

THINK ACT

BEYOND MAINSTREAM

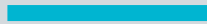
September 2016

Keep the dragon flying

China's reforms over the next five years will create multiple opportunities for chemical companies

THE BIG

3



5-year plan

Beijing has announced its 13th Five-Year Plan, covering the period 2016-2020.

Page 3

6%

is the compound annual growth we forecast for the Chinese chemical market in 2020-2025.

Page 12

EUR 1.3 trillion

is the size of the Chinese chemical market in 2025, representing 33% of the global market.

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China faces a raft of challenges, especially in the chemical industry. Careful implementation of reforms could lead to a "new normal".

China's 13th Five-Year Plan lays out a framework for reform. A key instrument for setting the direction of China's future economic development, the Plan is considered particularly important as 2020 is the deadline for the country achieving its stated goal of becoming a "moderately prosperous society".

China's Five-Year Plans are a reflection of the country's social, economic and political goals. Drafted by the National Development and Reform Commission, their targets are established in consultation with experts from industry, other government ministries and academics. The 13th Five-Year Plan sets out five main principles, backed up by 50 practical strategies, plans and policies embodying these principles.

The five underlying principles set out in the latest Plan are Innovation, Opening Up, Green Development, Coordination, and Sharing. Innovation includes goals such as doubling GDP and per capita income by 2020 (compared to 2010), shifting the country's economic structure to a higher-quality growth pattern, and moving manufacturing up the value chain through the

"Made in China 2025" initiative. Opening Up covers areas such as anti-corruption efforts and more active global governance in financial markets. Green Development foresees a rise in the share of non-fossil fuel to 15 percent, a ban on commercial logging in natural forests, and a reduction in emissions. The principle of Coordination aims to ensure balanced development between rural and urban areas, and also across different industries, and the implementation of a two-child policy. The Sharing principle entails sharing China's prosperity among the population, lifting 70 million people out of poverty, and ensuring universal enrolment in healthcare and pension schemes. → [A](#)

IT'S HARD TO QUIBBLE WITH ANY OF THESE GOALS

The Plan represents China's eminently sensible response to the challenges it currently faces both domestically and globally. China's economic importance is growing, with an increasing share of world GDP. The country has become an important export destination.

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Keep the dragon flying

A

FIVE MAIN PRINCIPLES UNDERPIN CHINA'S 13TH FIVE-YEAR PLAN

Backed up by 50 practical strategies, plans and policies embodying these principles.

1	INNOVATION	▶	Economic growth Economic development Domestic upgrading
2	OPENING UP	▶	Anti-corruption Financial markets
3	GREEN DEVELOPMENT	▶	Green development Environmental policy
4	COORDINATION	▶	Urbanization Demographic development
5	SHARING	▶	Equal prosperity Social welfare Social insurance

Source: Roland Berger

But, at the same time, its relative economic growth rate has slowed from 14 percent in 2007 to 7 percent in 2015 – still an enviable rate but well below previous levels.

In fact, China is facing a whole raft of challenges. Many companies, especially China's state-owned enterprises, display high levels of indebtedness. Labor costs are on the rise, undermining the country's competitiveness compared to other low-cost exporters such as India and parts of Africa.

Many Chinese industries are also plagued by overcapacity. Indeed, this is perhaps the most pressing issue facing the chemical industry, as we will see below. Factors driving overcapacity in key industries include fragmentation, local protectionism, weak enforcement of regulation, a fiscal system that encourages local governments to attract excessive investment, the widespread availability of comparably inexpensive technology, and environmental, health and safety standards that are often ignored. Added to this is a drive for market share rather than profitability. This complex fabric of factors has led to almost 30 percent overcapacity in

steel (China's steel production is more than double the combined production of the next four biggest producers: Japan, India, the United States and Russia), 24 percent overcapacity in aluminum (where 60 percent of production capacity has negative cashflow), and 27 percent overcapacity in cement production (China produced as much cement in 2010-2012 as the United States did during the entire twentieth century).

THE ISSUE OF OVERCAPACITY IS PARTICULARLY RELEVANT IN THE CHEMICAL INDUSTRY

The figures speak for themselves: Chinese production of nylon 6 saw 63 percent utilization in 2015 with a difference of 122 kilotons between capacity and production volume. Caprolactam saw 70 percent utilization with a difference of 109 kilotons between capacity and production volume, and utilization is projected to fall by 13 percentage points between 2015 and 2017. Chlorine saw 0.3 megatons of oversupply in 2015 with a projected oversupply of 1.1 megatons in 2017 – a key growth constraint on the chlor-alkali industry. Phos-

phorus pentoxide saw 70 percent utilization in 2014. We could go on.

The logical consequences of overcapacity are not hard to imagine. Overcapacity leads to oversupply, which leads to low product prices. At the same time, utilization leads to higher conversion costs, because companies are unable to produce efficiently. This results in low margins, putting further pressure on costs and margins.

WHAT DO WE AT ROLAND BERGER FORESEE FOR CHINA'S ECONOMIC DEVELOPMENT?

Given China's current challenges – above all its slowing GDP growth, overcapacity in key industries, stagnant exports, excessive indebtedness, and rising labor costs – we believe that the country's economic development will depend on two key factors. One of these factors is beyond Beijing's control: the development of the global economy. What happens in the global economy will have a direct impact on the level of Chinese exports. The other factor is within Beijing's power: whether and how consistently it implements the reforms and policies implied by the Five-Year Plan.

Based on the current economic situation, we see four future scenarios for how China could develop through 2020. If China is slow to implement its reform program, and global growth is weak, we foresee a "growth slowdown" scenario. This is the worst-case scenario, in which a lack of growth either in exports or private consumption goes hand in hand with potential social unrest triggered by high unemployment and bleak future prospects. The second scenario is where a slow pace of reform, combined with stronger global growth, leads to a "credit-financed stability" scenario. Here, structural problems remain a key risk to stability. The third, best-case scenario is one of far-reaching, dynamic political reforms, combined with rapid global growth. We call this the "new growth" scenario.

The final possibility is the "new normal" scenario, to use the term coined by President Xi Jinping in 2014. This is a positive scenario, in which the reforms of the 13th Five-Year Plan are successfully implemented and reduced exports are offset by higher consumption. Given the probability of growth rates that are still healthy, albeit less strong than in the past, and China's commitment to reform, we believe that the "new normal" scenario is not only possible but is in fact the most likely scenario. However, achieving it will be no walk in the

park: Beijing will face considerable obstacles to implementing all its planned reforms.

WHAT DOES ACHIEVING THE "NEW NORMAL" MEAN FOR CHINA?

Comparing the situation today with the situation envisaged for tomorrow highlights the differences. In terms of growth drivers, today we see exports alongside investment by the Chinese state; in the "new normal", these exports will to some extent be replaced by domestic consumption. Today's focus is on quantity and dynamic growth; tomorrow's focus will be on quality and sustainability. Today's goal is economic progress; tomorrow's goal will be improving the quality of life for Chinese citizens. Today's resource-intensive industries will give way to knowledge-intensive industries. Services will take over from industry as the most important sector. Regulation will increasingly rely on privatizing and regulating rather than owning and controlling. To access the Chinese market, foreign companies will have to ensure a high level of local content rather than setting up joint ventures as in the past.

So much for the broader picture of what the next half-decade holds for China. But this paper also has a narrower focus: the impact of China's reforms over the next five years on the chemical industry. In the following section, we look at how developments in China will affect the different segments of the chemical industry and present our forecast growth rates for relevant sectors.

The reforms China carries out over the space of the next five years will in some cases have a direct influence on the local chemical industry. On a global scale, however, we need to look one step beyond this direct influence, at how the new policies and reforms will indirectly affect the key industries that the chemical industry supplies. For example, the five key principles of the 13th Five-Year Plan have clear implications for the automotive industry. This, in turn, has significant implications for specific sectors of the chemical industry both locally and globally, namely petrochemicals, commodity plastics, engineered plastics, paints and coatings, synthetic rubbers, and other specialties. → **B**

Our analysis puts eight selected industries under the microscope and highlights how the expected changes will drive specific chemical sectors.

B

A KNOCK-ON EFFECT

Our analysis puts eight selected industries under the microscope. Each industry represents a key part of the Chinese economy.

Principles of the 13th Five-Year Plan

1
INNOVATION

2
OPENING UP

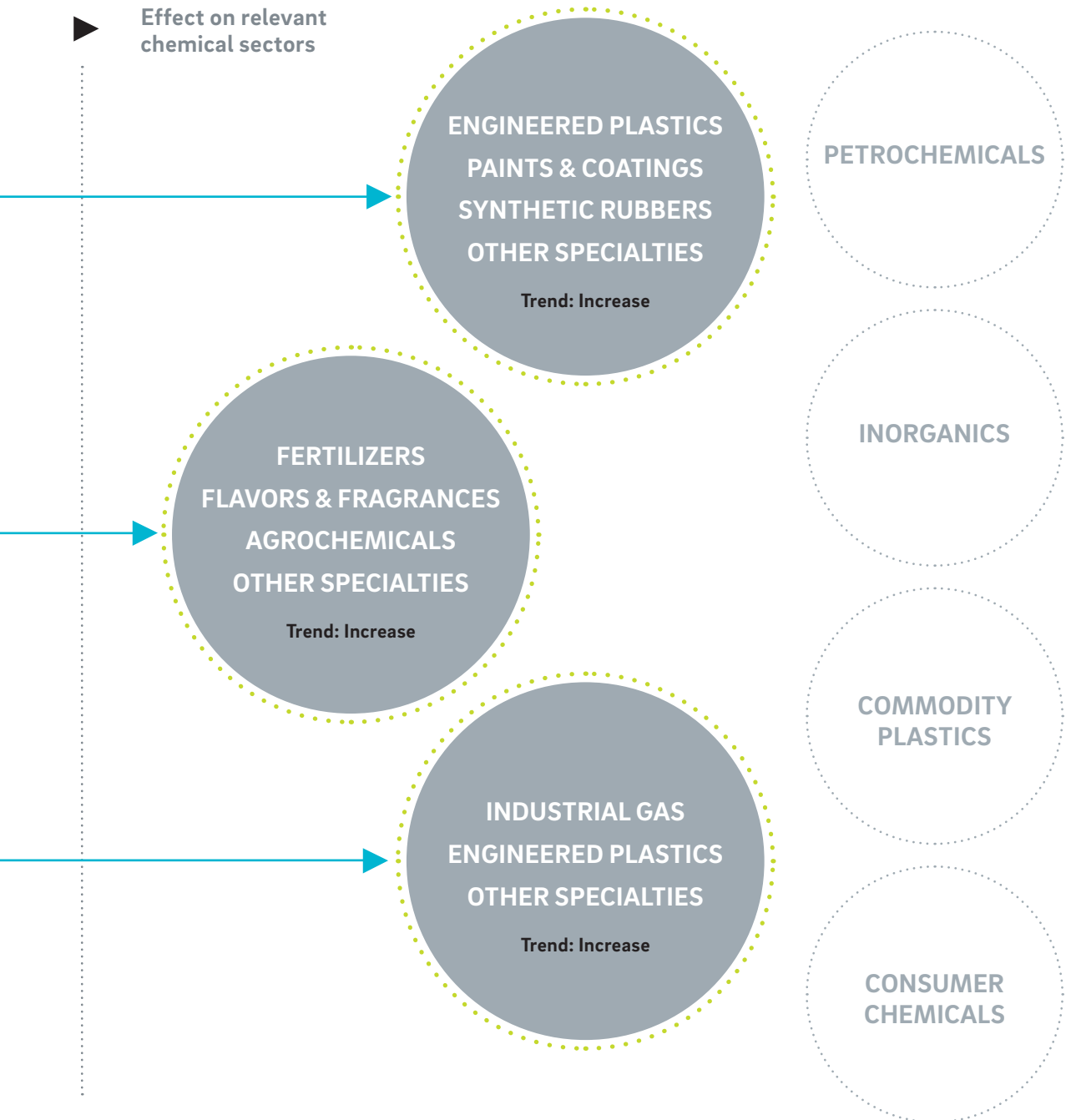
3
GREEN DEVELOPMENT

4
COORDINATION

5
SHARING

Effect on industries





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Keep the dragon flying

SOME OF THE MORE AFFECTED SECTORS

Details on these three industries

CONSTRUCTION

The impact of the 13th Five-Year Plan on the construction industry is expected to be very high. The industry will be strongly impacted by the principles of Innovation (in areas such as prefabricated construction modules, building-integrated photovoltaic systems), Green Development (green housing policies for the use of materials and resources etc.), Coordination (managed growth of megacities, enhanced connection of transportation routes, public transit etc.), and Sharing (upgrading of rural roads and power grids, access to broadband networks in urban and rural areas). The construction industry is highly relevant due to the fact that China is currently in an urbanization process. This drives a number of chemical sectors: engineered plastics (glass-fiber-reinforced plastics, polystyrene foam insulation, carbon fibers), paints and coatings (water-based, low-emission, corrosion and fire-resistant paints and coatings), synthetic rubbers (elastomers), and other specialties (solar cells, glass-fiber-reinforced concrete).



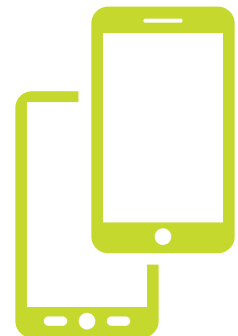
FOOD & BEVERAGES

We expect the 13th Five-Year Plan to have a medium to high impact on the food and beverages industry, largely through new agricultural policies. This impact will be seen mainly for the principles of Innovation (technologization of agriculture, crop rotation and fallow systems), Green Development (environmentally-friendly agriculture etc.), and Coordination (scaled-up agricultural operations and farming cooperatives, land transfers to larger agricultural businesses, guidance for farmers). China has the world's largest consumer market for food and beverages. Developments in this industry will drive several chemical sectors: fertilizers (organic fertilizers, green, high-yield, cost-efficient crops), flavors and fragrances (high demand for food flavors and organic flavors as food-processing is promoted to extend the food-production chain), agrochemicals (new crops and machinery will slow down growth in demand for herbicides), and other specialties (growing need for antioxidants, sweeteners and other food additives to meet demand for high-quality food and for food processing).



COMMUNICATIONS & ELECTRONICS

In the communications and electronics industry, we think the 13th Five-Year Plan will have only a medium impact. This impact will mainly relate to the principles of Innovation (the "Internet Plus" initiative), Opening Up (a transparent international Internet governance system), Green Development (lower energy and rare-earth magnet consumption), and Coordination (platforms for crowd innovation and support, sourcing and funding). Developments in this industry will drive three chemical sectors in particular: industrial gas (oxygen, nitrogen and argon for use in semiconductors, flat-panel displays, and thin-film solar panels), engineered plastics (plastic screens for scratch-resistant, lightweight screens and claddings), and other specialties (semiconductors for energy-efficient LED screens, polyphenylene vinylene for bendable, lightweight OLED screens, optical fiber cables providing high-speed, long-distance data connections, and graphene, copper and aluminum for RFID chips).



Chinese chemical sectors will grow by between 5 and 9% a year over the next five years. Under certain conditions.

Having looked at the broader picture, let's now zoom in on the detail. What impact will China's planned reforms have on specific segments of the chemical industry in the years 2015 to 2020? How big are the different market segments and how fast do we think they will grow? What do the different sectors need to do in order to achieve the "new normal"?

First of all, it's worth reminding ourselves just how massive the chemical market in China is. In our recent study [Chemicals 2035](#), we forecast that the Chinese chemical market will be worth a staggering EUR 1.3 trillion in 2025. It will account for a sizeable chunk of the global market – 33 percent, to be precise. That's a slice of the cake which global players cannot afford to ignore.

In our analysis we divide the industry up into 12 different segments. We forecast annual growth rates for each segment to be in the range of 5-9 percent over the next five years. We think the strongest growth will be in industrial gas (9 percent), followed by paints and

coatings (8 percent). A short distance behind them will come agrochemicals, and flavors and fragrances (both 7.5 percent). → [C](#)













Rather than going into full detail on each of the twelve sectors, we chose three sectors to discuss below that we find particularly interesting. They are as follows: petrochemicals, the largest individual sector in value terms today; fertilizers, the second-biggest sector; and industrial gas, the fastest-growing sector going forward.

PETROCHEMICALS represent the largest individual sector in the Chinese chemical market. Its value in 2015 was around EUR 122 billion. For the period 2015-2020, we forecast a CAGR of almost 6 percent. Between 2015 and 2025, in the "new normal" scenario, we predict that petrochemicals' share of the total value of the Chinese chemical market will remain stable at 17 percent, while the value of the sector overall will increase by EUR 81 billion.

C

CHEMICAL SECTOR IN CHINA

Annual growth rates in Chinese chemicals are in some cases as high as 9 percent.

	Market value 2015 [EUR bn]	CAGR 2015 - 2020 [in %]
Petrochemicals	122	 5.9
Fertilizers	107	 4.9
Commodity plastics	69	 6.2
Consumer chemicals	50	 5.9
Paints & coatings	46	 8.0
Industrial gas	38	 9.0
Agrochemicals	36	 7.5
Engineered plastics	26	 5.9
Inorganics	26	 5.3
Synthetic rubbers	16	 5.1
Flavors & fragrances	1	 7.5
Other specialties	193	 5.4

To achieve the "new normal" scenario, China is developing its production of commodity polymers, engineered polymers, and synthetic rubbers into a sector with high-end material output marked by quality and innovation. Beijing plans to make the necessary reforms to drive GDP: implement the two-child policy, equalize prosperity, enforce effective anti-corruption policies, liberalize markets, protect property rights, and so on. It will also be expanding infrastructure and networks as outlined in the 13th Five-Year Plan.

Sinopec (China Petroleum & Chemical Corporation), the major state-owned oil and gas company, is a good example of what forward-looking firms can do. To boost efficiency and cut costs, Sinopec has turned its Jiujiang facility into a "smart refinery", introducing state-of-the-art software and hardware and implementing modern communication technologies, including remote communication technologies from Huawei for safety monitoring and real-time communication with workers in the field. Using digitization, it has reduced the number of employees per machine by 12 percent and employees per work shift by 13 percent while maintaining high levels of productivity. It has also managed to reduce emissions.

FERTILIZERS form the second-largest sector in the Chinese chemical market today. The fertilizer market was worth around EUR 107 billion in 2015. For the period 2015-2020, we foresee a CAGR of approaching 5 percent – lower than the other sectors in our analysis but still higher than the global growth rate of 3.7 percent (for comparison, the growth rate in North America and Europe is around just 1 percent). Between 2015 and 2025, if the "new normal" scenario is realized, we believe that the value of the sector will increase by EUR 60 billion.

What is China doing to achieve the "new normal" scenario in fertilizers? The country will need to implement efficient forms of agribusinesses and more cost-efficient crops right across its agro-industry. Access must be ensured to the latest machinery in the agricultural sector. Previously unsuitable agricultural land needs to be developed. Information about which crops and breeds of animal are currently required, as well as climate conditions, can be spread via the Internet as part of the "Internet Plus" initiative. Modern agricultural techniques such as crop rotation will be adopted to improve sustainability of use. The logistics for

fresh agricultural products will be improved and the focus placed on the "most efficient" crop.

Yuntianhua, which produces and distributes fertilizers, chemical materials and products, offers a good example of the use of advanced product features. The firm has launched a pilot offering customized fertilizers to its customers. Customers provide information about where they plan to use the fertilizer, the type of crop, and the volume they require. Using this data, the company calculates the optimal fertilizer formulation based on a Chinese soil and crop database. The online or offline retailer then mixes the fertilizer according to the formulation and the customer picks up the product immediately or has it delivered via Yuntianhua's logistics network.

INDUSTRIAL GAS is our third and final sample sector. Industrial gas is interesting because it is set to be the fastest-growing sector in the coming years. The market is currently worth around EUR 38 billion (2015) and we forecast a massive 9 percent CAGR for the period 2015-2020, a rate well above forecast GDP. Between 2015 and 2025, in the "new normal" scenario, we believe that the value of the industrial gas sector will rise by EUR 47 billion.

To realize the "new normal", China plans to upgrade its manufacturing sector under the "Made in China 2025" initiative. It will develop its machinery and electronics sector from at present mostly low-end, to mid-market and high-end, in order to stimulate growth in the industrial gas segment, in particular the demand for ultrapure gases. The "Internet Plus" initiative and the expansion of IT infrastructure will be critical, as will the reforms needed to drive GDP (see Petrochemicals, above).

One example of the type of action being taken is the creation of the first industrial gas supply chain integration management platform in China, Feifan Qishi (literally "excellent gas city" – www.ffqs.com). The platform mainly focuses on business transactions for industrial gas, logistics optimization for gas supply, transaction information matching, and resource collaboration. New business models such as this will accelerate innovation in the industrial gas market.

Multiple opportunities are opening up for chemical companies. Astute players will seize the moment to develop and secure market share.

Let's recap. We've looked at what China is planning to do to keep its economy airborne, in the shape of the reforms and policies of the 13th Five-Year Plan. Implement these measures successfully and the country will achieve the "new normal". We've examined what these reforms mean for three sample sectors in the chemical industry: petrochemicals, fertilizers, and industrial gas. Now it's time to turn to the implications for players in the chemical markets and look at what opportunities the changing landscape offers.

The 13th Five-Year Plan will impact the Chinese chemical industry in multiple ways. The Plan's growth-driving reforms and policies – if, of course, Beijing can successfully implement them – will mitigate China's economic slowdown to some extent. They will not, however, reverse it entirely. In the "new normal" scenario, we forecast that China's chemical industry will grow stably, albeit more slowly than in the past: annual average growth will drop from 7.2 percent (2010-2015) to 6 percent (2020-2025). This slowdown

could lead to increased competition between existing chemical players and will inevitably put further pressure on profit margins. → [D](#)

It is worth pointing out that opinions differ on whether Beijing will, in fact, be able to systematically implement the 13th Five-Year Plan's strategic priorities and attain its growth targets. Opinions are somewhat more skeptical among European and US businesses than in China. Western analysts point out that China's innovative capabilities are yet to be proven in the mid term, and that experiences with the previous Five-Year Plan – the twelfth – cast some doubt on how far the new plan can be successfully implemented. The view in China is understandably more optimistic. In terms of the country's innovative capabilities, for example, it is apparent that China has already overtaken major European countries on digitization. China is also well aware that "new normal" growth could lead to political as well as economic stability, and hence more sustainable wealth.

D

THE CHINESE ECONOMY IS IN THE MIDDLE OF A TRANSITION

Opinions differ, but we are optimistic that China will achieve the "new normal" growth model

TODAY

TOMORROW

Exports and stateside investment



DRIVERS OF GROWTH

Domestic consumption and stateside investment

Quantity and dynamic growth



FOCUS

Quality and sustainability

Economic progress



GOAL

Improvement of quality of life

Resource-intensive industries



INDUSTRIES

Knowledge industries

Industry



MOST IMPORTANT SECTOR

Services

Own and control



MODE OF REGULATION

Privatize and regulate

Via joint ventures



MARKET ACCESS FOR FOREIGN COMPANIES

With higher local content

Assuming that China does manage to systematically implement the new Plan's strategic priorities and keep its economy airborne, what are the opportunities for national and international players in the chemical industry?

FIRST AND FOREMOST, we identify attractive opportunities in the mid sector. The shift from low-end (commodity and bulk chemicals) to high-end chemical sectors (specialty chemicals, such as pesticides, electronic chemicals, specialty polymers, coatings) opens up significant opportunities for expansion of the Chinese mid sector. To capture these opportunities and gain a competitive edge, one option for multinational corporations is to create a fruitful symbiosis with strongly positioned local Chinese companies in areas such as value-chain integration, collaboration over research and development, or localized supply chain.

THE UPSTREAM (e.g. crude oil, natural gas, industrial fuels) has limited attractiveness for both Chinese and Western companies. Here, we expect to see increases in efficiency and a reduction of capacity; for example, the formerly integrated player DSM has exited the upstream monomer business (caprolactam and acrylonitrile) by forming a joint venture with CVC, while retaining its nylon 6 polymerization and downstream compounding businesses. Fewer subsidies and tax benefits are available from the Chinese government for upstream investments by multinationals that in the past. Some Western companies have even been selling their assets to Chinese companies, as in the case of ICL's recent sale of Clearon to Hui Yu Xin American Corp., a subsidiary of Dalion.

DOWNSTREAM (e.g. specialty products such as detergents) the picture is altogether different. China is interested in downstream specialty chemicals, so Western companies would be well advised to build up their specialty competencies in China. CABB, for example, has recently opened a new plant producing high-purity MCA, whereas many Chinese companies are already active in lower-purity MCA. Chinese firms are also busily acquiring Western high-tech companies: ChemChina (China National Chemical Corporation) has bought Pirelli, KraussMaffei and is in final-stage negotiations with Syngenta.

The 13th Five-Year Plan also creates other opportunities for national and international firms. Reinforced by the stricter emission targets in the Plan, Green Development has the potential to affect several sectors of the chemical industry. Indeed, as environmentally-friendly solutions increasingly become a matter of priority in China, the provision of greener, more sustainable chemical applications presents a golden opportunity for astute players to develop and secure market share.

Finally, exciting opportunities are to be found in the area of digitization. China's "Internet Plus" initiative sets the framework for the digitization of Chinese industry. Industry 4.0 has the potential to create considerable added value for the chemical industry, through factors such as increased efficiency and productivity, more flexible supply chains, innovation in digital products, services and business models, and greater customer proximity. Again, successful players will exploit these opportunities to the full.

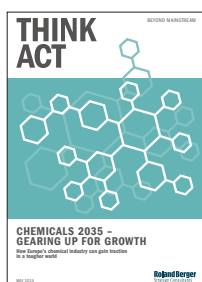
CONCLUSION

Where does this leave us? We believe that Beijing will manage to keep the dragon flying, albeit not quite as fast as in recent decades. Implementing the reforms and policies of the 13th Five-Year Plan will keep the Chinese economy strong and maintain growth rates in the chemical industry that will still surpass the global average. Difficulties such as overcapacity, caused by an overoptimistic mindset in the past, will need to be dealt with. But China is on course to achieve the "new normal" growth scenario. And that will create multiple opportunities for national and international chemical players who are ready to seize the day.

ABOUT US

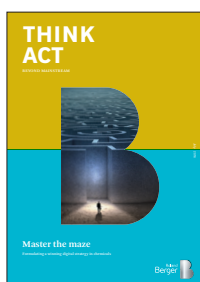
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FURTHER READING



CHEMICALS 2035 – GEARING UP FOR GROWTH: How Europe's chemical industry can gain traction in a tougher world

The market for chemical products is expected to grow to some 5.6 trillion euros by 2035. But the industry's dynamism is set to wane: growing at an average annual pace of 4.1% now, the chemicals market will expand by just 3.6% per year between 2030 and 2035.



MASTER THE MAZE Formulating a winning digital strategy in chemicals

Digitization. The word seems to be on everyone's lips, from market pundits to industry thought leaders. And leaves many executives in the chemical industry wondering what happened to the asset-intensive industry they used to know.

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