

REACTION

Chemical Magazine / Fifth Edition

The GCC in 2020: Downstream expansion of the Middle East Chemical Industry

KPMG
cutting through complexity

GPCA

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GULF PETROCHEMICALS & CHEMICALS ASSOCIATION







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Introduction

Welcome to the Fifth Edition of Reaction Magazine which, as you can see from the cover, we bring to you with the Gulf Petrochemical and Chemical Association (GPCA). It's a great privilege for us to be able to work with the GPCA in this way and I would like to offer my personal thanks to Dr Sadoun and his team for their support in preparing this paper.

Due to the nature of the paper, we've taken a break from the usual Reaction format and bring you one extended article focusing on the challenges facing the Arabian Gulf ("Gulf") chemical industry as it seeks to develop downstream – building on its current strength as a hub of global petrochemical manufacturing. Our global chemicals and performance technologies team will be in attendance at the GPCA Annual Forum in Dubai in December – we hope to see many of you there and we look forward to your comments on this latest edition of Reaction.

We'll be back to the regular Reaction format in March – as ever, we are keen to hear your views and if there are any issues you would like us to cover, please don't hesitate to contact us. Finally, take a look at a new feature inside the back page which highlights some of the things we have been doing in the industry since the last edition in June.



Mike Shannon
Global Chair
Chemicals and Performance
Technologies

KPMG and GPCA

identify key enablers of economic diversification



Executive summary

The Arabian Gulf (“Gulf”) petrochemical and chemical industry stands at an historic crossroads. Behind it lies three decades of exceptionally successful growth; leveraging advantaged feedstocks, economies of scale, integration and world-leading process technology to build a vibrant, influential and highly profitable petrochemical industry that is the envy of many other regions.

With almost 60 percent of the world's oil reserves and 40 percent of all natural gas reserves, the Gulf Cooperation Council (GCC) states – made up of Saudi Arabia, Bahrain, the United Arab Emirates (UAE), Oman, Qatar and Kuwait – has benefitted from expanding global petrochemical markets and compelling cost economics.

From an embryonic beginning in 1981, when the first exports of polyethylene

were shipped from Qatar, the region is now set to capture 20 percent of total global petrochemical capacity by 2015.

The Gulf petrochemical and chemical industry's undoubted success in the USD3.4 trillion chemical market was principally built on the export of low-cost petrochemical commodities to rapidly growing Asian markets.

Demographic pressures are increasingly making successful **economic diversification** and **downstream expansion** a necessity.

Over the decades, the GCC has developed a new generation of talented petrochemical leaders. These well-known individuals have won the respect of their global peers and are pushing their cash-laden, resource-rich corporations into the next phase of geographic and product expansions. Many of these CEOs have astutely developed global positions through acquisitions and alliances, and have made the GCC the pivotal player in the global petrochemical sector.

According to Dow Chemical, the region is "the foremost global petrochemical hub".¹

More recently, new strategic priorities have developed for the petrochemical industry in the GCC as governments seek to diversify their economies and attract wider industrial investment to create the sustainable growth necessary to meet the aspirations of the next, and future, generations. Much of this will be focused on creating and capturing the value that is currently captured by the region's export customers.

The petrochemical sector complements the well-established oil and gas 'pillar' industries in the hydrocarbon economies of the GCC and has been targeted by policy makers as having an instrumental role in diversifying their economies.

Within the sector, opportunities exist to capture much of the added-value that is currently exported, and to create the building blocks for major downstream conversion industries offering rewarding and fulfilling employment opportunities. This, in turn, would lead to more sustainable growth through the multiplier effect of economic growth.

In addition, attractive product differentiation opportunities exist for those Gulf commodity producers who are concerned about structural oversupply in the medium-term in their key export markets.

“ Nations do not sustainably raise their living standards by only selling commodities. ”

Khalid A. Al-Falih
President and CEO, Saudi Aramco

So the opportunity to grow with the huge demand for commodity and downstream derivative chemical products in the world's emerging markets in the years ahead beckons.

However, real challenges have to be met and overcome. Global competition is intensifying – shale gas is a game-changer for North American competitiveness and the development of coal-based technologies such as MTO in Asia may fundamentally impact import needs. While GCC producers will maintain their global cost-advantage, low cost ethane feedstock is tight. The move to heavier feedstocks and, typically, a 20 percent premium on US Gulf Coast benchmark capital plant construction costs will reduce margins. Geo-political tensions are high, with the risk of protectionism greater and confidence uncertain in a post-stimulus world. Volatility plagues the certainty sought by financial investors and attempts to rein in inflation in over-stimulated economies could lead to a hard-landing in some of the largest chemical markets in the world. More regionally, social unrest has temporarily impacted local markets while the human costs of piracy in the Indian Ocean remain as concerning as the financial costs to the region's vital supply chain links to Asia, Europe and beyond.

While chemical producers in each of the key global producing regions retain their unique strengths and weaknesses, they all share one similarity – adding value by producing downstream derivative products is heavily dependent upon developing or acquiring the requisite technology and know-how. In many downstream value chains, the essential proprietary technology for derivative products is often concentrated in the hands of relatively few owners. GCC producers pursuing this strategy will need to identify and gain access to these key technologies, or develop them locally in the high quality research institutions and product development centres that have been, or are being, set up in the region.

So a new era has begun for the petrochemical producers in the region – strategic imperatives are changing, feedstocks are less accessible, refinery/petrochemical integration more essential and prevalent, added value more essential, decisions more complex and markets less certain.

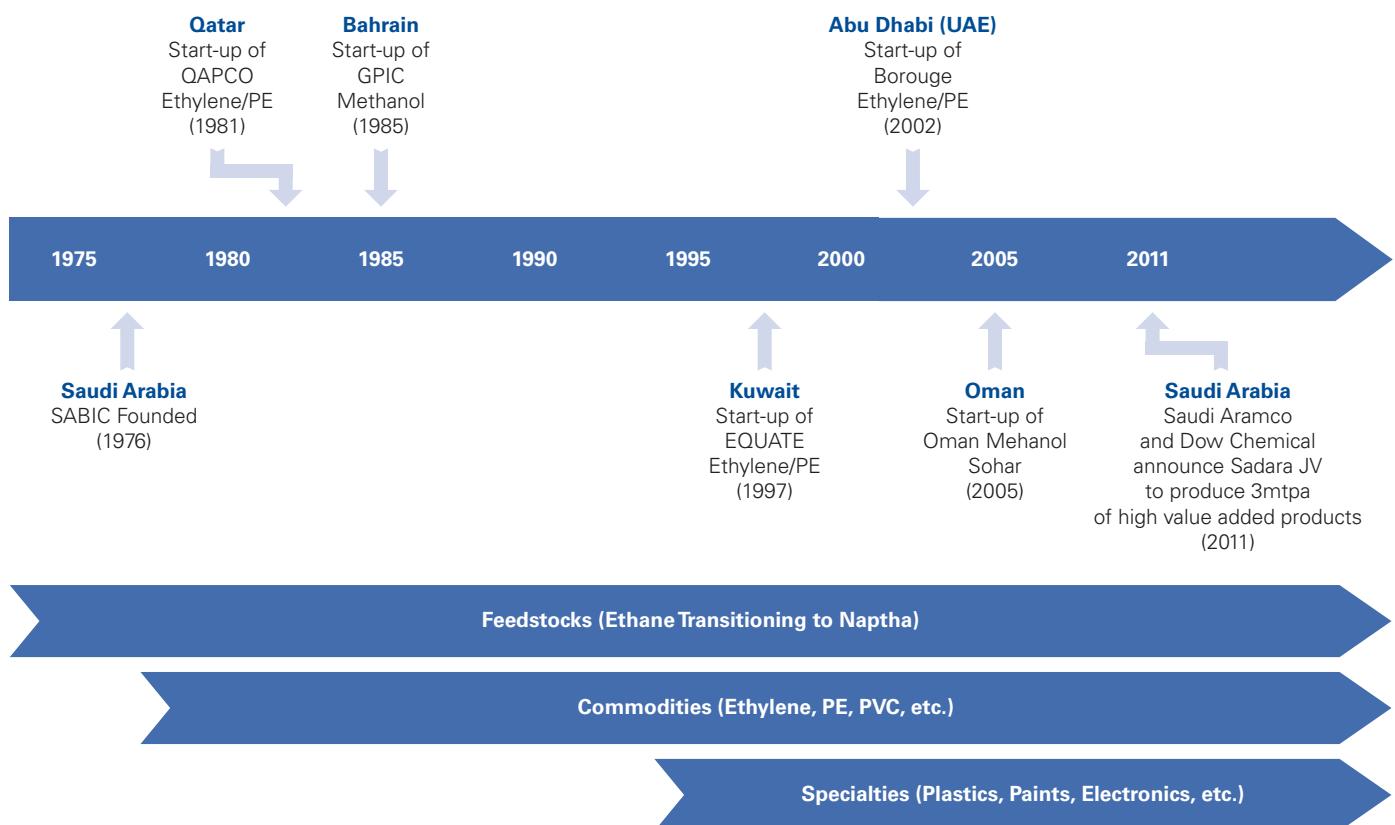
But the region has enduring strengths that will secure its leadership role in the next decade – strong cash reserves and refinery/petrochemical integration, excellent infrastructure, feedstock advantages, proximity to both growth markets in Asia and established markets in Europe as well as long-standing relationships with downstream producers in Europe, Japan and the US to bring the required technology to bear.

With the rapid expansion of its educated, urban youth, demographic pressures are increasingly making successful economic diversification and downstream expansion a necessity – for the Gulf petrochemical industry, the challenge has been set.

¹ Margaret Walker, Global VP of Engineering Solutions Technology Centers and Manufacturing and Engineering Work Processes, in Chemical Week Aug 9-15, 2010

Drivers of downstream expansion

Milestones in the development of the **Gulf chemical industry**



Source: GPCA (<http://www.gpca.org.ae/node/18>) and KPMG research

The push downstream by GCC chemical companies is driven primarily by two crucial factors:

The first factor is demographic: a large part of the population in GCC states is under the age of 25. In Saudi Arabia, almost 40 percent of the population is

under 14² and in the key age range of 20–24, unemployment is 39 percent, according to research by Jadwa Investment. Millions of jobs are, and will be, needed for this population segment, which will continue to grow based on present birth rates.

A large part of the **population** in GCC states is under the **age of 25**.

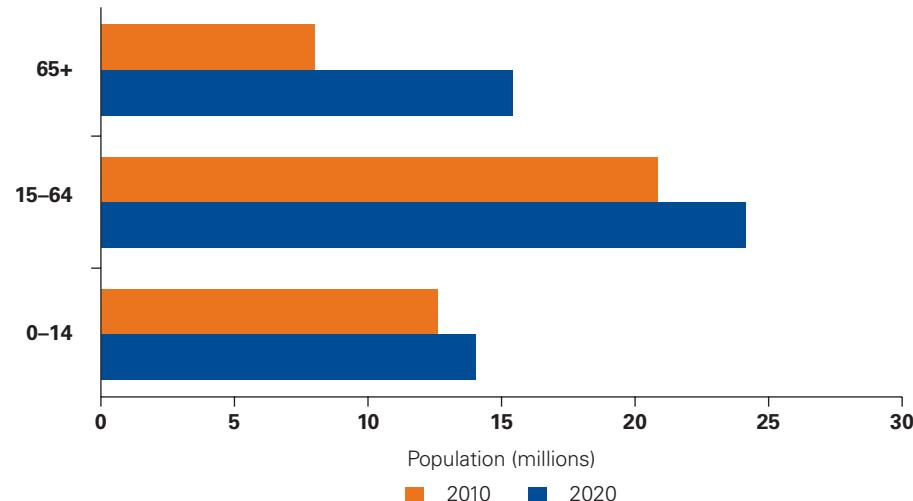
² "The World Fact Book," US Central Intelligence Agency, 2011

GCC Demographics

GCC population growth					
Population (m)	2000	2005	2010	2015	2020
Saudi Arabia	20.47	23.12	26.18	29.59	33.34
Kuwait	2.23	2.99	3.58	4.40	5.20
UAE	3.24	4.61	5.57	6.44	7.06
Bahrain	0.64	0.89	1.18	1.45	1.66
Oman	2.40	2.51	3.11	3.32	3.53
Qatar	0.64	0.97	1.82	2.33	2.79
Total	29.62	35.09	41.44	47.53	53.58

Source: Economist Intelligence Unit, The GCC in 2020: The Gulf and its People, September 2009

Age breakdown of GCC population



Source: Economist Intelligence Unit, The GCC in 2020: The Gulf and its People, September 2009

Regional governments fully understand the critical need to provide jobs either directly through the public sector or indirectly by supporting economic growth in the private sector. While commodity plants are large in physical scale, the manufacturing processes are capital-intensive, not labor-intensive, and therefore require relatively few employees to support them. Downstream chemical manufacturing provides far more employment opportunities because the product slate is often more differentiated and the products require more resources in R&D, sales and marketing, distribution, customer account management and other areas. Conversion of these

chemicals into end-products requires a significant pool of skilled labor.

For large ethylene crackers, a single job is typically created for every USD1 million of investment in the cracker. However, if the ethylene is converted into styrene, and then into rubber goods via SBR (Styrene-Butadiene-Rubber), up to 20 jobs may be created per USD1 million of investment. This provides a clear indication of the potential for job creation if the governments and chemical producers of the region can come together to successfully navigate the challenges presented by downstream expansion, which are discussed later in this report.

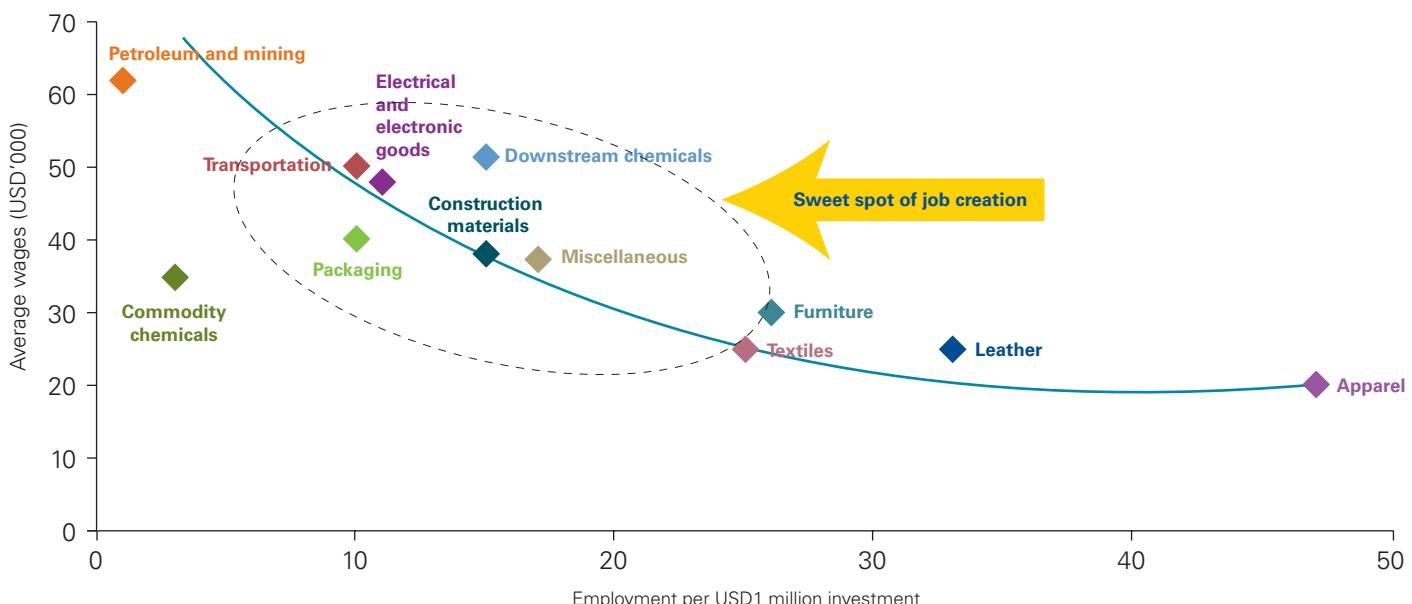
Regional governments fully understand the critical need to **provide jobs** either directly through the public sector or indirectly by supporting **economic growth** in the private sector.

The extent to which they successfully overcome these challenges will have a direct bearing on the number of jobs that will be created across the region – not just in the chemical industry but in downstream industries such as electronics and packaging which will be stimulated by production of new chemical products.

The second factor involves the rapid rise of the middle class in Asia, which continues to provide the demand stimulus for chemical products produced all over the world. Even by conservative estimates, Asia will add 2.5 billion people to the world's middle class in the next 20 years.³ If China's economy continues to grow at present

³ "Asia: the rise of the middle class," Financial Times, January 4, 2011

Manufacturing Employment vs. Compensation

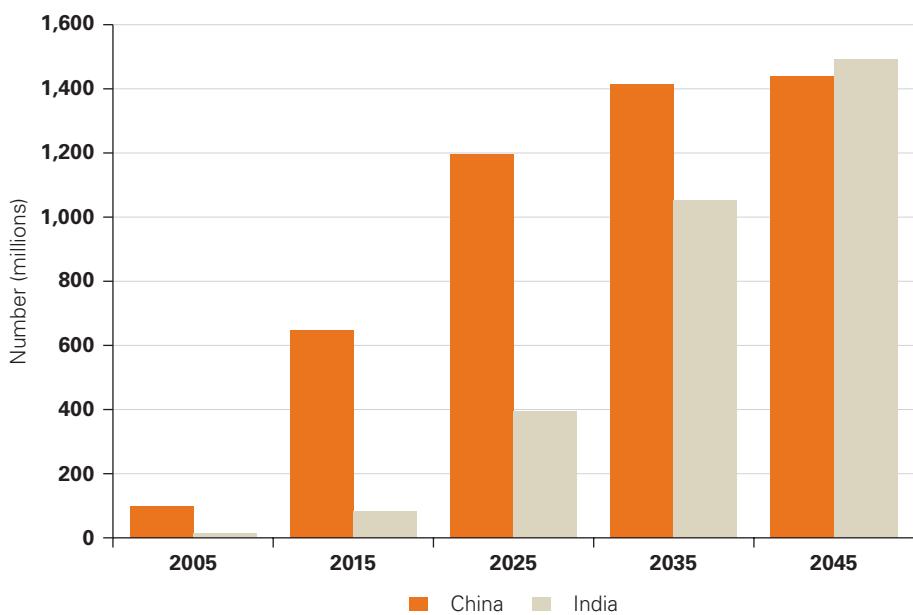


Source: Chemical Management Resources, KPMG analysis, 2011

rates, its middle class could increase to well over 600 million by 2023. India will have over 400 million middle class consumers by 2025, more than the present population of the US.⁴ India's middle class might rise even more quickly because Indian households benefit more from national growth than do Chinese households, based on the prevailing distribution of income in India.⁵

This growth is fueling a soaring demand for medicine, automobiles, electronics, construction materials, appliances and other goods, all of which require specialised chemicals and products. According to some estimates, retail sales in China may surpass those of the US by 2014.⁶ The Chinese already buy more cars and mobile phones than US consumers and will soon buy more computers. India's middle class consumption is expected to triple as a share of India's total consumption over the next 15 years.⁷

Middle class growth – China and India



Note: GS BRICs Model Projections, Middle class defined as above USD3000 GDP per capita

As of August 2009

Source: Goldman Sachs, 2010

⁴ Ibid.

⁵ "Asia's middle class on the rise," East Asia Forum, June 13th, 2011

⁶ Ibid.

⁷ "The Middle Class In India," Deutsche Bank Research, February 15, 2010



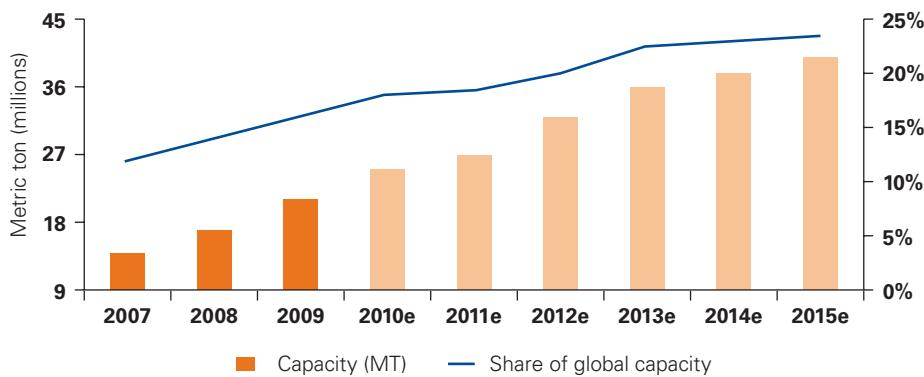
In contrast, the GCC region has relatively small local markets, but GCC petrochemical producers are geographically closer to Asian markets than their competitors in Europe and the US. In some cases, they can leverage long-standing business relationships as a feedstock supplier and partner in joint ventures. Asia's growing demand for middle class products will therefore

remain a strategic driver for GCC downstream development.

The success of these downstream projects will be closely tied to the region's long-standing leadership in the global petrochemical sector. Today, the GCC produces around 16 percent of the world's petrochemicals output, or around 105 million tons.⁸ For Saudi

Arabia alone, annual petrochemical output was 60 million tons in 2009.⁹ However, a welcome side effect of successful downstream expansion will provide added value to the region's natural resource base (than is currently provided by commodity chemical manufacture) and diversification into a less cyclical product base, providing more stable returns over the long term.

Share of Middle Eastern capacity in global ethylene production



Source: Saudi Petrochemicals Sector, alrajhi-capital, August 4, 2010

Successful downstream expansion will provide added value to the region's natural resource base.

⁸ GPCA, 2011

⁹ "Saudi petrochemical expansion needs feedstock," Middle East Oil & Gas Monitor, July 5, 2011

The changing **global** and **regional** competitive landscape

After weathering the economic downturn during 2008 and 2009 well, the GCC petrochemical industry saw steady increases in revenues and development for 2010.¹⁰ About 6.6 million metric tons of ethylene capacity was added in 2010 by companies in the region. SABIC's Saudi Kayan, Yansab and Sharq projects added approximately 3.3 million tons; Borouge II started up its 1.5 million ton cracker in Abu Dhabi; and Ras Laffan Olefins Company commissioned its

1.3 million ton cracker in Qatar. As ethylene production went up, production of ethylene derivatives followed suit. All these projects have added about 6 million tons of polyolefins to the region's output, including polyethylenes (HDPE and LLDPE) and polypropylene.¹¹

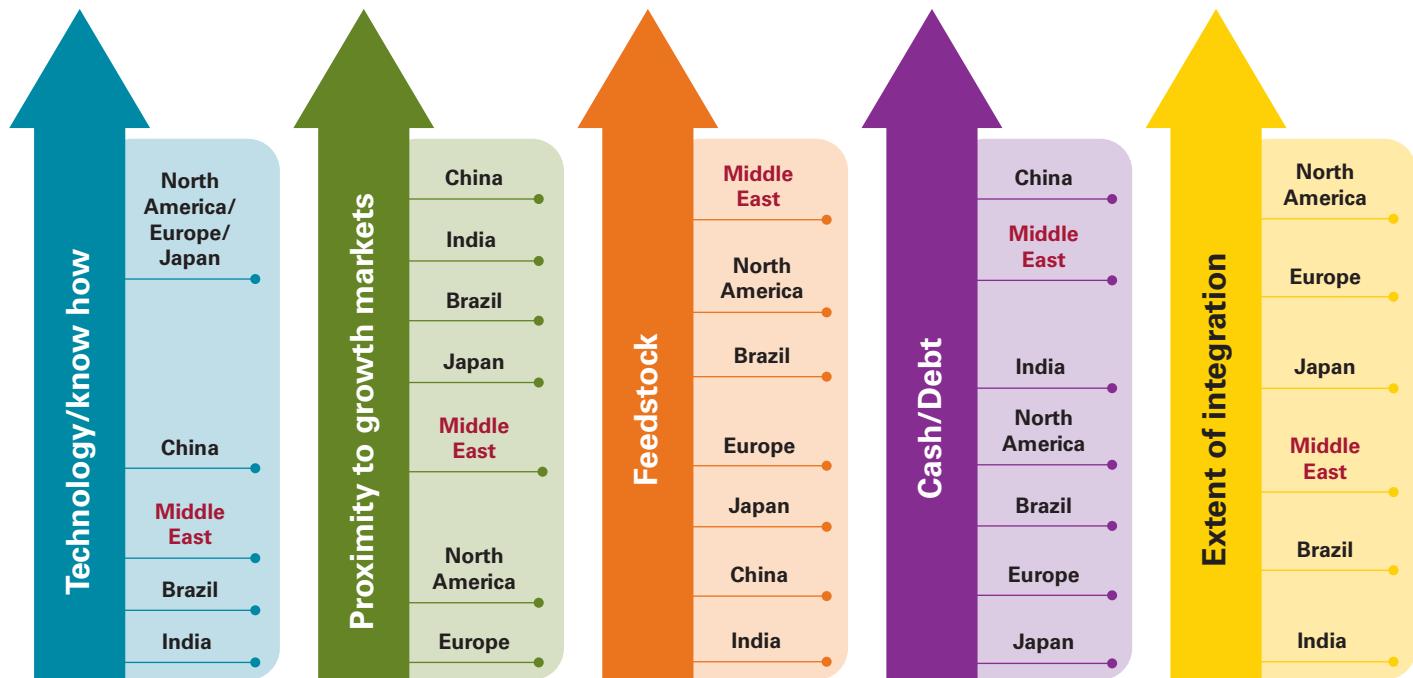
This is contributing to the eastward shift of the center of gravity of the global chemical industry – China overtook the US last year as the world's largest market for chemicals and has already

become the world's largest producer of chemicals. More generally, world chemical production increased between 1995 and 2005 by almost 40 percent. Over 95 percent of that growth was concentrated in developing countries.¹²

In 2008, only two out of the top ten global chemical producers by revenue were headquartered in the Middle East or Asia. By 2015, this number is likely to increase to five or six.¹³

Regional strengths in the global chemical sector

Successfully capture growth and margin



Source: KPMG research, 2011

¹⁰ "Excerpts from 2010 indicate... The Gulf petrochemical industry is on firmer footing to expand its production in 2011 and beyond," GPCA press release, June 6, 2011

¹¹ Ibid.

¹² "The state of the European Chemicals Industry – a thoughtstarter for the High Level Group on the competitiveness of the European Chemicals Industry," European Commission, 2007

¹³ KPMG research. This assumes that the rate of growth in petrochemical companies continues at the current rate until 2015.

The GCC has been at the heart of this development but over the coming years, Gulf producers will be competing more intensively to successfully capture downstream demand in the emerging markets. Each region is starting this race with different strengths and weaknesses and it is the region that best leverages their existing strengths that is likely to be successful.

China

Like many GCC chemical companies, Chinese chemical majors benefit from government support and funding, but the sheer size and proximity of local markets in China will remain a key competitive advantage over the Gulf. At the same time, Chinese companies face significant challenges in terms of higher priced and less accessible petrochemical raw materials and a lack of advanced technology for downstream products.¹⁴ Diversifying its

petrochemical feedstocks away from naphtha to coal will not be without its challenges. Like the GCC chemical industry, China will continue to need greater access to the technologies and resources held by companies in mature markets. Coal-based technologies and those at the specialty end of the chemicals value chain will be especially sought.

Southeast Asia

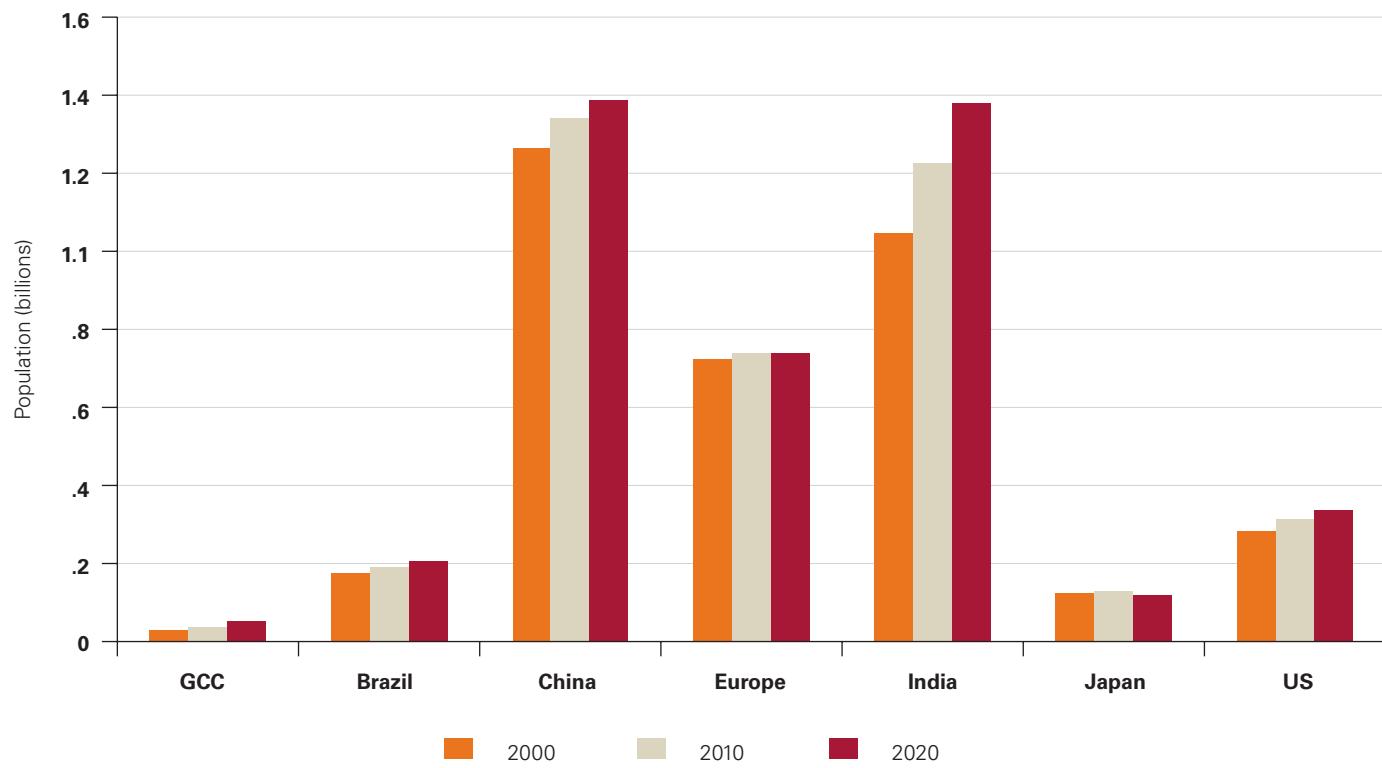
In addition to China, parts of Southeast Asia harbor significant chemical industry growth plans.¹⁵ In a recent interview, Datuk Wan Zulkifle, Executive Vice President/ Downstream Business at Petronas, discussed his company's plans to invest USD20 billion in developing an integrated refinery and petrochemicals project in Malaysia. The plan, he said "presents an opportunity for Petronas to further expand and diversify its petrochemical

business through volume growth, a more diversified products base, and a move into the high-value and premium specialty chemicals market."¹⁶ This strategy is centered on increases in production volume, product diversity and specialties and is similar to those announced by some GCC petrochemical leaders – suggesting that GCC chemical companies will see even stronger competition from this dynamic region in the future.

India

Like many countries in Asia, India enjoys large and rapidly expanding local markets. The country is the second-biggest market overall in Asia, based on a population of 1.1 billion and a rapidly-growing middle class demand for consumer products, many of which consume large quantities of chemicals.

Global population growth



Source: United Nations, accessed on June 27, 2011

¹⁴ "Chinese Chemical Industry: Key Challenges," 7Economy, June 19, 2011

¹⁵ "Southeast Asia Lures More Projects", Chemical Week, July 18/25, 2011

¹⁶ Ibid.





Successful expansion into downstream areas will be heavily dependent on the ability to **access, acquire or develop downstream technology.**

Currently, the nation's economy is the 13th-largest in GDP terms, and it is expected to exceed China's population by 2020.

The Indian government provides a number of economic incentives. Since 1991, many duties have been dramatically reduced or eliminated altogether. The government is also helping to create several petroleum, chemical, and petrochemical investment regions (PCPIRs), as well as Special Economic Zones (SEZs) that provide tariff, regulatory and support benefits to stimulate growth.

Other developments in India have had mixed results. The country enjoys low labor costs but these gains are often partially or completely offset by higher costs for feedstocks. The chemical industry includes specialty production in areas like dyes, pharmaceuticals and synthetic fibers, but these sectors lack critical mass and operate in relatively small clusters. A weak infrastructure hampers the reliable and efficient movement of feedstock and products. Trade and customs pose other difficulties, and high duties remain on naphtha and propane.

Brazil

Any discussion of downstream expansion should also include Brazil. Like the GCC states, Brazil has

access to cost-favorable chemical feedstock such as ethanol, which has been developed as a resource from the country's massive cultivation of sugarcane. This competitive advantage has led to Brazil becoming the third largest producer of ethanol in the world.¹⁷

Prompted by favorable government policies as well as industry growth in construction, automotive and consumer goods, Brazilian chemical companies are also expanding downstream in a number of areas.

Last year, Odebrecht, Braskem's parent company, announced an agreement to merge Braskem with Quattor, a thermoplastics firm controlled by Petrobras. The new company, "Nova Braskem," will have the capacity to produce 5.4 million tons/year of resins. Braskem's strategic repositioning also includes the recent purchase of Dow Chemical's polyethylene business for USD340 million, providing a significant footprint in the US and Europe.¹⁸

What is clear is that successful expansion into downstream areas will be heavily dependent on the ability to access, acquire or develop downstream technology. This key success factor often resides with more established chemical majors, principally in Europe, Japan, South Korea and the US.

¹⁷ "Climate of Opportunity: 2010 Ethanol Industry Outlook," Renewable Fuels Association

¹⁸ "Dow Chemical sells polypropylene unit to Brazil's Braskem for USD340 million," mlive.com, July 27, 2011

Options to obtain downstream technology

Although the GCC chemical industry and its competitors overseas have different degrees of advantage in terms of cost, feedstock and market access, they all share a common and critical need for downstream production technology.

“The only limit is our capacity to innovate.¹⁹

Moayyed I. Al Qurtas

Vice Chairman and CEO, TASNEE;
Chairman of the GPCA
Plastics Committee

The GCC chemical industry can exercise one of several options to gain the essential technology they need for future development into downstream areas.

Developing new technology: GCC producers have been hugely successful at building world scale petrochemical capacity but they currently lack the indigenous technology to build downstream facilities on their own in several value chain areas.

Several key competencies and products of strategic importance have been identified by GCC producers. These will be the focus for preferential resourcing, partnering and applied R&D development – strategically important areas of competence include catalysis, membrane technologies (for water treatment) and clean combustion technologies. However, as we have discussed, the drivers of change are

urgent making this the least feasible of the development options – the time that would be required to develop downstream technology is simply not available.

Buying and replicating: GCC companies could buy and replicate technology through acquisitions. The acquisition of European-based Borealis and Canadian-based NOVA Chemicals by Abu Dhabi investors is a recent example of this strategy. A provider of chemicals and plastics, Borealis now is 64 percent owned by the Abu Dhabi International Petroleum Investment Company (IPIC) and 36 percent by OMV, a European energy group.²⁰ Through Borouge, a joint venture between Borealis and the Abu Dhabi National Oil Company (ADNOC), plastics solutions are provided for the infrastructure market – pipe systems and power and communication cables – as well as automotive and packaging markets. In 2009, IPIC acquired NOVA Chemicals, adding to its downstream technical capabilities. This acquired technology has been successfully transferred to the Gulf, with Borouge likely to produce in excess of four million tons per annum of polyolefins in Abu Dhabi by 2013 based on proprietary technology.

With acquisitions, companies can quickly gain both technology and production capacity. However, a large part of the technology and intellectual property (IP) resides with management teams, so GCC chemical companies would need to take particular care in retaining these teams, especially if they buy a business in Europe or the US.

An advantage
GCC producers may have over their competitors in other emerging markets is their long **legacy of deal-making** in western markets.

¹⁹ “Moayyed I. Al Qurtas urges plastics industry to focus on innovation for the betterment of humankind at the Second GPCA Plastics Summit in Dubai,” GPCA press release, April 6, 2011.

²⁰ Data from www.borealisgroup.com and www.borouge.com.

An advantage GCC producers may have over their competitors in other emerging chemical markets is their long legacy of deal-making in western markets and their ability to move more quickly in M&A auction processes.

Incentivize foreign investors: Special incentives could be offered by GCC states for foreign investors with leading edge technologies. These can include tax holidays and lower tax rates, favorable conditions for expatriate labor; the duty-free import of equipment; guarantees against expropriation without compensation; the right to repatriate profits; and laws that protect the investor's Intellectual Property and proprietary information.

Given there is a finite amount of investment available to foreign direct investors, these incentives must be designed to compete with countries such as China which has already been successful in attracting foreign direct investment because of its market size and growth.

Joint ventures: A fourth option involves large joint ventures, structured to deliver specific benefits for each party. For GCC chemical producers, often this will involve trading access to feedstocks for proprietary technology.

One example is the Sadara Chemical Company, a USD20 billion joint venture between Dow Chemical and Saudi Aramco for the development of a world-scale, integrated chemicals complex. The complex will consist of 26 manufacturing units using ethane, propane and natural gas liquid feedstocks to produce more than 3 million tonnes per year of high value-added products – many have never before been made in GCC. The product

slate will include isocyanates, amines and glycol ethers. Many of these products are directly linked to the raw material and finished product needs of Saudi Arabia's National Industrial Cluster Development Program.

Sadara is expected to deliver annual revenues of approximately USD10 billion, with an average EBITDA of 40 percent, by 2020, according to Bill Weideman, Chief Financial Officer of Dow Chemical. The joint venture will be based on an "equity-light" model and will require limited future cash contributions from Dow Chemical going forward.²¹ Dow Chemical will also gain from Saudi Aramco's extensive integrated hydrocarbon infrastructure in Al Jubail. Saudi Aramco will make use of Dow Chemical's proprietary product and process technology, together with its expertise in marketing and operations, to develop a diverse product slate that can help generate thousands of direct and indirect employment opportunities through the complex and related investments in downstream value parks.

Technology licensing: Finally, GCC chemical producers have the option of licensing advanced technology from foreign competitors. SABIC has recently signed an agreement with Asahi Kasei and Mitsubishi Chemical to produce 200,000 mtpa of acrylonitrile, which will be the first time this product will be produced in the Middle East.

In addition to the acquisition and application of downstream technology, we believe there are a number of key enablers that will be crucial to supporting downstream development of the GCC chemical industry over the coming years.

Large joint ventures,
structured to deliver specific **benefits**
for each party...
will often involve trading access to **feedstocks** for **proprietary** technology.

“A key driver for the project is Saudi Arabia's National Industrial Cluster Program aimed at growing and diversifying the Kingdom's manufacturing sector.²²”

Mohammed Al Mady
Vice Chairman and CEO, SABIC

²¹ "Dow and Aramco Form Sadara Chemical JV; Investment to Reach USD20 Billion (Update 2)," Chemical Week, July 26, 2011

²² "SABIC in Acrylonitrile JV with Asahi and Mitsubishi," Chemical Week, May 2, 2011

Enablers for GCC downstream expansion

Continued feedstock availability and diversification

Feedstock gas prices in the GCC continue to be set to ensure global competitiveness. North America gas prices seem set to become structurally established at the USD4–USD4.25/million Btu level, while other regions are well above this level. In Saudi Arabia, gas is still priced at USD0.75/mm Btu, at least until the end of 2011. For most projects in the GCC, feedstock gas prices up to USD3.5/mm Btu will generate a return of 15 percent. However, there is widespread exploration for non-associated gas in the region reflecting the constraints imposed on the production of associated gas from crude oil production.

New plants in the GCC are predominantly world scale and often

integrated into refinery operations. Both generate major economies of scale, which are amplified by the use of leading-edge process technology. New crackers in the Gulf are usually well over 1 million tons per year of ethylene, compared to veteran European cracker capacities often less than half that size. Additionally, public and private finance is generally more freely available for Middle East projects, with greater tolerance for risk at the strategic and financial level.

However, limited ethane feedstock in a number of GCC States has forced a move to heavier feedstocks, where the magnitude of the feedstock cost advantage is less (although still world-leading). The different chemistries of the heavier feedstocks create new opportunities for downstream derivative

products and greater scope for value-addition. Importantly, the production of these chemicals, and their conversion into semi-finished and finished end-products, is employment-intensive.

A supportive government policy framework

Throughout the region, the GCC Governments are playing an active role in formulating a regulatory framework that will help create a conducive environment for the development of a globally competitive downstream industry. In Saudi Arabia, a key part of the National Industrial Clusters Development Program is to develop downstream industries in the Kingdom (Automotive, Construction, Consumer Goods, Flexible Packaging and Metals Processing). These will provide latent demand and value-adding opportunities



for chemical, and other, producers serving those industries.

Downstream conversion is therefore seen as a key source of economic diversification, job creation and value addition in Saudi Arabia. However, the downstream sector in Saudi Arabia is very small and is not expected to create a globally competitive downstream industry on its own. Saudi companies, especially the majors, are expected to support and foster the development of a downstream sector. Their future feedstock allocation may depend on it.

In Kuwait, the government has allocated sufficient feedstock for a third cracker and olefins project at Al Zhour. Although there are no current plans, inclusion of downstream units in the product slate would provide huge potential for additional value creation for the Kuwaiti economy. Similarly in UAE, while the Borouge project at Ruwais has expanded rapidly to 4.5 mtpa, huge additional value and job creation is offered by the planned downstream ChemaWEyaat complex, although that continues to be affected by delays.

However, with limited progress to date, a further, more explicit policy framework may be required across the Gulf States to enable a downstream conversion sector to be pursued as a core strategy. A Special Purpose Vehicle has been considered, with a remit to act as a magnet for all those interested in the downstream conversion sector. Finance and land may be offered on favorable terms and new 'anchor' industries may be created. These may be ring-fenced for special support and incubated in their formative period. Universities

and larger industrial companies may be encouraged to offer secondment opportunities in the new conversion sectors, many of whom will be the large domestic customers of the future.

Consolidation of existing downstream industries

The GCC plastics conversion market is valued at approximately USD10 billion per year and has a high degree of fragmentation. Although there are over 1,100 plastics converters in the GCC, only 10 percent are of reasonable size. In Saudi Arabia, the Saudi National Clusters Development Program expects around 2.5 million tons per year of polymers to be consumed by converters. Of the 600 or so converters in Saudi Arabia, only 10 can be considered world-scale (i.e. consuming more than 10,000 tons per year of resin). Accordingly, significant consolidation is likely to be required to develop a plastics converting industry that can be truly competitive on the world stage.

A thriving Research and Development (R&D) community

R&D in GCC chemical companies remains comparatively very low – less than 1 percent of revenues in 2010, compared to approximately 3 percent for the likes of BASF and Dow. Success in downstream areas requires continuous product development and improvement. If GCC chemical companies are to compete in high value product areas they will need to drive a transformational shift in the importance of R&D – placing it at the heart of business strategy.

Indeed, some progress has already been made in this area. SABIC has signed construction contracts to build a Plastics Application Development Centre at King Saud University's Technology Valley research complex which will be used as a collaborative centre with customers in developing new product applications. Borouge is opening an innovation centre where international researchers and engineers will focus on innovations for compounding and innovative plastics solutions for the pipe, automotive and advanced packaging industries. Similarly, Tasnee has opened a Plastics and Research Centre in Al Jubail, while Sipchem is due to open its Product and Application Development Centre in Dhahran Techno Valley in late 2012.

Ease of doing business

Ease of doing business is a crucial enabler as this will persuade, or dissuade, potential investors and technology providers to seek a stake in the downstream conversion industries. A recent survey of 183 economies by The World Bank and The International Finance Corporation placed all six GCC states in the top 50 percent in the 'Ease of Doing Business Index'. This survey was based on indicators such as starting a business, protecting Intellectual Property, dealing with construction permits, protecting investors, paying taxes, getting credit, trading across borders, enforcing contracts and employing workers.²³ Importantly, all of the GCC states out-rank other key emerging chemical producing countries of China, India and Brazil.

²³ "Doing Business 2011," The World Bank and The International Finance Corporation

2011 Rankings for the World Bank's 'Ease of Doing Business Index'

Rank	Economy
1	Singapore
2	Hong Kong
3	New Zealand
11	Saudi Arabia
28	Bahrain
40	UAE
50	Qatar
57	Oman
74	Kuwait
79	China
127	Brazil
129	Iran
134	India

Source: *Doing Business*, World Bank and International Finance Corporation, 2011

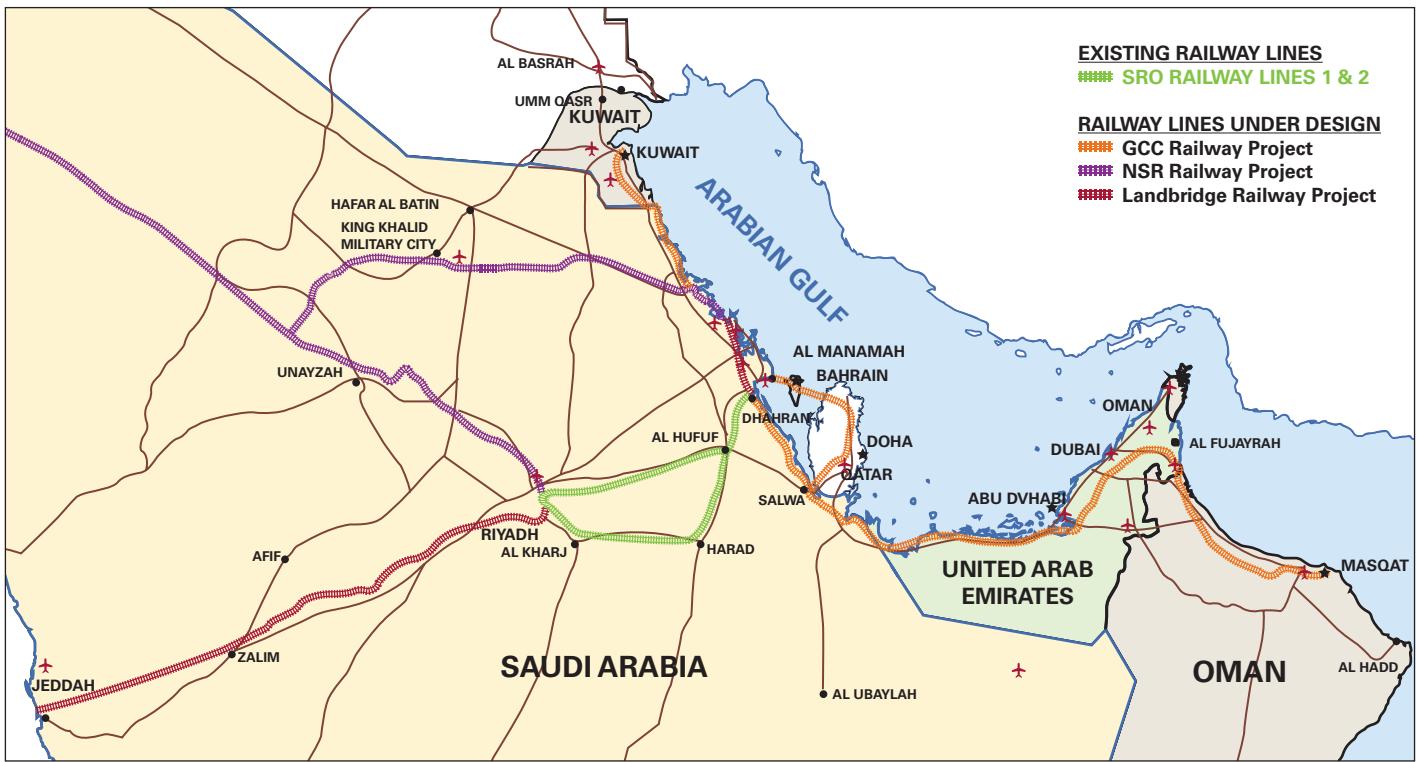
Infrastructure, supply chain and logistics

Unlike other petrochemical-producing regions, the GCC is not co-located on a major market. It is of course ideally situated to move product to either Europe or Asia but it is unique in its dependence on its supply chain. The infrastructure for this has been developed in a relatively short period of time, during which petrochemical exports have built up dramatically. The infrastructure has reached capacity and a series of huge investments is underway throughout the region. All the major ports in the region are being expanded, new terminals built, a pan-GCC rail network is planned for completion by 2020 and the main arterial routes are being improved.

Due to the low raw material costs in the region, supply chain costs are a disproportionately high percentage of total variable costs for Gulf producers. As a result, corporations often promote their most talented individuals into supply chain positions.

The development of a coordinated, cohesive and efficient logistics infrastructure is a critical success factor to meet the burgeoning export and import needs of producers and converters. To address these needs, projects such as the Saudi Land Bridge will be undertaken. The Land Bridge is a USD7 million project that will connect the production and manufacturing facilities on the eastern part of the Arabian peninsula with Riyadh Dry Port and the Jeddah Islamic Port on the Red Sea. In time, it will form part of the pan-GCC rail network and provide further supply chain options for those companies in the Saudi cluster program and those in the GCC conversion parks. Container shipping can take up to 11 days to sail between the Arabian Gulf and Jeddah Islamic Port. As a result, the Land Bridge offers the potential to accelerate product delivery times, thereby reducing order-to-cash cycles, and has the strategic benefit of eliminating the transfer of products through geopolitically sensitive areas such as the Strait of Hormuz and the Somali and Yemeni coasts.

GCC Regional Rail Network



Source: Etihad Rail, July 2010



Key challenges ahead

GCC petrochemical growth cannot, however, be taken for granted. The potential benefits accruing from the region's economies of scale, for example, are quickly dissipated, or even completely negated, when production facilities are working sub-optimally. Several plants in the GCC have had major start-up problems and/or operational problems which have led to interrupted production. This, combined with less freely available finance and tighter feedstock, has led to a new focus on operational reliability.

The embryonic downstream conversion sectors in many GCC states are predominantly sustained by private sector companies. These small, entrepreneurial companies often find it difficult to attract the talent

essential for their growth from the local market, where they compete for employees against domestic national oil companies and petrochemical majors offering a compelling range of inducements, security, status and career development.

While plastics processing centres in the region have been developed, including the Abu Dhabi Polymers Park and Rabigh Conversion Industrial Park/PlusTech, investment has been hard to attract and the essential critical mass has proved elusive. Despite exceptionally low utility costs in many of these parks, other issues have been a drag on investment. A number of overseas investors have found it hard to agree favorable raw material deals with local producers, while supply chain

infrastructure is often uncompetitive with nearby alternatives. In addition, synergies between the park tenants have been under exploited, or are often not realizable due to their different product mix.

Despite excellent educational facilities, there remains a chronic shortage of professional technologists to work in the many product development centres and scientific institutions that serve the petrochemical sector. Many of these are in-house product and application development centres for producers. More broadly, an up-skilling of the labor force is a strategic priority for many GCC states, who are investing heavily in primary, secondary and tertiary education facilities.

The final challenge to consider here is the ongoing switch from light to mixed and heavy feeds. This will need to be carefully managed – as of 2011, only Qatar remains a gas exporter in the region, while Saudi Arabia's natural gas consumption has risen sharply because of growing demand from power generation. The switch from gas-based feedstocks will have a cascading effect across the GCC chemical industry, applying new pressures on margins for almost all products.

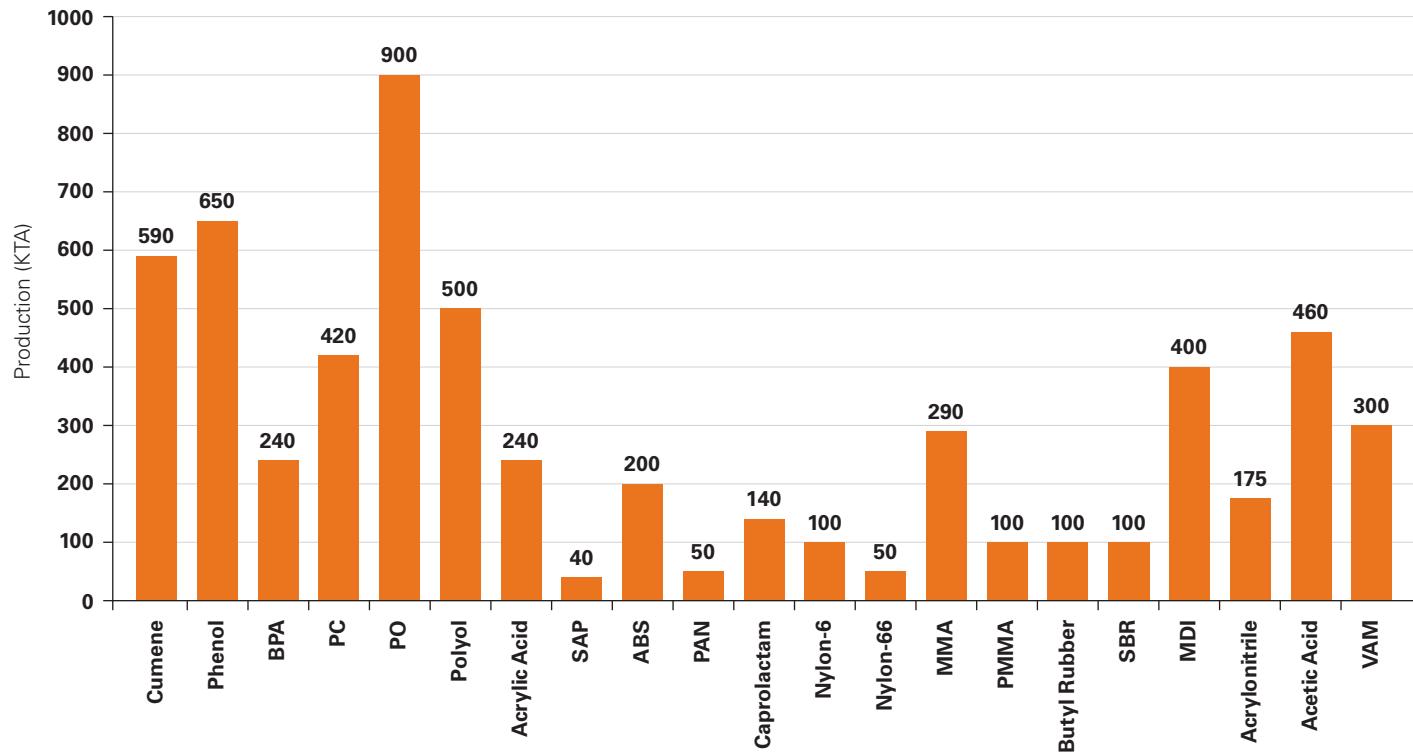
That said, for the right combination of downstream products, returns can still be strong enough to attract international technology licensors. At the same time, liquid feedstocks, still relatively cheap and available in the Gulf region, can be used to generate a much greater variety of downstream products. These offer the crucial employment opportunities

and economic diversity promised by the plastics and chemical conversion sector.

Crucially, there is a new sense of urgency to move forward and a new willingness and determination to openly discuss the challenges. There are already a new set of both petrochemicals and downstream chemicals in the pipeline which will stimulate ample opportunities for developing industrial clusters and downstream industries in the Gulf region in areas such as construction, packaging and automotive. In automotive, for example, the range of current or future products available will include many of the major products required by component OEMs – carbon black, polypropylene, polymethylmethacrylate (PMM A), nylon, elastomers, MDI/TDI/polyols (for polyurethane foam) and ABS.

There are already a **new** set of **downstream chemicals** in the pipeline which will **stimulate** ample opportunities for developing **industrial clusters**.

Selected new secondary petrochemicals and **downstream chemicals** for upcoming projects in the Gulf



Source: GPCA, 2011

Summary – The GCC in 2020

The GCC will remain a global leader in commodity petrochemicals, and the overall share of the region in the world petrochemical industry is projected to grow to 20 percent by 2015.²⁴ The GPCA estimates that the annual petrochemicals production of the GCC states will reach 113.4 million tons per annum by 2015.

At the same time, the region will continue to expand downstream, with clusters playing an increasingly important role in the manufacturing of specialty chemicals and downstream conversion parks consuming, and adding value to, locally-produced petrochemicals.

The success of downstream expansion will be heavily dependent on the enablers identified above. We believe the most important aspect is the role of GCC governments in providing a policy framework which will continue to foster growth. This will need to actively encourage the required behavior from GCC chemical producers to continue the push downstream and support the development of infrastructure and a pool of skilled labor that will enable those chemical producers to both develop high value products and subsequently get those products to market.

If successful, this will provide jobs and economic diversification with opportunities across multiple disciplines, including chemical engineering, finance, R&D, customer service and supply chain management. As such, the Gulf petrochemical industry has the ability to be a key enabler for the long-term development and diversification of the Gulf economies; helping to provide solutions to key economic and demographic challenges.

The GCC chemical industry in 2020 will be marked by greater production flexibility (with a greater dependency on liquid feedstock), an increased diversity of downstream products, a growing focus on specialty markets in Asia and the developed economies, expanded clusters and the continued development of joint ventures with foreign investors. A diverse, multi-modal, high capacity infrastructure and well-developed hinterland will provide the platform that underpins the region's international trade competitiveness. This, combined with the region's natural resources, financial strength and developing human resources, will secure the region's long-term, sustainable growth.

²⁴ Op. cit. "Saudi petrochemical expansion needs feedstock"





KPMG in the Industry

In this new feature, we update you on some of the things we have been doing since the last edition of Reaction. It's been a busy few months for our Global Chemicals & Performance Technologies team as we stay embedded in the heart of the industry.....

Annual China visit

During our annual trip to China, KPMG's Global Chemicals steering group visited with a number of Chinese majors and foreign multinational chemicals companies. Highlights of this year's trip included our visit to Sinopec Petrochemicals Limited (pictured) and our annual Chemicals CEO & CFO wine tasting dinner, which this year attracted over 30 attendees from the industry.



Courtesy: Sinopec

Pictured from left to right: Miguel Montoya, Vir Lakshman, Norbert Meyring, Paul Harnick, Mike Shannon

Busy season of industry association events



Chemistry Industry Association of Canada **Association canadienne de l'industrie de la chimie**

Chemicals Industry Association of Canada

KPMG in Canada was proud to recently become the first associate member of the CIAC. At their AGM in Ottawa in October, Paul Harnick, Global Chemicals COO, KPMG in the UK, spoke on global chemicals industry trends and Doug Varty, Partner, KPMG in Canada, addressed the current economic environment in Canada and the impact on the chemicals industry.

American Chemistry Council

KPMG in the US recently attended the ACC's Annual Chairman's Dinner as one of the golden gavel contributors. Mike Shannon and Paul Harnick from our Global Chemicals and Performance Technologies steering group were present as the industry paid a fitting tribute to outgoing ACC Chairman, Dr. Stephanie Burns of Dow Corning.



*Member of the
Chemical Industries Association*

Chemical Industries Association

We've been busy in Europe too, Chris Stirling (EMA Sector Leader) hosting a table at the CIA's Annual Dinner in London. Thanks to all of our guests for a thoroughly enjoyable evening.

We'll continue to be active in the industry over the coming months and we look forward to seeing as many of you as possible.



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GULF PETROCHEMICALS & CHEMICALS ASSOCIATION

About The Gulf Petrochemicals and Chemicals Association

The Gulf Petrochemicals and Chemicals Association (GPCA) is a dedicated and non-profit making association serving all its members with a variety of data, technical assistance and resources required by the petrochemicals and chemicals industry. GPCA's mission is singular and specific in that it intends to support the growth and sustainable development of the petrochemical and chemical industries in the Gulf in partnership with its members and stakeholders and be both a sounding board and a meeting point for debate and discussion. It is the first such association to represent the interests of the industry in the Middle East and it has brought a major dimension to its task by creating both a forum for discussion and a place where like minded people can meet and share concepts and ideas. Since its inception in March 2006, the GPCA has earned the enviable reputation for steering the regional industry towards a whole new level of co-operation and raising the standard in terms of common ground interests.

Additional information is available at www.gpca.org.ae

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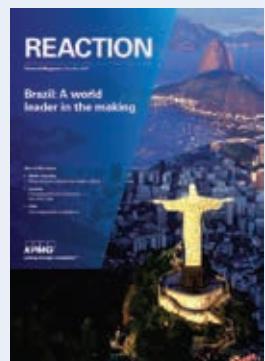
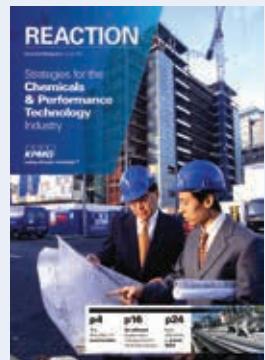
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