



## AFRICA FERTILIZER MARKET OUTLOOK: Challenges and Opportunities for GCC producers

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**Background:** This white paper was published in GPCA Conference 2018, in Oman. This is the second such publication produced by Nexant on Africa Fertilizer industry. The white paper provides insight into the opportunities and challenges for developing Africa's fertilizer market as well as the opportunities for GCC producers to invest in the fertilizer industry in African countries.

The importance of Africa cannot be undermined; it continues to offer perhaps the greatest growth opportunities with regards to fertilizer consumption but faces obstacles that hamper its potential.

In this white paper, we address the current development of the nitrogen fertilizer sectors: ammonia, urea, and ammonium nitrates (AN). The report provides recent statistics on demand and supply of these products as well as consumption by end use. Opportunities and challenges in Africa market have been discussed. At the end of the report, recommendations are provided for GCC producers to grasp the opportunities ahead and facilitate required changes in Africa. There are various ways for GCC producers to get involved in Africa's Green Revolution, given the GCC's strong fertilizer export position, strategic geographic location, financial strength, operational experience and access to other supporting sectors such as logistics. The challenges might seem significant but given the untouched nature of much of the African continent's agricultural sector, so are the opportunities and options of developing a business case in Africa.

## Introduction

Africa's economic development accelerated in the years following 2000, making it the world's second fastest growing region after Asia and equal to the Middle East. Africa has the world's fastest growing population with more than 40% of global population growth expected to occur in the region between now and 2050. Compared to other developing regions, fertilizer consumption in Africa has increased only marginally over the past four decades. To address the growing challenge of food security, given the large population growth, fertilizer under-application and low crop productivity, African leaders adopted the Abuja Declaration in 2006, which called for increasing average fertilizer use in Sub-Saharan Africa from less than 10 kg per hectare to at least 50 kg per hectare by 2015. In reality only ca. 17 kg per hectare are projected to be achieved in 2018. Although some could argue that this is only a modest improvement, compared to the initial target, it is an early indication that things are gradually moving in the right direction. As a comparison, the average application rate in North Africa is 120 kg per hectare, which is the highest on the continent.

As implied earlier, fertilizer consumption is key to Africa's food security. Africa continues to offer perhaps the greatest growth opportunities with regards to fertilizer consumption but faces obstacles that hamper its potential. To boost agricultural productivity, African countries require a higher degree of mechanized agriculture and increased fertilizer use. Micro-dosing, private sector investments, improved access to credit, reduction in import costs, smart subsidy programs and accelerated sustainable soil practices are a few factors that could also help Africa realize its Green Revolution dream. The challenges to developing efficient agricultural production in Africa are many but so are the opportunities. GCC fertilizer producers could now play a pivotal role in helping to realize this goal, while generating significant business opportunities along the way. This report addresses the current development of the nitrogen fertilizer sector, its challenges that put a break on the potential development of the fertilizer industry in Sub-Sahara Africa and the opportunities for GCC producers to facilitate change.

## Nitrogen Fertilizer Outlook in Africa

### Ammonia

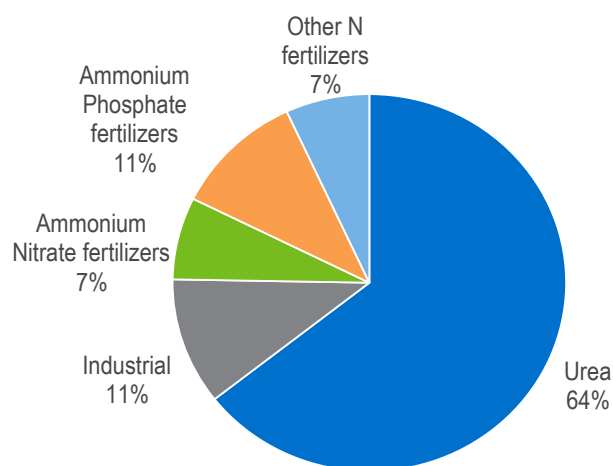
Africa consumes relatively small amounts of ammonia, especially considering the size and population of the region. Consumption totaled an estimated 7.3 million tons in 2017. However, there is ample low cost gas feedstock and investments have been planned to monetize some of these reserves, including by developing new ammonia and urea production facilities. Although the majority of the production capacity is currently located in North Africa (e.g., Algeria and Egypt), it is likely that new capacity will be added on the West coast in the coming years. There is also an increasing interest in monetizing new gas finds on Africa's east coast as well.

For example, Yara recently announced a new ammonia/urea facility in Mozambique, making use of the country's vast offshore natural gas reserves. Yara is also considering building a terminal in Tanzania and a potash mine in Ethiopia underlining the Norwegian company's trust in the long term importance of the African agricultural market. However, new projects in Africa develop very slowly due to political and security uncertainties, difficult bureaucracy and limited access to finance. This is the case in a number of fertilizer projects in the region such as in Nigeria, Gabon, Tanzania, Kenya, Cameroon, Equatorial Guinea and Mozambique at various stages of development. It is expected that if and once these projects proceed they would substitute a significant amount of fertilizer imports to the region and will also help drive internal demand.

Approximately 64% of ammonia is used for urea production in the region. Ammonium nitrates (7%) and ammonium phosphates (11%) are also important end uses. Ammonium nitrate production is concentrated in Egypt and South Africa, while ammonium phosphates are mainly produced in Morocco and Tunisia. Phosphate rock supply is expected to increase, resulting in increased consumption of ammonia into ammonium phosphates. OCP brought an additional 2 million tons of DAP/ MAP/NP capacity online in Morocco in 2017 after slurry pipeline technical setbacks postponed such plans in 2015.

Higher disposable incomes fuelled by increase in GDP as well as a fast growing population could result in higher crop demand in the region. The vast availability of potential farm land will support domestic crop production in the future. As mentioned previously, there has been growing interest in developing ammonia and urea capacity in various parts of the region. However, it is likely that some of these projects will get delayed or cancelled due to an increasingly more difficult international market environment (as a result of oversupply), limited access to financing for projects in Africa and, in some cases, concerns about access to feedstock.

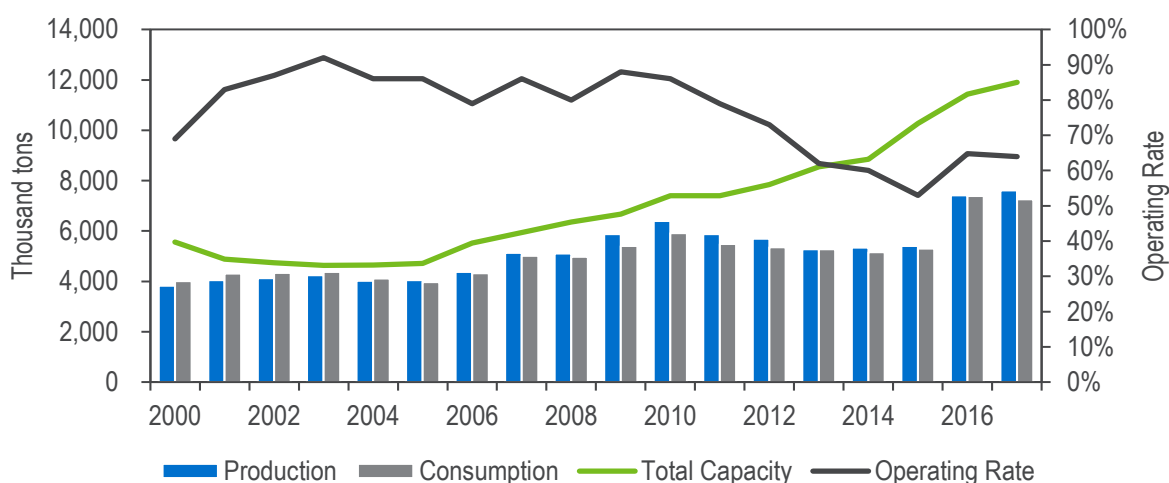
**Figure 1: Africa ammonia demand by end-use (2017 estimate, demand = 7.2 million tons)**



There are a number of countries in Africa with significant hydrocarbon reserves. Developing these reserves however can be slow and politically challenging. The importance of a well-functioning upstream natural gas sector for downstream investments can be seen in one of the largest fertilizer exporters in the world – Egypt. Following political unrest and a lack of investment into the upstream hydrocarbon sector, Egypt resorted to importing liquefied natural gas (LNG) to augment supply. Until new fields enter service, project development is ultimately contingent on the resolution of ongoing supply issues.

Current gas supply issues in Egypt will be mitigated by the startup of the Zohr gas field. The 2015 discovery of the 30 trillion cubic feet field provided a much needed boost for the country's upstream sector. Undoubtedly, it is hoped that additional discoveries will provide further security of gas supply. The possibility also exists for Egypt to augment domestic production with imports from some neighboring countries, including Cyprus, thereby diversifying and broadening the country's supply base.

**Figure 2: Africa ammonia supply and demand (2000-2017)**



Ammonia capacity in Africa stands at about nine million tons, with Egypt alone accounting for more than 50% of this capacity. While new gas supplies for Egypt could be used to develop new ammonia and urea plants, existing end users will most likely have priority for the allocation of incremental volumes. Given the growing volume of urea available for global trade, it will remain a challenge to secure financing for new ammonia and urea projects in Egypt until the market and prices recover. Despite the recent strengthening of fertilizer commodity prices, Nexant maintains a conservative outlook towards ammonia and urea capacity additions in Africa over the next decade. Some of the most prominent projects in the region are listed below.

- Brass Fertilizer and Petrochemical Company have secured a 25-year natural gas supply contract for 300 mmscf per day from Shell Petroleum Development Company of Nigeria. The gas will be used in the production of methanol and ammonia-urea plants, which the company is currently constructing. The plant capacities are 1.3 million tons per year of urea, and 792 000 tons per year of ammonia. The plants are expected to be on stream post 2020.

- Singapore based commodity firm Olam is planning to construct USD 1.3 billion ammonia-urea fertilizer complex in the West African nation of Gabon. The project was planned to commence operations by the first half of 2014 and run at full capacity of 2,200 metric tons of ammonia and 3,850 metric tons of urea per day by 2015, producing a total of 1.3 million metric tons of urea per annum. However, the start-up was delayed to 2018.
- Dangote is planning to construct a 2.6 million tons ammonia urea complex in Lagos, Nigeria by 2020. The plant was expected to start construction in the second half of 2018 but to Nexant's understanding the project may have been facing delays.
- Indorama Eleme Fertilizer & Chemicals has awarded the technology licensing, basic engineering design contract for a new ammonia plant to KBR. The plant is proposed to be built in Port Harcourt, Nigeria. Information about the timeline for the project, the new plant's capacity, and the end use of ammonia has not been disclosed yet.
- Gujarat State Fertilizers and Chemicals (GSFC) have proposed a new ammonia/urea complex in the Republic of Congo. GSFC signed an agreement with the government of Republic of Congo on 17 April, with an aim to enhance the agricultural growth in Africa. The project is still considered speculative.
- International Finance Corporation (IFC) is supporting the construction of 100,000 tons per year fertilizer plant in Nakrau County, Kenya. The plant is being built by Fertiplant. IFC has given a loan of USD 10 million to Fertiplant.

As a result of some of these projects potentially materializing, production is expected to keep pace with the growing demand. There is an even more optimistic scenario, but an unlikely one in Nexant's view that Africa's demand will grow at considerably faster rates due to the availability of local production and positive underlying consumption drivers. Africa is now a net exporter of ammonia since 2007. Operating rates are expected to vary from country to country, but Africa as a region will have relatively low operating rates due to feedstock supply issues and low production rates in politically sensitive areas such as Algeria, Nigeria and others. Natural gas supply issues in Egypt have further contributed to the low operating rates in the region. South Africa has the highest operating rates among the African countries.

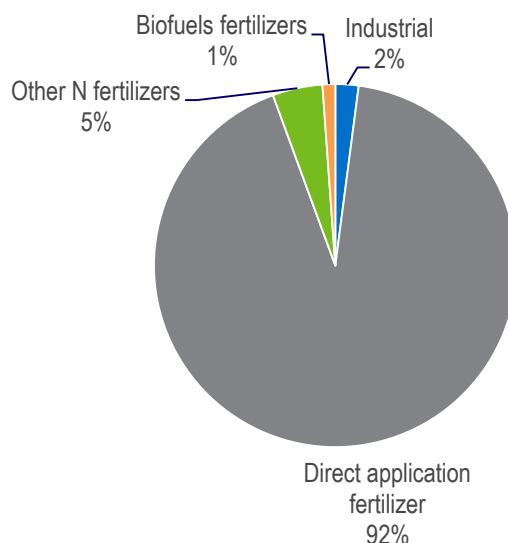
Africa's net exports are expected to spike in the short to medium term, with the start-up of new facilities in Nigeria, but then expected to decline given the slower pace of capacity additions, the political issues, and the frequent disruptions in the gas supply in the region. However, should capacity additions materialize in Equatorial Guinea, Egypt, Mozambique etc., Africa definitely has the potential to become a larger exporter of ammonia in the future.

## Urea

Urea demand in Africa in 2017 was estimated at 4.9 million tons, with around 92% consumed in direct fertilizer use for food production. Maize, cereals and pulses are major crops in the region.

The largest consumers in Africa are Egypt and South Africa. Fertilizer consumption growth is expected to be modest in the near term, mainly attributed to significant socio-economic difficulties that many of the large economies on the continent are facing. Apart from security concerns in many countries which pose a significant hurdle for economic development, the lack of financial means to purchase fertilizers and the lack of education about the benefits of utilizing fertilizers are the main reasons for the relatively slow average growth in Africa. Although there are few programs in place which aim at increasing the use of fertilizers in Africa, significant demand growth is only expected in the mid- to long-term.

**Figure 3: Africa urea demand by end-use (2017 estimate, demand = 4.9 million tons)**



Africa, with 9.4 million tons of urea capacity, accounts for less than 5% of the global urea capacity. Egypt alone accounts for about 70% of the urea capacity in the region.

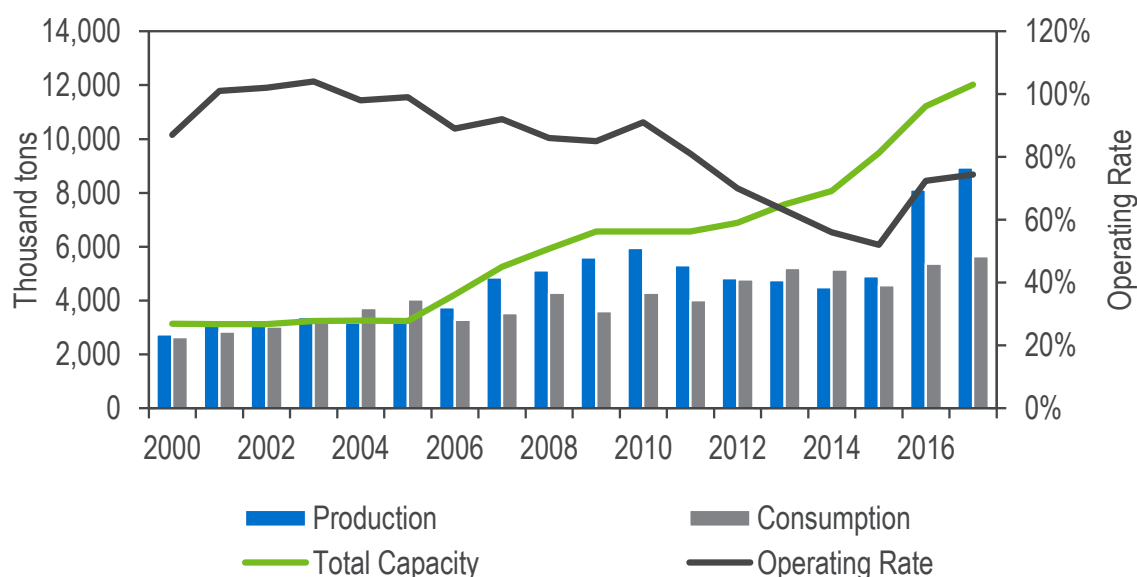
In the past two years, urea capacity has increased by about three million tons in Africa. Indorama Eleme Fertilizer & Chemicals (IEFCL) started production at its 1.4 million tons per urea plant in Port Harcourt, Rivers state in Nigeria in 2016. Misr Oil Processing Company (MOPCO) started operation at one of its urea-ammonia complexes in 2015, with a urea plant capacity of 650 000 tons per year, and started up another complex in the fourth quarter of 2016.

In several African countries including Egypt, Libya and Algeria there have been political instabilities in recent years, which have had a strong influence on production levels. As political tensions in these countries have not yet eased fully, Nexant assumes operating rates to remain rather low in the short-term, especially in the light of new capacity coming onstream globally. Despite the political challenges, capacity in North Africa will be cost competitive due to relatively low cost of natural gas.



Additional capacity will contribute to Africa's growing export basis. Africa is, however, not expected to rival the Middle East in terms of net export capacity any time soon. This is mainly because Africa's domestic demand for urea is expected to increase given the region's large and growing population as well as its favourable climate and availability of farmland, lowering the availability of capacity for export. In addition, new projects in Africa are expected to take substantially longer to develop compared to the Middle East. Recently, there has been an increasing interest from Egypt to develop integrated ammonia/ urea production facilities, despite the natural gas supply shortages the country has been facing which caused much of the country's LNG export capacity to remain idle. In fact, Egypt imported LNG to fulfil its increasing energy and industrial needs. The government recently announced that LNG imports have been halted since June 2018 reflecting the improved conditions in the upstream sector.

**Figure 4: Africa urea supply and demand (2000-2017)**

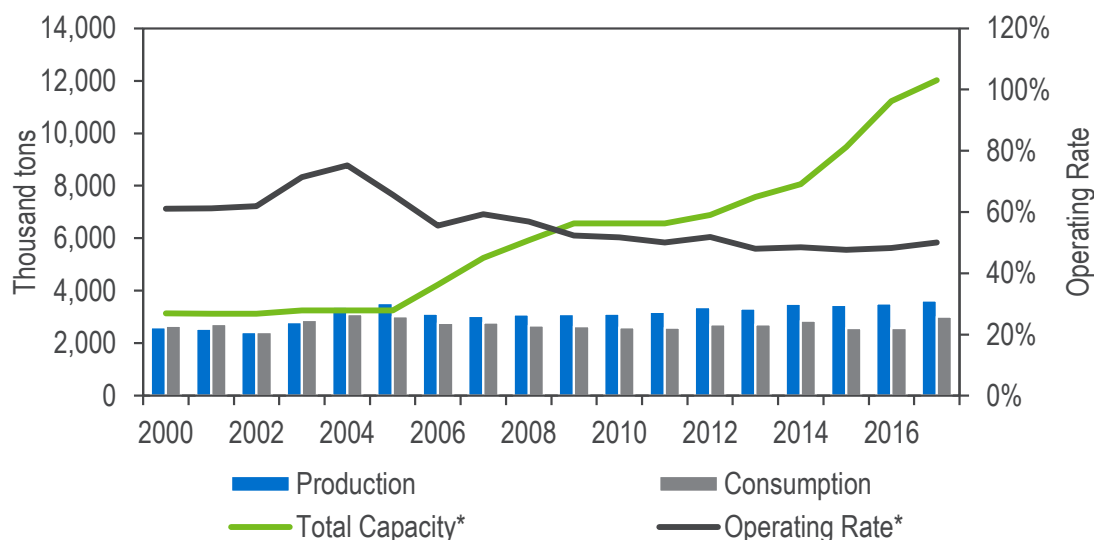


## Ammonium Nitrate (AN)

There are only few ammonium nitrates producers in Africa. The two countries that account for ca. 90% of Africa's total ammonium nitrates production are South Africa and Egypt. The region is a net importer of ammonium nitrate (AN) and calcium ammonium nitrate (CAN) but an exporter of urea ammonium nitrate (UAN). Ammonium nitrates demand in Africa consists mainly of AN with a relatively small market for UAN and CAN. Africa consumes AN in both explosive grade (EGAN) and fertilizer grade (FGAN) applications. South Africa is by far the largest consumer of EGAN with a share of around 80% of the region's demand. About half of the EGAN in South Africa is consumed in the coal mining industry. The country is one of the world's top coal producers and exporters. Rising demand for coal domestically and internationally is expected to increase the demand for EGAN in this country in the future. Also in other parts of Africa, there seems to be interest in expanding mining activities pushing the region's demand up in the future. Similar to the case of the Middle East, Nexant expects that much of the demand for EGAN will be met through imports given the security concerns in many parts of the continent despite a generally favourable feedstock position. Consumption of UAN and CAN is expected to remain relatively small. UAN solution is particularly effective when applied through irrigation systems. The lack of irrigation infrastructure in Africa will likely dampen the domestic demand growth for this nitrogen source.

However, in the light of feedstock availability and the general interest to develop additional ammonia/urea capacity it is possible that some UAN capacity will be developed over the forecast period, which will mainly target the export markets and strengthen the continents' net exporting position.

**Figure 5: Africa ammonium nitrate supply and demand (2000-2017)**



\*Operating rate & capacity is shown for the sum of AN and CAN



## Challenges in Africa

Africa offers perhaps the greatest growth opportunities with regards to fertilizer consumption but faces obstacles that hamper its potential. Constraints affecting the performance of fertilizer markets could be broadly divided into three groups: market development, technical and infrastructure constraints.

- **Market development constrains:** Well-functioning markets need an enabling policy environment, adequate human capital (embodied in marketing, financial, and technical skills), easy access to finance and market information, and effective enforcement of regulatory systems. In Africa, despite some attempts of policy reforms, the policy environment remains uncertain, human capital is lacking certain expertise and skill sets, access to finance and market information is limited, and the enforcement of regulations is ineffective. As a result, fertilizer markets are constrained and currently operate at suboptimal levels.
- **Uncertain policy environment:** The policy environment of the private sector remains uncertain in many African countries.
- **Human capital challenges:** The quantity and the quality of human capital involved in the agricultural business are limited. Quantity refers to the number of “input” dealers available in the country, especially in the rural areas, and quality refers to marketing and technical skills of people involved in the “input” business. As a result, farmers often have to travel long distances to purchase fertilizers, seeds, and other agronomic inputs. The additional travel costs raise the cost to farmers of inputs which are often already expensive compared to other regions given the remote location and limited availability of (imported) agricultural input products. These additional costs to farmers, often further limit the quantities they can afford to purchase or rend them unable to purchase any inputs at all.
- **Limited access to finance:** The fertilizer business is capital intensive, and access to finance is an important determinant of the importers’ and dealers’ ability to conduct their business activities. The banking sector in African countries has limited outreach in rural areas. High interest rates and stringent collateral requirements make it difficult to access finance for business development. Innovative mechanisms are needed to induce banks to lend for agribusiness development.
- **Lack of market information:** Information about fertilizer demand is important for market development because it creates transparency. It enables planning and reduces transaction costs, which facilitates long distance trade.
- **Market size:** Most agricultural input products are imported. Due to low economics of scale in production and procurement, countries using small quantities of these products pay higher prices for both product and shipping. This is affecting many countries in Africa given their small (absolute) agricultural market sizes (compared to other regions).
- **Macroeconomic instability:** Fluctuating exchange rates and high levels of inflation discourage investments in input production, processing, and marketing generally.

- **Technical constrains:** Sound technical knowledge of fertilizer products on the part of farmers is essential to promote adequate and timely supply of fertilizers in the countryside. Poor knowledge of farmers regarding the correct use of agricultural inputs is a serious problem constraining consumption growth.
- **Infrastructural constrain:** Improvement in rural road networks is essential to promote social and agricultural development and reduce transaction costs. In many countries, such as Zambia, Tanzania, Ghana, and Nigeria, main highways and intercity roads are well maintained, but feeder roads linking main cities to other areas are in poor condition, adding to transportation costs and making fertilizers/inputs costly.

## Opportunities in Africa

Demand growth for fertilizers in Africa is much dependent on how the challenges described above are being addressed. This is different from other regions (especially economically developed regions) where fertilizer demand growth is mainly correlated to population and economic development. As such demand growth forecasts will have to take into account a range of different assumptions which may not be so important in other regions. In Africa, opportunities for growth can only be materialized if certain aspects are successfully combined to support the latent growth potential of the African fertilizer market. Some of these opportunities and proposed means to achieve them are listed below.

- **Develop business linkages with importers in coastal countries:** Not all countries in Africa have a coastline. Many countries, such as Mali, Burkina Faso, Uganda, Zambia, Malawi, Congo, Chad, Rwanda, and Burundi, are landlocked. These countries incur high freight costs for transporting goods from the ports to their borders (often up to USD 100 per ton of fertilizer). The mere geographic location of these countries acts against its farmers because these have to pay higher prices for imported fertilizers and (potentially) receive lower netback prices for crop products. Nothing can be done to overcome the landlocked nature of these countries. But by developing business linkages with importers in coastal countries, developing multi country fertilizer markets, improving transportation links (especially railways), and exploring other innovative means, significant improvements could be made in prices and availability of fertilizers.
- **Improve regional trade cooperation:** Regional fertilizer trade cooperation and integration offer some opportunities to achieve economies of scale for the small fertilizer markets common in Sub Saharan Africa. Together with improved market demand estimation through market information systems, access to affordable trade, distribution and retail credit products, and improvements in transport efficiency, there are opportunities to reduce farm gate fertilizer costs.
- **Improve access to finance:** In many countries access to finance for business development is difficult. Interest rates are often high and collateral requirements stringent. To alleviate this constraint, warehouse collateral and bonded warehouses could be explored by commercial banks. At the import and wholesale levels, supplier's credit can be encouraged through proper business linkages. Financial risk can be mitigated throughout the supply chain.

- **Realize the economics of scale:** The size of the fertilizer market is small in many countries. As a result, the individual countries cannot realize the economics of scale in procurement and transportation and end up paying higher prices for imported fertilizers. To realize the economics of scale in procurement and shipping, importers in these countries could form a multi country trading block and import fertilizer in bulk for the whole block. Two such examples include the MZM (Malawi-Zambia-Mozambique) Development Triangle and the Tanzania Zambia-Malawi Block. Pooling import requirements into single transactions can be difficult to organize. This will require a combination of private sector involvement (e.g. in form of trading and logistics companies), supported by national governments providing specific services such as training, technical assistance, and policy workshops.
  
- **Improve infrastructure and transportation arrangements:** Improvements in transportation arrangements for interregional and international trade need to be considered. If small importing countries in Africa link up with big importers additional savings could be realized through economics of scale in procurement. Internal transport costs are high in Africa because of long transport distances and poor infrastructure. The low standard of feeder roads in rural areas adds significantly to the transportation cost of supplying inputs, especially fertilizers, in rural areas. Investment in building and maintaining good roads in rural areas should receive priority in development budgets of national governments. Where rail transport is available, attention should be given to strengthening the capacity on its railway lines because, over long distances, railway freight costs should be cheaper than road transport on a per ton basis. Expensive transportation costs are detrimental to establishing retail market networks because wholesalers are reluctant to transport product to rural retailers where uncertain demand, due to poor seasonal conditions or lack of purchasing power, can result in inventories being carried over to the next season. This can result in products exceeding shelf life and undergoing possible deterioration. Inventory security in rural areas is another constraint to the establishment of retail market networks.
  
- **Increased private sector involvement:** In order to ensure competitive, sustainable and healthy agricultural input business in Africa, private sector involvement (ideally with support from national governments) is crucial. The private sector can be an effective part of establishing input/fertilizer raw material collection and delivery, processing/semi processing, packaging, storage, transportation, and final sale/trade services. Initial success of such involvement can be seen in few existing public-private partnerships (PPPs). For instance, while Yara's Africa Partnership Programmes in Ghana, Malawi, Mozambique, and the United Republic of Tanzania support the agricultural input development by focusing on business development, the governments of these countries provide support and complementary public goods such as investments in roads, irrigation, basic education, market information systems as well as in improving institutions (contract law and enforcement, systems of quality grades and standards).

## Opportunities in the GCC

The GCC is a major global fertilizer supplier and export hub. The low cost of natural gas in the region (and hence the low cost of production) makes the construction of export orientated, integrated fertilizer plants very attractive. GCC could establish PPPs with African countries and invest in the fertilizer supply chain. GCC producers could possibly adopt a value chain approach, looking at the need to address the entire food value chain, debottlenecking through targeted infrastructure investments, public-private collaboration and gaining access to markets for the African farmer.

This concept, “Agricultural Growth Corridors”, is being implemented in Mozambique and Tanzania by Yara. Yara has been strongly promoting PPPs, in order to rally support for much needed investments. Particular attention has been given to smallholders – the great majority of the continent’s farmers, encouraging local entrepreneurship and market development to make farming a viable business.

There is high fertilizer production growth potential for African countries with large natural gas reserves. Nigeria has the largest gas reserves in Africa. The gross imbalance in the supply and demand of fertilizer for agricultural productivity in Nigeria gives opportunity to support the need to establish fertilizer plants. Significant gas reserves and policies aimed at reducing gas flaring of associated gas production are encouraging downstream investment and ammonia/urea capacity additions. In order to meet the domestic fertilizer market demand and improve agricultural production, the Nigerian Federal Government decided to reduce the country’s dependence on urea imports and privatize the fertilizer sector by 2015. As part of the government’s privatization plans, Indorama acquired Eleme Petrochemicals Company, a subsidiary of Nigerian National Petroleum Corporation (NNPC) in August 2006. Construction of the fertilizer and methanol plants is part of Indorama’s aim to create the country’s biggest petrochemicals hub. The Indorama Eleme Complex has been a success story of publicprivate partnerships in Nigeria, with several benefits including import substitution of raw materials to over 450 downstream industries; increased crop yields of over 30%; training of 200,000 farmers on the proper use of fertilizers, creation of new jobs and contributing to the prosperity of Nigeria. GCC producers could potentially get involved in some of the domestic African nitrogen fertilizer production projects such as the ones in Nigeria. This can be as financial investors and or operational partners. Many producers in the GCC have acquired a significant amount of operational experience over the past few decades and could partner with African fertilizer project initiates.

With the exception of some phosphates production in Saudi Arabia, the GCC produces mainly nitrogen (ammonia/urea) based fertilizers. The African continent however offers access to vast amounts of phosphate and potash reserves. There is an opportunity for GCC producers to diversify its offering by developing P and K projects in Africa. There are multiple ways such investments could be integrated into the GCC producers’ existing value chains.

The GCC population is expected to double from 300 million in 2000 to nearly 600 million by 2030. This poses a major challenge for the GCC countries. Arable land is very limited and conventional water sources in the GCC spares. The fast-growing population and the expected developments on the industrial side will lead to competition for allocation of scarce water resources. By 2025, domestic water demand is expected to double, and the industrial sector is projected to require three times the current water volume. Desalination will hardly be able to function as a large-scale substitute for conventional water sources in agriculture as it is energy-intensive and costly.

Therefore, African countries like Mozambique, Sudan and South Africa could prove to be important destinations of agricultural investments by GCC countries as they seek to improve their food security. This could be done for example by developing swap deals: fertilizer supply in exchange for taking ownership of crops. Such an undertaking would of course require setting up extensive agricultural commodities trading and logistics operations. The infrastructure development is also considerable and would need to be accompanied by a comprehensive development strategy. GCC producers could establish PPP relationships in those countries (similarly to Yara and Indorama) by developing the fertilizer industry which will help to improve the productivity of the agriculture sector. A major challenge for any Arabian Gulf country that aims at food exports from Africa is the consideration of local food requirements, as most of the countries in question are, at this stage, net food importers themselves. Investments would need to be on such a scale that they could improve local food security (which can contribute to social and political stability), and produce an additional exportable surplus.

There are various ways for GCC producers to get involved in Africa's Green Revolution, given the GCC's strong fertilizer export position, strategic geographic location, financial strength, operational experience and access to other supporting sectors such as logistics. The challenges might seem significant but given the untouched nature of much of the African continent's agricultural sector, so are the opportunities and options of developing a business case in Africa.



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