Global Fertilizer Trends - Opportunities and Challenges for GCC Fertilizer Producers
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1.1 INTRODUCTION TO N, P & K FERTILIZERS

In order for crops to grow, three principal soil nutrients are required: nitrogen (chemical symbol, N), phosphorus (chemical symbol, P) and potassium (chemical symbol, K). As each harvest removes these nutrients in the form of crops, they must be replenished to prevent the land from becoming barren. Minor nutrients required for healthy crops include calcium (Ca), Magnesium (Mg) and sulphur (S).

Nitrogen forms around 80 percent of the atmosphere and this is used to make ammonia (NH3), the starting point for virtually all nitrogenous fertilizer production. The hydrogen (H) component of ammonia is sourced from hydrocarbon natural resources. Most commonly this is methane (CH4), the main component of natural gas. Phosphorus and potassium are sourced by extraction from mineral ores.

The vast majority of inorganic fertilizers applied to crops globally predominantly contain these three primary ingredients of nitrogen (N), phosphorus (P), and potassium (K), (known as N-P-K fertilizers), which may been produced as compounds or bulk blending to produce a mixture of the desired N:P:K ratio.

Such fertilizers are named according to the content of these three elements. For example, if nitrogen is the main element, the fertilizer is often described as a nitrogen or nitrogenous fertilizer.

The feedstocks and production routes for the various N-P-K fertilizers are shown below.

N, P & K Fertilizer Value Chain

Source: Nexant’s Ammonia and Urea Strategic Business Analysis 2013
1.2 FERTILIZER FEEDSTOCKS

1.2.1 Natural Gas (Including Shale Gas)

Although there are many different available fertilizers which are sources of nitrogen the main source which is then used in the production of other fertilizers is ammonia. Air is the source of nitrogen while methane or heavier hydrocarbons are usually the main source of hydrogen. Of the hydrogen feedstock sources (natural gas, coal and petroleum fractions) natural gas is the most often employed in commercial ammonia plants, currently representing about 65 percent of world production, with coal derived syngas making up the majority of the remainder, especially in China. Some plants gasify refinery waste oils, while a few commercial plants exist that produce hydrogen for ammonia by electrolysis of water; this route requires costly electric power and is rarely used.

Natural gas is favoured for several reasons: its availability and ease of delivery as an inexpensive feedstock, its high hydrogen content, and the relative simplicity and ease of extracting the hydrogen.

In the past, the discovery of natural gas fields in remote or “stranded” locations of the world has driven the development of the ammonia and integrated urea industry in these low cost regions. Natural gas values in “stranded-gas” regions of the world have been fixed at constant (or nearly constant) low values either by Government Decree or by negotiation with the gas suppliers. These values reflect the limited alternative value and, in the case of associated gas, often just represent the recovery cost as an alternative against flaring. Adopting this strategy successfully attracted ammonia and integrated urea producers to invest in such locations, leading to the development of major production hubs such as the Middle East and Trinidad and allowed projects in these regions to be competitive even after allowing for the significant freight and tariff costs of delivering to the major markets.

Global Proven Gas Reserves, 2012
(187 trillion cubic meters)

Source: BP Statistical Review of World Energy 2013
Middle East as a region currently holds the largest gas reserves in the world. It is hence not surprising that the Middle East is one of the regions where ammonia and integrated urea capacity has developed rapidly in the past years especially as gas is priced highly competitively there.

A key trend over the past three to four years is the establishment of shale gas in the U.S. as a significant source of natural gas supply and the impact this had on natural gas prices.

U.S. gas prices have historically tracked the value of competing fuels such as fuel oil and gas oil as a result of fuel switching capability in certain power and industrial applications. However, owing to the significant drop in gas prices since 2008 due to the sharp increases in U.S. gas production from unconventional sources, its price has been detached from pricing for petroleum derived fuels. This trend is expected to remain over the coming decade, with a notable impact on the ammonia and urea industry dynamics (urea being the main ammonia end-use).

The US natural gas price is currently significantly below European prices reflecting the large capacity of shale gas in the market. Although gas prices are expected to remain relatively low in the US there is upward pressure due to lower expected production from some conventional gas deposits. Furthermore, the additional supply of shale gas has prompted interest in developing LNG export facilities in the US. Currently, there is only one liquefaction plant located on U.S. territory in Alaska. Other parties, mainly existing LNG import facilities, are currently seeking export permits from the Department of Energy. So far one permit has been granted to Sabine Pass in Louisiana. Construction of the liquefaction facilities with an expected export capacity of 22.7 Bcm per year is expected to be finished by 2015. Another 8 terminals with a potential export capacity of 142 Bcm per year are currently waiting for export permit approvals while the Department of Energy is studying the effects of granting more such permits. The Federal Energy Regulatory Commission (FERC) also has to give the applicants permission to construct the necessary LNG facilities. Any additional LNG capacity will put more upward pressure on domestic gas prices in the US and will lower the feedstock advantage for US ammonia producers.

There are currently debates in the Middle East about the level of natural gas price, particularly in Saudi Arabia. The current price of $0.75 per MMBtu in Saudi Arabia may be revised upward in future.
1.2.2 Phosphate

Phosphorite or phosphate rock is a non-detrital sedimentary rock which contains high amounts of phosphate bearing minerals. The phosphate content of phosphate rock is at least 10 to 20 percent, which is a large enrichment over the typical sedimentary rock content of less than 0.2 percent. The phosphate is present as fluorapatite Ca$_5$(PO$_4$)$_3$F (CFA) typically in cryptocrystalline masses (grain sizes $< 1 \mu$m) referred to as collophane. It is also present as hydroxyapatite Ca$_5$(PO$_4$)$_3$OH, which is often dissolved from vertebrate bones and teeth, whereas fluorapatite can originate from hydrothermal veins.

Currently, almost all phosphate fertilizers are manufactured from naturally occurring minerals. Bone or manure which are other sources of phosphorus are more expensive when compared on a nutrient value basis and not available in sufficient quantities to supply the global agricultural industry.

The rock is mined using a variety of different techniques and many types of equipment which are similar to methods and equipment used in coal mining. Phosphate rock is mined by both surface (open cast or strip mining) and underground methods. Generally, surface mining is more economical than exploiting underground deposits.
As can be seen in the figure above, the distribution of phosphate rock deposits is highly uneven. Northern Africa and in particular Morocco, has the largest phosphate reserves with the continent totalling more than 80 percent of the world’s total while the Middle East and Asia Pacific have around seven percent, respectively. The reserves located in the Middle East are predominantly found in the north including Iraq, Israel, Jordan, Syria and the north of Saudi Arabia.

Unlike natural gas for ammonia production which has several applications, the primary market for phosphate rock is the production of phosphate fertilizer products such as ammonium phosphates (DAP, MAP), superphosphates and NPKs. It is estimated that fertilizer production accounts for more than 90 percent of world phosphate rock consumption. The balance is consumed as animal feed and in a variety of industrial/technical applications.

Although Morocco is by far the country with the largest phosphate rock reserves and also the biggest exporter, China is the largest producer of the mineral rich rock accounting for more than 30 percent of global production. As China is the most populous country, its requirements for phosphates and other fertilizers are the highest in the world.

### 1.2.3 Potash

Potash is the common name for various mined and manufactured salts that contain potassium in water-soluble form, the most common being potassium chloride (KCl). Also known as muriate of potash (MOP) it contains around 60 percent K2O. Some crops are intolerant of chloride in which case other forms of potash such as potassium sulphate or sulphate of potash (SOP) which contains 50 percent K2O can be used.
Potassium is the seventh most abundant element in the Earth's crust, and it is one of the three major plant and crop nutrients with nitrogen and phosphate. It has been used since ancient times as a soil fertilizer. Potash is important for agriculture because it improves water retention, yield, nutrient value, taste, colour, texture and disease resistance of food crops. It has wide application to fruit and vegetables, rice, wheat and other grains, sugar, corn, soybeans, palm oil and cotton, all of which benefit from the nutrient’s quality-enhancing properties.

Market conditions in recent years and strong demand prospects in the medium term have spurred many prospective producers to invest in exploration and capacity development programmes. The potash industry is highly consolidated with most of the market dominated by the marketing cartels of Canpotex, representing the major Canadian producers, and Uralkali-Belaruskali consortium of the CIS. In recent time the longstanding cooperation between Uralkali and Belaruskali has been jeopardized by several disagreements between the two parties. It is not clear yet if this major partnership will resume leaving the market unsure of how potash prices are going to develop.

The largest potash reserves are found in North America, closely followed by Europe and Eurasia. Unsurprisingly, much of the potash capacity development due to come onstream in the near future is in both regions respectively. There are exceptions which include inter alia some developments in Congo, Laos and Australia. These investments include primarily brownfield developments but also a few greenfield sites. Canada is the largest potash producer in the world followed by Russia, Belarus, China and Germany. The Middle East has only a very limited amount of potash reserves. Similar to the case of phosphates these are located primarily in the north in Jordan and Israel. However, despite only modest reserves of potash, the Middle East is a net-exporter of the nutrient as there is very limited intra-regional consumption of fertilizers.
1.3 FERTILIZER MARKET DYNAMICS

1.3.1 Demand Drivers

Fertilizer demand growth is a function of:

- Population growth.
- GDP growth.
- Government policies on tariffs and subsidies.
- Environmental implications of fertilizer use including biofuels.

The dramatic historic and projected rise in global population, the main driver for fertilizer growth, is shown in the figure below. Unsurprisingly, different regions are expected to show vast variations in population growth. Asia Pacific and Africa are forecast to show a rapid increase in population size, while in Western Europe and North America’s population is expected to remain almost constant up to 2030. Therefore, demand growth for food and hence fertilizers are expected to be significantly higher in Asia Pacific than in the West over the outlook period.

![Global Population Growth](image-url)

In the long run the second most important factor in fertilizer demand growth is economic development. Production of food is first and foremost a vital factor for the survival of human
kind. Consequently, basic food consumption is highly inelastic. However, similar to other
goods the quality and variety of food that is consumed increases with an increase of disposable
income. The production of one kilogram of beef requires a multiple of the volume of fertilizers
for the production of for instance one kilogram of grain. The development of economic
prosperity therefore also drives fertilizers consumption.

Similar to the case of population growth, economic growth is the highest in developing regions
such as Asia Pacific, South America and the Middle East. Consequently, the increase in
fertilizer consumption driven by economic development is also expected in developing nations.
Despite slower economic growth rates, West Europe and North America on the other side are
expected to continue having high disposable incomes per capita allowing its residence to
continue consuming high quality foods that require high fertilizer utilisation.

Regional consumption of fertilizers is naturally constrained by the size of its arable land. Especially in populated areas which lack the availability of much arable land such as the
Middle East population and economic growth can only determine fertilizer consumption growth
to the physical limit of its arable land size. A similar constraint to the issue of arable land size is
the availability of water. As an essential ingredient to agricultural production the lack of water
naturally constrains the development of crop production on a large scale. Although in some
parts of the world where the cost of energy is comparatively low there are large scale seawater
desalination efforts undertaken which offer a solution to water availability. However, the often
subsidised desalinated water is generally more expensive than water sourced from fresh water
reserves pushing the production costs of crops up. Another example of overcoming the
constraint of a lack of arable land is the use of modern agricultural techniques such as
hydroponics. This is a method of growing plants using mineral nutrient solutions in water
without soil. This technique is widely used for bio-research purposes. Although there are
several large scale hydroponic farms around the world the economics of growing plants using
this method are generally less favourable than using arable land.
Global Relative Population, GDP and Arable Land Distribution, 2011
*(in percent of global total)*

Whereas population and GDP are growing relatively fast, arable land is a more stable figure, constrained inter alia by land mass, topology, fresh water sources, climate, and soil composition. As can be seen from the figure above the relative distribution of population vs. GDP vs. arable land is by no means even. Changes in GDP and population distribution across the globe will inevitably have an effect on where food will be produced and consumed as well as the trade flows of food. Consequently the consumption of fertilizers will be influenced as well. In how far trade routes of fertilizers will change also depends on the supply side of the fertilizer industry.

### 1.3.2 Consumption

Nitrogen is by far the most consumed of the three main nutrients. Around 134 million tons of nitrogen were consumed in 2011 (59 percent of total) compared to only 59 million tons of P2O5 (26 of total) and 34 million tons of K2O (15 percent of total). When farmers find themselves under cost pressures, they are more likely to forego phosphate and potash application for a season as this has less impact on yields than foregoing nitrogen fertilizers.

Asia Pacific unsurprisingly consumes the largest volumes of fertilizers of all regions with a total volume of 113 million tons while the Middle East consumes the least with only 12 million tons in 2011. Interestingly, the amount of nitrogenous fertilizers consumed in the Middle East is unusually high with 78 percent of the total nutrient value. Similarly the amount of phosphorus consumed in Africa is much higher than the other two main nutrients with 63 percent of the total nutrients consumed. As Africa has the largest reserves of phosphate rock and the Middle East...
the largest natural gas reserves in the world relative prices for these nutrients respectively are comparatively low in these regions.

Global N vs. P vs. K Consumption, 2011

1.3.2.1 Ammonia

In 2011, approximately 55 percent of ammonia was used to make urea (the most applied and traded fertilizer globally), and the majority of this urea is consumed as direct application fertilizer. An additional 35 percent of ammonia production is consumed as other fertilizers, namely ammonium phosphates (7 percent), ammonium nitrates (12 percent), other N fertilizers (13 percent) and direct application fertilizer (three percent). The remaining ten percent is for industrial applications. The proportion of urea consumed in industrial applications has been fairly constant over the past decade, but is expected to increase in the long term. Among fertilizer applications, urea has been steadily increasing its share of total ammonia consumption (from around 48 percent in 2000 to 55 percent in 2011). Nexant believes that this trend is set to continue, albeit at a slower rate.
The top three consuming regions are Asia Pacific (with China and India accounting for the majority of the demand), North America and Eastern Europe. Unsurprisingly, these are also major fertilizer producing regions. North America and Western Europe are mature markets and thus are expected to show slow growth over the next 15 years. On the other hand, South America and the Middle East are expected to experience ammonia demand growth much above global GDP. Consumption in Africa is also forecast to grow strongly.

Ammonia consumption in the Middle East grew rapidly at over six percent per year between 2000 and 2011. Growth is expected to continue, albeit at a lower rate, due to low cost gas feedstock availability encouraging investment in new integrated ammonia/urea units. In 2000,
6.0 million tons of ammonia was consumed in the region, but by 2030 Nexant predicts that demand will more than triple. In 2011, the major ammonia consuming countries in the Middle East were Saudi Arabia, Qatar and Iran. The Middle East is a small fertilizer consuming region. The majority of ammonia in this region is consumed to produce fertilizers for export. For example, the region exported over 14 million tons of urea in 2011 (and urea net trade was around 12.8 million tons). In 2011, urea accounted for 86 percent of total ammonia consumption, with the remainder spread between ammonia phosphate fertilizers, ammonia nitrate fertilizers, other N fertilizers, and industrial uses.

1.3.2.2 DAP

The main phosphorus fertilizer used and traded today in terms of nutrient and product volume is di-ammonium phosphate (DAP). DAP is consumed principally in fertilizer applications and is applied directly to soil in its pure form or as a blend with other fertilizers. Its excellent handling properties and its N-P-K nutrient composition of 18-46-0 makes it well suited to both large scale and small scale agriculture. Non fertilizer applications include its use as a fire retardant, as an additive in some cigarettes and to control precipitation of alkali-soluble and acid-insoluble colloidal dyes in wool.

Fertilizer market conditions strengthened as the global economy recovered from the downturn in 2008 when DAP prices reached $1200 per ton, up from an annual average of $433 per ton in 2007. Since June 2009 prices have increased strongly at a monthly average increase of three percent while continuing to be volatile. The global consumption of DAP in 2011 was 33.3 million tons.

India is the largest consumer of DAP and in 2011 accounted for around 32 percent of global demand, followed by China with 28 percent. The figure below shows the global DAP consumption by region in 2011.
The demand for fertilizers is relatively inelastic as a minimum amount of food has to be consumed regardless of its price. This is best shown in the price spike of 2008 when DAP prices increased around 300 percent from the previous year while the consumption of DAP only retracted by 3.2 percent. The consumption of fertilizers in general is mainly driven by population growth and the changes in GDP per capita that influence food preferences and consumption. The large populations of China and India, which are experiencing considerable increases in per capita income, are affecting global food consumption patterns and thus influencing fertilizer demand. India and China are expected to remain the largest consumers of DAP in the foreseeable future.
1.3.2.3 **Potash**

Although potash accounts for the smallest volumes of the three main nutrients it is still a vital ingredient for healthy plant growth and high agricultural yields. Similar to the other three nutrients consumption volumes are typically highest in populous developing regions such as China and India.

![Global Potash Demand by Region, 2011](image)

Source: International Fertilizer Association and Nexant analysis

Unlike ammonia and phosphate rock, potash is often applied directly to the soil in the form of MOP or SOP. However, there are numerous different compound fertilizers with vastly different N-P-K nutrient ratios. The two other main nutrients N and P both have compound commodity grade fertilizer products such as DAP and MAP whereas for potash there is no commodity grade compound fertilizer. This makes market analysis of this product highly complex. Typically the volume of potash applied directly to the soil is higher than for compound potash applications. This however is not the case in all regions. Mainly in Europe the amount of compound potassic fertilizers is higher than the consumption volumes of straight potash.
1.3.3 Supply and Trade

1.3.3.1 Ammonia

In 2011, the global installed ammonia capacity was 209 million tons per year.

Over past years, global ammonia capacity has been seen to migrate to regions with cost competitive feedstock. During the recent economic crisis, a significant amount of capacity in Western and Central Europe was idled - some on a short term basis, but some production is likely to be closed permanently in the longer term due to the sustained high gas prices. Facilities in China mostly use coal as a feedstock and the cost advantages are far lower than regions with low cost natural gas resources. These coal based capacities will experience temporary shutdowns during a low market, when demand is low, e.g. 25-35 percent of Chinese capacity chose to cease production during the recent economic crisis.

As shown earlier, the Middle East as a region holds the largest gas reserves in the world. It is hence not surprising that the Middle East is one of the regions where ammonia capacity has developed rapidly especially as gas is generally priced highly competitively within the region. The Middle East currently is the third largest producer of ammonia behind Asia Pacific and Central & East Europe and further capacity additions can be expected in this region. Unlike Asia Pacific, the Middle East however produces almost exclusively for export due to the lack of arable land. Nitrogen produced in the Middle East is exported as ammonia and to a larger extent as urea (after conversion from ammonia).
1.3.3.2 DAP

Phosphate rock similar to ammonia is typically not directly applied to the soil but processed into phosphoric acid which in turn is processed further into products including ammonium phosphates and NPK fertilizers. The main phosphorus fertilizers include di-ammonium phosphate (DAP), mono-ammonium phosphate (MAP), triple superphosphate (TSP) and various NPK grades. The largest volume (on a product and nutrient basis) phosphate fertilizer consumed and traded in the world is DAP.

Production of DAP tends to be concentrated in the countries where phosphate rock is available. Long term access to low cost rock reserves is essential in order to be competitive. China is the world’s largest producer of phosphate rock and most of its rock is for the domestic market. Morocco is the second largest producer having overtaken the U.S. in 2010. Morocco is the largest exporter of phosphate rock, accounting for around 35 percent of the total phosphate rock exports in 2010.

Asia Pacific as a region is the largest producer of DAP followed by North America and Africa, which has taken over as the world’s third largest producer from India. In 2013 the total global capacity of DAP stands around 57 million tons of which 29 million are located in Asia Pacific, 12.7 million tons in North America, 5.5 million tons in Middle East and 5 million tons in Africa. Most capacity addition over the past few years have been taken place in Asia Pacific (China in particular), Africa and also the Middle East. The Middle East’s capacity was boosted by the major Ma’aden fertilizer complex in Saudi Arabia. The plant with an estimated production capacity of three million tons of DAP/MAP receives the phosphate rock from the company’s own mines in Al Jalamid. The complex is further back-integrated into ammonia, and sulphuric acid production. Ma’aden is currently developing a significant expansion project of its phosphate operations which would further enhance the regions net-exporting position with regards to phosphates.
Over the long term Asia Pacific is projected to continue to import DAP while net-exports from the US are expected to decline due to maturing phosphate deposits in the US. China became a net exporter of DAP in 2007 and it is expected to remain in this position over the medium term while India will continue being the largest net-importer of DAP in the world.

**Global DAP Production Capacity**

Potash

In 2011, the total potash production worldwide exceeded 34 million tons per year most of which was consumed as fertilizers. Demand for food and animal feed has been on the rise since 2000 as a result of annual population growth. Almost half of the potash consumption occurs in China, South America and North America. China is the biggest single consumer with 6.8 million tons per year, which constitutes 20 percent of global demand for potash.

Potash is typically produced in form of MOP and SOP and unlike phosphate rock often applied directly to the soil as fertilizer. However, large amounts of MOP and SOP are further used in the production of other fertilizers such as compound NKs, PKs and NPKs. The form in which the largest volumes are traded internationally is MOP. Typically, potash is imported in the form of MOP and then further processed domestically. However, various NPK grades are also traded in large volumes internationally.

It is expected that North America, Central and East Europe, and the Middle East will remain net exporters of potash while all other regions are expected to remain net importers in the foreseeable future.
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Global Potash Supply by Region, 2011
(34.3 million tons of K2O)

- North America: 34%
- Central & East Europe: 34%
- Middle East: 11%
- South America: 11%
- Western Europe: 9%
- Asia Pacific: 8%
- Africa: 0%

Source: International Fertilizer Association and Nexant analysis
1.4 CONCLUSIONS (IMPACT ON GCC)

1.4.1 Ammonia

Feedstock costs typically make up the largest part of the total cash costs of production for ammonia and other fertilizers. Hence in the case of ammonia, the natural gas price is the most important determinant of production costs. The Middle East as a region has the largest natural gas reserves in the world. Domestic gas prices in this region have historically been substantially lower than in other parts of the world which has led to a significant build-up of ammonia/urea capacity over the past decades.

Lower gas prices in the US in recent years have substantially reduced cost of production for ammonia. In 2008, the average Henry Hub price for the year was $8.70 MMBtu and the cost of production for an ammonia producer was approximately $355 per ton. However, by 2012, shale gas developments drove the US gas price down to an average of $2.75 per MMBtu, resulting in an ammonia US Gulf Coast (USGC) leader plant having cost of production of $141 per ton. This was even lower than ammonia delivered costs to the USGC from an Arabian Gulf Leader plant, which currently receives gas at $0.75 per MMBtu, as it incurs substantial freight costs. Gas prices in the US in 2013 have in the meantime bounced back to a year to date average of $3.77 per MMBtu, increasing cash cost of production for ammonia to $177 per ton, while delivered costs from an Arabian Gulf Leader plant have decreased slightly to $169 per ton due to marginally lower fuel prices, which decreased freight costs to the US.

Ammonia Delivered Cost to USGC (Houston) in 2008, 2012 and 2013 for US and Arab Gulf Producers

Source: Nexant’s Ammonia and Urea Strategic Business Analysis 2013
This change in competitiveness within a timeframe of only two quarters underpins the importance of gas prices in the production of ammonia and the price volatility of this commodity in the U.S. Due to the geographic location of some of the shale gas deposits and a lack of midstream infrastructure to distribute the gas to consumers, there is currently some imbalance in gas wholesale prices throughout the U.S. which can vary by more than $1 per MMBtu.

The recent generally lower gas prices in the U.S., in combination with high ammonia prices have led to a number of companies announcing capacity developments in the country. The issue of how much ammonia capacity will be added in North America is an important topic that concerns the whole industry. During 2012, a whole host of companies announced new capacity in the region with a potential combined new capacity of ten million tons of ammonia in North America by 2020.

However, typically not all announced projects actually materialise. Due to expected lower production of gas from conventional fields and an increase in LNG export capacity, Nexant does not expect the low gas prices in the U.S. to be sustainable in the long-run, albeit they will not return to 2008 levels, and hence it is unlikely that all announced new ammonia capacities will actually be developed.

In how far any additional gas supplies would materialise into the development of ammonia plants rather than for other applications such as power production is not clear. Generally speaking, the production of shale gas is expected to remain more expensive than gas production from conventional gas deposits which in the case of the Middle East are abundant. It can therefore be expected that despite current debates of increasing gas prices in the Middle East and GCC in particular to levels which would be still far below international gas prices, the Middle East will continue to enjoy a feedstock advantage over other regions in the world in the case of ammonia. This will lead to new capacity developments and higher net-exports of ammonia/urea in this region as its delivered costs to the high volume and high growth Asian markets will remain lower than those from the US (which has both higher gas and freight costs to these markets).

1.4.2 Phosphates & Potash

The Middle East as a region has the second largest phosphate reserves in the world trailing only Africa (albeit at a significant distance). Phosphate rock in this region is primarily found in the north. Development of phosphate mines in some of the countries in the Middle East is currently operationally difficult due to political tensions such as in Iraq and Syria.

Similar to the case of ammonia, the cost of production of phosphate and potash fertilizers is highly influenced by the cost of raw materials. As such the cost of providing phosphorous is a deciding factor for the development of phosphoric fertilizer capacity. In locations with high fertilizer demand which in the Middle East includes for example Turkey, there are fertilizer plants which source its phosphorus through imports of phosphoric acid due to the higher content of P2O5 compared to phosphate rock and the subsequently lower transportation costs per ton of nutrients. Potash, for the production of NK, PK or NPK fertilizers is usually imported in the form of MOP or SOP. Typically, these plants produce fertilizers for the domestic market and only export surplus production.
Especially for countries in which fertilizers are produced mainly for exports, it is economically absolutely essential that raw materials are sourced more competitively than regions with high fertilizer net-imports/consumption in order to compensate for lower net-backs as a result of freight costs. Fertilizer producers in the Middle East and GCC in particular typically have this advantage (as described above) in terms of natural gas as a source for the production of the nitrogen component of fertilizers but less so in the case of phosphates and almost no advantage in terms of potash. One exception is the Ma’aden project in the north of Saudi Arabia which is back-integrated into phosphate mines.
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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 likeminded 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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Nexant Overview

Nexant is an independent international energy consulting company with over 600 professional consultants in offices located around the world, including San Francisco, New York, Houston, London, Bahrain, Bangkok, Shanghai, Tokyo, Seoul, Beijing, and Buenos Aires.

Nexant includes Chem Systems which was acquired in 2001 and has been providing management consulting services to the petroleum and chemical industry since 1964.

Nexant offers its clients independent insight and understanding. Our extensive technical experience and resources, provides expertise to clients in several areas, including:

- Strategy and business planning
- Master planning/feasibility studies
- Techno-economic and commercial analyses
- Transaction related support (project finance, M&A, privatisation, private equity)
- Financial evaluation

Graham Hoar holds the position of Vice President, Middle East. He leads Nexant’s Middle East energy and chemicals consulting activities and has extensive experience of working with a broad range of clients across Europe, Middle East, Africa and Asia. Graham has strengths in strategic planning, commercial and techno-economic analysis as well as extensive global experience in project and business evaluations/privatisations. He has also provided commercial and technical due diligence support for M&A and project finance activities. Graham also leads Nexant’s global activities in C1 Chemicals & Fertilizers.

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