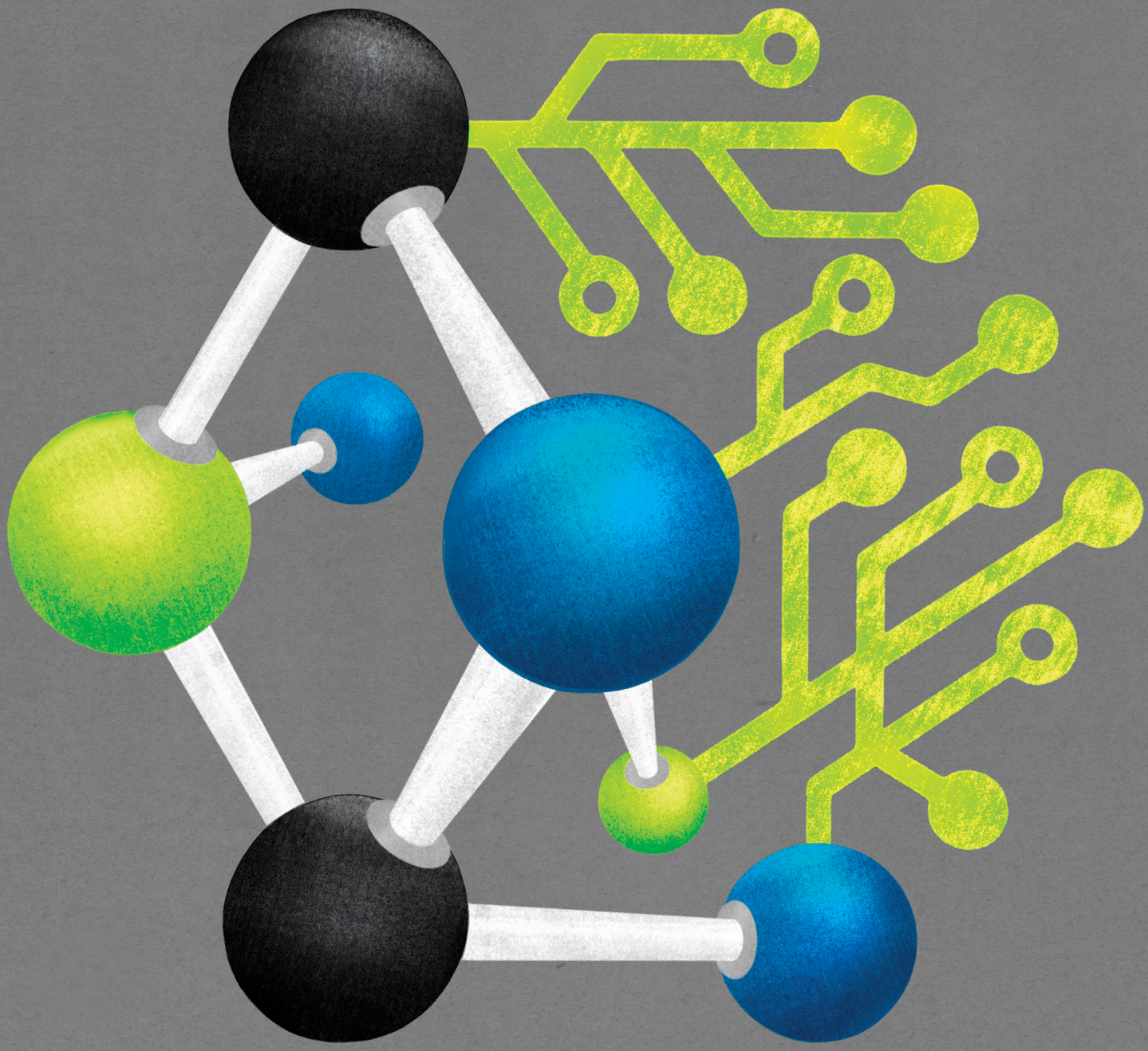
Deloitte.
Insights



Winning in evolving times

Strategic imperatives for chemicals companies

Deloitte's operations transformation (OT) service offerings transforms clients' core business operations. Teams advise, design, implement, and deploy solutions focused on "heart of the business" issues in specific sectors, including Energy, Resources & Industrials. Market offerings include operations excellence and emerging business models. Drawing on deep sector knowledge and experience in technical business operations, OT practitioners approach client priorities from a strategic perspective to help clients prepare for growth, embrace the digital agenda, and maximize operational efficiency. Contact the authors for more information or read more about Deloitte's offerings in the operations transformation space.

Contents

Executive summary | 2

Latest growth story hides impending structural changes | 4

Evolving business models, new prerogatives | 7

Fuels-to-Chemicals (FTC): The potential future driving force behind chemicals production | 9

Digital transformation: Optimizing everything from manufacturing operations to organizational processes | 11

Sustainability and the circular economy: Creating new opportunities for chemicals companies | 14

Gearing up for the long term | 17

Endnotes | 18

Executive summary

FOR THE GLOBAL chemicals industry, 2017 has been one of the best years since 2011. The industry registered impressive revenue growth, aggregate industry margins reached all-time highs, most companies recorded healthy cash reserves, and end-markets recovered with demand outlooks showing positive near-term growth promise. Surely, these are good times for chemicals companies, but questions remain about the continuation of this growth momentum in the mid to long term. Three key long-term developments seem to be knocking on chemicals companies' doors, which could reveal new opportunities if companies respond in a prompt and strategic manner.

The first of these, Fuels-to-Chemicals (FTC) technologies (directly converting crude oil/natural gas to chemicals), hold immense potential to disrupt the future of chemicals manufacturing because of their huge chemicals yields. Anticipating this situation, companies belonging to different categories (see sidebar, "Classifying chemicals companies") should respond differently. Natural Owners should not only further integrate their petrochemicals assets with refineries (to realize higher synergies) but also tie up with process technology companies, and foray into "Differentiated Commodities" space. And while some Differentiated Commodities companies could explore backward integration through the FTC route, others should adopt a service-oriented "solutions" approach to satisfy evolving customer needs. Solution Providers can follow the same strategy as Differentiated Commodities, with a renewed focus on altering their solutions packaging and pricing strategies.

The second key long-term development, **digital transformation**, has the potential to metamorphose many aspects of the global chemicals enterprise. While highly diversified companies are already leveraging digital technologies across many functions, the need is to strike a balance between overenthused investments in digital versus viewing digital initiatives as a low-key affair. Companies can perhaps best leverage the power of digital transformation by adopting appropriate digital operating models, recruiting and developing digital talent, investing in advanced and compatible digital technologies, enabling a "digitally mature" culture with support from senior leadership, and watching out for digital disruptions in end-markets. Successful use of digital technologies can also enable companies to leapfrog between categories. Though the category to which the company belongs may decide the scope and scale of digital transformation, chemicals enterprises should always strive to envision novel uses of digital.

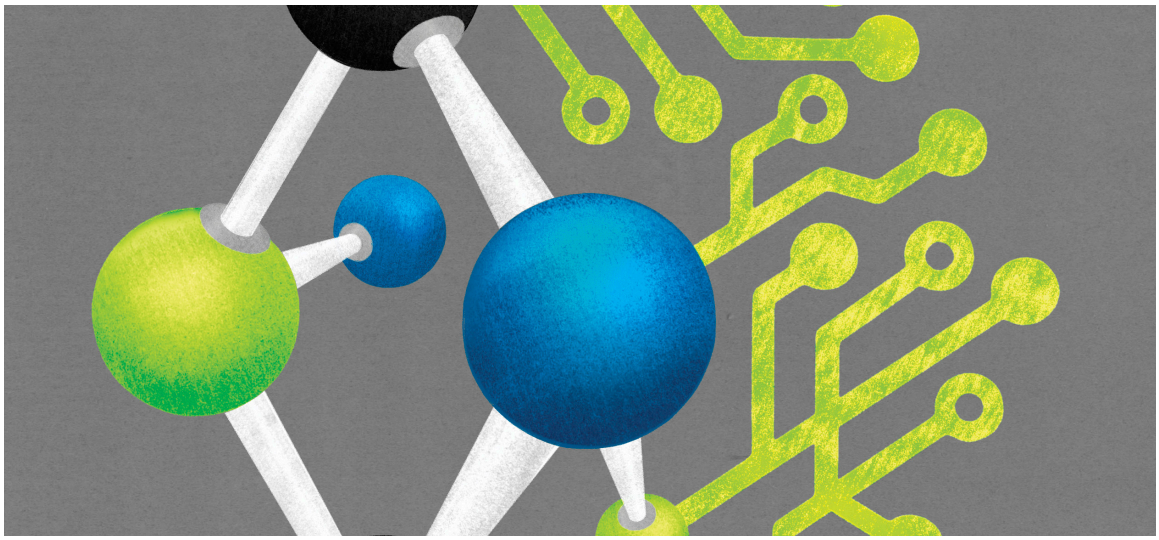
CLASSIFYING CHEMICALS COMPANIES

To better qualify the strategic responses to these long-term developments, Deloitte looked at global chemicals companies through a different lens in our previously published paper, *The chemical multiverse 4.0.* This approach divides chemicals companies into three categories: Natural Owners, Differentiated Commodities, and Solution Providers. Each of these categories typically has a different strategic imperative. For instance, Natural Owners—large-scale and vertically integrated—tend to focus more on continuous improvement and operational excellence. Solution Providers generally focus on realizing the power of differentiation that comes from bundling their products with services. Differentiated Commodities often focus on supply chain efficiency, innovation, and cost optimization to thrive in a highly fragmented category.

The third key long-term development concerns **sustainability and the circular economy**. Chemicals companies can be part of the solution here by not only helping to solve sustainability challenges faced by end-use industries but also by capturing new opportunities. Apart from investing in new technologies and developing new materials, chemicals companies should work with suppliers, regulators, and customers to enable solutions for solving "ecosystem-wide" issues related to energy and material efficiencies and develop newer ways of doing business—for instance, exploring new service-heavy business models such as chemical leasing, owning the entire circular economy loop, redesigning products and processes with customers, and establishing dedicated supply chains for advanced materials. Barriers to solving sustainability challenges can be overcome by choosing a starting point that is not beset with inertia. For instance, Natural Owners will likely find it easier to integrate technologies enabling energy capture, storage, and use in their daily operations. Differentiated Commodities might invest in recycling technology and infrastructure to own the entire circular economy loop. Solution Providers can provide packaged solutions to sustainability issues without even owning the required product, technology, or service.

It remains to be seen how these three key long-term developments impact the global chemicals industry and the three categories. We hope that through this article, we not only cover the potential impact but also the plausible strategic responses to these long-term developments, which will likely change the entire global chemicals industry landscape by 2030.

Latest growth story hides impending structural changes



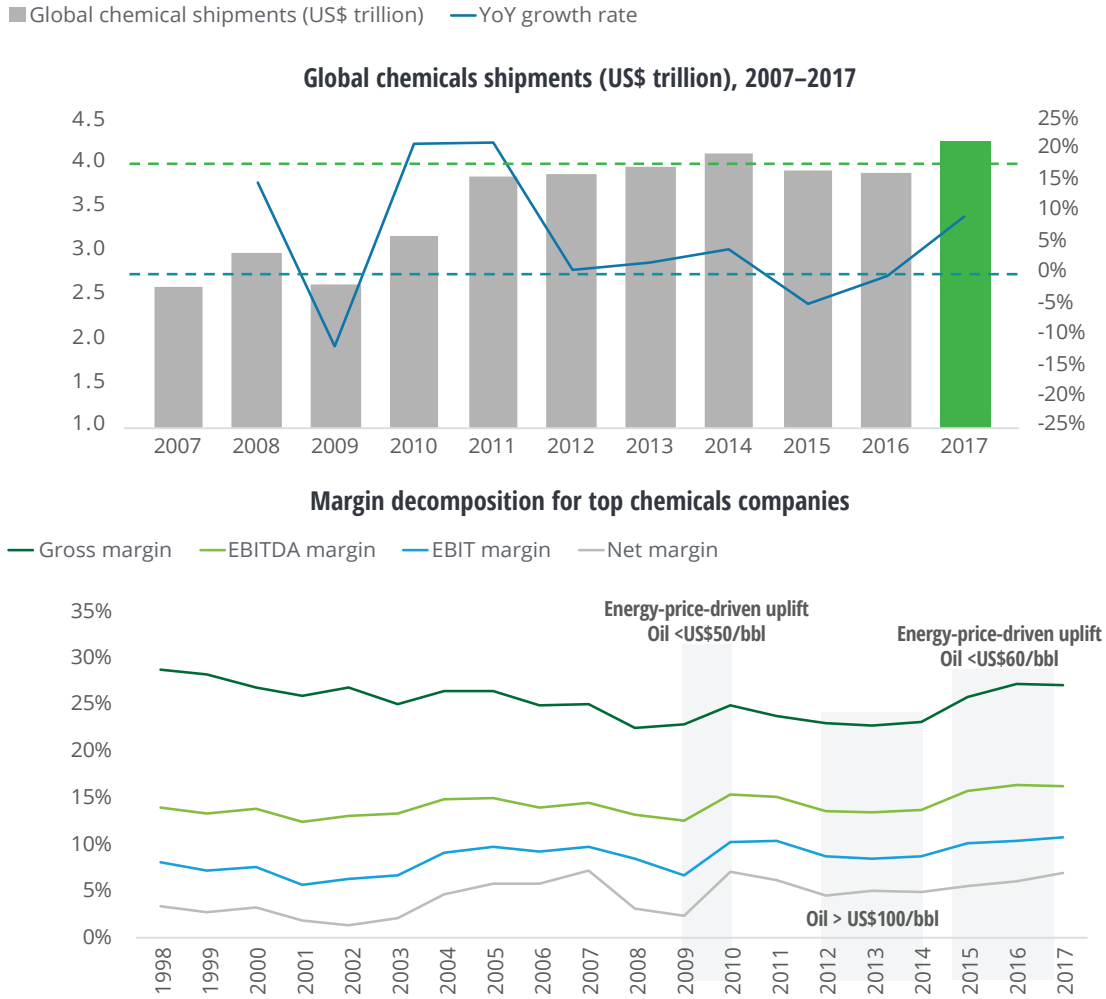
GROWTH IN GLOBAL GDP is on a positive track, manufacturing production has gained momentum, and global chemicals trade has picked up.[1] The global chemicals industry crossed the US$4 trillion mark in shipments in 2017, with margins stabilizing and revenue growth for top chemical companies picking up steam (see figure 1). There is undeniable evidence of near-term growth momentum, and many chemicals executives are also upbeat about the industry's future.[2] But will this momentum continue in the mid to long term?

The current trends point toward a global chemicals industry that will continue to outgrow GDP growth, driven by middle-class growth in emerging economies and substitution of traditional materials. But a few developments are rendering the long-term growth outlook for the global chemicals industry uncertain. Traditional approaches, though important and still the core of business strategy, may be less effective. The next phase of growth is expected to come from proactively strategizing in response to these long-term developments.

It also should be kept in consideration that the chemicals industry remains cyclical—the strong margin (and revenue) growth reflects a robust demand recovery in end-markets. Strategizing in response to key long-term developments could involve an unflinching focus on maintaining these strong margins, regardless of the nature of the business cycle. Though these margins will differ by the level of exposure to maturing end-markets, chemicals companies cannot thrive without affecting major portfolio shifts, either through acquisitions or divestitures.

FIGURE 1

2017 has been a positive year for the chemicals industry, both in terms of global shipments and margins



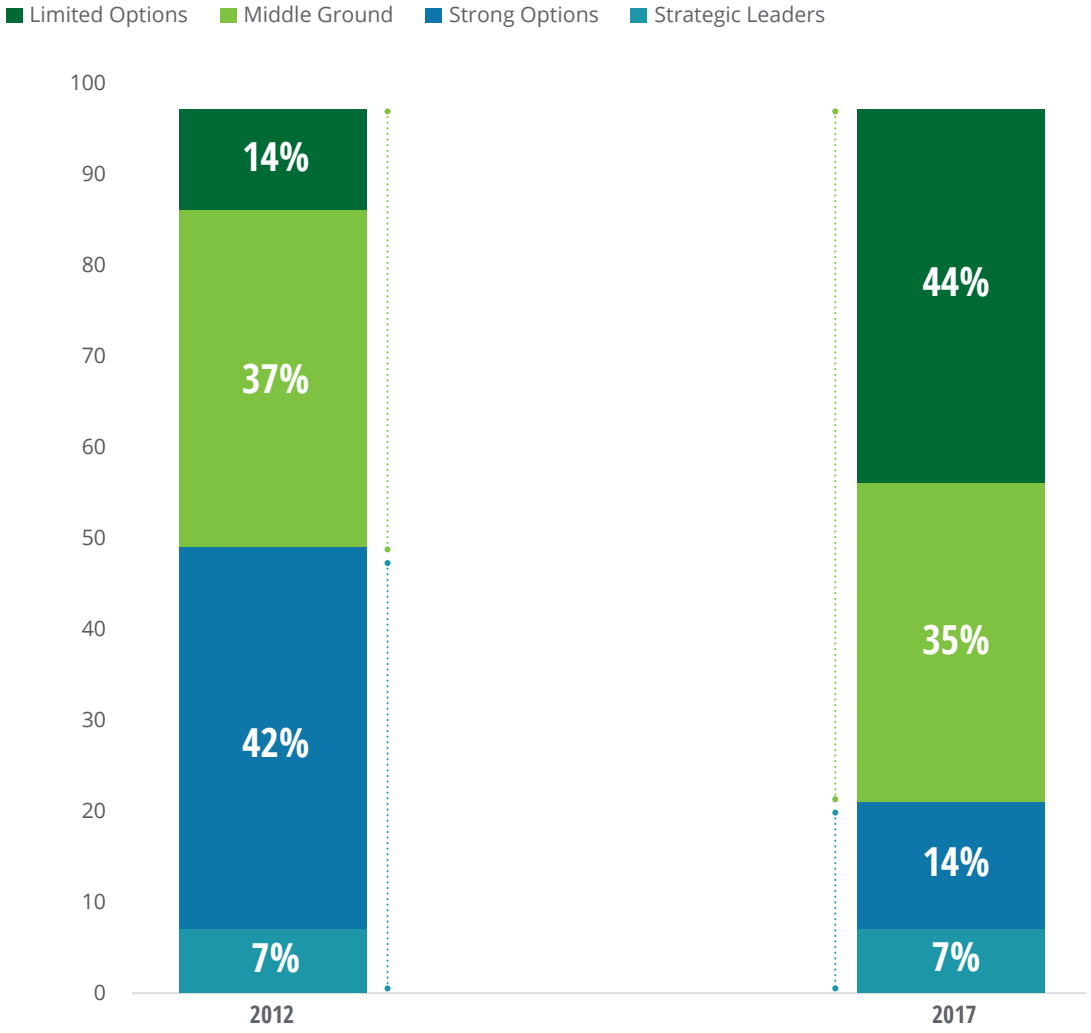
Note: Global chemicals shipments = Domestic sales + exports – imports. Chemicals does not include pharmaceuticals.
Source: American Chemistry Council; Deloitte analysis based on S&P Capital IQ financial data for 344 publicly traded chemicals companies with revenues more than US$500 million.

WHAT THE "MULTIVERSE" APPROACH REVEALS ABOUT THE CURRENT STATE OF THE CHEMICALS INDUSTRY

In our previously published paper, *The chemical multiverse 4.0*, we introduced a segmentation approach to clarify the current standing of global chemicals companies. Simply put, chemicals companies were measured on two dimensions: the financial resources at their disposal and their ability to generate returns using those financial resources. This gave rise to four distinct strategic groups that we called: Strategic Leaders, Strong Options, Middle Ground, and Limited Options. Each group has its own unique characteristics but overall, while the former two are financially strong and have a large scale and scope, the latter two have fewer financial resources and suffer from relatively lower business performance.

FIGURE 2

The chemicals multiverse changed significantly from 2012 to 2017



Note: For 2012, a total of 251 global chemicals companies were considered while for 2017, 344 chemicals companies were considered. Percentages indicate the percentage of chemicals companies in each category.
Source: Deloitte analysis based on financial data extracted from S&P Capital IQ.

Though the percentage split of these four strategic groups (in terms of number of chemicals companies belonging to each category) have changed significantly in 2017 (see figure 2), the overall financial performance of each of these categories have gone up. For instance, though the number of Strategic Leaders and Strong Options companies combined comprised 49 percent of all companies in 2012, and this percentage dropped to 21 percent in 2017; these sets of companies have performed better (in 2017 vs. 2012) when it comes to "Financial resources availability" and "Financial returns." Another key trend to notice is that the greatest gains in financial resources and returns have happened to Middle Ground and Limited Options companies, rather than to Strategic Leaders and Strong Options. This indicates that while the strong are not necessarily getting stronger, the weak are beginning to inherit the chemicals industry. In other words, the relative difference in performance is shrinking between categories.

Evolving business models, new prerogatives

MANY FACTORS ARE leading most chemicals companies to return to the "core" of their businesses, at least in the short to midterm.[3] They are beginning to have dedicated, focused product lines, services, and segments without spreading themselves too thin, likely due to several reasons: **shareholder activism**, which has forced companies to refocus on their key assets and businesses;[4] **governments' anti-monopoly stand**, which is forcing them to divest their assets and operations across regions, postmerger;[5] **cost rationalization**, especially for commodity and diversified chemicals companies; and **maturing returns on sales**.[6]

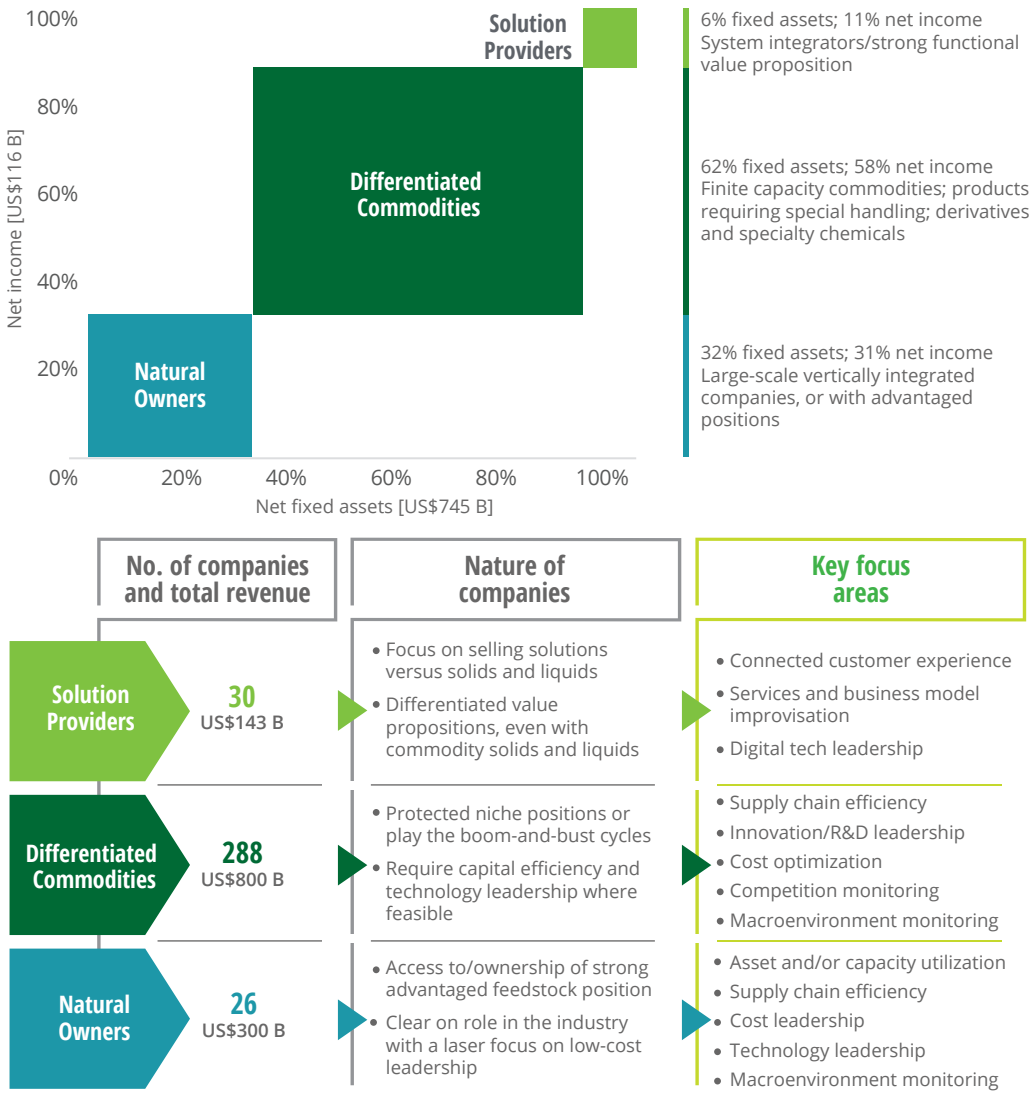
Accordingly, all global chemicals companies can be viewed through the lens of evolving business models and can be segmented into Natural Owners, Differentiated Commodities, and Solution Providers (see figure 3).

With creating added customer value as the new mantra, these three categories generally signify three different strategic directions. For instance, Natural Owners, which are mostly state-owned, large-scale, and vertically integrated enterprises, often focus on operational excellence and continuous improvement, and sometimes also explore offering their core products to different customer segments. Solution Providers, on the other hand, typically realize the power of exceptional differentiation, which comes from combining tangible products with intangible services into inimitable solutions. Differentiated Commodities tend to follow a strategy that lies somewhere between that of Natural Owners and Solution Providers.

While no chemicals company would be exclusively focused on a single strategic trajectory, there is an overarching approach that determines the strategic path of that company. Based on that overarching approach, we have tried categorizing chemicals companies into these three categories (see figure 3). In the rest of the article, we will discuss strategic imperatives of these three categories in response to three key long-term developments.

FIGURE 3

Three fundamental business models are emerging in the global chemicals industry



Source: Deloitte analysis based on financial data of the top 344 publicly traded chemical companies pulled from S&P Capital IQ.

Fuels-to-Chemicals (FTC): The potential future driving force behind chemicals production

Many advanced manufacturing technologies are gradually changing the scale and scope of chemicals production and operations. The most important of these is the Fuels-to-Chemicals (FTC) technology, which encompasses technologies like Crude-Oil-to-Chemicals (COTC) and Oxidative Coupling of Methane (OCM) under its umbrella. These technologies enable the direct conversion of crude oil or natural gas to chemicals, skipping the usual steps in refining or gas processing—resulting in huge chemicals yields. For instance, the COTC technology will likely result in 40–80 percent of chemicals yield per barrel of oil—and huge capacities for some basic chemicals.[7] Currently, COTC complexes are mostly emerging in China and the Middle East (see figure 4).

FIGURE 4

COTC projects announced during 2015–2018 are mostly based in China or the Middle East

Project	Region	Refinery capacity (Mta)	Paraxylene capacity (Mta)	Olefin capacity (Mta)	Investment (US$B)	Expected start
Hengli	China	20	4.3	1.5	11.4	Nov 2018
Zhejiang PetroChem	China	40	10.4	2.8	26.6	1st phase: Dec 2018; 2nd phase: 2026
Shenghong Refinery and Integrated Petrochem	China	16	2.8	1.1	11.0	2019
Hengyi (Brunei) PMB Refinery-Petrochem	South East Asia	8	1.5	0.5	3.45	Q2 2019
Saudi Aramco-SABIC JV	Middle East	20	--	9 (total chemicals)	20.0	2025

Source: IHS Markit.

Motivation to build such complexes likely stems from the fact that future annual average growth in petrochemicals is expected to be around 4 percent, while that for transportation fuels may be lower, at around 1 percent.[8] Due to this, many companies having the financial muscle, including major integrated oil-and-gas companies, may likely pursue the FTC route to chemicals production.

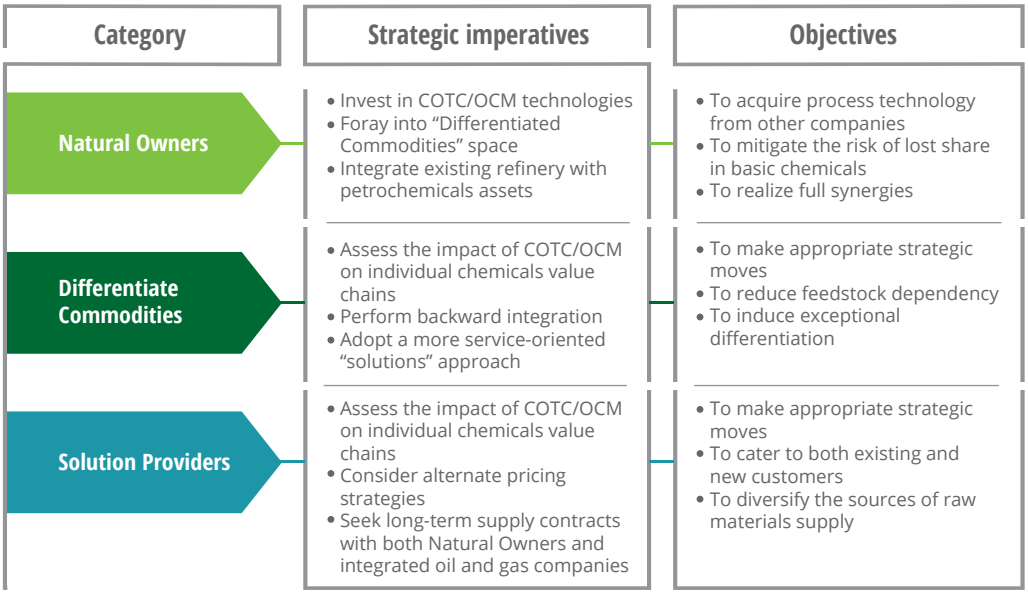
Apart from FTC technologies, there are others, such as Coal-to-Olefins (CTO), Methanol-to-Olefins (MTO), and Propane Dehydrogenation (PDH), which are already implemented at commercial scale and seem to be redefining regional dynamics when it comes to chemicals production and trade. However, even with a few companies adopting the FTC route to chemicals production, technologies such as CTO, MTO, and PDH might get pushed to the sidelines.

The effect of FTC on petrochemicals capacity growth and utilization will most likely be felt post 2025. Until 2025, despite several capacity-addition announcements by prominent players through the traditional routes, there will likely be capacity build-up delays.[9] Also, there is an increasing trend of refinery–petrochemicals integration, especially in Asia.[10] Though the traditional route of refinery–petrochemicals integration might directly compete with FTC complexes, both will likely thrive depending on regional feedstock availability, process economics, end-market demand dynamics, and ownership structures.

In view of these potential developments, companies should consider certain strategic imperatives, outlined in figure 5. Right now, FTC is mostly pursued to reduce the import dependency of heavier basic chemicals—as is happening in China to reduce dependency on imported aromatics such as paraxylene. By 2030, we may likely see more FTC complexes geared toward producing light olefins such as ethylene and propylene. Again, this would depend on regional feedstock positions and capital-efficiency paradigms. Also, by 2030, integrated oil and gas companies could demonstrate more market power than before since they already have a secure position in crude oil and natural gas—the key raw materials for FTC technologies.

FIGURE 5

Chemicals companies need to adopt certain strategies to make the most of advanced manufacturing technologies



Source: Deloitte analysis.

Digital transformation: Optimizing everything from manufacturing operations to organizational processes

DIGITAL TECHNOLOGIES ARE currently used to optimize manufacturing operations, supply chain and logistics, R&D, sales and marketing, HR processes, etc. in many chemicals companies (see figure 6). Anecdotal evidence suggests that the potential of using digital to achieve the next frontier of efficiency is endless—theoretically. However, many companies have suffered from the digital "curse" since they moved too quickly with their digital efforts. These companies went on a spending spree only to see either meager returns on their digital investments or returns which didn't come through quickly enough.[11] The result was eventual scale-back of digital initiatives and downsizing of proposed digital investments.

On the other hand, some chemicals companies have shied away from investing heavily in their digital efforts—they can be termed as "too cautious." Most cite several barriers, including a lack of a convincing business case for digital and half-hearted support from senior executives,[12] for their lackluster investments in digital initiatives.

So, how should chemicals companies go about leveraging the power of digital without teetering between these two extremes?

- **Accommodate digital initiatives by adopting appropriate operating models:** Digital will likely offer different opportunities and benefits to different chemicals segments. For example, a specialty chemicals company could benefit more if it utilizes digital to formulate new products and/or reduce time-to-market, rather than investing in digital to gain higher asset utilization rates. To maximize the chances of success, chemicals companies should adopt a digital operating model that is best suited to their digital maturity and market readiness.
- **Recruit and develop digital talent:** The future of workforce in chemicals is expected to increasingly be determined using digital technologies within organizations. Digital can act not only as an enabler for attracting a more agile workforce, but also cause chemicals enterprises to hire, develop, and retain highly skilled talent.
- **Invest in advanced digital technologies:** These technologies should integrate well and enhance the functionalities of current systems. Chemicals companies should move away from monolithic enterprise resource planning (ERP) structures to more integrated platforms that enable real-time visibility, higher computing power, cloud-based architectures, and advanced analytics capabilities including artificial intelligence and machine learning.
- **Enable a "digitally mature" culture with support from senior leadership:** Primary evidence suggests that digitally maturing organizations have cultures that actively encourage employees to take calculated risks, be agile, and collaborate better.[13] Senior leadership in chemicals organizations can proactively

FIGURE 6

Digital transformation use cases in chemicals companies

Application	Company	Description	Results
Making manufacturing safer and more efficient	A diversified global chemicals conglomerate	• Fed live data collected through sensors into a special analysis software, which also takes historical operations data into consideration	• Prediction of maintenance downtime • Optimized coordination between maintenance and production processes
Forecasting supply chain needs	A diversified global chemicals manufacturer	• Launched the Executive Sales & Operations Planning (ES&OP) tool, which forecasted the need for transportation services months in advance • Used the digital tool to give carriers and third-party logistics providers monthly forecasts of logistics requirements	• Substantial cost savings and optimized fleet management through reduced need for dedicated transportation equipment
Innovating and formulating new products	A global consumer packaged goods company	• Pioneered the use of high-performance computing (HPC) to simulate and model product performance • Used HPC to modify formulations of its products down to the molecular level	• Reduction of steps involved in product design • Minimization of market risks associated with an otherwise failed product
Creating new solutions for customers	An agrochemicals company	• Employed a big data app that monitors real-time conditions and harnesses predictive analytics to help farmers make smart choices about several important factors that can optimize their crop yield	• Overwhelming success, with 92 million acres (more than a third of US farmland) currently cultivated using the company's guidance

Source: Deloitte analysis based on *Chemical Week Magazine*, "Digital transformation: Bringing chemicals into the internet era," October 2016; Supply Chain Brain, "Something old, something new: Dow applies S&OP to logistics planning," December 2012; Stephen J. Ezell and Robert D. Atkinson, *The vital importance of high performance computing to US competitiveness*, ITIF, April 2016; Karl Plume, "Monsanto's Climate Corp to expand digital farming platform," Reuters, August 2016.

espouse such a culture. Evidence also points to the fact that future digital initiatives will increasingly be driven by the C-suite, instead of an IT or digital function.[14]

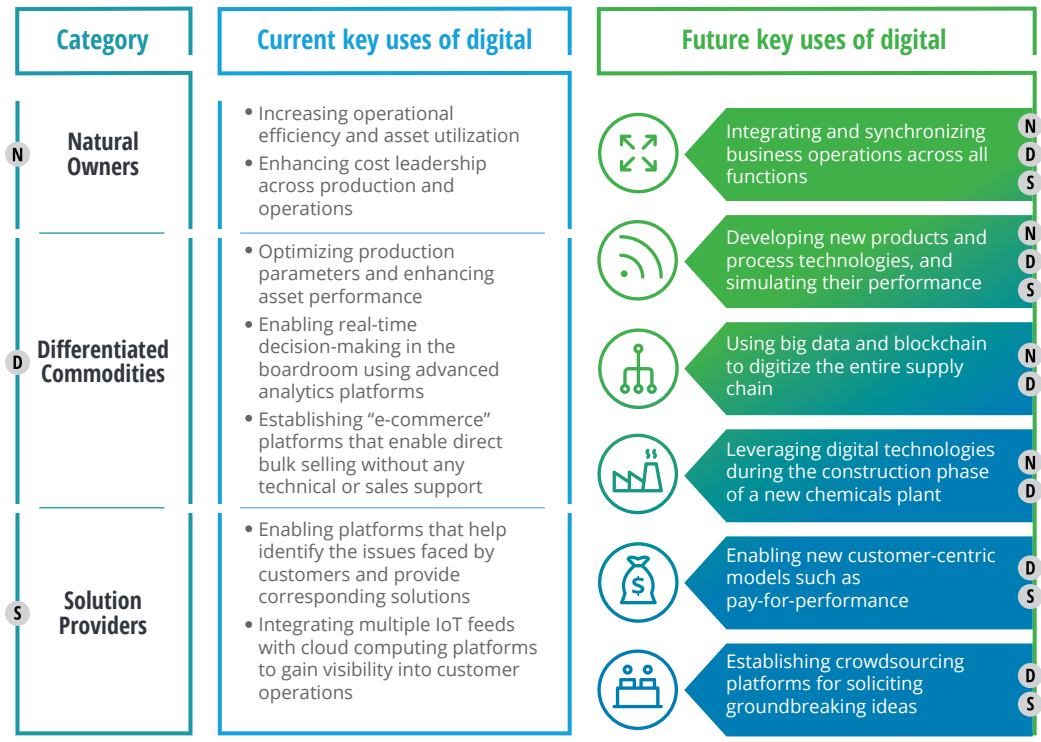
- **Watch out for digital disruptions and leverage digital in newer ways:** Chemicals companies should not only look at new areas in which digital can add the most value (e.g., customer engagement), but also how they can further strengthen their core businesses using digital (e.g., asset utilization). They also should pay attention to digital disruptions happening in their end-markets and how those can impact their businesses.

Certain segments that are closer to the end-consumer might be more exposed to digital disruptions than others. And accordingly, these segments should take a more proactive approach to digital transformation—with the inadvertent focus on meeting or exceeding their customer expectations. For example, a paints and coatings company (i.e., a Differentiated Commodities company) could provide paint services to its end-consumers through an immersive in-store experience that leverages the power of augmented reality (AR). A water-treatment company (i.e., a Solution Provider) could monitor the water quality for its industrial customers using its own customized Internet of Things (IoT) systems, and accordingly provide highly customized solutions based on a "performance pay" model. Similarly, the use of blockchain to manage transactions across suppliers, JV partners, subsidiary companies, and vendors can enable a Natural Owner to reduce fraud and error across the supply chain and save costs for all its stakeholders. An agrochemicals company could bundle its crop protection products with a platform (an app or website) that would convey vital information (related to weather forecasts, crop yields, seeds and fertilizers, etc.), and sell it to farmers (see figure 7).

It can be gleaned that digital technologies can help chemicals companies leapfrog categories. For instance, the paints and coatings company from our previous example would clearly leverage the power of AR to transform itself from being a Differentiated Commodities company to a Solution Provider. Also, digital helps them in not only transforming their business models but also in gaining real-time insights on the progress of such transformation efforts.

FIGURE 7

How can chemicals companies leverage the power of digital technologies?



Source: Deloitte analysis.

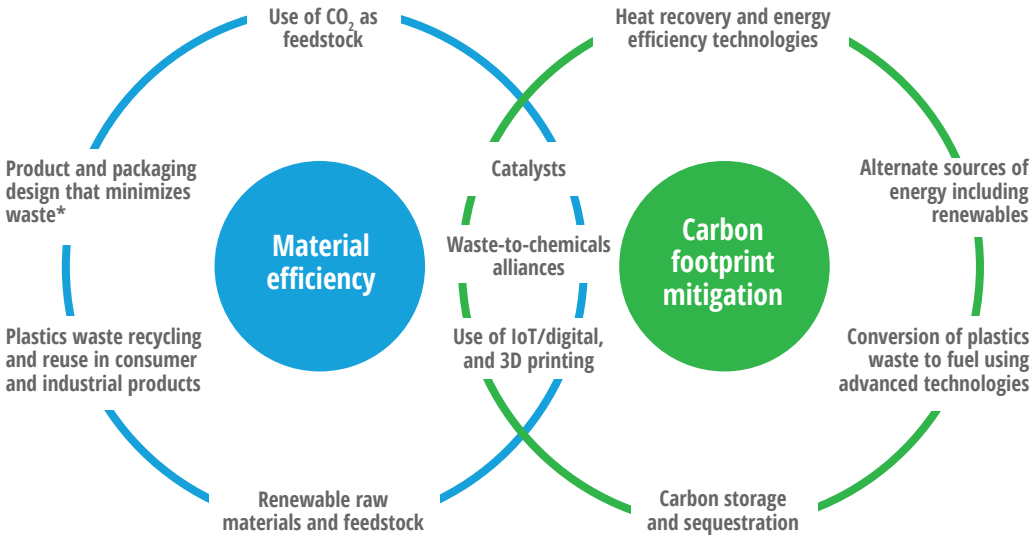
Sustainability and the circular economy: Creating new opportunities for chemicals companies

IDEAL SUSTAINABLE PRACTICES enable nearly closed-loop systems with minimum waste, highly efficient energy flows, and constant material recycling and reuse. If successfully replicated in large-scale settings, it translates to a circular economy where almost everything gets used and nothing goes to waste (see figure 8). A futuristic vision of a true circular economy typically involves a minimized role of fossil-fuel-based materials, higher contribution of nontoxic bio-based materials and renewable energy, elimination of recycling and waste disposal, and service-heavy business models.[15] Realizing this vision of a circular economy can lead to billions in economic benefits ranging from substantial net material savings to higher innovation and job growth.[16]

Many end-use industries are aspiring to reach the state of the circular economy, but results remain

FIGURE 8

A circular economy is one where everything is utilized and nothing goes to waste



* Minimum waste needs to be considered throughout the full life cycle. Advantages of an increased product lifespan or the possibility of recycling are factors to consider as well.

Source: Deloitte analysis based on Raffaele Cucciniello and Daniele Cespi, *Recycling within the chemical industry: The circular economy era*, MDPI, May 2018; The National Academies Press, *Sustainability in the chemical industry: Grand challenges and research needs*, 2006; Cefic, *Teaming up for a sustainable Europe*, 2014; IEA, *The future of petrochemicals*, 2018.

unclear due to varied challenges.[17] Evolving regulations and consumer activism are causing many end-use industries—and even some governments—to look for alternative solutions to these challenges.[18] For example, the Chinese government's plastics waste imports ban (which took effect 2017) is already compelling developed economies (Europe and the United States) to increase recycling rates, set up better plastics waste collection mechanisms, and institute other policies to counter the plastics waste challenge.[19]

Chemicals companies can be part of the solution here—for not only solving sustainability challenges faced by end-industries but also in capturing new opportunities. For example, government targets to reduce CO_2 emissions and increase the fuel economy of vehicles have led to higher incorporation of lightweight chemicals and materials in new vehicles. In the construction sector, as companies strive to make buildings "smarter," they also are trying to incorporate greener construction materials.[20] In the packaging sector, the focus is on making packaging materials biodegradable and reusable.[21] In the power & utilities sector, growth of renewable energy resources such as solar and wind is leading to greater production of solar-cell materials and higher use of composites in wind turbine blades. Thus, the role of chemicals and materials is

FUTURE OF MOBILITY: A KEY ELEMENT OF SUSTAINABILITY IN CHEMICALS

Based on the substantial evidence that the changes associated with the future of mobility will continue to accelerate, it is unlikely to relent and settle into something incremental or linear. Converging trends such as social change, connectivity, smart materials, and digital technologies are fundamentally reshaping the way people and goods flow—a transformation of greater magnitude than the world has experienced in a century. And for chemicals and materials companies, it could dramatically alter their relationship with the broader transportation industry. Each of the key dimensions of the future of mobility—shared transportation, self-driving cars, and electric vehicles—could significantly affect chemicals and materials companies' business. These shifts also can be considered in the context of sustainability. Deloitte's analysis (Scott Corwin, et al., *Forces of change: The future of mobility*) points to a likely increase in total miles driven via broad use of more convenient and cost-effective ridesharing services with a concurrent decrease in vehicle builds as individual vehicle utilization increases significantly. Incentives will align around a lightweight, highly energy-efficient fleet of shared vehicles. Polymer and composite solutions will continue to lead strategies for durable yet lightweight engineering materials.

Among the most sustainable forms of transportation is an electric vehicle (EV) tied to a renewable-energy-based grid. Both technologies require, and will be advanced by, products of the chemicals and specialty materials sectors. Examples include advanced battery materials, high-voltage-resistant engineering thermoplastic connectors, advanced composite bus bodies, specialty coatings for wind turbine blades, and fire-resistant fibers to protect EV passengers from (albeit rare) battery-pack failures. Of course, sustainability approaches such as total lifecycle analysis of materials require full consideration of raw material and energy inputs in the production and disposal of materials. As participants in a process industry, chemicals and materials companies have long invested in technology research with the goal of reducing total material and energy conversion costs. These same skills and investments can be applied to improving the sustainability of materials and processes.

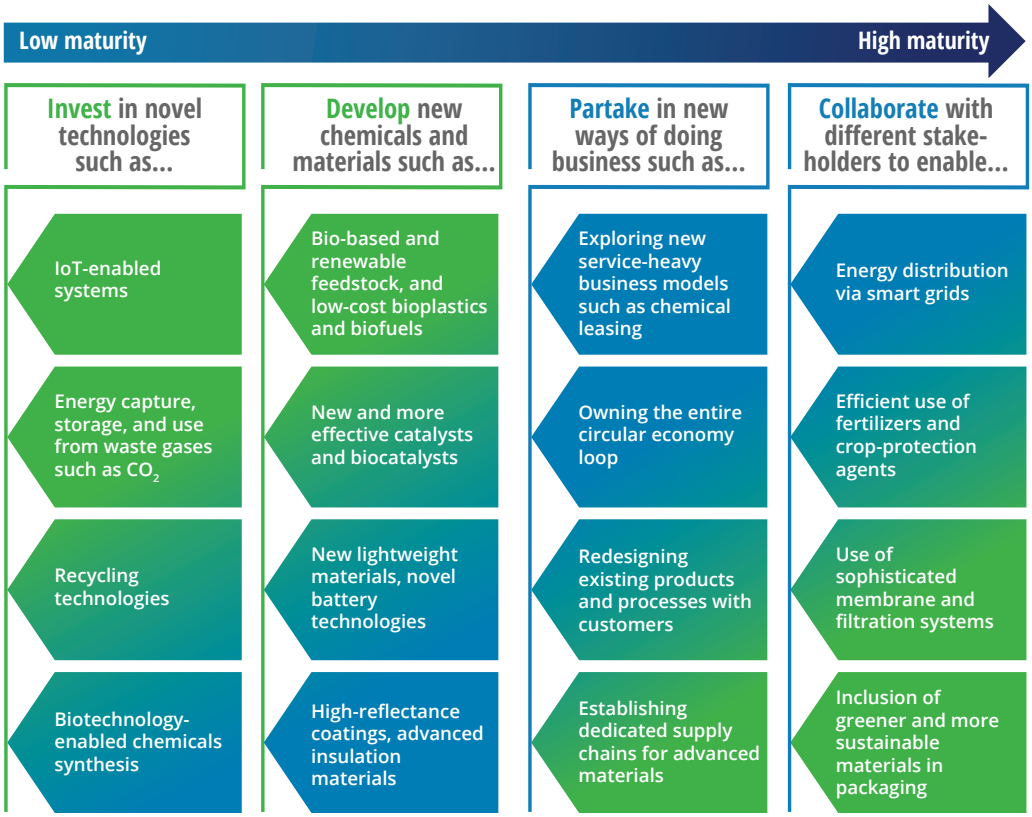
All three shifts in the future of mobility (shared usage, autonomy, and electrification) have the potential to increase the sustainability of transportation. Fully harnessing these benefits will require a coordinated approach that will wed the most efficient production processes with use of materials in energy- and resource-saving mobility applications.

extending well beyond their current functionalities. And though there is long-term demand uncertainty in key end-markets, sustainability presents a huge opportunity for chemicals companies to meet new sources of demand growth (see figure 9).

It is highly likely that by 2030, stricter health, safety, and environmental standards will lead companies across end-use industries to innovate and implement new products, processes, and technologies. In some cases, more creative approaches may be required to empower sustainability-related growth drivers, such as inclusion of more women directors on company boards that can lead to better performance on environmental, social, and governance metrics.[22] A collaboration or "consortium" approach—with chemicals companies at the center—is also recommended. However, the level of interest to capture the opportunities unveiled by sustainability could differ by category. For instance, Natural Owners with high exposure to commodity chemicals will likely have lower motivation to invest in "sustainable" products and services, as their need for differentiation is low. Yet some Natural Owners can realize the "sustainability" opportunities if they have solutions to enduring issues such as the use of microplastics in cosmetics and multilayer packaging films. However, it is more likely that some Differentiated Commodities companies and almost all Solution Providers could be best placed—and have lower inertia—to take advantage of the opportunities unveiled by sustainability.

FIGURE 9

The focus on sustainability offers a range of opportunities for chemicals companies



Source: Cefic; IEA; and Deloitte.

Gearing up for the long term

A QUICK ASSESSMENT OF top companies in each of the categories in terms of their exposure to the three long-term developments and relative preparedness seems to reveal a few distinct trends (figure 10). First, Natural Owners appear most exposed to the impact of Fuels-to-Chemicals technology and the least prepared to take advantage of opportunities unveiled by sustainability. Second, Differentiated Commodities are expected to be most affected by sustainability as the clamor for more innovative solutions to sustainability challenges grows louder; they remain moderately prepared for all three key long-term developments. Third, Solution Providers will likely be most affected by the next wave of digital transformation since they remain closest to their customers.

It is obvious that the strategic responses to the three long-term developments highlighted in this paper will vary by the company category. Depending on the benefits of these developments perceived by chemicals companies in these categories, specific company responses will also differ. In Deloitte's *2018 oil, gas, and chemicals industry survey*, chemicals executives listed innovation, sustainability, and advanced technologies as their top strategic priorities.[23] This is good news, as these strategic priorities correspond to the three key long-term developments discussed here. But just having the clarity of strategic purpose is likely not enough. Chemicals companies should position themselves well enough to seize the new opportunities arising from these long-term developments. This positioning could require renewed focus on optimizing their products and services portfolio through continued acquisitions or divestitures. Moreover, this positioning should be done in the spirit of making themselves robust enough to successfully navigate the economic down-cycle and maximize profit-making opportunities during the up-cycle.

FIGURE 10

How well-prepared are chemicals companies to face the potential impact of long-term developments?

■ Very high ■ High ■ Moderate ■ Low

Long-term developments	Potential impact (by 2030) and level of preparedness					
	Natural Owners		Differentiated Commodities		Solution Providers	
	Potential impact	Level of preparedness	Potential impact	Level of preparedness	Potential impact	Level of preparedness
Fuels-to-Chemicals (FTC)	■	■	■	■	■	■
Digital transformation	■	■	■	■	■	■
Sustainability and the circular economy	■	■	■	■	■	■

Source: Deloitte analysis.

Endnotes

1. Deloitte analysis based on data from International Monetary Fund, Haver Analytics, and American Chemistry Council.
2. Hydrocarbon Processing, "Deloitte survey: Upbeat outlook for oil, gas and chemicals sectors," October 2018.
3. At least in commodity, fertilizer, industrial gas, and inorganics segments, where the top 10 players have increasingly consolidated their market positions in 2017 vs. 2010, according to Deloitte's analysis of financial data from S&P Capital IQ.
4. Mark Eramo, ""Activist investors" amid an active M&A market: Short term gains versus long term strategy," IHS Markit, November 2017.
5. Michael McCoy, "Antitrust regulators increasingly probe chemical deals," C&EN, July 2018.
6. Deloitte analysis.
7. Clare Goldsberry, "Crude oil-to-chemicals technology could be game changer for chemicals industry," *PlasticsToday*, June 2018.
8. Ibid.
9. These delays could happen due to a variety of reasons, including pipeline constraints from oil and gas fields (notably, Permian in the United States), construction delays of downstream plants (e.g., polyethylene plants), labor and material shortages, poor project management, and natural disasters (e.g., hurricanes).
10. Nexant and GPCA, *Advancing refining petrochemicals integration in the Arabian Gulf*, 2017.
11. Thomas H. Davenport and George Westerman, "Why so many high-profile digital transformations fail," *Harvard Business Review*, March 2018.
12. Yann Cohen, Rene Waslo, and Duane Dickson, *Digital transformation: Are chemical enterprises ready?*, Deloitte, January 2017.
13. Gerald C. Kane et al., *Aligning the organization for its digital future, MIT Sloan Management Review* and Deloitte Global, August 2016.
14. Cohen et al., *Digital transformation*.
15. World Economic Forum, *From linear to circular—accelerating a proven concep*t, January 2014.
16. World Economic Forum, *An economic opportunity worth billions—charting the new territory*, January 2014.
17. The National Academies Press, *Sustainability in the chemical industry*; Deloitte and Utrecht University, *Breaking the barriers to the circular economy: According to businesses and policy makers*, October 2017.
18. European Commission, "Circular economy: Implementation of the circular economy action plan," July 2018.
19. Shoshana Wodinsky, "China's plastic waste ban will leave 111 million tons of trash with nowhere to go," The Verge, June 2018.
20. Katie Pyzyk, "5 of the world's most eco-friendly building materials," Smart Cities Drive, July 2018.
21. Refers to both bioplastics and petrochemicals-based biodegradable plastics.
22. ISS Corporate Solutions, *Across the board improvements: Gender diversity and ESG performance*, September 2018.
23. Deloitte, *2018 oil, gas, and chemicals industry executive survey*, October 2018.

About the authors

DUANE DICKSON is a vice chairman and principal in Deloitte Consulting LLP's Energy Resources & Industrials industry group, as well as the US Oil, Gas & Chemicals sector leader and the Global Oil, Gas & Chemicals Consulting leader. Dickson has more than 38 years of business and consulting experience in senior leadership positions in major industrial and health care product companies.

AIJAZ HUSSAIN is a senior manager and subject matter expert with US Insights, Deloitte Services LP, and leads the aerospace & defense and chemicals and specialty materials sector research for the US firm. Hussain has more than 16 years of experience in research, thoughtware development, market/competitive intelligence, business strategy, and financial analysis.

ROBERT J. KUMPF is a specialist executive with Deloitte Consulting LLP, serving clients in the chemicals and specialty materials sector, with a focus on strategy, innovation, and leading company transformations. He has 27 years of chemical industry experience at both large multinationals and startups.

SANDEEPAN MONDAL is an assistant manager with Deloitte Services LLP with more than 8 years of experience in thoughtware development and industry and market research across manufacturing, automotive, and chemicals industries.

Acknowledgments

The authors would like to thank **Wolfgang Falter** and **Larissa Skwirblies** of Deloitte Germany, **Krishna Venkatesh Raghavan** of Deloitte Consulting India Private Limited, and **Andrew Slaughter** and **Derek Pankratz** of Deloitte Services LP for their contributions to this thoughtware.

Contacts

Duane Dickson
US Oil, Gas & Chemicals sector leader
Principal & vice chairman
Deloitte Consulting LLP
+1 203 979 2300
rdickson@deloitte.com

Robert J. Kumpf
Specialist executive
Deloitte Consulting LLP
+1 412 452 8023
rkumpf@deloitte.com

Aijaz Hussain
Subject matter expert, US Insights
Senior manager, Client Experience
Deloitte Services LP
+1 469 380 6100
aihussain@deloitte.com

Deloitte.
Insights

Sign up for Deloitte Insights updates at www.deloitte.com/insights.

Follow @DeloitteInsight

Deloitte Insights contributors

Editorial: Rithu Thomas, Rupesh Bhat, and Preetha Devan

Creative: Emily Moreano, Anoop K R, and Mahima Nair

Promotion: Nikita Garia

Cover artwork: Alex Nabaum

About Deloitte Insights

Deloitte Insights publishes original articles, reports and periodicals that provide insights for businesses, the public sector and NGOs. Our goal is to draw upon research and experience from throughout our professional services organization, and that of coauthors in academia and business, to advance the conversation on a broad spectrum of topics of interest to executives and government leaders.

Deloitte Insights is an imprint of Deloitte Development LLC.

About this publication

This publication contains general information only, and none of Deloitte Touche Tohmatsu Limited, its member firms, or its and their affiliates are, by means of this publication, rendering accounting, business, financial, investment, legal, tax, or other professional advice or services. This publication is not a substitute for such professional advice or services, nor should it be used as a basis for any decision or action that may affect your finances or your business. Before making any decision or taking any action that may affect your finances or your business, you should consult a qualified professional adviser.

None of Deloitte Touche Tohmatsu Limited, its member firms, or its and their respective affiliates shall be responsible for any loss whatsoever sustained by any person who relies on this publication.

About Deloitte

Deloitte refers to one or more of Deloitte Touche Tohmatsu Limited, a UK private company limited by guarantee ("DTTL"), its network of member firms, and their related entities. DTTL and each of its member firms are legally separate and independent entities. DTTL (also referred to as "Deloitte Global") does not provide services to clients. In the United States, Deloitte refers to one or more of the US member firms of DTTL, their related entities that operate using the "Deloitte" name in the United States and their respective affiliates. Certain services may not be available to attest clients under the rules and regulations of public accounting. Please see www.deloitte.com/about to learn more about our global network of member firms.

Copyright © 2018 Deloitte Development LLC. All rights reserved.
Member of Deloitte Touche Tohmatsu Limited