AFRICA FERTILIZER MARKET DEVELOPMENT
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Introduction

Africa has the potential to become a major fertilizer market. The region is endowed with mineral reserves of the three major plant macronutrients: nitrogen (N), phosphate (P) and potash (K). Moreover, the continent is subject to rapid population and income growth and changing food consumption habits. The pace and diversification of Africa’s food needs will require the region’s farmers to increase agricultural production and yields, which boost fertilizer demand.

However, despite over half of all African employment being in the agricultural sector, the fertilizer industry remains immature. Average fertilizer usage is among the world’s lowest, while farming remains overwhelmingly small-scale and inefficient. There is little incentive for subsistence family farmers to invest in relatively expensive crop inputs.

The growth potential of the African fertilizer market lies largely in its ability to adopt large-scale commercial agriculture. This requires a high degree of local and inter-regional cooperation between public and private sectors, robust policies, institutions and infrastructures among other things.

In this report, we provide an overview of the African fertilizer market, tracking the development of agriculture and demand. We also include supply side fundamentals, including an overview of N, P and K feedstocks, locations and capacity building projects. We describe our expectations for Africa’s fertilizer market and likely implications.

After many false starts, the fertilizer producing members of GPCA must see the realization of Africa’s long overdue potential nearing. GPCA producers have the surplus of nutrients available to export to deficient African markets which are practically on their doorstep.
African fertilizer demand

African fertilizer markets are diverse and nutrient consumption varies significantly between countries and regions. The continent can be split between North Africa, which contains the Maghreb countries (Algeria, Morocco, Tunisia, Libya, Mauritania) plus Egypt. The remaining 41 countries form sub-Saharan Africa (SSA), which can be further divided into four categories (see Figure 1).

Apart from a few countries in the north and south, African fertilizer consumption is extremely low when compared with most of the rest of the world. At around 7 million nutrient tons for combined N, P and K use, it accounts for around 3% of global fertilizer consumption. Where usage is significant, it tends to be concentrated among the major fertilizer producing African countries and/or cash-crop producing and exporting countries. Egypt and Algeria are the major North African fertilizer markets, consuming approximately 90% of apparent North African demand in 2016. In SSA, there tends to be a single dominant fertilizer consuming nation in each of the major sub regions, as shown in Figure 2.

Figure 1: Africa’s regional breakdown

<table>
<thead>
<tr>
<th>Sub-Saharan Africa</th>
<th>North</th>
<th>Central</th>
<th>West</th>
<th>East</th>
<th>Southern</th>
</tr>
</thead>
<tbody>
<tr>
<td>Algeria</td>
<td>Burundi</td>
<td>Benin</td>
<td>Eritrea</td>
<td>Angola</td>
<td></td>
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<tr>
<td>Egypt</td>
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<td>Burkina Faso</td>
<td>Ethiopia</td>
<td>Botswana</td>
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<tr>
<td>Libya</td>
<td>Congo</td>
<td>Cameroon</td>
<td>Kenya</td>
<td>Lesotho</td>
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<tr>
<td>Mauritania</td>
<td>Niger</td>
<td>Cape Verde</td>
<td>Reunion</td>
<td>Madagascar</td>
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<tr>
<td>Morocco</td>
<td>Rwanda</td>
<td>Cote d’Ivoire</td>
<td>Seychelles</td>
<td>Malawi</td>
<td></td>
</tr>
<tr>
<td>Tunisia</td>
<td>Zaire</td>
<td>Gabon</td>
<td>Somalia</td>
<td>Mauritius</td>
<td></td>
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<tr>
<td>Zambia</td>
<td>Gambia</td>
<td>Sudan</td>
<td>Mozambique</td>
<td></td>
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<tr>
<td>Guinea</td>
<td>Ghana</td>
<td>Tanzania</td>
<td>Namibia</td>
<td></td>
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<td>Liberia</td>
<td>Uganda</td>
<td>South Africa</td>
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<tr>
<td>Mali</td>
<td>Nigeria</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nigeria</td>
<td>Senegal</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Togo</td>
<td>Sierra Leone</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Figure 2: Major fertilizer consumers in Africa

<table>
<thead>
<tr>
<th>Region</th>
<th>Main fertilizer consumer</th>
<th>Estimated N, P and K consumption 2016 (’000 nutrient tons)</th>
<th>Percentage of sub-regional consumption</th>
</tr>
</thead>
<tbody>
<tr>
<td>West</td>
<td>Nigeria</td>
<td>327</td>
<td>33%</td>
</tr>
<tr>
<td>South</td>
<td>South Africa</td>
<td>1,282</td>
<td>84%</td>
</tr>
<tr>
<td>East</td>
<td>Ethiopia</td>
<td>273</td>
<td>37%</td>
</tr>
</tbody>
</table>

Source: IFA, Integer

Note that demand and import data in this booklet refers to the main straight nitrogen, phosphate and potash fertilizer products (e.g. urea, DAP, potassium chloride). We have not included compound fertilizers, as consumption is patchy and makes up a relatively small market share of overall African consumption. Also, we have not re-adjusted for re-exported fertilizers; for example, ammonia imported to produce DAP/MAP that is then exported in the final product.
Apparent African fertilizer consumption increased by around 2 million nutrient tons from 2010-2016 with its share of global fertilizer demand increasing marginally from 2% to 3% over that period. This is illustrated in Figure 3.

Aside from Central Africa, there appears to have been a general upward trend in fertilizer consumption over the last 5 years, with the most noticeable jump occurring in 2016, where the rate of growth doubled the previous year.

Nitrogen is overwhelmingly the dominant fertilizer used in Africa, responsible for over three quarters of annual fertilizer consumption. This is mainly in the form of urea but also ammonium nitrates and sulphates. In North Africa, Egypt and Algeria are more than self-sufficient in nitrogen fertilizers, whereas the rest of the continent relies largely on intra-regional and inter-regional trade to feed demand.

According to IFA figures, historical phosphate consumption was almost entirely limited to three source countries: Morocco, South Africa and Tunisia, which accounted for 93% of African P2O5 demand from 2010-2016. These countries are also the continent’s leading finished phosphates producers. In 2016, consumption increased by 0.5 million tons P2O5 with the increase mainly occurring in East African countries. At the same time, Moroccan producer OCP launched its African dedicated phosphate hub and the producer has been quite aggressive in targeting African fertilizer market share, particularly in East Africa.

Potash consumption grew between 2010 and 2016 from 0.4 million tons K2O to 0.7 million tons K2O. Combined, South Africa and Morocco consume half of Africa’s potash annually, some of which is mixed with nitrogen and phosphate to produce NPK compound fertilizers. So far there is negligible primary potash production in Africa, so all product is imported, but there is substantial potential for this to change in future.

Regional fertilizer imports

In 2016, Africa imported approximately 4.3 million nutrient tons of fertilizer and fertilizer imports have generally been on an upward trend from 3.1 million nutrient tons imported in 2011. The import split between products and regions is shown in the next page.

Nitrogen is the most imported nutrient commanding 63% of the combined N, P and K total in 2016, followed by phosphate (22%) and potash (15%). Nitrogen imports averaged 2.5 million tons N from 2010-2016. In 2016, nitrogen imports made up around one-third of the continent’s N apparent demand. Urea and ammonia are the most important forms of N with 44% and 39% of N imports respectively from 2010-2016. Ammonia tends to be imported into the countries with downstream phosphate processing capacities and Morocco is the largest ammonia importer with almost three-quarters of African ammonia imports in 2016. Much of this ammonia is then re-exported in ammoniated phosphate form intra-regionally and beyond.

North Africa dominates regional fertilizer consumption, while nitrogen is overwhelmingly Africa’s most consumed nutrient
Urea imports reached 1.2 million tons N in 2016 and South Africa was the largest importer with 0.4 million tons N. The bulk of Africa’s urea imports come into Southern and East Africa, where it is applied straight or used in dry bulk blends. Aside from Ethiopia, Kenya and Tanzania, Sudan imported 181,000 tons N of urea in 2016, up from 57,000 tons N in 2015. Nigerian urea imports have been declining from 282,000 tons N in 2013 to just 8,000 tons N in 2016. This is a reflection of the country growing its nitrogen self-sufficiency, adding nitrogen processing capacity and increasing capacity utilization rates. Cote d’Ivoire and Ethiopia typically import over 100,000 N tons of urea annually, while imports on the rest of the continent are patchy. Over half of African ammonia imports are sourced from Russia, with the remainder coming from the Caribbean, US and Middle East. Urea is typically sourced from the Middle East (56% in 2016), Russia and other former Soviet Union countries (FSU) (20% in 2016), with the remainder coming from various other sources. Phosphate imports reached 0.8 million tons P2O5 in 2016, showing steady growth from 0.5 million tons in 2011. DAP commands the largest market share, averaging 54% of imports from 2010-2016, followed by MAP (28%) and TSP (8%). Ethiopia and Kenya are the major ammonia phosphates importers accounting for 40% of imports in 2016. Saudi Arabia was the main source of African DAP imports in 2016 making up 39% of the total, followed by Morocco with 36%. Morocco dominates African MAP trade and was the source of 91% of African MAP imports in 2016. There are small volumes of traded phosphate rock and phosphoric acid within the continent, which would typically be sourced intra-regionally from African phosphates producers. Potash imports have increased from 0.4 million tons K20 in 2011 to 0.7 million tons K20 in 2016. Around half of the volume in 2016 came into South Africa, followed by West Africa (29%) and North Africa (20%). Belarus and Jordan are the major potash supply sources to the district in the form of MOP. Fertilizer demand potential There is enormous potential for future fertilizer demand growth which stems from several macro fundamentals. Africa’s population is expected to triple by 2060, with growth driven mainly by SSA. In Africa’s most populous country, Nigeria, the population is expected to reach almost half a billion by 2060 from a present figure of 190 million. The UN’s Food and Agricultural Organisation (FAO) predicts that intra-regional food production will need to increase by a similar magnitude if self-sufficiency is to become a reality. Current application rates in SSA are generally the lowest in the world averaging around 12kg/hectare (ha). To some
extent this figure masks large differences in application rates between cash crop exporting countries – where commercial farming arrangements improve access to fertilizers – and wholly subsistence farming communities, where average farm plots are typically smaller than one hectare. When we compare average SSA application rates to rest of the world averages of 110 kg/ha, it underlines the paltry current use in most of the region and the great potential of Africa’s fertilizer market:

» Crop yields need to improve to feed a growing population

» Fertilizer application rates need to increase to offset soil nutrient depletion and degradation and support higher crop yields

There are several important initiatives aimed at stimulating demand and application rate growth:

» In 2000, as part of the Abuja Declaration to improve socio-economic conditions among the world’s least developed countries, the UN’s World Health Organisation (WHO) set a target for average fertilizer application rates in SSA to reach 50 kg/ha by 2015

» This target has obviously been missed by a considerable margin, and the WHO now expect 17-18 kg/ha by 2021 to be a more realistic goal

» The African Fertilizer Financing Mechanism (AFFM) is affiliated to the African Development Bank (ADB) and was set up solely as a channel to help raise agricultural productivity. AFFM outlined a target of 50 kg/ha application rates to be reached by 2030. However, so far implementation of this mechanism has taken considerably longer than planned

Fertilizer demand constraints

It is clear that Africa has failed to significantly increase fertilizer adoption since the Abuja Declaration targets were set almost two decades ago. Notwithstanding country-specific idiosyncrasies, the major constraints on widespread fertilizer adoption in SSA are very similar between countries and may be summarized as follows:

Political instability: Wars and other forms of social unrest are a major hindrance to any form of development. For example, Tunisian phosphate production is only just beginning to stabilize after several years of disruption which followed the Arab Spring uprisings.

Weak access to credit: Many farmers have been constrained from acquiring the necessary agro-inputs due to a lack of available crop production finance. Agriculture is a business where there is inherently a substantial lead time between realization of input costs and crop revenues, and access to affordable credit is crucial. Similarly, agro-stockists without credit are unable to hold consistent volumes of fertilizer, which further dissuades regular fertilizer usage. In many African countries, a lack of collateral to finance crop production is the main hurdle.

Information asymmetries: Many rural farmers are largely unaware of best crop practices, meaning that fertilizers are applied inefficiently or their benefits are under-appreciated. Nutrients are often applied at sub-optimal time in the pre-cropping window. Furthermore, smallholders are unaware which crops respond best to which NPK combinations, given the soil type. Substantial areas of idle arable land exist throughout the country. However, the International Food Policy Research Institute (IFPRI) suggests that most smallholders would rather open new land to cultivation rather than invest in yield enhancing
technologies on existing land. A lack of historical data on agronomics and fertilizer consumption habits makes it more difficult to formulate accurate and effective training programmes for smallholder farmers. Thus, many farmers fail to see the benefit of using fertilizer.

**Logistical constraints:** There are several logistical constraints for farmers:

» There is often a large distance between farmers and their local agro-dealers and there may be only one dealer serving a village located many miles away. Where farmers have no transport, walking such distances with 50kg fertilizer bags, in addition to seed bags is unmanageable

» Similarly, the distance between the farm gate and crop output markets may be too far for farmers to reach. Transport costs may exceed the potential benefit of selling goods at market

» The 50kg bags often exceed the volume of fertilizer necessary for small farms. However, stockists often have insufficient facilities to repackage 50kg bags into smaller bags

» Outside of the major port-inland routes, most road infrastructure is relatively underdeveloped. As such, high in-land transportation costs make fertilizer unaffordable in the absence of subsidies and other support measures, meaning fertilizer consumption outside of the main transport routes does not make sense. This plays out in reverse, when substantial costs to transport crops surpluses to markets which are often some distance away mean the netback crop price to farmers are substantially reduced

» Inadequate storage infrastructure for grain means that farmers are often forced to sell at low prices, rather than warehousing the grain and selling when they can receive the best price

**Institutional weakness:** In Africa, the role of government is often unable to provide the necessary support to agriculture, and barriers to an efficient fertilizer supply chain remain in place. The following problems are typical:

» Poor implementation of subsidy policies

» Long and overdrawn tendering processes

» Uncertain and inconsistent policy environments

» Different subsidy regimes at federal, state and local government levels

» Instances of patronage and corruption are still widespread throughout the region

**Volatile weather conditions and agricultural markets:** Countries in East and Southern Africa are prone to adverse weather conditions, such as prolonged droughts and floods. Where there is no access to irrigation, the impact on crop production is harder to mitigate. Furthermore, food crop production is often subject to weather-related boom and bust cycles, affecting prices. Uncertain crop prices, dent farmers’ confidence that they will receive a fair price for their crop, so they would be reluctant to pay for fertilizer to boost production.

Relatively weak farmer training and extension services are a further hurdle. Farmers do not get access to knowledge resources necessary to achieve best practice in fertilizer application and benefit from yield improvements.
Africa's increasing fertilizer self-sufficiency is likely to boost future fertilizer demand potential. The continent is endowed with sufficient resources to become both self-sufficient and a net exporting region. However, despite its substantial reserves, primary fertilizer production is confined to 10 countries, of which six are in North Africa. In this section, we give an overview of current fertilizer supply and potential for future growth.

Nitrogen

The foundation of a sustainable and competitive nitrogen industry is the availability of relatively abundant, accessible and reasonably priced hydrocarbons, with natural gas offering the greatest potential, with coal a distant second alternative. Africa is home to some of the world’s fastest-growing oil and gas producing countries, including Nigeria, Egypt and Algeria. Historically, African gas production has been dominated by North Africa, where Algeria, Egypt and Libya account for around half of the continent’s proven reserves and over two thirds of output. Coastal SSA countries with surplus natural gas have the largest potential to exploit their abundant natural gas resources for nitrogen production, including Mozambique and Gabon.

Figure 5: East Africa’s market fertilizer policies

<table>
<thead>
<tr>
<th>Country</th>
<th>Policy Measures</th>
</tr>
</thead>
</table>
| Ethiopia | » Agricultural Development Led Industrialisation (ADLI), launched in 1991, extends to provide high-yield Growth Transformation Plan (GTP) sets out a five-year strategy (2015-2020) to significantly increase yields by providing soil fertility services and increasing investment into rural infrastructures, seed varieties, credit and chemical fertilizers to farmers.  
  » The Ethiopian Government transitioning from DAP to NPS products as a tool to address their crop/soil specific fertilizer programme. |
| Kenya | » The Kenyan Government launched the “Strategy for Revitalizing Agriculture” (SRA) in 2004 with a 20-year plan to improve farmers’ access to modern farming and increase yields.  
  » The “Kenyan Agricultural Sector Development Strategy” (2010-2020) aims to convert Kenya’s agriculture from subsistence to commercial agri-business.  
  » The government (in association with Equity Bank and AGRA) have created a risk-sharing partnership through credit guarantee schemes, providing farmers with credit at low-interest rates. However, most farmers still receive credit from cooperatives or NGOs.  
  » Electronic subsidy program pilot was implemented March 2016 for small scale farmers. Transactions will be electronic and payments by mobile money.  
  » In 2012, Kenyan President Kibaki issued a publication called ‘Vision 2030’ outlining the development plan for the country. Part of the plan is to increase the area of arable land in Kenya by 30% to increase crop yields by providing irrigation to previously non-arable areas. |

Source: International development agencies, World Bank, UN, local governments
In SSA, natural gas production is concentrated in West Africa, where Nigeria is the predominant supplier and the country with the largest proven reserves. Most of Nigeria’s gas reserves are in the Niger Delta. There are a few recently developed and upcoming natural gas projects that are focused on monetizing natural gas that is currently flared.

SSA is one of the few regions with surplus natural gas and the region has the potential to realize significant production increases in the coming decades due to large offshore discoveries off East Africa, particularly Mozambique and Tanzania. Mozambique’s Empresa Nacional de Hidrocarbonetos (the government arm dedicated to developing the hydrocarbons industry) estimates Mozambique may hold ~7.1 trillion cubic metres of recoverable natural gas. Tanzania has discovered substantial reserves in recent years, while Uganda and Ethiopia are increasingly seeing exploration activities. However, the main obstacle is lack of infrastructure to recover and transport gas (and related commercial issues on gas pricing) and significant investment will be needed to help these countries realize their potential.

Wordwide existing coal based nitrogen production is confined almost solely to China, but it is possible that a coal based nitrogen sector could develop in Africa. African coal reserves and production are concentrated in southern African countries with South Africa (where there is already coal based nitrogen) being the dominant player and the world’s seventh largest coal producer. The country accounts for 70% of proven African coal reserves and 95% of African coal production in 2016. South Africa has well developed infrastructure unlike countries such as Botswana or Mozambique with rich deposits but comparatively poor infrastructures. Five companies dominate South Africa’s coal industry, namely, Anglo American, South 32, Sasol Mining,
Glencore Xstrata and Exxaro. Around half of South Africa’s coal is exported and its primary domestic use is in the energy sector.

Zimbabwe is endowed with coal resources in two basins. The country’s coal industry is underdeveloped, but as the country develops there might be increasing coal demand and additional growth opportunities.

Africa’s nitrogen industry has been heavily influenced by the region’s hydrocarbons supply, particularly natural gas, which is the preferred feedstock. Approximately 95% of African ammonia capacity is in the major gas-producing countries, as shown in the table below.

African urea capacity has expanded over the last decade as governments in Egypt, Nigeria and Algeria have worked with private investors to monetize gas with urea exports to Europe and North America and the region has gone from a net importer to a net exporter.

However, as we describe above, regional demand is low by global standards with Egypt accounting for around 45% of regional apparent consumption. Consequently, new urea capacity developments are largely focused on exports. We expect two projects to begin production by 2022; these are Kima in Egypt and Dangote Lekki in Nigeria. The Kima project is relatively small and its inland location means that it is likely to target the domestic market. The Dangote project is being built by the coast and will be well placed to target sales to the Brazilian and other freight logical markets.

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### Figure 8: African ammonia capacity and production, 2016 (million tons N)

<table>
<thead>
<tr>
<th></th>
<th>Capacity</th>
<th>Production</th>
<th>Utilization</th>
</tr>
</thead>
<tbody>
<tr>
<td>Algeria</td>
<td>3,216</td>
<td>2,166</td>
<td>67%</td>
</tr>
<tr>
<td>Egypt</td>
<td>4,233</td>
<td>2,833</td>
<td>67%</td>
</tr>
<tr>
<td>Nigeria</td>
<td>895</td>
<td>426</td>
<td>48%</td>
</tr>
<tr>
<td>Libya</td>
<td>599</td>
<td>216</td>
<td>36%</td>
</tr>
<tr>
<td>South Africa</td>
<td>514</td>
<td>451</td>
<td>88%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>9,457</strong></td>
<td><strong>6,092</strong></td>
<td><strong>61%</strong></td>
</tr>
</tbody>
</table>

*Source: IFA, Integer*

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### Figure 9: Major fertilizer projects in Africa

**Product status key**
- Delayed
- Cancelled
- Planned
- Under construction
- Completed / commissioned

**Egyptian Chemical Industries’ KIMA 2 Project**
- To be completed 2018-end
- Capacity: 1,200 tons of ammonia and 1,600 tons of urea per day

**Dangote Group Fertilizer Project**
- Production to commence in 2018
- Capacity: 8,000 tonnes of urea daily; 4,000 tonnes of ammonia daily

**Soyo Fertilizer Project**
- Expected completion in 2021
- 2,000 tons of ammonia and 1,750 tons of urea

*Source: Integer, company sources*
Phosphate

Africa is home to the world’s largest phosphate reserves, consisting primarily of sedimentary deposits, notwithstanding igneous deposits found in South Africa and Zimbabwe. In contrast to most of the world’s major phosphate rock-producers (where rock is consumed captively for fertilizer production), a significant portion of African phosphate rock production is exported inter-regionally. This is a legacy of the large gap between domestic phosphate supply and local consumption, related to the immaturity of the regional market and lack of processed phosphate capacity. However, the picture is starting to change.

Morocco and Western Sahara, which have 50 billion tons of measured reserve, account for over 70% of global phosphate reserves. The resource is mined, processed and marketed by Moroccan state monopoly Office Cherifiens des Phosphates (OCP). OCP’s large-scale, low-cost position, means the producer exports vast quantities of phosphate rock and its derivatives. Indeed, Morocco is the world’s largest phosphate rock and phosphoric acid exporter and, consequently, its activities are a key influence on global phosphate supply-price dynamics.

Morocco’s competitive advantage is primarily phosphate rock-based, and the country is investing heavily in downstream phosphates capacity, with only China and the US possessing larger finished phosphates capacity.

Elsewhere in North Africa, Tunisia, Egypt and Algeria possess significant rock resources with the latter two very active in the global rock export market, supplying Europe and East Asia. Tunisia is unique among North African producers in that it exports comparatively small volumes of phosphate rock, instead processing almost all its mined output into intermediate and finished phosphates. Prior to the Arab Spring in 2011, Tunisian rock production averaged around 7-8 million tons per year, which converted into phosphoric acid and 2-2.5 million tons DAP and TSP. However, the ensuing years of destabilization saw rock output reduced to 2 million tons per year. The return of relative calm to Tunisia over the last few years has boosted its phosphate outlook and output volumes are recovering. While

<table>
<thead>
<tr>
<th>Country</th>
<th>Production</th>
<th>P2O5 content</th>
<th>Exports</th>
<th>Exports %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Morocco</td>
<td>26.3</td>
<td>32%</td>
<td>8.6</td>
<td>33%</td>
</tr>
<tr>
<td>Egypt</td>
<td>4.1</td>
<td>28%</td>
<td>3.0</td>
<td>73%</td>
</tr>
<tr>
<td>Tunisia</td>
<td>3.2</td>
<td>29%</td>
<td>0.0</td>
<td>N/a</td>
</tr>
<tr>
<td>Senegal</td>
<td>1.8</td>
<td>35%</td>
<td>0.1</td>
<td>6%</td>
</tr>
<tr>
<td>South Africa</td>
<td>1.7</td>
<td>37%</td>
<td>0.1</td>
<td>6%</td>
</tr>
<tr>
<td>Algeria</td>
<td>1.3</td>
<td>28%</td>
<td>1.3</td>
<td>100%</td>
</tr>
<tr>
<td>Togo</td>
<td>1.2</td>
<td>36%</td>
<td>0.1</td>
<td>8%</td>
</tr>
<tr>
<td>Zimbabwe</td>
<td>0.0</td>
<td>38%</td>
<td>0.0</td>
<td>N/a</td>
</tr>
</tbody>
</table>

Source: IFA, Integer
production still falls significantly short of pre-2011 levels, we expect this situation to continue to improve.

In West Africa, Mali, Senegal, Togo, Niger, and Burkina Faso have phosphate rock deposits. However, only Senegal has developed these resources for fertilizer or intermediate production, and only one, Togo, has significantly developed its phosphate rock resources for export.

**Potash**

African potash supply is limited. There is only one current producing country, Egypt, which has a single producer, Evergrow. This production is secondary processing imported primary muriate of potash (MOP) into secondary sulphate of potash (SOP) in conjunction with a range of specialty fertilizer products. Although there are widespread potash deposits across Africa the largest potash deposits are found in Ethiopia, Eritrea and the Republic of Congo. The deposits in East Africa are in the Danakil Depression near Dallol which extends into Southern Eritrea. Small-scale potash mining in the region has been carried out intermittently from the early 1900s.

There are several MOP and SOP projects at feasibility stage and beyond in Africa, which are shown in the map below. We note the following SOP projects:

- Danakali is entering the financing stage for its SOP project in Eritrea
- Likewise, Yara is entering the financing stage for development of its 0.6 million tpy SOP project in the Danakil depression in Ethiopia
- Circum Minerals has completed a feasibility study for its MOP and SOP project in the Danakil depression
- ICL Group (Allana Potash) was promoting a project in the Danakil depression, but this has been cancelled.

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**Figure 11: Project hotspots in Africa (Danakil Depression, Ethiopia/Eritrea, and the Republic of Congo)**

<table>
<thead>
<tr>
<th>Key</th>
<th>Stage</th>
</tr>
</thead>
<tbody>
<tr>
<td>RED</td>
<td>Under construction</td>
</tr>
<tr>
<td>GREEN</td>
<td>Feasibility study</td>
</tr>
<tr>
<td>GREEN</td>
<td>Pre-feasibility study</td>
</tr>
<tr>
<td>GREEN</td>
<td>NI 43-101</td>
</tr>
<tr>
<td>ORANGE</td>
<td>Exploratory</td>
</tr>
</tbody>
</table>

Source: Integer
Despite small nuances between countries, fertilizer distribution models are broadly similar throughout Africa. Typically, fertilizer is produced domestically and/or imported. Whereas many larger scale developed fertilizer markets have significant competition, African fertilizer markets tend to be oligopolistic at the import level. There are typically three to five major fertilizer importers in each country. Wholesalers procure large volumes, which are stored in warehouses. Warehoused product is bought by agro-retailers, of which there may be hundreds per country dealing in relatively small volumes. The retail network is the last stage on the supply chain and farmers buy directly. Most retailed product is sold in 50kg or small sized bags, bearing in mind that most African farmers own small plots of land with low-yielding crops.

There are some variations on this typical model.

» In large cash crop plantations, such as tea in Kenya or coffee in Ethiopia, large commercial farmers will often have their own import channels, where they purchase directly from the international market and distribute fertilizers to outgrowers (contract farmers)

» In some supply chains, estate crop owners (international agribusinesses or large domestic players), parastatal companies, or government departments import fertilizer products directly from the global market and/or regional markets and market the products. This supply chain bypasses importers, wholesalers, and retailers

» In others, non-governmental organizations and producer organizations deal directly with wholesalers and supply inputs to farmers, thereby bypassing retailers

» In subsidised markets, government departments issue tenders to the private sector and/or negotiate the delivered price at the farm gate

Figure 12: Typical African fertilizer distribution model

Figure 13: Alternative fertilizer distribution model
Ethiopia is a country with potential to become one of Africa’s dominant fertilizer markets and recently there have been signs of substantial demand growth. Located in the Horn of Africa, a region endowed with fertile farmland and diverse crop mix, Ethiopia imports all its fertilizer for domestic consumption because there is currently no fertilizer production in the country. However, the country has some of the largest potash reserves in Africa and there is an ongoing project to mine potash in future. Urea and ammoniated phosphates (including NPs with secondary nutrients) are imported through a government parastatal, AISE (Agricultural Input Supply Enterprise). Imports have increased over the last decade at a rate of 6% per year (2006-2016), nevertheless they remain low by global standards (270,000 nutrient tons in 2016) with application rates relatively low as well.

In this case study, we take a high-level overview of Ethiopia’s fertilizer market and industry and discuss its future growth potential.

**Ethiopian fertilizer demand**

Fertilizer use in Ethiopia is applied mainly on cereal crops (maize, teff, sorghum, wheat, barley and rice), as coffee tends to be grown organically, bypassing the need for traditional fertilizers. The chart below shows Ethiopian fertilizer imports over the last decade. According to the FAO, arable land stood at approximately 15 million ha in 2015. This implies average application rates of 9.7 kg/ha N and 8.3 kg/ha P2O5. Compared to 2006, where approximately 13.4 million ha of land was under crops, N and P application rates averaged 4.9 kg/ha and 6.2 kg/ha respectively. This suggests that Ethiopia has improved fertilizer adoption, as well as planted acreage.

As described above, fertilizers are imported, with urea typically imported from Russia and the Middle East. Russia and Jordan were the major phosphates suppliers to Ethiopia from 2000-2010 in the form of DAP. Since then, Morocco has emerged as the main supplier to Ethiopia, accounting for 100% of imports in the form of DAP and, more recently, MAP (and NPS).

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**Figure 14: Ethiopia fertilizer imports**

*000 nutrient tonnes

<table>
<thead>
<tr>
<th>Year</th>
<th>Urea</th>
<th>DAP</th>
<th>MAP</th>
</tr>
</thead>
<tbody>
<tr>
<td>2006</td>
<td>83</td>
<td>117</td>
<td>130</td>
</tr>
<tr>
<td>2007</td>
<td>65</td>
<td>48</td>
<td>56</td>
</tr>
<tr>
<td>2008</td>
<td>148</td>
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<tr>
<td>2009</td>
<td>321</td>
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<tr>
<td>2010</td>
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<tr>
<td>2011</td>
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<tr>
<td>2012</td>
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<td>244</td>
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</tr>
<tr>
<td>2013</td>
<td>136</td>
<td>360</td>
<td>270</td>
</tr>
<tr>
<td>2014</td>
<td>73</td>
<td>146</td>
<td>269</td>
</tr>
<tr>
<td>2015</td>
<td>125</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2016</td>
<td>171</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: IFA

Ethiopian fertilizer consumption is volatile but on an upward trajectory
**Ethiopian fertilizer supply/distribution model**

The Ethiopian government controls most of the supply chain. Initially, government departments are responsible for import planning. The Ministry of Agriculture and Rural Development (MoARD) determines projected domestic demand for the coming year and the Bureau of Agriculture and Rural Development (BoARD) sets the price in consultation with stakeholders. Next, MoARD and the Ministry of Finance and Economic Development (MoFED) provide a credit guarantee for the National Bank of Ethiopia (NBE) or Commercial Bank of Ethiopia (CBE). These credit guarantees allow the banks to purchase the fertilizer on behalf of AISE.

Once purchased, AISE is responsible for the transportation of fertilizer from the port, through Djibouti and inland into Ethiopia. Once the fertilizer is in Ethiopia, AISE then sells most of it (90%) to cooperative unions. The remainder is sold directly to large commercial farmers, usually through AISE’s regional headquarters.

There are many cooperative unions in Ethiopia and they deal with nearly all the distribution after the initial entry into Ethiopia from Djibouti. They are provided with credit from the Bank of Ethiopia to purchase fertilizer from AISE, which is then mainly sold to farming unions. These primary unions sell it directly to farmers for cash, except in some areas where it is paid for on a 50/50 cash/credit basis.

**Agricultural Input Supply Enterprise (AISE)**

AISE has been the sole importer of fertilizer in Ethiopia since 2009. Competing importers have attempted to dilute the monopoly, and have also appealed to the government to be allowed to participate in the market, but this has so far been denied. The government’s reasoning is that AISE’s dominance allows for economies of scale and limits transaction costs. Therefore, international agri-business companies or commercial farms have been permitted to import specialized fertilizer in bulk purchases, but are still expected to source their DAP and urea through AISE.

The purchase of fertilizer by AISE is enacted using tenders, which are approved by local financial institutions and backed by the World Bank. The World Bank is also responsible for setting the requirements for competitive tenders and tender process guidelines.

**Ethiopian fertilizer regulatory framework**

The Ethiopian government has been supportive of agricultural development under its ‘Agricultural Development Led Industrialisation’ (ADLI) policy that was launched in 1991. ADLI was the central economic policy for fulfilling the Millennium Development Goals of food security by 2020. The policy intends to provide high-yield seed varieties, credit and chemical fertilizers to farmers. This has been financed almost entirely by the public sector.

As part of this strategy, the government has introduced several targets for expected crop production. To meet the annual growth rates of ~8%, the plan is dependent on a shift in production from the traditional subsistence farming to a more commercial agribusiness style, with production for export as well as internal consumption.

**Ethiopian Agricultural Transformation Agency (EATA)**

EATA was created in December 2012 to aid the government to develop the agricultural sector. As per the EATA website ‘The Agency’s mandate is focused solely on improving the livelihoods of smallholder farmers across the country’.

EATA works with government, private sector and NGO partners, such as the US Agency for International Development (USAID) programme – Capacity to Improve Agriculture and Food Security (CIAPS). EATA development programmes cover the entire agribusiness spectrum; including crop and crop inputs, market development and access, and agricultural commercialisation initiatives. A recent example of this is the cooperative-based seed production initiative (CBSP), where the EATA aims to mobilise localised seed production and distribution. The project ultimately aims to improve seed quality and volumes nationwide. At present, Ethiopia has around 285 seed-producing cooperatives, yet the overwhelming majority do not meet the regulatory requirements needed to become accredited. The CBSP seeks to address such constraints.

**Farm subsidies and credit**

There have been some subsidies on fertilizer in Ethiopia, but as of August 2012 all subsidies were discontinued. Similarly, the farm loan service has been stopped in Ethiopia, due to banking “irregularities” and the government was unable to provide the financing to make up the deficit. Therefore, despite plans to improve the access for farmers, the rising cost of fertilizer and lack of credit means that poorer smallholders find it unaffordable, a significant constraint to adopting a more commercial farming approach.

**Policy environment – investing in Ethiopia**

There are some steps to try and encourage private investment, capital and technology in the agricultural sector. There are some exemptions from import customs and income tax for foreign corporations subject to extensive guidelines. The government has also sold some state-owned companies, including Arbagugu Coffee Plantation and Upper Awash Agro-Industry, the country’s largest orange grower.

Agribusiness companies have made some significant investments in recent years. In 2011, Saudi Star Agricultural PLC (owned by Saudi Arabian, Sheikh Mohammed al-Amoudi) acquired a 60-year rent free lease on 10,000 ha to develop commercial cereals production for export and domestic consumption. However, these types of deals can give rise to domestic hostility, where smallholder land comes under threat.

**Constraints to Ethiopian fertilizer usage**

The key constraints on the growth of Ethiopian fertilizer can be summarized as follows:

**Government restrictions:** Despite its best efforts, the government still provides some barriers to creating the most efficient fertilizer supply chain.

**Exchange and marketing costs:** The cost of fertilizer continues to be high in Ethiopia by the time it reaches the farmer, like the rest of Sub-Saharan Africa, and this is primarily because of high transport, storage, handling and transaction costs. Improving the port efficiency, road and rail infrastructure and avoiding long-term storage of fertilizer could reduce these costs. A further
significant cost is accrued by the poor location of warehouses, which can cause further delays in fertilizer distribution.

**Unaffordability of fertilizers:** Many farmers in Ethiopia simply cannot afford to buy fertilizer, the government cannot afford to provide subsidies or credit and private companies cannot access sufficient finances to enter the market.

**Misuse of fertilizer:** A lack of research as to the most effective fertilizer type and use means that the highest yields are not being achieved. Soil conditions are highly varied, requiring more bespoke formulations.

**Risk factors:** Farmers face a risk when purchasing an input product such as fertilizer (it could also be high-yield seed varieties or irrigation) that their crops will fail due to rainfall variability. Similarly, fertilizer sales can be significantly affected by early or late rainfall, so cash must be spent on storage for the carryover.

**Logistics projects**

There has been substantial infrastructural investment linked to expediting Ethiopia’s agricultural progress.

- In June 2017, a new port was opened in Tadjourah, Djibouti that will serve as an entry point for potash exports from Ethiopia. The USD 90 million port has capacity for 4 million tons potash throughput per year. The project was funded by the Arab Fund for Economic and Social Development (USD 36 million) and the Saudi Fund for Development (USD 25 million).

- In 2010, the Ethiopian Rail Network Plan was launched, to build almost 5,000 km of railway across the country over a 10-year period. A new railway line was constructed between Awash and Woldia: the ‘Hara Gebeya Railway Project’. The Ethiopian Railway Corporation (ERC) owns the project and has already invested more that is linked to the existing Addis Ababa – Djibouti line.

  - In May 2017, several sources announced that the 268km Mekelle-Woldya project had been suspended and workers laid off, although the government dispute this. The USD 1.5 billion Mekelle-Woldya project was awarded to the China Communications Construction Company (CCCC) and construction began in 2015.

  - Road upgrades are largely associated with the Allana Potash project. This has been undertaken by Chinese and Middle Eastern contractors who provided the funding. The road from Serdo (which is on the Addis Ababa – Djibouti highway) to Adfera was completed in 2011 and the road from Dallol to Mekele was completed in 2012.

**Regional cooperation**

Increasingly, fertilizer producers recognize Ethiopia’s (and East Africa’s) potential as a “breadbasket” region of high farm productivity and are seeking ways to tap into this potential through partnerships and collaborations.

In 2016, OCP signed a deal with Ethiopian firm Chemical Industries Corporation (CIC) to construct a USD 3.7 billion fertilizer plant in Dire Dawa town, eastern Ethiopia. The plant will produce compound fertilizers for domestic production, although at the time of writing construction had not yet started. The project is expected to produce 2.5 million tons of fertiliser by 2022, and a second phase would see a further USD 1.3 billion invested to increase production to 3.8 million tons by 2025.

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**Figure 15: Ethiopia infrastructure investment**

Source: Integer
Conclusion

African fertilizer demand is growing over time, but within the region, it has been patchy, volatile and with a small number of exceptions, country level demand growth is starting from a small base. Most African governments are focused on domestic food security or agricultural productivity as central policy themes and several initiatives (both at domestic and regional level) are in place that we would expect to help fuel future demand growth. Regional cooperation initiatives are also providing a boost.

On the supply side, Africa has substantial N, P and K resources and fertilizer supply is increasing, although the region remains dependent on imports from outside Africa, and the viability of most of the projects aimed at developing supply is dependent on some portion of inter-regional exports. If the continent is to become fertilizer self-sufficient, then much work needs to be done on developing upstream potential, as well as building the required downstream capabilities.

There remain significant constraints to fertilizer market development at national and regional levels. However, increasingly, local governments are committed to overcoming many of these hurdles and steps are being made to develop the necessary infrastructure and institutions that will serve as the foundations for development. Progress may be slower than the levels targeted through the landmark Abuja Declaration and other development goals but attitudes are shifting and most countries can be said to be on the right path.

About Integer

Integer Research is an independent provider of specialist market research and analysis, conferences and events and tailored consultancy services across three core industries: environment and emissions; fertilizers and chemicals; wire and cable. Headquartered in London, UK, and with offices around the world, Integer offers a variety of information services such as research projects, publications, subscription services and industry events.

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The Gulf Petrochemicals and Chemicals Association (GPCA) represents the downstream hydrocarbon industry in the Arabian Gulf. Established in 2006, the association voices the common interests of more than 250 member companies from the chemical and allied industries, accounting for over 95% of chemical output in the Gulf region. The industry makes up the second largest manufacturing sector in the region, producing over US$ 108 billion worth of products a year.

The association supports the region’s petrochemical and chemical industry through advocacy, networking and thought leadership initiatives that help member companies to connect, to share and advance knowledge, to contribute to international dialogue, and to become prime influencers in shaping the future of the global petrochemicals industry.

Committed to providing a regional platform for stakeholders from across the industry, the GPCA manages six working committees - Plastics, Supply Chain, Fertilizers, International Trade, Research and Innovation, and Responsible Care - and organizes five world-class events each year. The association also publishes an annual report, regular newsletters and reports.

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