, former Soviet states in the north were left with crude production but no refineries. While plans were made to relocate U.S.-based refinery equipment to Russia, none of it met the Russian standards. To solve this problem, Ventech designed and executed a modular, new refinery project that was engineered, designed, and fabricated in the Ventech fabrication shop. The finished


EV


BR

Eric Vaillancourt & Bill Ruhl

EV: President
BR: Director of Sales, Americas
GARLOCK SEALING TECHNOLOGIES

Garlock recently celebrated its 125th anniversary. Could you provide us with a brief introduction to the company and any flagship products?
EV: We were founded in 1887 in Palmyra, New York by O. J. Garlock and have been synonymous with innovation since that time. We were the first to go to market with a product called Gylon®, which is a modified polytetrafluoroethylene-gasket material. Although this product has been around for 50 years, it is still growing in market share. We also introduced Blue-Gard®, which is a compressed fiber sheet. We recently introduced THERMa-PUR™, our new, proprietary, high-temperature, gasketing material designed for process and exhaust applications up to 1,000^{O} C. Garlock primarily serves the chemical, oil and gas, power generation, marine, mining and primary metals markets and is entering the food and pharmaceuticals industries.

Garlock has operations in seven markets, so how big of a role does the chemicals industry play in the company's overall corporate strategy?
BR: The chemicals industry plays an important role in the company's overall strategy. We are seeing a chemical renaissance taking place in the United States and feel the industry particularly identifies with the safety and performance value that Garlock brings. The world is taking note of the United States' feedstock advantage, excellent work force, and reasonably priced energy, and is allocating heavy investment towards reestablishing the United States as a manufacturing base. We have seen this resurgence through a higher demand from our clients. Although the recent low oil prices have slowed matters, clients are looking strategically at the long-term advantage of manufacturing here. From an industry point of view, the petrochemicals field in particular is doing well, while we are experiencing modest growth for specialty chemicals. We serve the entire chemical industry, from upstream to specialty areas and really make an effort to address the entire spectrum.

Can you elaborate on Garlock's global strategy and also how you develop and maintain client relationships worldwide?
EV: Globally, we try to enter countries with a concentration of industries, as this presents opportunity for Garlock. Currently, we either sell directly or through a distribution partnership model. We have Garlock locations in Asia, Latin America, Middle East, Europe, and North America. We pride ourselves on our long-standing distribution partnerships, with some distributors, such as in Chile, working with us for more than 60 years. These distributors provide us with a high level of client responsiveness.

Given that safety is of the utmost importance to both Garlock and the industry, what kind of training does the company offer?
EV: We offer our week-long Fluid Sealing Academy in both the United States and China and have trained around 2,000 people. We offer events such as 'Lunch and Learns' and walk-throughs of our plants. Our parent company EnPro offers a host of training sessions and it is testament to our training and safety measures that EnPro has been named one of the safest companies in America twice in the last five years. Our incident rating is one of the lowest worldwide. Our campus is often used by other companies to demonstrate safety procedures and for special training. Garlock is very committed to this part of the business and invests a lot of money into it in order to influence a culture of safety.

Are you noticing an increasing awareness of the importance of safety within the chemical industry?
BR: Safety is a top priority for most chemical companies. We work closely with our clients to not only make sure they get the highest-quality product but to ensure that they are choosing the right product for the right application and installing it correctly. A key part of what we do as a company is technical-application assistance and installation training.

What regulatory demands are placed on the chemical industry and how can your products assist with this?
BR: There is a great deal of focus on fugitive-emission regulation in the industry, particularly on the refining side. Reducing emissions from chemical plants is a major safety and environmental concern that our products address. Another area is transportation, where our products are used extensively for safely sealing chemicals and petroleum in railcars.

What is the future for Garlock as you approach your 130th anniversary and beyond?
EV: Our primary focus for the next few years is going to be on geographic expansion, innovation, and making it easier for our customers to do business with us. We will be focusing on expanding our global network to Eastern Europe and developing countries. •

Tony Spencer

CEO
CERTIFIEDSAFETY

CertifiedSafety was founded in 2001. Could you give us a brief overview of the company over the past decade and a half and cover any recent key milestones?
The company is roughly 15 years old and was established with the mindset of providing petrochemical owners with high-quality, third-party safety personnel and services, which was not common at that time. For most of the 35 years that I have been in the industry, contractors provided their own safety personnel. With the increasing demand by owners to consistently have excellent safety performance on their maintenance and construction projects, many decided to contract third-party firms specializing in the area of personnel safety. In response to the needs of our clients, CertifiedSafety has evolved over the past 15 years from providing safety personnel as more of a commodity, to providing our clients with solution-based project safety programs and their implementation. This industry is still in the process of determining the best practices for achieving consistently excellent safety performance on their projects, in a manner that also enhances the schedule and budget of their projects.

For CertifiedSafety, we provided support to clients through the United States and overseas in 2015. This encompassed the West Coast, the concentration around Colorado, Utah and Montana, the Mid-West, the Gulf Coast, the North East of the United States and Qatar. Our clients tend to be multinational, multi-facility petrochemical corporations. Regarding trend and recent milestones, the global nature of this industry, along with the increased visibility to the public, continues to require petrochemical owners to continuously improve their performance on all levels, but we definitely see a strong trend toward defining best practices for achieving consistent and predictably high levels of personnel safety.

Could you explain the training process at CertifiedSafety and the overall ethos underpinning the company's operations?
At its lowest level, safety is driven off attitude. You can only be consistently safe if it is what you always intend to do. Our ethos is to hire for attitude and train for skill, because you cannot teach attitude. We base our training on the safety pyramid: for every fatality there are ten injuries, 100 cases where first aid is required, 1,000 unsafe acts and 10,000 near misses. Generally, the pyramid ends there, but CertifiedSafety goes further and asks what causes those unsafe acts and conditions. These outcomes are the result of behaviors, and behaviors are the result of culture. With that in mind, when we work with our clients to consistently achieve excellent project safety performance, we focus on establishing and modeling a culture committed to working safety. Said another way, CertifiedSafety aims to make safe practices a habit. A fringe benefit of this proactive and culture-based approach to safety is that it also improves overall project productivity, thereby lowering cost and shortening the project's duration.
Our employee application process begins with screening for attitude, followed by a number of interviews and assessments. Attitude is of paramount importance at every step. The training program itself begins with an initial stage of learning theory, followed by learning in a classroom environment, before putting the skills learned into practice during hands-on demonstration and assessments. During this process, employees have to demonstrate both their skill level, their physical ability, and their attitude. Anything other than excellence in each of these areas prohibits applicants from being deployed - we are looking for those people who will thrive rather than simply survive in this challenging environment.

Could you tell us about recent developments in the petrochemical industry from your perspective?
Prior to the widespread production of shale oils and LPGs, the petrochemical industry was fairly mature, going through cycles and maintaining and optimizing existing facilities rather than building new ones. With the advent of cheap feedstock and fuel in the United States, billions of dollars have been poured into constructing new chemical facilities. There is a growing demand for chemicals worldwide and the ability to export them is fairly unconstrained. The Panama Canal along with the ports of New Orleans and Houston are undergoing huge development, with new shipping facilities being put in place. There is in fact so much new capacity that in some situations, companies are being told to leave the oil in the ground.

Where do you expect to see the company in the next three to five years?
The company is growing by double digits on average per year, particularly as demand moves from general contractors to specialty safety contractors such as ourselves. This is of course constrained by how fast we can assimilate talent, and the pressures that we face at peak periods. CertifiedSafety is also expanding geographically; where there are concentrations of facilities, clients expect us to provide a predominantly local workforce. Over this same time frame, in response to both the global competition and the loss of intellectual capital, I expect to see a notable shift in our product offerings with an increased focus on providing our clients the personnel and methods they need to continuously improve the safety of their projects, at a lower overall cost. •

AT HOME AND ABROAD: DISTRIBUTING CHEMICALS

"Everybody has become much more aware of the environment. [Distributors] have an obligation to limit the exposure people have to chemicals and raw materials."

- Ben Gutmann,
CEO,
BassTech International

Image: Thinkstock

MANAGING THE SUPPLY CHAIN: DISTRIBUTION AND LOGISTICS

Journalist: James Hogan

The production of chemicals in the United States has been steadily increasing since the 2008 global financial crisis, thanks to many factors discussed earlier in this report, none more notable than the shale gas revolution. To accommodate this increase and absorb the growth in production, a more robust distribution and logistics network has been needed. While there are signs that distributors are meeting this challenge, questions remain. Port infrastructure, for example, needs to be expanded to be able to accommodate growing demands for exports. Domestic transportation infrastructure, long one of the backbones of a thriving U.S. economy, also presents growing challenges, as roads, railways, and bridges are in a state of decay and require revitalization. Safety and environmental factors, moreover, are compelling companies to better monitor their supply chains through the use of technology.

As manufacturers concentrate on their core competencies, they are increasingly looking to third-party logistics (3PL) companies to manage their supply chains. BDP International is one such company that offers supply chain and logistics services that create value while keeping overheads in check. Lance W. Malesh, BDP's chief commercial officer, said: "Being privately held, we have the flexibility to tailor solutions as per the client's needs, as opposed to having them adjust to the inflexibility of a one-size-fits-all business model." BDP's offering solutions that go beyond simple transactional services is an important part of the company's business model. This is a key consideration for any supply chain management company looking to form partnerships with producers.

Smaller companies rely on these extra services as well as providing an intimate customer environment. CLX Logistics is a 3PL that targets smaller chemicals producers as it feels that it is for these companies the firm can bring the most value. Mike Challman, vice president of North American operations, said: "These smaller companies will want to avoid the fixed costs associated with an internal logistics department, and we are able to offer flexible costs that reflect changes in a customer's volume and business over time."

As always when forming such strategic partnerships between manufacturers and distributors, reliability and trust are fundamental, particularly as safety and environmental concerns are growing more acute. Safety, security, and above all sustainability are part of the social and economic fabric of the twenty-first century, and producers will see this as a core value for service providers to possess. Ben Gutmann, CEO of BassTech International, said: "Everybody has become much more aware of the environment. [Distributors] have an obligation to limit the exposure that people have to chemicals and raw materials." As such, adhering to environmentally friendly standards should be seen as an opportunity rather than a challenge. It is a chance for companies to increase revenues by creating brand and reputation value through the reduction of carbon dioxide emissions.

Regulatory compliance is also essential for logistics companies and distributors to demonstrate, but U.S. chemical distributors are seeing an alarming rise in the number and scope of regulations. The National Association of Chemical Distributors (NACD) recently launched an online university with a view to better educate its members about the wave of new regulations that are designed to protect and sustain the environment. "Greater environmental restrictions throughout North America and on a global basis make it crucial to have advanced modeling to ensure that risk is measured and products can be delivered safely," said James J. Griffin, director of business development for South Coast Terminals. Griffin also claimed: "The pool of commercial transporters has continued to shrink because of the additional scrutiny and regulations they face."

Multinational chemical manufacturers are continuously looking to duplicate and achieve the same process efficiencies in every geographic market where they do business. As a result, distributors are trying to utilize advances in technology to provide better transparency for their clients' supply chain. Malesh of BDP International affirmed the focus on technology: "Technology is a key driver in this business, not only from an operational standpoint, but also from a sales and marketing capability."

Mike Challman, vice president of North American operations for CLX Logistics added: "Technology is a vital aspect of chemical logistics." CLX use Transport Management System (TMS) technology to provide their customers with visibility to relevant network information in near-real time. Stephen Brauer, president of Brenntag Specialties Inc. (BSI) said: "We can better forecast industry trends and pinpoint customer requirements by using cutting-edge technologies."

Decaying transport infrastructure within the United States has grown into a major issue over time. Nearly a quarter of all chemical shipments travel by rail and nearly all at some point will travel by road, and more efficient and modernized transport infrastructure would permit speedier delivery of chemical products. Delays in transportation caused by poor infrastructure not only undermine a 3PL's reliability and reputations but also threaten human safety and even harm the environment. Chairman of the NACD Matthew Brainerd cited a different problem: "The main challenge that distributors face is driver shortage. The country will need nearly 400,000 drivers in 2016. Furthermore, the country's roads and bridges are in dire need of repair." Congress has recently passed legislation that will provide $305 billion in funding for surface transportation systems over the next five years.

But while domestic distribution and logistics frameworks need strengthening, the export business has benefited greatly from the expansion of the Panama Canal, which will permit much larger ships and cargo loads to navigate it, and allow the growing supplies of chemicals being produced in North America to find markets overseas. The expansion of the Canal will also reduce the cost for East Coast producers to serve Asian markets. U.S. chemicals producers as a whole could expand their market share across Asia and elsewhere. Ports in the United States are also expanding to accommodate these new product flows. Houston has undergone a major expansion that will allow the port to serve ships carrying 8,000 containers.

U.S. companies already enjoy relatively low tariffs on transatlantic shipping to Europe, but the passage of the Transatlantic Trade Investment Partnership (TTIP) would eliminate tariffs altogether and be a further boon to European exports. Both the American Chemistry Council (ACC) and the Society of Chemical Manufacturers and Affiliates (SOCMA) support TTIP, arguing that the U.S. specialty chemical industry has more to gain than any other manufacturing sector from the pending free trade agreement.

Due to the burgeoning middle classes in countries such as India and China, and the accompanying increase in their demand for durable goods, the export business will continue to grow. Mike Vergnano, CEO of The Chemours Co., said: "The chemical industry, rather than being focused on individual markets, is a global industry with global capacity and opportunities. The Chemours Co. must think on a global scale in terms of distribution."

The resurgence of manufacturing in the United States, the growth in U.S. chemicals supplies, and the ongoing shift towards a global supply chain, will foster even greater competition among distributors and logistics companies to become the partner of choice for producers. The extent to which distributors embrace technology-driven strategies that help producers adhere to the growing body of regulations designed to protect the environment and human health, and that provide reliable service to their customers, may determine the winners. •

Eric Byer & Mathew Brainerd

EB: President
MB: Chairman
NATIONAL ASSOCIATION OF CHEMICAL DISTRIBUTORS


EB


MB

How has NACD grown its membership numbers since 2012 and improved member performance in the Responsible Distribution program?

EB: Up from 85% of companies in 2012, we now have around 93% of chemical distribution activity under the NACD umbrella. The growth of NACD Responsible Distribution®, our mandatory third-party-verified environmental, health, safety and security program, is essential for our member companies' ability to operate safely. We continue to be nearly twice as safe as all manufacturing combined, and because of our members' participation in the program, we see lower rates of injuries and lost workdays. The program also enables us to represent distributors' interests more effectively to federal and state governments, meaning we can work with policymakers to craft legislation and regulation that reduce burdens on the industry in smart ways, while also maintaining our safety record and allowing the industry to thrive.

How has the resurgence in manufacturing in the United States impacted on your members' operations?

MB: Despite strong economic headwinds over the last decade, the distribution sector has proven to be vibrant and growing. One reason for that is the recent resurgence in manufacturing. Manufacturers are focusing on production and the capabilities and infrastructure they need to ensure continued growth. Distribution companies are partnering with manufacturers to provide those services by delivering their products to end users, warehousing finished products, and visiting downstream customers to confirm chemicals are being used responsibly. Distributors are also now providing manufacturers additional post-manufacturing services such as testing and blending of products.

The NACD has a number of regional and national events. Could you tell us more about them and the benefits that they offer members?

EB: We have three main events each year. Our spring Washington Fly-in brings member companies to the nation's capital to lobby their members of Congress on important issues affecting the chemical industry. Our ChemEdge event in August targets management-level staff to provide them with the resources that they need to improve their operational performance and safety. Our annual meeting for executives takes place in November and focuses on high-level issues and strategies to help them run their businesses more effectively. We also have four regional meetings per year that bring together business owners in a more intimate setting to learn from each other and make important connections. We also offer several programs at these meetings that our members can take advantage of to grow professionally. Two years ago, we created a partnership with Duke University to bring executive education to our event line-up. Two programs are offered, one for leadership and another for management to enhance their skills. We also hold workshops at our events for our Emerging Leaders program that was launched three years ago to give up-and-coming leaders in the industry the tools they need to succeed.

NACD recently launched a new online training center. Could you tell us more about the courses you offer and how it enables you to improve member performance in Responsible Distribution?

EB: We launched NACD U at our 2015 ChemEdge event. The online training university has two aspects: regulatory compliance training, and a focus on our Responsible Distribution Codes of Management Practice. In addition to more than 70 regulatory courses, we currently have available the first two introductory courses to Responsible Distribution and a senior leadership module. A tailored curriculum is being created for each individual code throughout 2016. The goal is to bring our members the education they need, when they want it and where they want it.

Transportation infrastructure in the United States is a key issue for NACD member companies. What can be done to help alleviate this problem?

MB: As a business owner, I think of transportation infrastructure as the capabilities businesses need to transport their goods. In that regard, the main challenge distributors face is driver shortage. Our country will need nearly 400,000 drivers in 2016. Some companies are embracing their own transportation infrastructure, while others are contracting third party logistics firms. In order to solve this problem, wages will have to increase, robust benefits packages will have to be implemented and an awareness of the need for drivers to spend time with their families will need to be created.

EB: From a national perspective, our country's roads and bridges are in dire need of repair. Fortunately, Congress just recently passed legislation that will provide $305 billion in funding for our surface transportation system over the next five years. This much needed funding will help rebuild our 60-year-old interstate highway system and repair or replace bridges that in some cases are 90 years old.

Additionally, Congress also passed legislation that makes modest reforms to the Surface Transportation Board (STB), which has been a key priority for NACD in 2015. These changes will streamline the rate case adjudication process and allow the STB to operate more efficiently and effectively so that NACD members have greater recourse for action when addressing issues with rail shippers.

NACD actively supports TSCA reform. What has this process taught us for the future?

EB: This process has taught us that bi-partisan support, though critical, does not guarantee change. We have also learned that our Washington Fly-ins have positive effects. Before our 2015 Fly-in in April, the TSCA bill had around a dozen co-sponsors; we doubled that number following our Fly-in and visits with Senate staff. In the intervening months, our advocacy efforts helped bring the total number of co-sponsors up to the 60 senators who we have today. We are optimistic that efforts like those put forth for the TSCA bill will enable future legislation to gain solid support.

MB: The lack of TSCA reform in the last three decades created an environment where states felt it necessary to pass their own legislation, creating further difficulties in the chemical distribution industry. This process has taught us that sometimes more federal legislation is better than piecemeal efforts at the state level because it provides greater consistency across state lines.

Could you tell us more about how safety and environmental regulation impacts upon the chemical distribution industry?

MB: U.S. chemical distributors are seeing an alarming increase in the number and scope of regulations coming out of this administration. In order to stem this tide of regulations, we need to do a better job of educating regulators on our safety record, namely that the U.S. chemical distribution sector is nearly twice as safe as all of manufacturing combined. We take the safety of both our employees and the general public very seriously. Yet, regulators still put out rules that create direct and undue burdens on distributors.

For example, regarding the Occupational Health and Safety Administration's (OSHA) recent memorandum that created new requirements under Process Safety Management (PSM), OSHA did not allow stakeholders to provide input on the changes to the PSM standards, since the agency was just issuing a memorandum and not launching an official rulemaking process. We were therefore unable to communicate the true hazards associated with certain chemicals. Because of the manner in which OSHA pursued changes to the PSM standard, the memorandum inadvertently created extra administrative work from both a financial and time perspective. We are seeing this type of regulatory overreach more and more, which is of particular concern to our industry.

EB: OSHA circumvented due process regarding changes to the PSM standards, which is a huge concern for distributors and other sectors of the industry. It has potentially created a precedent that other regulatory agencies can now follow.

Why is it important for the United States to be seen as a global leader in the area of chemical stewardship?

MB: As the past president of the International Council of Chemical Trade Associations (ICCTA), I know that worldwide stewardship and best practice is critical to the reputation of the global chemical industry. Incidents in one country have ramifications for countries the world over and could be prevented with the correct processes. By having a respected and proven platform such as Responsible Distribution here in the United States, we can unite to create similar programs that address safety needs and share best practices.

What can we expect for NACD over the next three years?

EB: From a programs standpoint, we expect to continue developing some of our newer initiatives that will be much more robust in three years. We recently launched NACD U, but in three years' time we will have a fully stocked curriculum to help our members grow professionally in a host of areas. We will also have five or six graduated classes of Emerging Leaders by that point, which will likely be close to 70 individuals that will have gone through the program. These leaders will be able to support NACD in various capacities and ultimately push the industry to even greater heights.

On the government advocacy front, we hope to minimize the regulatory compliance burden on our member companies through outreach to legislators and regulators alike, ensuring fewer regulations while maintaining a safe environment that leads to economic growth.

MB: Although we have increased our industry footprint from 85% to 93% of all sales throughput over the last three years, it becomes increasingly difficult to improve this further as a function of increased membership. Many of the remaining outlier companies are small operations that are concerned about their ability to implement Responsible Distribution. Over the next three years, we will continue to work diligently on education programs and finding out exactly what we can do to assist them in that implementation process.

CR

Carlos Restrepo & Keith Wilkinson

CR: Senior Vice President, Performance Chemicals
KW: Vice President, Specialty Chemicals
ACETO CORP.

How has Aceto's chemical business evolved over the last three years and what is its current role within the corporation?
CR: For more than 60 years, Aceto has been a public chemicals and raw materials business. We have just received an SEC code for our pharma company. In the past three years, we have moved from being simply a commodities business to adding value and services to our products. Our value-add is in sourcing: the key is that 98% of our products are sourced from India, China, and Japan and we have been there for more than 20 years. We have 25 people in our Shanghai office for sourcing and regulatory, six of whom work for specialties. Our dedicated sourcing group consists of only chemists, chemical engineers, and experts in the field. In India, we have 12 people, four of whom are dedicated to the specialties business.
KW: Many people see that we are investing heavily in the finished dosage part of the business, but we maintain that specialty chemicals are imperative to the strategy of the company as a whole. Our growth will not be due to large acquisitions; instead we want to focus on organic growth and geographic expansion in Europe and the United States, as well as in Canada, Mexico, and South America. China is competitive and companies in the region offer quality products for high prices. We want to become a traditional distributor for these Chinese companies by offering products, platforms, and complete transparency with regard to our customers. We are not just an intermediary – although we can speak the language - we are a complete partner.

Where are your core markets for distribution and how does your organizational structure facilitate this?
KW: Coatings, inks, and adhesives are a big market for us. Within intermediates, we focus on the two areas of colors, dyes, and pigments and agriculture. In addition to additives, such as catalysts, anti-oxidants and UV absorbers, we are also strong in cosmetics and personal care, flavor and fragrance. We also supply tannic acid for the beer and wine industry, which has more stringent regulation that we are required to meet compared to the other industries. The majority of our business comes from North America and a small percentage comes from Europe, which is a region where we are looking to expand.

How are you overcoming the challenges in China, such as competitive sourcing, lower prices and quality issues?
CR: If these challenges did not exist, Aceto would not exist either because then there would be no need for our services. We are a public company, so we follow the rules and do not cut any corners. We audit our plants and know which Chinese companies to work with. Companies need this guidance in order to differentiate what is good quality from what is not. Our typical customer is a multinational company, who has a plant or sourcing office in China and obtains the main bulk of its materials from the Chinese market, but needs help with sourcing the smaller and more difficult to locate products. This is reflected in India for agriculture. Since we are comfortable in both of these markets and have a well-developed network of suppliers, we are able to deliver on these special items within 24 to 48 hours. Multinationals, such as Univar and Brenntag, see the value in us as a sourcing distributor and thus avail themselves of our services.

How can we expect the implications of the final stages of REACH to affect the future of the specialty chemical industry?
CR: In 2018, the REACH dossier of distribution goes down to 1 metric ton, which affects us. We now have to pay to register products. You now have to go to Europe with your suppliers and support each other in order to make it work. It costs from $75,000 up to $500,000 to register each chemical – and we sell 700 of them. So you have to identify which are your key chemicals and what is viable. This is an opportunity for us, if we start early, to decide how we can offer value to our customers and our suppliers.
KW: If we do REACH right for one or two items with a customer, our feeling is that Aceto can be seen as a supportive supplier and take over any business that might fall away from other suppliers. We sell many chemicals that are crucial to a formulation, but may only make up a small percentage of it. Many customers will find value in Aceto for our sourcing services. We hope to be able to expand and help more markets globally in the future, but we will have to wait until 2018 to find out.

Looking ahead, where will Aceto be in the next three to five years?
CR: We hope that Aceto will grow in the high single digits with the right team and resources. We want to be a full-service traditional distributor, given our relationships with suppliers in China, India, and Japan in platform-type markets. Given the current market, Chinese manufacturers are now being faced with the quandary of offering higher-quality products at competitive prices, in addition to having to employ eco-friendly measures enforced by the Chinese government. We plan to use our sourcing to grow, and additionally offer unique solutions to platforms in the United States, as well as growing in Mexico, Canada, and Europe. We have a transparency policy, as we inform our clients about who our suppliers are and vice versa. In this manner, we ensure that our customers see value in our services.

BG

AC

Ben Gutmann & Alan Chalup

BG: CEO
AC: COO
BASSTECH INTERNATIONAL LLC

Could you provide us with an overview of BassTech, including how your focus has changed since we last saw you in 2012?
BG: Our customers' requirements constantly re-focus us. Although some of the initiative is ours, our customers direct much of our new product sourcing. Once we have developed a reputation as being able to leverage our international suppliers to source hard-to-find products, they continue to look to us for solutions.
AC: We have certainly experienced changes since 2012. Much of it is based on external issues, such as exchange rates and the cost of energy. Production in general for many finished goods within the industries we service are returning to the United States. Our customers now find themselves in a position of improved competitiveness and require an increasing amount of raw materials and feedstocks to meet higher outputs. They turn to BassTech, as the traditional supplier of their products, to enable them to find alternative sources from around the world.

How has your portfolio developed over the last three years and have there been any major additions or changes to the products you are offering?
AC: BassTech continues to concentrate on two areas of business: inorganic chemicals and polymers, which includes plastics and synthetic rubbers. We have seen a focus on the increasing volumes of the off-spec materials created by our customers both in North America and overseas, as their production levels grow. We have spent time with these producers, along with their customers, to develop non-traditional applications for streams. We have termed this '100% utilization' – 100% of the materials that goes into production yields 100% viable materials coming out, whether it is for the intended application it was designed for or something else.
Our customers would initially sell this off-spec product to their existing customers at a discount, detracting from their prime market. What we have done, using our laboratories, is to find a secondary application for the material, which does not cannibalize their prime markets and turns what was originally considered a liability into an asset. This is positive for us, as we now have a ready available supply of materials; this also sets us apart from our competitors, who do not have access to these products and do not provide a creative value-added to their consumers and suppliers.

BassTech is also a member of the NACD's Responsible Distribution program. How does sustainability play an increasing role in your operations?
BG: This has changed dramatically since we last spoke to GBR in 2012. Everybody has become much more aware of the environment. We have an obligation to limit the exposure people have to chemicals and raw materials. As part of the NACD's Responsible Distribution program, we are third-party verified and we also have to conduct monthly and annual audits ourselves. The NACD works hard to ensure a correlation between Responsible Care and Responsible Distribution – this makes it easier for the big chemical companies to feel confident distributing through NACD members.

What impact is the REACH legislation having on the specialty chemicals industry both in the United States and globally?
BG: REACH has been a big challenge for us and was the main impetus for us to open our office in Belgium. We have registered a number of chemicals in Europe, but it is both very expensive and very complicated.
AC: There are certain products that we distribute in very low quantities annually. For many of these smaller products, it does not make economical sense to form a Substance Information Exchange Forum (SIEF) and complete the registration, so their viability is in question after 2018. However, we do see opportunities in the future as certain product lines are forced out of Europe. The world demand for a product will not change and, as production becomes increasingly automated, China has less of an advantage. The cost of energy is cheaper in the United States, along with many strategic feedstock productions. Therefore, we see the opportunity for supply growth in the coming years as some production exits Europe due to the constraints imposed by REACH.

Looking forward, where can we expect to see BassTech's focus lie?
BG: We are very excited about the future and have hired more personnel to help us expand. As big corporations try to rationalize their employee numbers, they will be looking to outsource some of their requirements and will be looking to sell more of their by-product and off-spec material through companies like BassTech.
AC: From our customers' perspective, they are coming out of a downturn, where they were forced to shed staff. They were running lean companies and, whether it was intentional or not, they no longer had the knowledge base inherent in their departments to enable them to source new raw materials to meet their increasing demands. To our benefit, our staff have long tenures and we have retained that knowledge base, which enables us to help our customers. Our customers' development labs also lack manpower; this is another service that we can provide, as our office in Belgium has a full polymer laboratory.

Stephen Brauer

President
BRENNTAG SPECIALTIES INC. (BSI)

Can you provide a brief history explaining the evolution of Brenntag Specialties Inc.?
U.S.-based Brenntag Specialties Inc. (BSI) can trace its roots back 125 years. In the broader Brenntag enterprise—a leader in the chemical distribution arena—BSI operates in both life sciences and material sciences globally. BSI was created in 2007 and operates within the Brenntag group of companies in North America, as the first of its kind to offer specialty distribution and customized services to industry on a national basis. BSI is a technology-based company, as we offer solutions to our customers' needs in cooperation with our key producer partners. As per our corporate claim launched at the end of 2015, we provide a platform to 'connect chemistry' between our customers and our principals. Brenntag North America, through its seven subsidiaries, has an extensive fleet of trucks and multi-purpose facilities throughout North America that provide un-paralleled service and capability that BSI is able to utilize. We are our principals' exclusive distribution channel to the market and, as such, represent their brands. We are, in essence, an extension of their name and reputation.

How important is the specialties division to the overall Brenntag Company?
BSI is complementary to the full-line chemical distribution company in Brenntag North America. BSI's focus is on customer research and development (R&D) and product development, while the full-line organization focuses on customer operations, procurement, and logistics needs. Separately, we focus on different groups of chemistries but, together, we provide an impressive combination of resources linking technology, logistics, and operational services to our trading partners. This also brings greater efficiency to Brenntag as a whole, and brings greater value to our broad customer and supplier base. Our commercial teams are constantly exploring opportunities to sell a broader portfolio of specialties and industrial chemicals. We can combine our knowledge, applications and technical support, and offer this advantage to our customers.

"BSI is complementary to the full-line chemical distribution company in Brenntag North America. BSI's focus is on customer research and development (R&D) and product development, while the full-line organization focuses on customer operations, procurement, and logistics needs. Separately, we focus on different groups of chemistries but, together, we provide an impressive combination of resources linking technology, logistics, and operational services to our trading partners."

Could you elaborate on the organizational structure of BSI and your target markets?
We also have a specialties platform in Europe, Asia-Pacific and Latin America. Our global specialties strategy is a significant part of the Brenntag global footprint. The global organizational structure may look different depending on which part of the world we are in, because we modify the structure to best respond to our customer and supplier partner needs in the particular regions. This flexibility is crucial in a globalized industry where our trading partners' needs vary. A significant part of Brenntag's business is in the specialty arena. We continue to service our core industries, which include most material science markets, such as coatings; adhesives; plastics; composites; rubber; the life sciences; pharmaceuticals; nutraceuticals; and food and personal care, among many other micro markets. We also have a regulatory department that supports our customers in all industries, but most significantly in the life sciences. We have grown more rapidly into some of these micro markets over the last three to five years, driven by the needs of our principals.

Could you elaborate on the services and product applications that you provide to your customers in addition to providing them with the ingredients?
We are always looking at industry and technology trends as we develop new chemistries and innovative solutions to meet the challenges and demands of the marketplace. We support customers' new product development through our application laboratories that create starting-point formulas and prototypes.
Through market research we generate an extensive amount of market intelligence, which is imperative for us and our trading partners. Our market insight, supported by cutting-edge technologies, allows Brenntag to better forecast industry trends and to pinpoint consumer requirements. We collaborate with our supply partners to provide competitive options for our customers where we feel we can offer something unique and new. We focus on innovation, as that gives us a competitive and creative advantage. Innovation comes in many forms, not only from new chemistries, but also from Brenntag's many diverse assets, resources, and people. In addition, sustainability and recyclability ideas come from that creative edge.

What is Brenntag's view on the state of the regulatory environment surrounding the chemicals industry?
We actively participate in several associations, including SOCMA, NACD and ACC, which have proven to be a powerful voice in representing the industry's perspective in Washington, DC. Participation in legislation through these trade organizations is critical to the health of our industry. The TSCA needed to be modernized to reflect the advances in scientific understanding and the applications of chemistry.

What are some of the industry trends that we can expect to see in the future and where would BSI likely position itself moving forward?
The growth in the chemical industry is going to be driven by value We are noticing that the growing economies and manufacturing in India and China are leading to greater dependence on imports here in the United States. Mexico is also growing as a manufacturing base and is a space to be watched. Given that we have not managed to match up in exports, this is not beneficial for the balance of trade. However, this increased competition from Asia and elsewhere has led to greater development within the industry, encouraging innovation. This is the path on which BSI, together with our supply partners, must continue. We also see greater-than-average growth in specialties for the foreseeable future. Innovation will continue to be one of the top growth drivers here at BSI, and our vision is to remain at the forefront alongside our Brenntag colleagues to continue to grow both organically and through acquisitions. •

James J. Griffin

Director of Business Development
SOUTH COAST TERMINALS

cialty additive industry, which has seen the company grow on average by 8% to 10% per annum.
Moreover, during the 2008 economic downturn, companies such as Shell, Exxon, and DuPont needed to redirect their resources on their chemical manufacturing and avoid labor consuming distribution practices such as 'just-in-time' manufacturing. Therefore, outsourcing became a major part of the business models of leading players in the chemical industry.

How can we explain the push by major players to outsource some of their manufacturing activities?
Due to low crude oil prices, our clients have to run their plants at a certain level of capacity to meet performance benchmarks and reach certain economies of scale. For South Coast, this means our clients will continue to produce at a level above consumption. They will review their product offerings and examine which additives are critical to their company's overall success. Among these, they will evaluate which products require a significant labor input, distribution services and outsource the production to providers like us who, through the incremental scale of our business, can manufacture the products in more cost-efficient ways. Consequently, our clients will be able to keep these products in their portfolio instead of having them become obsolete. In the alternate scenario where the growth of the industry is outstripping capacity, clients will still look to outsource so they can choose their capital expenditures efficiently.

In regards to hazardous chemicals, how do you solve storage and transportation issues?
Greater environmental restrictions throughout North America and on a global basis make it crucial to have advanced modeling to ensure that risk is measured and we can deliver products safely. The bigger challenge in the industry is transportation logistics, and risk management from this perspective. The pool of commercial transporters has continued to shrink because of the additional scrutiny and regulations that they face. The cost of being a major player in the transportation industry has increased. Moreover, Burlington Northern and the railroads that Warren Buffet owns have been affected by derailments. This speaks to the state of infrastructure in the United States. The U.S. Department of Transport's Pipeline and Hazardous Materials Safety Administration (PHMSA) is the main regulatory group in this area and continues to emphasize managing risk through implementation of greater regulatory restrictions. Pipelines transporting fuel to the East Coast are aging and are increasingly unsafe. Further investment is required to secure our network and support the growth of the industry. The Department of Homeland Security (DHS) works closely with PHMSA to ensure our pipeline network is protected from terrorist activities. When we meet with PHMSA and DHS, all parties recognize the importance of investment in the quality and safety of the country's pipeline infrastructure.

South Coast Terminals has received the SOCMA national safety and improvement award for the last 14 consecutive years. How important are programs such as ChemStewards and Responsible Care?
Without reporting, there is no accountability. It is important to be accountable to somebody other than yourself. While it is of course useful for marketing and communication purposes, as it allows our company to differentiate itself from competitors, it also serves to bring the industry up to a standard and proves useful in addressing critical safety issues within the company. Certifications, baseline requirements and standards are important for day-to-day operations and the safety of our employees.

Having recently celebrated its 50th anniversary, where is South Coast Terminals heading in the next decade?
South Coast Terminals projects a doubling in the size of the company, due to expected growth in the additive industry. Low crude and natural gas prices will drive the industry, in an aggressive manner, toward increasing specialization. As this happens, many companies will choose to utilize services provided by third-party players such as South Coast, who can provide competitive pricing and quality products. •

Dick Oskam

Regional Marketing Manager
VOPAK AMERICAS

Can you provide us with a brief overview of Vopak and its predecessor companies, highlighting some key milestones along the way?
Vopak's rich history dates back to 1616. In 2016, the company will be celebrating 400 years. Much has changed since 1616, but at the core, we remain the same: we connect global trade flows, enabling the delivery of products that are vital to our economy and daily lives.
Together with Rotterdam (Netherlands) and Singapore, the Vopak Deer Park Terminal in the United States is one of Vopak's three key international chemical hub locations. The business conducted at Deer Park supports local trade and functions as a stepping-stone for customers to serve other regions in Vopak's network, like Latin America, Europe and Asia. Consequently, our whole infrastructure has been built to support these flows. Since tight oil and shale gas were discovered and produced very economically, the United States has seen a huge turnaround in fortunes and became an even stronger producer of chemicals, with close to 70% of manufactured product being exported. As a result, our infrastructure across the entire Americas segment, comprising North and South America, has been positively impacted, providing Vopak with an opportunity to follow the flows and serve customers with the right infrastructure across the region and making the required investments.

How important is the Americas segment within Vopak's global corporate strategy and could you tell us more about your U.S. sites?
Our Americas network of terminals is gaining importance based on the above-mentioned feedstock advantages in North America. Within the region, the relationship between North and South America is becoming increasingly important, as we find that Latin American products and production are not always as competitive as the U.S. chemical products. This rationale was, in part, the basis of merging Vopak's North and South American business operations and management into one regional organization. The consolidation, which came into effect in 2013, allowed for improvements to our service activity along the product flows across the supply chain.
We have four terminal sites in the United States: two in California, one on the East Coast (Savannah), and Deer Park in the Gulf Coast. The terminals on the West Coast perform local activities in the California market and support some activity with the Far East. The East Coast facility is regionally focused, and the number one tropical oil import terminal in the United States.
Our Deer Park facility in Southeast Texas is a chemical hub terminal, and serves a large number of chemical production facilities on the Gulf Coast. For some customers, we receive their feedstock, which is sent to their facilities via pipeline, and receive their formulated products back in the terminal for distribution or for exports.

What are the key drivers for storage demand as the market adapts?
Faster processing is required today with the higher export demand. The whole transport module in the United States has been transforming over the years as a result of increased trade between East and West, particularly in regards to commodity chemicals. For example, North America is a net importer of benzene and Asia is increasingly a net exporter of benzene; this trend, combined with the Panama Canal expansion, supports larger shipments of benzene into the Gulf Coast.

Given that Vopak is a European-headquartered company, what insights can you offer on the European chemical industry compared to the United States?
Generally speaking, the chemical industry is following common trends one sees, for example, in the automotive industry. The bulk of cars may be manufactured in the United States and Asia, with a smaller but important portion manufactured in Europe, which is serving premium segments. As chemical feedstock and production costs increased in Europe, we have seen the chemicals industry moving away from commodities and more focused on specialty chemicals, which inherently could have higher margins. We do see short-term strength developing in the petrochemical sector in Europe in this lower oil price environment and on the basis of cheaper base chemical imports into Europe.

Following its 400th anniversary celebrations, what can we expect from Vopak in the future?
We pride ourselves in our ability and commitment to meet our customer's expectations towards safety, service and sustainability. Inspired by a rich heritage, and looking forward to the opportunities that lie ahead, we want to be a strong link in our customers' global value chains and a leader in our industry.
We will always strive to maintain long-term relevance for our customers and for society and continue to invest in our service improvement by conducting annual customer satisfaction surveys and asking customers what is really important to them. We also support responsible care programs as they, in turn, support our drive for a successful working environment and embody the voice of organizations across the world. Vopak has been facilitating global trade flows for 400 years. Today more than ever, we remain committed to providing efficient, safe and clean storage and services to keep our company relevant, healthy and fit for the future. •

Lance W. Malesh

Chief Commercial Officer
BDP INTERNATIONAL

Can you tell us about BDP's background within the chemical industry?
BDP was founded in 1966. The company is a privately owned, non-asset-based, international logistics company. BDP has specialized its practices in the chemical sector, and the most recent tally by IHS Chemical Week indicates that BDP serves eight of the world's top ten chemical manufacturers in terms of sales revenue. The company has grown exponentially with its annual growth averaging between 9% and 15%. We operate as a customer-intimate organization and, though we do not endeavor to be the cheapest, we do nurture our relationships through value-creation and steadfast reliability. Being privately held, we have the flexibility to tailor solutions as per the client's needs, as opposed to having them adjust to the inflexibility of a one-size-fits-all business model. Our technology differentiates us in that it is built to be highly configurable according to the cross-functional needs of our clients.
This is something that we do on a daily basis, and not for a one-time project. As we expand our client portfolio globally, clients are seeking a company that serves their needs whether it is custom integration or programming. The foundation upon which we have built our business for nearly 50 years is a small company 'can do' culture.

What are some of the major challenges you are presented with in your industry segment?
Our major challenge is the commoditization of transportation and the standards with brokerage services. We see a shift in private equities entering into this field, and many of these companies are starting to manage from a time to cash standard. This is a challenge for the sector as a whole. A bigger challenge is how to maximize the logistics component of the supply chain and take a holistic view of the supply chain itself. We are employing new technologies to cut costs in the supply chain. Technology is a key driver in this business, not only from an operational standpoint, but also from a sales and marketing capability. Customer service is a differentiator for customers, along with the fact that logistics is not their core competency.

To what extent has BDP International felt pressure through adhering to tighter eco-friendly standards?
There is pressure for this, but we view it as an opportunity. Many of the items that are discussed in carbon-footprint calculators and the reduction of carbon dioxide emissions also present the opportunity to increase revenues by creating brand and reputation value. By actively trying to do the right thing for the environment, we also experience cost reduction and risk mitigation. Sustainability and ecofriendly practices form the fabric of doing business in the 21st century and, with inevitable generational change within the chemical sector, sustainability is key.

How will the potential passage of the Free Trade Bill affect BDP's operations?
In the future, we will need to change how we conduct business; we need to wait, however, until the bill is finalized and implemented. With reference to the trans-Pacific and trans-Atlantic acts, certainly free trade is beneficial all around.

Being privately held, we have the flexibility to tailor solutions as per the client's needs, as opposed to having them adjust to the inflexibility of a one-size-fits-all business model. Our technology differentiates us in that it is built to be highly configurable according to the cross-functional needs of our clients.

How have shipping and transport changed in the last five years in terms of the advent of local suppliers?
Due to the impact of the shale gas phenomenon, we have seen in excess of $150 billion of capital investment come back into the United States, more than 60% of which is foreign direct investment. The additional capacity coming into the United States is vastly beneficial. We are an export-oriented company, and we will see a rise in exports due to the burgeoning middle classes in countries such as India and China and the increased demand for Western durable goods. The shift in trade may move from an East to West trade line to one that is North to South.

Where will BDP International be in five years?
We are two years into our five-year strategic plan. Our strategy is to deepen our technologies and partnerships within the chemical sector. We are also seeking to have a broader scope in terms of becoming a life sciences company as well as a chemicals company, especially for petrochemicals, oil and gas that are overlapping elements. We need to continue investing heavily in technology, which will be a chief driver of business. Since we are trying to move up the value chain, these strategies will be instrumental and crucial in our growth. •

Mike Challman

Vice President, North American Operations
CLX LOGISTICS

Can you offer an introduction as to how CLX Logistics has evolved since its founding almost two decades ago?
Today's CLX Logistics began in 1998 as Leaman Logistics, an off-shoot of Chemical Leaman Corp. By the early 2000s, we had established ourselves as ChemLogix, a premier provider of third-party logistics and technology to the chemical industry. In more recent times, we have expanded our operations into other industry verticals and rebranded ourselves as CLX Logistics, though we still retain the ChemLogix brand as well, and our focus in chemicals remains just as strong. We have always approached customer solutions with a flexible engagement strategy, which means that our solutions are driven by customer needs. Rather than sell the same solution, we aim to build solutions that are specific to each client.

Can you outline the main services that you are able to offer to the chemical industry?
With regards to our chemicals focus, our business model is fairly unique among third-party logistics companies (3PLs) and is divided into three pillars. The first is our role as a licensed reseller of the Kewell Transport Management System (TMS). With a highly skilled technology group that is well versed in implementing and supporting the TMS, we can offer our customers the option to purchase a software-as-a-service (SaaS) license for the TMS, and operate it with their own logistics resources. Our team will then provide support with regards to maintenance and enhancements. The second pillar is our international and intermodal capabilities. Though we are not primarily an asset-based company, we operate the largest fleet of intermodal ISO tanks in North America. The third and final pillar is managed services, which acts as our customers' 3PL provider. In this case, we function as their logistics department, utilizing our TMS technology and our vast operational experience.

In your managed services role, who are the companies that will benefit the most from the services you offer?
Mid-sized chemical companies find significant value in engaging CLX Logistics as their 3PL. This opportunity often arises when a large chemical company spins off one or more of their divisions. The sudden loss of corporate support can be jarring, and the spin-off can find itself under-resourced and over-worked. We are able to really guide them and offer value and flexibility to their requirements. These smaller companies will want to avoid the fixed costs associated with an internal logistics department and we are able to offer flexible costs that reflect changes in a customer's volume and in their business over time.

To what extent do you operate internationally?
We are actively moving towards an even larger global footprint. Two years ago we acquired Dutch consulting company LHC, which now operates as CLX Europe; more recently we installed an aggressive vice president of international operations. These additions, accompanied by global business growth with our customer base, are helping us to serve customers in Europe, South America, and other regions as we continue to expand our global capabilities.

What role have advances in technology played in chemical logistics?
Technology is an absolutely vital aspect of chemical logistics; even more so than other industries. It is essential for any shipper to maintain visibility across the supply chain, but particularly so for chemical shippers where safety and security are of the utmost importance. Technology can also be leveraged to ensure that companies are shipping in the most cost-effective and time-efficient manner. In our case, we link our TMS technology to an online dashboard capability which provides our customers with visibility to relevant network information in near-real time.

Looking ahead, in which areas are you looking to innovate and in what direction are you hoping to expand?
Primarily, we continue to focus on providing leading-edge technology and world-class operational capabilities. We are very bullish on our growth projections for the next several years. We have been very successful in the last seven or eight years with consistent double-digit growth in both revenue and earnings, and we fully expect to continue that growth path in the future. A key challenge we will address is maintaining the customer-centric, boutique culture that we have fostered for so long. In five years, I would like CLX Logistics to have a strong operational presence in multiple regions around the globe, while continuing to be a market leader in chemical logistics for North America. We are certainly on track to achieve both of those goals, and I hope that in five years we can point to many more successful operations, while still maintaining our entrepreneurial, open, and friendly culture. •

Image: Thinkstock

INTO THE FUTURE FINAL THOUGHTS, COMPANY INDEX, AND CREDITS

"Our pipeline is very rich in products that serve a sustainable world. Food production, energy efficiency, consumer healthcare, electronics, and water filtration are just a few of the innovations that we are providing the world. We are committed to our future by continuing to fund our growth investments, which include our $20-billion Sadara JV in Saudi Arabia, our continued investments in the U.S. Gulf Coast, and our $1.7-billion investment in research and development programs every year. All investments go toward supporting our contributions to a sustainable planet."

- Joe E. Harlan,
Vice Chairman and Chief Commercial Officer,
The Dow Chemical Co.

Foreign investors will likely continue to have an interest in investing in the United States due to its favorable feedstock, capital expenditure, and demand environment. This could be via direct investment—a number of Chinese companies have built methanol plants in Louisiana—or through partnerships.

- Andy Walberer, Partner, Chemical Industry Practice,
A.T. Kearney

Specialty chemicals have helped every facet of life. We need to send a message to the world that what we do is necessary and crucial. There are several countries that have rampant malnourishment, poor water treatment, low crop yields, and high infant mortality rates. People should appreciate the industry for what it has done.

- Ephraim Rabin, CEO,
Parchem

Firms in the industry should be seeking consolidation opportunities, increasing efficiency, and looking for ways to improve their supply chain and business portfolio. As soon as there is an oversupply, costs create pressure for firms. Consolidation is necessary for efficiency, because the chemical industry is a commodity-driven industry and the cycle will not correct itself unless the market is balanced. Seeking opportunities and places for profitable growth is another intelligent strategy in times of oversupply.

- K'Lynne Johnson, CO-founder and Former CEO,
Elevance Renewable Sciences

To date, 84 projects have been announced for Texas as a result of the shale economy, for an estimated $46 billion in investment. These projects are projected to generate 153,000 jobs, both permanent and temporary, as well as $1.8 billion in local and state tax revenues. A third of the overall investment that has come to the United States due to shale gas has been in Texas alone.

- Hector Rivero, President,
Texas Chemical Council (TCC)

The United States is once again one of the most competitive locations for manufacturing petrochemicals and that is not about to change, despite the recent decline in oil prices which has simply reduced the magnitude of cost advantage between the United States and other regions. There will be challenges ahead in 2017 or 2018, when the next wave of new plants comes online; by the end of the decade, however, additional demand should ensure a rebalancing of the market.

- Vijay Sarathy, Partner,
PwC

Global Business Reports

As experience is gained, both OSHA and our clients continue to define and implement more robust approaches to proactively improve worker safety. This trend is evidenced by the dramatic reduction in industry TRIR over the past 20 years. With that said, the challenge to maintain the current levels of safety, or to improve on them, are being complicated by the retirement of the baby boomer generation. This depletion of experience has increased the demand for outsourcing project safety, as it has with most other technical needs.

- Tony Spencer, CEO,
CertifiedSafety

We also work to ensure that we have taken the risk out of decision-making for companies interested in our greenfield industrial sites. We went from having three sites that had been certified as 'shovel ready' in 2012, to more than 30 now. This is thanks to our huge push to find suitable locations and then focus our efforts and funding on their development and certification. Today, around one third of the 77 projects considering a site in the region are chemical companies. There are currently around 8,000 students in some way associated with the chemical industry in the metro area. Despite this, demand will continue to outstrip supply, and we need to recruit talent from elsewhere. We will work together with organizations such as Louisiana Economic Development and Louisiana FastStart to create customized workforce solutions, entirely free of charge to the companies.

- Adam Knapp, President and CEO,
Baton Rouge Area Chamber (BRAC)

Multinational chemical producers are increasingly looking at supply chain management from a strategic point of view to achieve better ROI. They are looking to be faster and more nimble to adjust to changing business conditions. When things go bump in the night, they want flexible sourcing options to keep plants open and products moving to markets. It is about regions and business cultures even within the same industry competing with one another to win.

- Lance W. Malesh, Chief Commercial Officer,
BDP International

The United States thus provides a favorable environment for growth and we are cautiously optimistic for the country and the NAFTA region in general; we believe it can be a powerhouse of industry. But, as the market grows, we expect the growth rate itself to shrink. The automotive industry has a lot of potential, as does the building and construction industry. In the consumer market, we are seeing trends towards green, sustainable products, which is an area where the chemical industry can, and does, provide solutions.

- Antonis Papadourakis, President and CEO,
LANXESS Corp.

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This list contains those companies interviewed during the course of research for this publication and as such represents only a limited selection of the companies operating in the chemical industry of the United States. It should not be considered a comprehensive guide. GBR holds an exclusive and extensive chemical database for the United States and the wider region. For further information on database access packages, please contact info@gbreports.com or call +44 20 7812 4511.

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Additional copies of this book can be ordered through Elif Ozturk (elif@gbreports.com).

THANK YOU

We would also like to sincerely thank all the governmental bodies and associations that took time to share their insights into the market as well as their experience and knowledge.

AMERICAN CHEMISTRY COUNCIL (ACC)
americanchemistry.com

SOCIETY OF CHEMICAL MANUFACTURERS AND AFFILIATES (SOCMA)
socma.com

NATIONAL ASSOCIATION OF CHEMICAL DISTRIBUTORS (NACD)
nacd.com

AMERICAN FUEL & PETROCHEMICAL MANUFACTURERS (AFPM)
afpm.org

U.S. ENVIRONMENTAL PROTECTION AGENCY (EPA)
epa.gov

U.S. OCCUPATIONAL SAFETY AND HEALTH ADMINISTRAION (OSHA)
osha.gov

TEXAS CHEMICAL COUNCIL (TCC)
txchemcouncil.com

BATON ROUGE AREA CHAMBER (BRAC)
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