



Sub- Sahara Africa (SSA) Fertilizer Industry & Projects

A Review: Compiled by
Petrochem Engineering & IT
Services Private Ltd
(www.peits.com):

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1. ABSTRACT

The information about (SSA) fertilizer industry, existing as well as upcoming, is limited and scattered. The sources include DFIs, R&D Institutions, Press Releases, News Items, etc: all of it is not reliable. As a part of this report, an attempt has been made to organize and present the available information making it useful for various interest groups and individuals. The report structure and information makes it easy to have an overall view of the fertilizer industry related issues from technical, distribution, business and entrepreneurial viewpoints in the light of the ground realities. The attempt at compilation of the data may not have achieved absolute completion but it includes bulk of it. The ready references have been provided wherever available.

Further work covering additional information for relevant interest groups to be part of the subsequent report which is likely to include:

- Comments with regard to investments, targets and schedules in respect of projects currently on hand.
- Upfront problems with respect to raw materials, project schedules, manpower and investment for the few projects which are likely to achieve maturity.
- The host of problems with respect to product marketing along with “Investors” view point which may crop up.
- Share Purchase Guidance.
- Contacts: A listing of Addresses/Phone/Fax/Email contacts.
- Potential for small/medium scale consultants in (SSA) fertilizer industry.
- Career Potential in (SSA) fertilizer industry for the job seekers.

2. Terminology & Abbreviations

- | | |
|--------------------------------|---------------------------|
| -Capacity: Name Plate Capacity | -SCF: Standard Cubic Feet |
| -(SSA): Sub Saharan Africa | -M: Meter |
| -NG: Natural Gas | -SQ: Square |
| - t: Ton | -mm: Million |
| -D: Day | -bbl: Barrel |
| -Y: Year | -G: Granular |
| -KM: Kilometer | -ha; Hectare |
| -CU: Cubic | |

3. (SSA) Regional Background and Information

3.1 Geography and Population Indicators

(www.ifdc.org/2013/08/15/new-approach---sahara-africa): In terms of the size, Africa is the second largest (30 million SQKM) of the World's continents (approximately three times the size of Europe) consisting of 6% of total surface and 20.4% of total land area (Wikipedia) with maximum North-South (8000 KM) and East-West (7200 kM) distances. Africa is also World's second most populous Continent (1.11 billion in 2015) Almost entire African continent is geologically stable.

3.2 Food and Irrigation Scenario Highlights

- IFDC work indicates that 87% (SSA) population is food insecure compared to 49% in Latin America and 37% in Asia (Bumb-1995).
- (NEPAD): New partnership for Africa's Development/(AGRA):Alliance for a Green Revolution in Africa/FAO-UN/IFDC reports and releases provide further information concerning these aspects.
- The irrigation system in (SSA) is largely rain fed contributing to low use of fertilizers and low output. The ongoing controversy over large scale versus small scale irrigation systems has not been productive.
- (www.fao.org/economics/esa): Working paper no: 12-04, July 2012(Zoe Druilhe & Jesus Barreiro-Hurle):The(SSA) region (low input/low output) market with following constraints:
 - Poor output price
 - High fertilizer price
 - Lack of liquidity/credit
 - Lack of knowledge
 - (www.fao.org/3/a-apo77e.pdf):

Subsidies involving unsustainable fixed costs can help but not desirable on long term basis. Subsidies under controlled environment may be helpful.

- (<http://ssm.comabstract=2249812>):- April 2013 Paper (Laila Domenech & Claudia Ringler-IFPRI) elaborating on increased food production/Irrigation and (Nutrient-Health-Gender) aspects.

3.3 Education and Health Indicators

(SSA) stock of 'Human Capital' is extremely low. The contributing factors being:

- Low enrollment ratios
- Low literacy rates
- Hindered women's participation due to lack of education and skills along with cultural impediments.
- Absolute amount of educated labour in (SSA) is lower than any other region of the World. The (1990) data for 15 years old indicate: 25% primary education completion in (SSA) as compared to 32% in South Asia and 85% in East Asia: similar figures for secondary education being:(SSA) 4%, South Asia 10% and East Asia 50%.
- <http://learningenglish.voanews.com/content/traffic-accidents-health-subsaharan-africa-world-bank-fao/1761394.html>:

A new international report that notes progress in the fight against malaria and HIV-AIDS and confirmed by another report also note a sharp increase in the number of deaths in traffic accidents in (SSA)region .

Recent reports from the World Bank describe the health challenges facing six major parts of the world. These include many diseases -- and also road accidents. "The big one remains communicable diseases. That relates to HIV and malaria. And, of all the regions in the world, sub-Saharan Africa (SSA) is the only region where there are more deaths and life years lost from communicable diseases than other types of illness and injury."

3.4 Skill Availability and Development Highlights:

(elibrary.worldbank.org):-Skills Development in Sub-Saharan Africa by Richard K. Johanson and Arvil V. Adams-2001

- (SSA) Skill Development: The usual skills development pattern in much of the (SSA) may include following:
 - State/Donor supported (TVET)-Technical Vocational Education Training programs: Donor interest in these programs reduced around mid (1990)s as a result of increasing preference for basic education funding. By the end of the decade widespread decay in public (TVET)s resulted. Much of the skills developed through (TVET) remain un-utilized due to non availability of jobs.
 - Skill Development through 'Informal Economies': It was estimated that 85% of work force utilized available opportunities in these informal economies which consisted of small farms, retail businesses, etc. Such skill developments were self financed and received very little importance from the informal economies.
 - Enterprise Based Skill Development:

'Enterprise Skill Development' from an imperfect (SSA) labour market could be termed a success. Due to lack of availability of jobs, induction had been easy and skill development efforts yielded positive results.

3.5 Growth Rates:

- (SSA) Decadal Growth Rates (GDP/Capita) in US\$: (Geeta Kingdon, Justin Sandefur and Francis Teal-Feb 2005)
Economic growth rates across continents moved from negative

in (1980)s to positive in (1990)s. (SSA) growth rate was still 0.2% for the same durations. The average (SSA) growth rate during previous four decades averaged 0.3%.

- (SSA) Skill Indicating Ratio: The (SSA) ratio of educated labour to the land endowment is far lower than any other region of the World. The (SSA) region has lowest amount of schooling and highest amount of land per worker.
- Based on (Heckscher-Ohlin Trade Theory) and (Wood/Berg/Mayer:1994-98) this region lacks advantage in 'Manufacturing' which is skill intensive. The conclusion (Wood): African exports will continue to be dominated by natural resources.

3.6 Labour Related Constraints:

- HIV & AIDS/War/Diseases Related aspects force enterprises to train three persons instead one to cater for contingencies.
- Security regulations may limit ability of the enterprises to labour layoffs during downturns.
- The 'Soft' minimum wage regulations may not pose any significant problems for the enterprises

4. Food/Fertilizer Scenario Highlights

4.1 Global: (<https://pdf.usaid.org/pdf---dact263.pdf>):-(2007-2008):

- The “Green Revolution” (yrs 1960-1970)s was due to improved seeds/fertilization High Yielding (HYVs) dwarf wheat and rice varieties contributed(DR. Norman Borlaug: Nobel Peace Prize

1970: Founder of the “World Food Prize” known as father of the “Green Revolution”). Many Countries (India/Pakistan/Mexico) from being importers became food surplus areas as a part of the “Green Revolution”.

- (www.magindustry.com):

Potash boosts crop development, water retention, Increased resistance to various plant diseases. Potash is particularly good for depleted Indian/Chinese Soils and for slightly acidic Brazilian Soils.

- (Years 2005-2015) present a scenario of increasing food prices and decreasing availability.

(SSA), World's poorest region hit hardest.

- Growing middle class in developing countries driving food Prices upward mainly because of changes in preferences.

Besides, population increase, biofuel demand and other contributors having additional impact on rising energy for food Costs.

- Fertilizer supply in previous years (particularly past decade) did Not keep pace with consumption. The imbalance is also reflected in pricing patterns: Figure 1

(<https://pdf.usaid.org/pdf---dact263.pdf>):-(2007-2008)

indicates steady pricing profile between years (2000-2003): sharper increases in years (2004-2006) and runaway Hikes in years (2007-2008).

- Nitrogen fertilizer price increased (170%-180%) during (2007-08). During similar periods, Phosphate fertilizer (DAP) recorded price. Increase of 200% whereas Potash prices increased by 170%.
- Prevailing fertilizer prices are reasonably stable and do not appear to be any higher in comparison to predicted trends.
- Speculations & Governmental limitations/bans/high tariffs also contributed towards worsening situation.
- Farmer Fertilizer Application Practices: In most underdeveloped countries sprinkling of Urea in flooded rice Paddies results in 60% of nutrient loss. In some cases, on an average, only 30% of the urea fertilizer nutrient may have been gainfully utilized.
- IFDC developed urea deep placement (UDP) method involving insertion of large urea briquettes into rice root zone resulting into 25% yield increase and 40% less urea consumption is an example of success story reported from Bangladesh.
- As identified in aforementioned document

(<https://pdf.usaid.org/pdf---dact263.pdf>):-(2007-2008): 4 barrels of oil are required to produce 1 ton of urea of which 2.5 barrels may go waste to atmosphere or appear as a pollutant due to Inefficient application methods. The loss of unused components which may be termed Inert in such case, also constitute a significant component in terms transportation costs.

- Manufacturing Technologies: Phosphate stands as a

Non-renewable source. At current consumption rates, entire available deposits shall be consumed within the next 200 years thereby requiring innovations to safeguard against its Losses. On the contrary existing (DAP) production technology is inefficient: (www.minjinguines.com/link5html): Global Phosphate Rock Comparative Tabulation.

- World Population (1961)-2.5 billions:(2012)-7 billions:
Projected (1950)-9 billions: Arable land 0.42 ha/person in (1961):
0.2 ha/person (2012):Requiring enhanced use of fertilizers to
keep pace approximately 8%-10% per year both in terms
quantity and average yearly price increase of Potash fertilizers
(www.magindustry.com).

- Fertilizer developments introduced by Tennessee Valley Authority (TVA) during (1950-70) period using US Government Funding helped in achieving improved products and efficiencies.
Policy Issues: Farmers' access to Seed & Fertilizers, as always.

4.2 (SSA) Region:

Key highlights are as below:

Available information on African fertilizer Sector is contained under two regional categories:

- North Africa (Egypt, Libya, Morocco, Tunisia, Algeria) plus South Africa.

North African sector is better developed in terms of use, production, marketing and constraints with respect to use of fertilizers and agricultural productivity.

- Egypt/Morocco/Tunisia produced 88% of fertilizers in Africa (2013).
- South Africa produced 90% of African phosphate fertilizers which

Were almost entirely consumed locally (2013).

- Sub-Sahara Africa (SSA) includes rest of the African Countries Except those included in North African Sector.

Much of the fertilizer sector activity is currently focussed on (SSA)

in view of:

- (SSA) Agricultural Productivity 1 t/ha (t stands for ton whereas ha for hector) as compared to 4 t/ha in the under Developed countries. This indicator has remained unchanged during past decades.
- Around 27% (SSA) population was undernourished. The total

agricultural output in the past decades has kept pace by increase in the area under cultivation without enhancement in the

Agricultural Productivity.

- Average fertilizer use (8 kg/ha) in (SSA) as against (107 kg/ha) Globally is lowest in the World.
- Soil nutrition decline in (SSA) exceed 60%.
- (SSA) fertilizer consumption level (Currently lowest in the World) is expected to improve by eliminating/minimizing marketing/distribution constraints and changes/incentives in (SSA) Countries' policies. World Bank/FAO/IFDC/IFA/STAT/AUC/NEPAD and many other international institutions working on this subject.
- (SSA) presently is net fertilizer exporter whereas imports (90%) to meet local demands.

5. (SSA) Raw Material Resources

The available raw materials in (SSA) include:

- Phosphates-Tanzania/Togo/Senegal/Namibia
(Commercial Level Deposits).
- Potash: DRC & Ethiopia (Commercial Level Deposits).
- Natural Gas: Nigeria/Ghana/Angola/Equatorial Guinea/
Ethiopia/Ivory Coast/Mozambique/Namibia/DRC/

Madagascar/Tanzania.

References:

- i. Fertilizer Market Development in Sub-Sahara Africa

(Maria Wanzala & Bob Grant) Web

(www.ifdc.org/Fertilizer-M/Fertilizer-Industry-Africa).

ii. (www.ifpri.org : Improving Regional Fertilizer Markets in West Africa.

iii(www.worldbank.org/hrml/extdr/fertilizer/documents.pdf/highprices.pdf).

iv.(www.africafertilizer.org

v.(<ftp://ftp.fao.org/ag/agp/docs/cwfto16.pdf>):World Fertilizer Trends & Outlook to 2016.

5.1 Phosphates:

- Sandpiper Deposits:

These deposits were discovered by South African Mining Company in the year 1990

(www.mining-technology.com/projects/sandpiper-marine-phosphate-project/).

- Location: Walvis Bay, Erongo Region, Namibia Coastal Waters, (60-100 KM) at depth of (190-250 meters). Owners: Namibian Marine Phosphate Pvt Ltd (NMP).

- Deposit/Characteristics

(www.en.wikipedia.org/wiki/sandpiper_mine/July 30, 2014):

- One of the largest known phosphate reserves in the World

(1.82 billion t/P2O5=19.5%).

- Luderitz Bay Phosphate Deposits:

- Location: 170 KM North West of the shore at Luderitz Bay in Namibia.

- Deposit Estimates: 2 billion (t) being adequate to cover the project life of 20 years with planned production rates of (2 mm t/Y) of phosphate rock.

- -Minjingu Phosphate Deposits:

(www.minjingumines.com)

(www.scielo.br/pdf/aabc/v78n4/---/pdf):

The potential of East African

Phosphate Rock Deposits: B.Jama 2006:Minjingu Phosphate Deposits-Tanzania.

- Location: 106 KM South of Arusha along (Arusha-Dodoma Highway), Tanzania.

- Deposits: Soft Rock:3.3 mm t & Hard Rock 4.8 mm t(IFDC figures:Soft:0.6 mm t & Hard 10 mm t): Phosphate content of around 13%.

5.2 Potash

- (www.magindustries.com): Pointe-Noire Potash Deposits:

- Location: 20 KM from Pointe-Noire, Republic of Congo(ROC)

- Deposits 33.2 mm t Deposit depth is 400 M to 1000 M.

- (MPC) is working on two other Potash exploration concessions with (ROC)

- (www.allanaresources.com): Exploration & Development of Dallol Potash in the Danakil Depression in Ethiopia.
- Sitoukola Potash Deposits (ROC): (www.mining-technology.com/projects/sintoukola-potash-project/):

(2011-2012):

- Location: Kouilou Province, Congo (ROC): Nearby site(Chiboola) for the export jetty.
- Deposits Estimate 1.29 billion t.

6. (SSA) Existing Fertilizer Manufacturing:

6.1 Overview:

- Ammonia/Urea: Nigeria: Currently only one plant (Notore Chemicals) in production.
- (N-P) Small scale old facilities locations and configurations uncertain .
- Bulk Blending small scale (N-P-K) Plants: Ivory Coast/ Ghana/Malawi/ Mozambique/Nigeria/Tanzania/Kenya/ Zambia/Ethiopia/Zimbabwe.
- Small Scale Blending facilities (N-P-K): Nigeria/Mauritius/ Senegal/Zimbabwe.
- Phosphate: Tanzania has small scale production: Grinding of Phosphate Rock and its direct application to soil: Burkina Faso/Madagascar/Mali/Senegal/Zimbabwe.
- Currently there is no commercial production of Potash Fertilizers in Africa.

References:

- African Centre for Fertilizer Development (www.au.int/en)

base at Harare, Zimbabwe:

6.2 Notore Chemicals Company Ltd, Nigeria (www.notore.com):

Notore operates the only urea fertiliser plant in Sub-Saharan Africa . The company also produces Ammonia and have the capability to produce NPK fertilizers.

The Notore plant is strategically located at Onne sea port in the Niger Delta region of Nigeria. Accordingly, its

products are well positioned for effective shipment and distribution across the Atlantic coast.

Notore commenced production of commercial quantities of ammonia in January 2010 and granular urea in April 2010 at its 300,000 t/Y ammonia and 500,000 t/Y urea capacity plant. The

Company has achieved nameplate capacity of its factory Through a refurbishment and operational excellence Programme that it embarked upon.

6.3 Minjingu Mines & Fertilizer Company Ltd (MMFL):

(www.minjingu.com)&

(www.scielo.br/pdf/aabc/v78n4/---/pdf):Potential of East African Phosphate Rock Deposits:B.Jama 2006:Minjingu Phosphate Deposits-Tanzania.

-Location: 106 KM South of Arusha along (Arusha-Dodoma Highway), Tanzania.

-Deposits:soft Rock:3.3 mm t & Hard Rock 4.8 mm t

(IFDC figures: Soft:0.6 mm t & Hard 10 mm t): Phosphate content of around 13%.

- Background: Discovered in 1956 (Gold Field Mines, South Africa):

Minjingu Phosphate Company (MIPCO) under Tanzania State Mining Corporation(STAMICO) which supplied rock to Tanzania Fertilizer Company in Tanga (TFC) to be processed as SSP & TSP: Mines subsequently privatised as Minjingu Mines & Fertilizer Company Ltd (MMFL) which is now in business to market processed & Beneficiated rock products for direct application to Soil.

- Rock Processing: Sun Drying/Sieving/Sorting/Rapid Drying/Final

Sieving & Gravity Classification/Granulation if desired by

Customers: Final Phosphate content of up to 30%(MMFL).

- A Global Phosphate Rock Comparison tabulation is also provided by (MMFL):(www.minjingu.com/link5.html).
- Production Capacities: Open Cast Mining of around 165,000 MTY producing about 100, 000 t/Y Soft Rock Products. Granulated products to cater for specific customers only (Approximately 30,000 t/Y).
- Brand: (MMFL) has branded its products as "Hyper Organic Fertilizer".

7. (SSA) Fertilizer Projects (Planned/Investigated/Feasibility)

Stage/Others)

7.1 Overview:

- Indorama Elme Chemicals Ltd (Nigeria: Ammonia/Urea World Size Capacity mainly for export):Ammonia /Urea(G) at Port Harcourt,Nigeria

(www.emergingafricafund.com/news/

indorama-elme-fertilizer-and-chemicals-limited.aspx)

- Green Park Nitrogen Fertilizer Project

(www.ventures-africa.com):World Size Nitrogen Fertilizer Project in Nigeria: Export based:

Project phase (OPIC approved \$250 mm financing.

- Dangote Fertilizer Ltd: World Size Nitrogen Fertilizer Project in Nigeria Export oriented.

- Nagarjuna Fertilizers & Chemicals (Hyderabad based): Fertilizer & Petrochemical project (Export oriented) being planned For Nigeria.

- State run Rashtriya Chemicals & Fertilizer (India) setting up

World Size Urea plant in Ghana and considering similar investments

In Mozambique & Gabon also: Export Oriented.

- Brass Fertilizer Company Ltd (Nigeria): World Size export oriented: Phase -1 & Phase-2. Each phase with World Size Capacities.
- Gabon Fertilizer Company: Export Oriented Ammonia

& Urea (Granulated) World Size :

(www.technip.com/en).

- Talka Fertilizer Project: Export oriented World Size Ammonia/ & Urea 570,000 Met/yr): Other details not known.

- Yara International ASA (previously Norsk Hydro, Norway: (www.yara.com): Evaluating feasibility of establishing fertilizer complex in Africa: Location East/West Africa (Decision Pending).

- Japanese consortium evaluating establishment of Urea plant in Angola.

- Canadian Investors evaluating establishment of Muriate of Potash (MOP) plant in Ethiopia.

- (www.elementalminerals.com.au):

Australian Investors establishing (Santoukola Potash Plant) in DRC.

- Toyota East Africa Fertilizer Plant in Kenya proposed.
- Brazilian Mining Company evaluating

Phosphate rich rock concentration facility in (SSA) for export.

- Ghana Ammonia/Urea Complex based on offshore natural gas under evaluation.

- OBAX WORLD LTD Fertilizer project in Nigeria

Olego (Border Town between Edo & Delta)

Fertilizer/Power Project announced (March 17, 2015) by

OBAX World Ltd and local government.

- Wentworth Resources Feasibility, Tanzania.

Exploration Company (Wentworth Resources) completed feasibility for Methanol/Ammonia/Urea complex in Tanzania. (August 2014)

- SHELVED PROJETS:

Under mentioned Fertilizer Projects have been shelved due to non-availability of gas supply assurance from the Ghana Government.

- Nayankrom Fertilizer Project(JV:Indian Investors-Nagarjuna Fertilizer 2012):

(www.vibeghana.com/2012/07/13/work---nayankrom/):

(www.ghanaweb.com/ghanahomepage/news/Archive/Article.php).

- Government of India backed (Rashtriya Fertilizer & Chemicals-RCF) project cancelled: June 01, 2014:(www.business-standard.com/article/companies/rcf---):

References: African Centre for Fertilizer Development
(www.mineafrica.com).

7.2 Notore/ Mitsubishi J/V (WWW.NOTORE.COM):

Notore set to increase fertiliser production through joint development with Mitsubishi Corporation

Notore Chemical Industries Limited (Notore), owner of the only urea fertiliser plant in sub-Saharan Africa, has signed a Joint Venture Agreement with Mitsubishi Corporation at Mitsubishi's corporate headquarters in Tokyo, Japan to develop an ammonia, urea and other petrochemicals project at its existing facility at Onne, Rivers State, Nigeria.

Mitsubishi Corporation is a global integrated business enterprise that develops and operates businesses across virtually

Every industry including industrial finance, energy, metals, machinery, chemicals, foods and environmental business.

The project will involve the construction of an integrated plant complex with production capacities of 1,700 t/D of ammonia, 3,000 t/D of urea, and 1,500 t/D of other petrochemicals, respectively.

An agreement was also signed with Mitsubishi Heavy Industries in Japan to carry out the pre- Front End Engineering Design for the project (FEED). It is expected that early works (including FEED) should be concluded in the first quarter of 2013. The early works phase will be followed by 36 months of Engineering, Procurement and Construction (EPC). The new plant, owing to its

advantage of being built on a 'brown-field' site with existing gas facilities and other infrastructure, is expected to come on-stream by 2016.

7.3 Brass Fertilizer Company Ltd

- Participation Agreement: Brass fertilizer Co. Ltd & Haldor Topsoe A/S (HTAS) led Danish Consortium.

- Investors (Local):

- Bayelsa State Government (Bayelsa Investment & Development

Corporation(BIDC).

- Local Subsidiary of DSV Group (local Pipeline Solutions Provider).

- Community (Investment=\$15 million): 330 hectare land for project.Total equity shareholding=1.5

- Investors (Foreign)::

- HTAS (Haldor Topsoe A/S, Denmark.

- IFU: (Investment Fund for Developing Countries).

- Maj Investment (Major Investment Group).

- Swedfund.

- Plant Configuration:

- \$40 KM long natural gas line from(Shell OML 33 Field) to feed Production facilities and direct gas supply system.

-Phase 1: Ammonia:2200 t/D/Urea 3850 t/D(1.3 mm t/Y)/

methanol 5000 t/D (1.75 mm t/Y)/Brass Gas 200,000 SCFD.

Phase 2: Urea 1.3 mm t/Y after 5 yrs.

Note: Methanol production, if any, for Phase 2 not specified

- Investment:

- Phase-1: \$2.7 billion

- Phase-2: \$1.0 billion after five years.

- Key Participants:

- Bayelsa Provincial Government(Bayelsa Investment & Development Corporation (BIDC).

- Haldor Topsoe A/S:Danish Company founded 1940 by Dr Haldor Topsoe.Specializes in production of heterogeneous catalysts and design of process plants based on catalytic processes (Fertilizers/Chemical/Petrochemical/Oil Refineries/Power Plants).

- Taylor-DeJongh Inc(USA): Investment Banking firm in energy & infrastructure sector (Amongst top 10). Global Clientele over 30 yrs (\$250 billions) business.

Advisors/Contractors/Consultants:

- Ammonia/Methanol Technology & Process Design (HTAS).

- Front end/Utilities/Offsites/Urea Process Design (SAIPEM, Eni Group, Italy).

- Project Management Consultant (PMC): Engineers India Ltd

(EIL-State owned) for Urea/Methanol plants.

-Financial Advisors (Taylor-DeJongh Inc, USA).

- EPC Contractors: Short listing done-decision by June 2015.

- Project Schedule:

-Phase 1 production by 2018.

-Phase 2 launching 2020.

Reference (www.brassfertilizer.com)

7.3 Gabon Fertilizer Company, Gabon

- J/V led by Olam International Ltd (80%):Republic of Gabon (ROG-20%) Holdings (Nov.12/2010).

- Revision-01:Olam Component split: Tata Chemicals Ltd Takes on (TCL-25.1%): April 11, 2011.

- TCL terminated participation: March 28, 2014.

- Olam announced its desire to keep its equity holding to less than 50% level.

- Investments & Project Schedule:

- Initial Project Cost Estimate(\$845 mm) with 65/35 debt/equity ratio (November 12, 2010) with commencement of production by the year 2015.

- Current project cost estimates(\$1.3 billion) with production by the year 2018.

- Plant Configuration:

- Ammonia: 2200 t/D: Urea:3850 t/D(1.3 mm t/Y).

- Natural Gas(NG) for feed/fuel (3.0 mm CUM/D approximately 100 mm SCF/D) obtained by using currently (O&G) flared gases(Sources: PERENCO/Royal Dutch/Total):
No arrangements finalized (May 30, 2013) as yet.
- Water Supply (3.0 mm CUM/day or 72 mm litres/D) by Laying 56 KM long pipeline from Ogooyu River.

Conveyor belt from plant to the Jetty for Urea export.

- Current Project Status:

-Initial baseline technical work done by (TCL).

-Frontend Engineering (FEED) carried out by TECHNIP, France.

- References

-established in 1989 involved in Agribusiness. Involved in supplies To food & catering industry globally. In Gabon engaged in distribution of dairy products and rice: JV partner with (ROG) in Establishment of Gabon Special Economic Zone (70/30 JV).

Web (olamgroup.com) / (www.olamonline.com/)
(www.lagabon.org).

7.4 Green Park Petrochemical Company Ltd, Nigeria

The Project is expected to open 1000 construction & 500 post Operation regular jobs.

- Plant Configuration:

- Kenai Alaska (Pre-owned) urea/ammonia plants which went out

of operation in 2007 are to be re-engineered/refurbished and Relocated at Green Park site.

- The installed plant is expected to have 1850 t/Y urea capacity with 5% over design margin.
- Utilities/Off sites shall have to be redesigned.
- Project is to be based on NG which is currently being flared.
- Water shall be drawn from a nearby river and shall have internal water processing plant for its reuse with zero blow down. Only make Up water shall be required.
- Local gas company shall lay down the line and supply NG. The entire length of the pipeline is within existing estate for which ROW already exists.

- Sponsors:

- Ossimo Investments Ltd & Unity Nominees Ltd from Nigeria.
- Gujrat Narmada Fertilizers & MBS Merchants Ltd (India) along with Haldor Topsoe A/S with other Scandinavian Investors.

- Financing:

- (OPIC) approval for \$250 millions exists with 12 years tenor including principal grace of up to 3.5 years during construction.

- Project Cost:

- Estimated project investment stands at \$370 millions.

- Marketing:

- 50% of the production shall be for local use whereas the other 50% shall be exported.
- US/Canadian Nexus:
 - Agrium Inc (Canadian Company) involved in the sale of plant to Green Park and for handling the export of urea to USA.
- Location:
 - The plant is to be located in "Ossimo Industrial Estate". Approval for its export zone status is awaited.
 - (OPIC) visited existing plant in Alaska (May 2011) & Green

Park site (June 2011).

- Environmental:
 - Project shall reduce NG flaring by (58 mm SCFD) which is 1.9 mm t/Y carbon dioxide.
 - The project is expected to result in 371,000 t/Y of carbon dioxide equivalent in direct emissions.

7.5 Indorama Elme Fertilizers & Chemicals Company Ltd

(IEFCL):

- Sponsors:
 - Indorama Elme Petrochemicals Ltd (IEPL) which

belongs to

Indorama Corporation Pte Ltd (Global industrial conglomerate

manufacturing (Polypropylene/Poly olefines/PE and

other downstream products). (IEPL) is already operating

a petrochemical plant at Port Harcourt, Nigeria (www.indorama.com). Investors with their holdings are (www.ifc.org/projects/indorama):

- Indorama Group: 65%
- Nigerian National Petroleum Corporation: 10%
- Rivers State Government: 10%
- Host Communities: 7.5%
- Employees: 2.5%
- Nigerian Federal Government: 5%

(www.indoramaelme.com/project).

- Location:

Existing (IEPL) Site (361 ha) carries adequate available Space to house (IEFCL) plant which requires (36 ha).

- Gas Supply:

83 KM long gas supply pipeline is to be laid from existing (NAOC)

Gas plant located at (Obiafu/Obrikom) region. A 15 meter wide (ROW) for the gas line already exists Carrying two already installed pipelines in it.

- Export Jetty:

The facility shall be owned by a separate entity (OIS-Oil Industrial Services Ltd) which is JV between

(IEPL=51%) & (OIS=49%) and shall be built on a (6 ha) plot on renewable 25 yrs lease from Nigerian Port Authority (NPA). Jetty will have a bulk urea storage Capacity of (45000 t).

5. Plant Configuration:

- Ammonia: 2300 t/D, Urea(G):4000 t/D, Yearly: mm t 1.4

Urea(G):

- Investment:

-US \$ 1.2 billion (www.ifc.org/projects/indorama):

Oct 12/2012

-Disclosure: Nov 20/2012-Board:April 23/2013

- Due Diligence: Conducted by IFC

(www.ifc.org/projects/indorama).

- Lenders(www.ifc.org/projects/indorama):

- IFC Loans: (IFC-A)=\$150 mm: (IFC-B)=\$150 mm

(Mobilization

Tranche.

-Emerging Africa Infrastructure Fund-EAIF

(www.emergingafricafund/news/indorama-fertilizer-and-chemicals

-ltd.aspx): \$30MM.

-African Development Bank(www.afdb.or/en/news-and-events/

indorama):\$100 (Jan 30/2013).

- CDC(UK Development Finance): \$40 (May04/2013)

:[:\(www.dealfeed-intl.com/cdc-investment-in-indorama\)](http://www.dealfeed-intl.com/cdc-investment-in-indorama).

- FMO Fund (Entrepreneurial Development Financing:
Netherlands Development Financing Company):

\$30 MM (www.fmo.nl)

- Financial Close:

- Signed Feb 20/2013: Debt:800 mm: Equity:400 mm

(www.highbeam.com).

- Signed in Dubai April 13/2015: Financing package(\$1.2 billions):(www.mideast.com/news/indorama.

- Contracts:

- Ammonia Process/Technology: Purifier Process System:

KBR(Kellogg Brown Root): Contract awarded(Dec 2012):

(www.kbr.com/news/indorama).

- Urea(G) Process/Technology: Uhde Fluidbed Urea Granulation

Technology for the 1st train and for subsequent 2nd train:

(www.uhde-fertilizer-technology.com/print/news.html):

March 04/2014

- Plant Construction Contract: J/V-Daewoo Engineering &

Construction Company & Toyo Engineering Corporation:

Dec 2012): \$765MM. (www.indoramaelme.com/project).

- (KBR):Dec.13/2013:(www.kbr.com)
- (FMO-Funds):(www.fmo.nl)

(www.nairaland.com/1584746/indorama):

(www.mideast.com/news/indorama):dated April 13/2015.

- Ground Breaking: April 2013
- Project Completion Target: 2015
- Current Mechanical Completion Target: 4th Q/2015.
- Current Commercial Production Target: 1st Q/2016

7.6 Dangote Free Trade Zone Fertilizer Projects(Edo Fertilizer & Lekhi Fertilizer):

The available information in this regard is summarized below:

- Edo Fertilizer (Double Train) Project

(www.worldconstruction.com/Dangote)-March, 20/2013 and many other similar news/media releases.

-Consultancy contract (PMC) awarded to Tata (TCE), India.

-Project EPC contract awarded to SAIPEM (Eni), Italy.

-Urea(Granulation) process/technology contract awarded for the upcoming and subsequent future train to Uhde, Germany

(www.uhde-fertilizer-technology.com/print/news.html): December 01 & March 04, 2014.

-Investment: \$1.9 billion.

-Urea (Granular) Capacity: 3850 t/D Single Train.

-Location: Edo free Zone, Nigeria.

- Lekhi Fertilizer Project which includes (Oil Refinery & Petrochemical Plants)-

(www.law360.com/61033/ifc-may-invest-in-11b-dangote-fertilizer-oil-refinery): January 12, 2015.

- Plant Capacities: Urea (Granular) 2.6 mm t/Y: Oil Refinery: 650,000 bbl Petrochemicals (PE/PP) 2.5 mm t/Y.

- Investment:\$11 billion

- Equity: \$4.5 billion

- Commercial Bank Debt: 3.25 billion

- DFI Debt: 1.21 billion

- Potential Investors(Black Rhino-African focussed Infrastructure Developers backed by Blackstone Group LP)

- Banking Consortium

(www.allafrica.com/stories/201309050841/html):

Sept 05/2013: Local/International Banking Consortium pledging &3.30 billion medium term loan.

- Location: LEKHI (Free Zone). Nigeria.

7.8 Sandpiper Phosphate Project, Namibia:

Sandpiper Phosphate deposits were discovered by South African Mining Company in the year 1990

(www.mining-technology.com/projects/sandpiper-marine-phosphate-project/).

- Location: Walvis Bay, Erongo Region, Namibia Coastal Waters, (60-100 KM) at depth of (190-250 M). Owners: Namibian Marine Phosphate Pvt Ltd (NMP).

2. Deposit/Characteristics

(www.en.wikipedia.org/wiki/sandpiper_mine/July 30, 2014):

- One of the largest known phosphate reserves in the World (1.82 billion t/P₂O₅=19.5%). Marine Phosphate Project is a Greenfield undertaking which has never been done before.

Major Milestones:

- Mining License granted: 2011
Retrieved: 2013 citing (EIS) requirements and clearance(www.allafrica.com/stories/2013209190630.html/Sept 19, 2013).

Project: Namibian Marine Phosphate Pty Ltd

- Marine Rock Mining using available dredging technology (www.namphos.com/project/sandpiper.html/March 2012).

- Saleable rock 3.0 t/Y
- investment: \$326 mm with 23.6% IRR based on 20 years DCF Model.
- Commissioning/Construction Time; 20 months
- Plan involving sale for direct application as well as creating Downstream processing facilities subsequently.
 - Evaluations/Studies

(www.mining-technology.com/projects/sandpipers-marine-phosphate-project/)

- Feasibility April 2012) by Consultant Jan de Nul, Petersen & Cooke (Consulting Engineers) for (Lithon Projects Consultants & Enviro Dynamics):

- Lead Consultants (Bateman Advanced Technologies) to take on basic engineering followed by front end engineering design for the plant.

-EIS Report(www.envirod.com/pdf/---/NMP: March 30, 2012)

-Scoping Report for the Terrestrial Component

(www.envirod.com/pdf/% through their wholly owned subsidiary (Namibian Marine Phosphate Pty Ltd).

- Stakeholders:

-UCL Resources (www.uclresources.com.au): 42.5% stake through wholly owned subsidiary (Namibian Marine Phosphate

Pty Ltd).

-Mine Makers Ltd (www.minemakers.com.au) 42.5% through wholly owned subsidiary. Mine Makers subsequently sold its interest to Mawarid Mining(www.muwaridmining.com/)/
(www.proactiveinvestors.com.au/company/news/37246/minemakers: December 12, 2012)

- Tungeni Investments (Local Namibian Company) 15%.

Stakeholders:-Mawarid Mining (MB Holding) acquired 100% holding of Namphos(Namibian Marine Phosphate Pty Ltd):(www.mbholdingco.com/www.muwaridmining.com).

7.9 Lev Leviev Offshore Marine Phosphate Project Namibia1.

(www.jewishbusiness.com/2014/04/30/lev-leviev-800-million---/)

Leviev Namibia Phosphate Ltd-(LLNP) is wholly owned by the Sakawe Mining Corporation(www.sakawe.com) with Leviev Group holding in it being 76%. The offshore Marine project (LLNP) readily available information is indicated below:

- Location: 170 KM North West of the shore at Luderitz Bay In Namibia.
- Deposit Estimates: 2 billion (t) being adequate to cover the project life of 20 years with planned production rates of

(2 mm t/Y) of phosphate rock.

4. Investment: \$800 mm with first phase investment on the Demonstration Plant being \$20 mm achieving production in The year 2018.

- Status:

(www.globes.co.il/---/article-namibia-halts-leviev-offshore-phosphate-project---). Government of Namibia issues Moratorium against (LLNP) project citing environmental concerns (April 30, 2014).

- Marketing: Lev Leviev intended to export (LLNP) production to India and Latin America.
- Lev Leviev Group(www.leviev.com) is an International Holding & Investment Company involved in Diamond exploration, processing and marketing besides having interests in real estate, trading, chemicals and fertilizers

7.10 Eldorado Fertilizer Plant, Kenya

(www.constructionreviewonline.com/2014/09/us1-2bn-new-fertilizer-production-plant-built-kenys/):-

Toyota Tsusho Corporation to build multi nutrient Facility under a phased production plan.

-Title; ELDORADO Fertilizer Plant:

Toyota/GOK JV for an East

Africa fertilizer project in Kenya to be owned by Toyota as a Private company.

-Location: Eldorado, Kenya located in the middle of main fertilizer Consumption belt in Kenya.

- Plant Configuration

- Phase-1: (N-P-K) production plant to be operational by 2016.

- Phase-2: (DAP)/(UREA)/(CAN) plants: No details concerning gas supply, phosphate and potash raw materials as well as Capacities available.

- Investment:

(www.spyghana.com/toyota-east-africa---kenya/):-(March 20, 2015)

\$2.0 billion financed by the Toyota Group along with land and Local logistics arranged by the GOK.

- Marketing: Much of the production shall be utilized locally.

Currently, the fertilizer product available in this area includes

A price tag of around 40% transportation charge.

7.11 Tororo District Fertilizer Project, Uganda

(www.africachinadaily.com.cn/weekly/2015-01-16/

content_19333.557.htm):- Uganda Tororo District Fertilizer project

as part of "Mining Development Deal" between (Guangzhou Dongsong Energy-GDE) and the (GOU).

- (GDE) was established in (2006) and carries current Assets of over (\$1.1 billion).

-Project Configuration: The project is based on mining at (26.47 SQKM site) located in Kenya's Tororo District to process 1mm t/Y.

ore for 170,000 t/Y Steel production for Phase-1:

-Phase -2 constitutes production of 120.000 t/Y Sulphuric acid to be used in production of downstream products (100,000 t/Y):

- Sulphuric Acid plant shall be an exporter of the energy meeting bulk of the requirements of the complex.

7.12 MagMinerals Pottasse Congo SA, Congo:

(www.magindustries.com):

MagMinerals Potasse Congo SA-(MPC):Subsidiary of MagMinerals Potash Corporation (Mag Industries Corporation Canada):

- Potash Fertilizer Project:

-Location: 20 KM from Pointe-Noire, Republic of Congo(ROC)

-Deposits/Production Capacity: 33.2 mm t reserves adequate

for more than 25 years for the plant capacity of 1.2 mm t/Y.

Deposit depth is 400 M to 1000 M

- Agreement Signed: 2008 for 25 years exclusive rights.

o Feasibility for a capacity of (600,000 t/Y) by SNC

Lavalin-2008:Upgraded to (1.2 mm t/Y) by Chinese Changsha Institute-2009.

- Gas supply agreement signed with Eni Congo SA-2009.
- Plant under construction with base camp fully operational.
- Project completion with commencement of production expected During 2015.
- Marketing: Demand expected to grow (8-10)% per year with Increasing trends.

7.13 Sintoukola Potash Project, Congo:

(www.mining-technology.com/projects/sintoukola-potash-project/):

(2011-2012):-Elemental Minerals Ltd: Sintoukola Potash Project:

-Location: Kouilou Province, Congo (ROC): Nearby site(Chiboola) for the export jetty to be built.

-Deposits/Planned Capacity:Estimated 1.29 billion t reserves adequate for over 20 years project life: Initial production capacity to be 600,000 t/Y likely to be increased to 1.2 mm t/Y

Subsequently: All Product to be granular.

-Conventional Technology to be employed. Cheap gas and

Abundant water availability assured. Effluent discharge into the sea. The construction of the export jetty part of the project.

- Scoping Study

(www.proactiveinvestors.com.au/companies/news/58827/elemental-minerals-start---/58827.html/): German Consultants

(ERCOSPLAN-November 11,

2014) commenced work with ETC 1Q, 2015.

-Ownership: Elemental Minerals 93%;Les Etablissements

Congolese MGM 5%;Tanaka Resources 2%. Increase in Elemental Minerals holdings to 97% reported subsequently.

Export to India/China and Brazil planned.

- (MPC) is working on two other Potash exploration concessions with (ROC)

7.14 Dallol Allana Potash Project, Ethiopia:

(www.allanaresources.com/): Exploration & Development of Dallol Potash in the Danakil Depression in Ethiopia.

- J/V: Allana Resources/ChinaCo
- Due Diligence completed & China Company received go ahead from Chinese Investment Club.
- Strategic Off take/Financing Agreement with China Minerals

United Management Ltd to acquire 20% of the production Completed.

8. Petrochem Engineering & IT Services Private Limited (PEITS):

- The Company (PEITS) carries with it decades of Project Management/Technical & Operational Management Experience which includes Two World Size Ammonia/Urea Grass Root Projects: One Relocation of Mega Pre-owned Ammonia Plant from USA to Developing Country:

One Acquisition & Refurbishment of Existing World Size Ammonia/Urea Complex.

- All this experience has been acquired by working as “Project Manager” in respect of the last three and as Lead (Training/operational/process/project/monitoring & evaluation/budgetary aspects and coordination with large number of engineering/licensing/Construction contractors and consultants) for the very first Mega Grass Root Ammonia/Urea Complex.

- As a part of these projects, valuable experience of working with Major International Financial Institutions & International Contractors were also acquired.

- The company makes full use of all its expertise & know how while undertaking research and providing services and looks Forward to receiving any inquiries in this regard.