Welcome to the second edition of *The Unisol Magazine*, Essel Group ME’s publication that takes a fresh look at the industries in which we operate and the latest developments affecting them. Every month brings another exciting development, and my vision for this magazine is to give our stakeholders a holistic view of the Group.

EGME is an international business, with assets across a broad spectrum of sectors and geographies. Our strategy is to grow by acquisition, focusing on attractive, underinvested assets with strong fundamentals. We now have interests across a wide range of different industries and each month, through this magazine, we will take a deeper look at a particular topic, industry, region or business. In this issue we focus on another of our key industries: potash.

This little-known commodity is a key ingredient in fertiliser, without which the contents of our fridges would look very different. The pressure on our food producers has never been greater, and it is imperative that agricultural land becomes as productive as possible. Potash-based fertilisers play an important part in this.

Potash forms a significant part of EGME’s portfolio too. We currently have two potash development projects underway – the one billion-tonne Bada project in Eritrea, and the Vanguard project in Canada’s Saskatchewan province, which we are developing in conjunction with Gensource Potash Corporation. You will gain a deeper understanding of these projects and the potash industry as a whole in this issue.

I very much hope that you enjoy reading this second edition of *The Unisol Magazine*.
NOTE

Fresh from the success of our maiden issue, I am delighted to introduce the second edition of The Unisol Magazine.

This month we take a closer look at potash and our most promising potash assets. In building this issue we spoke to people from right across the Group, as well as those outside it, to give a 360-degree view of potash and its place within our portfolio.

In this magazine you’ll find insights from our senior management, interviews with third-party experts and innovations from our technical teams. I hope that reading this edition is as engaging and thought-provoking as it was to compile.

We designed this magazine to appeal to each and every one of our stakeholders and we always value your feedback, so please get in touch with me at kriti@esselgroupme.com and share your thoughts.

I’d like to take this opportunity to thank our talented team at Essel Group ME for making our vision for this magazine a reality, and to everyone both inside and outside the Group for their valued contributions.

Kriti Ladsaria
VP Branding & Corporate Communications, Essel Group ME

The Unisol Magazine has been initiated and ideated by the EGME Branding and Corporate Communications Team.

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Feature
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Only 12 countries produce potash

Bada Potash will become one of the major sources of potash in the next few years

Essel Group ME, through its group company Interu Mining and Trading DMCC, acquired the exploration license for the Bada potash mine in May 2015

Estimates suggest the Prairie Canada Evaporite contains 50 percent of the world’s known potash resources
Eritrea

**Port of Massawa** provides direct access to key markets in Europe, Africa, India, China and Southeast Asia.

By 2018, Eritrea is expected to have four mines in operation: gold, copper, zinc and potash.

The Bada license area is only **40 km** from the Red Sea.

The Bada potash mine is located in the northern-most part of the Danakil region of Eritrea, East Africa, and measures **626 km²**.

The mine lies approximately **330 km** by road from Eritrea’s capital city of Asmara and **230 km** from the port of Massawa.

EGME estimates that Bada possesses approximate reserves of more than **1 billion metric tons**.

Production of potash at the Bada potash mine is expected to start in late 2017/early 2018.

**Potash** is the common name for various compounds containing potassium, which are used mainly as fertilisers.

**IN NUMBERS**

**PREDICTED OVERALL INCREASE IN DEMAND OF POTASH BETWEEN 2014 AND 2018**

- **Asia**: 56%
- **Europe**: 11%
- **Africa**: 6%
- **Rest of the world**: 27%

Source: United Nations Food and Agriculture Organisation

**The UNISOL Magazine**
Canada

The province of Saskatchewan in Canada holds the world’s largest potash deposits.

Large-scale potash production in Saskatchewan has been continuous since 1959.

Canada, Russia, Belarus and Germany account for more than 75% of the global supply of potash.

The Canadians account for the control, directly and indirectly, of 80% of the world’s supply of potash.

It is estimated that 1,000 years of the world’s consumption can be supplied from the Prairie Evaporite.

In November 2016, Gensource and EGME signed a memorandum of understanding (MoU) to create a joint venture company to implement one of Gensource’s new small-scale facilities.

In April 2017, the joint venture company was created, called Vanguard Potash Corp.

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SALES VALUE PROJECTIONS

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EBT PROJECTIONS

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With potash playing a key role in meeting agriculture’s needs and with 95 percent of it being used as fertiliser, Essel Group ME (EGME) is set to start production of Eritrea’s first mine by next year.

Speaking about his company’s flagship potash project and the future of the industry, Punkaj Gupta, Joint Managing Director and Group Chief Executive of EGME, said in an interview to World Fertilizer: “Through our potash business, we have an interest in two extremely exciting projects. In May 2015 we acquired the exploration licence for the Bada potash mine, which is situated in the most northern part of the Danakil region of Eritrea. Then, in November 2016, we signed a memorandum of understanding (MoU) with Gensource Potash Corp. (Gensource) to form a joint venture to develop a potash project in the Vanguard area in Saskatchewan, Canada."

Gupta added: “The 626 km² Bada licence area is situated in the Danakil Depression in Eritrea, which is renowned for possessing significant accumulations of potash. It is favourably located close to existing infrastructure and is approximately 330km from the capital city Asmara and 230km from established port facilities in Massawa, which provides direct and highly cost-competitive access to key end markets. We are also looking at the feasibility of constructing a jetty on the Red Sea coast, a mere 40km from the Bada project, to further improve access.”

Danakali, in conjunction with the Eritrean National Mining Corporation, is developing the world class Colluli Potash Project in the Danakil region of Eritrea. Colluli is the largest and shallowest known evaporite deposit in the world with a solid-form ore reserves estimate of more than 1.1 billion tonnes.

Potash developer Danakali will broaden its capital base by raising Aus$12.25 million through a share placement to sophisticated and institutional investors in the UK and Australia.

The company told shareholders in May that some 20 million new shares will be issued at Aus$0.62 each, representing a 7.4 percent discount to the company’s last closing price on the ASX and a 7.9 percent discount to the 30-day volume-weighted average price of Danakali shares.

Proceeds from the placement will be used to complete the development and optimisation work identified during the front-end engineering design process of the Colluli potash project in Eritrea, as well as completing the tendering processes for key contracts, including mining and engineering procurement and construction, and completing off-take and financing activities.

“This placement is testimony of how the international profile of the Colluli project is growing and is a clear endorsement of the project, the jurisdiction and the company,” says Paul Donaldson, Managing Director of Danakali.

A 2015 feasibility study estimated that the Stage 1 development of Colluli would require a capital investment of $442 million, with Danakali recently adding a further 47,000 t/y of sulphate potash output capacity, after a systematic de-bottlenecking of the processing plant configuration.

The additional capacity will increase Stage 1 sulphate of potash output to 472,000 t/y, up from the planned 425,000 t/y identified in the project’s definitive feasibility study.

Danakali, in conjunction with the Eritrean National Mining Corporation, is developing the world class Colluli Potash Project in the Danakil region of Eritrea, Colluli is the largest and shallowest known evaporite deposit in the world with solid-form ore reserves estimate of more than 1.1 billion tonnes.
GENSOURCE ANNOUNCES RESULTS OF VANGUARD ONE FEASIBILITY STUDY

Gensource Potash Corporation on May 31 announced the results from the detailed feasibility study for its Vanguard One Potash Project in Saskatchewan, Canada.

“We are delighted to have completed the feasibility study for Vanguard and are even more pleased that, as we dig deeper into the detail, the chosen mining and processing methods continue to affirm that Gensource has selected the right approach to potash production. Not only do we have a world-class resource, but the project also provides a strong return on investment, in part because it is small and easily scalable, all the while setting a new bar for environmental responsibility in the development of new potash production,” says Gensource’s President and CEO, Mike Ferguson.

“The results of the study speak for themselves; even in this time of low potash prices and even with Gensource’s conservative assumptions on potash prices in the future and on-going sustaining capital costs for the operation, the project is technically and economically robust. We are excited to take the Vanguard Project to the next step – confirming the construction financing and then into construction and, ultimately, operation. We are more convinced than ever that this is the way to produce potash in the 21st century,” he adds.

The study was initiated in October 2016 with a planned completion date of Q2 2017, a goal that has now been met. The successful completion of the feasibility study is a key milestone for Gensource. From this point, the development of one of these new, small-scale facilities is open to any group that is interested in controlling its potash supply chain – from distributors to farmer co-ops.

Gensource has an agreement with Essel Group ME Limited (EGME) to be a partner in a joint venture, called Vanguard Potash Corp, to develop one of the projects. Now that Gensource has completed the feasibility study, Vanguard Potash Corp can move ahead with the construction of the actual mine.

The construction schedule was determined to be 20 to 22 months. So, depending on weather, the environment and a few other factors, the first project could start initial work in the fall before the freeze-up and then work through 2018, with production starting in mid-2019.

SIMBA ESSEL ENERGY COMPLETES SHARES FOR DEBT AGREEMENT WITH EGME

Simba Essel Energy told investors it had completed the shares for debt agreement announced in May with Essel Group ME (EGME), which owns 60 percent of the former’s African exploration assets, according to a press statement by Simba.

The company issued more than 10.5 million shares at $0.7 to EGME to settle the debt for advances and direct payments made by EGME to the Simba Essel Energy’s creditors to the tune of $739,845. The shares are subject to a statutory hold period until October 28, 2017.

Simba Essel Energy has active onshore production-sharing contracts (PSCs) in Kenya and is in final negotiations for a new PSC in Guinea, as well as a new hydrocarbon reconnaissance permit in Liberia and PSCs under negotiation in Chad and Ghana.

In April, the firm changed its name to Simba Essel Energy Inc after it received approval at the AGM for two agreements that were struck with the global conglomerate, EGME, in 2015. Two years ago, EGME was granted the right to earn 60 percent interest in Simba Essel’s PSCs in Kenya, Chad and Guinea by contributing 100 percent of the financing to carry out an exploration programme on the PSCs.

In November 2015, Simba Essel entered a definitive farm-out agreement with EGME for its Block 2A in Kenya, wherein EGME earns a 60 percent interest by financing 100 percent of exploration expenses until the completion of two conventional wells on Block 2A.

Also in April, Simba Essel revealed it had struck a deal with the national oil company (NOCAL) in Liberia, which had doubled the junior’s acreage. The agreement with NOCAL saw Simba Essel issued with a new reconnaissance licence, NR-002, which expands the latter’s acreage to 2,961.7km².

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Preliminary testing shows the Bada project area has an evaporite basin depositional environment similar to that of the Dallol and Colluli areas, where huge potash resources have recently been identified.

KEY HIGHLIGHTS:
- Comprises evaporite sequence (gypsum, etc.) and Late Cenozoic volcanic rocks, dominated by basalt and tuffs.
- The low-lying ‘graben’ area is covered with thick, fine and un-consolidated clastic sediments. Moreover, extensive evaporites are deposited between the coast and the Bada basin (mainly anhydrite and minor gypsum ‘lens-shaped’ deposits).
- The surrounding platform located towards the north and the north-east of the basin is capped by young volcanic rock.
- Thick stratified and consolidated siltstone to sandstone beds are outcropped at the western margin of the license area. These sediments are uncomfortable and overlain by basalt flow.
- In the north-western part of the basin, 1cm thick anhydrite and chert lamina are present beneath the volcanic rocks. The chert lamina also show imprints of fossiliferous helical grooves.
ATTRACTION DEPOSITIONAL ENVIRONMENT

Exploration in Eritrea

Essel Group ME (EGME), through its group company Interu Mining and Trading DMCC, acquired the exploration license for the Bada potash mine in May 2015. It is located in the most northern part of the Danakil region of Eritrea, East Africa, an area renowned for possessing significant accumulations of potash salts. Measuring 626km², Bada possesses an estimated one billion metric tons of reserves.

BADA LICENSE AREA
- The proximity to established infrastructure links provides the means to service the strong demand for potash in India as well as China
- There are plans to develop a second port facility at Anfile Bay, which is 75km from the Bada exploration site
- The Danakil region of Eritrea offers a combination of bountiful resource reserves and favourable geographical location
The Province of Saskatchewan in Canada holds the world’s largest potash deposits. These enormous deposits are located within the Prairie Evaporite Formation, which covers a large part of the southern part of the province.

It is estimated that the Prairie Evaporite contains 50 percent of the world’s known potash resource – some sources estimate 63 billion tonnes of final, saleable potash product: more than 1,000 years of world consumption can be supplied from the Prairie Evaporite alone.
Large-scale potash production has continuously been under way in Saskatchewan since 1959. Today, the province contains nine potash mines and processing facilities, with a tenth, the Bethune mine, owned by K+S Ag. of Germany, just completing its commissioning phase.

Currently, only three producers operate in Saskatchewan: PotashCorp, Mosaic and Agrium. A fourth, Big Quill Resources (now owned by Compass Minerals), produces a specialty sulfate of potash fertiliser product.
A LOOK AT THE POTASH MINING SPACE IN CANADA AND ERITREA

SASKATCHEWAN IN CANADA HOLDS THE WORLD’S LARGEST POTASH DEPOSITS, WHILE ERITREA’S DANAKIL REGION IS FAST ATTRACTING MAJOR PLAYERS

BY KEVIN BRIDGES
This cartel, or oligopolistic, structure of the potash industry tends to maintain prices at an artificially high level, which not only reduces global demand for potash, but also results in the demise of innovation within the industry. The result is a stagnant, highly controlled global space: mining and processing methods have not significantly changed in the potash industry in the past five to seven decades.

At the same time, in the agricultural world, potash remains agronomically under-applied in a large part of the world due to the inability of the end user – the farmer – to either gain access to potash or access it at a price that makes sense economically.

Along with the Canadian producers who operate internationally under the marketing company Canpotex, the potash space is dominated by Russia’s Uralkali and Belarussia’s BelarusKali, who operated a second cartel under the marketing company Belarus Potash Company (BPC) until that organisation broke up in 2013.

These control structures are nothing new to the potash industry, which has been highly concentrated and controlled since the beginning of industrial-scale potash mining dating to the mid 1800s in Germany.

Since the breakup of BPC, the producers have faced difficulties, with the potash price dropping in an oversupply situation caused by an overhang of expansion and greenfield projects initiated during the period of high potash prices, between 2008 and 2013.

With the market in a state of flux due to oversupply and the attendant low-price environment, an opportunity now exists for new companies to advance innovative technologies that exhibit significant improvements over existing mining and processing technologies – new approaches that will eventually become “the way potash is produced”. These include both technical matters (mining and processing technologies) as well as business structures.

The Province of Saskatchewan in Canada holds the world’s largest potash deposits. These enormous deposits are located within the Prairie Evaporite Formation, which covers a large portion of the southern part of the province. Mining and processing methods have not significantly changed in the potash industry in several decades.
The UNISOL Magazine

For the first time, with Gensource’s ability to economically implement a small and scalable potash project, it is now possible to vertically integrate a potash production facility with a specific end-user market. Gensource believes this approach is the future of the potash industry – that a series of small and scalable potash mines, each implemented to serve a very specific market, will allow the industry to break away from its oligopolistic past and move towards a future that provides the end users with a product they need at a price that makes sense in their own business context.

Existing major potash producers have too much invested in their existing infrastructure and way of doing business to make wholesale changes to technology. This is a typical situation in any industry where large players do not keep up with changing technologies. They fall behind and soon become high-cost producers.

The shift towards highly evolved solution mining methods and innovative processing methods will become the technological norm of the future and those who embrace it early will see a “first-mover” advantage.

It is estimated that the Prairie Evaporite contains 50 per cent of the world’s known potash resource – some sources estimate 63 billion tonnes of final, saleable potash product; more than 1,000 years of world consumption can be supplied from the Prairie Evaporite alone.

POTASH MINING IN SASKATCHEWAN
Large-scale potash production in Saskatchewan has been continuous since 1959 and the province now hosts nine potash mines and associated processing facilities, with a tenth currently completing its commissioning phase. Currently, only three producers operate in Saskatchewan: PotashCorp, Mosaic and Agrrium.

A fourth, very small, producer, Big Quill Resources (now owned by Compass Minerals), produces a specialty sulphate of potash fertiliser product. K+S AG of Germany is the owner of the tenth operation, the Bethune Mine, having just completed its commissioning. Generally, roughly one-third (20 million tonnes) of the global demand for potash, which was about 62 million tonnes worldwide in 2016, is met by Saskatchewan producers.

More than 1,000 years of world consumption can be supplied from the Prairie Evaporite alone
Gensource, with its Selective Mining and Enhanced Recovery technologies, will help create an open space for those forward-looking groups who also see the opportunity of entering the potash industry as a low cost producer and who are looking to secure the product. They will be the first to become partners in these innovative and scalable potash facilities, which will help change the industry.

ERITREA EMERGING AS A MAJOR PLAYER IN GLOBAL POTASH MAP
Global potash supply is dominated by Canada and Russia. However, Eritrea is gradually emerging as a major player in the potash sector. The Danakil region of Eritrea is known to have significant reserves of potash. More than six billion tonnes of potassium-bearing salts have been identified to date and the region has attracted a number of major fertiliser players.

Danakali Ltd (formerly Australian South Boulder Mines Limited) and the Eritrean National Mining Company are 50-50 joint venture partners in the development of the world class Colluli potash project while the Essel Group ME (EGME) has acquired the Bada potash mine – both located in the Danakil Depression of Eritrea.

The Danakil Depression has long been known to contain near-surface potash mineralisation, with close to 100 years of potash exploration history in the area. The region is in close proximity to the Red Sea shipping corridor and only 75km from the coastline. It is close to existing in country port facilities such as Massawa, which is only 180km away, and the areas are mostly linked by coastal highway. The climate and topography of Danakil and the surrounding coast are extremely favourable for mining operations, solar evaporation and easy transportation.

Sitting at the epicentre of booming population growth, Eritrea is strategically positioned to take advantage of current and future the key markets of the future.

In August 2015, EGME-owned company Interu Mining and Trading acquired the Bada Potash Exploration License, located in Danakil Depression, Eritrea. Interu Mining and Trading has been granted the exploration license by the Eritrean government.

The license area is 150km southeast of the capital city of Asmara and covers an area of 626km². It is situated within the northern portion of an evaporite basin extending southward into Ethiopia, with large crescent, Musleypotash, along with sylvite deposits. In the Eritrean part of the basin, The neighbouring Licenses Mines Ltd. have announced the discovery of shallow potash mineralization near the village of Colluli in Eritrea.

According to findings made public by Interu, the Bada mine has suitable depositional environment including continental rift and magmatism; marine flooding; and, a restricted coastal plain.

The Northern Danakil Basin, where the Bada potash project lies, is an emerging potash province known to host more than six billion tonnes of potassium-bearing salts, which makes the region one of the largest unexploited potash basins. Besides the Bada mine, Interu also has the exploration license for two iron mines in Ghedem (23km²) and Aghameda (120km²) in Eritrea.

Through these mining developments, Eritrea hopes to see a positive development in its mineral industry, apart from increasing its gold and copper exploration activities.

The exploration for potash is also expected to increase in the future due to an increase in demand for this industrial mineral. Eritrea is also keen on attracting more foreign investments in its mining sector through the country’s liberal mining laws.
Mines at the heart of Canada’s potash industry are gearing up to increase production in 2017, while in Eritrea’s Danakil region, more than six billion tonnes of potassium-bearing salts have been identified.

BY GEORGIE TURNER
Canada accounts for 46 per cent of global potash reserves. A significant portion of these reserves are found in the Prairie Evaporite Deposit, which lies beneath the southern plains of Saskatchewan, making the province the heart of Canada’s potash industry. The country also produces 32 per cent of the mineral’s total global production, making it the world’s largest potash producer and exporter.

Between 2015 and 2016, Canada exported 21.5 million tonnes of potash worth nearly $10 billion to countries with either agriculture-based economies or large agricultural sectors such as the United States, China, Brazil and India, according to figures released by Natural Resources Canada. There are 11 potash mining and processing operations in Canada; of which ten are located in Saskatchewan.

As the world’s largest potash producer, the province is hopeful that the low potash prices of recent years, due to over-supply and lower-than-expected demand, have reached their lowest point. In August 2016, the price of potash was $220/metric tonne (mt), down from $300/mt the same time last year, and well below the peak price of $870/mt reached in February 2009.

The Food and Agriculture Organization of the United Nations has predicted steady growth in demand for nitrogen, phosphate and potassium fertilisers between 2015 and 2019. In addition, signs of improvement in other commodity prices have been observed since January 2016, as economies around the world strengthen. In response, Saskatchewan’s potash industry has been building and expanding operations, and a number of projects are set to advance in 2017.

POTASHCORP-AGRIUM DEAL DOMINATES GLOBAL NEWS

Dominating global agriculture news in 2016 and much of the first half of 2017 was the announcement of a proposed merger later this year between the Potash Corporation of Saskatchewan (PotashCorp) and Calgary-based fertiliser producer, Agrium Inc. The new company will be called Nutrien, which will be the largest crop nutrient company in the world and the third-largest natural resource company in Canada, employing close to 20,000 employees in 18 countries with a value of $36 billion.

“This is a transformational merger that creates benefits and growth opportunities that neither company could achieve alone,” said Chuck Magro, Agrium president and CEO in a news release on September 12, 2016. The deal is described as a “merger of equals” and the new company expects to generate up to $500 million annually as an integrated global supplier of crop inputs.

In January 2016, PotashCorp suspended operations at the Picadilly potash mine in New Brunswick indefinitely, resulting in the loss of more than 400 jobs. Extra positions were offered to 100 affected employees willing to relocate to Saskatchewan, where PotashCorp operates five mines. The company’s eight-year, $3 billion expansion to the Rocanville mine, 200km east of Regina near the Manitoba border, was completed in November 2016, making it one of the biggest underground mines in the world.

For the Mosaic Company, which operates the remaining three potash mines in Saskatchewan, good news came in the form of a $3.2 billion K3 mine expansion at the giant Esterhazy mine, while the bad news involved 330 employees temporarily laid off at Colonsay. The mine remained idle for much of the second half of 2016, but employees were recalled in January 2017 on expectation of a stronger year. K3 is expected to reach capacity of 21 million ore tonnes by 2024.

Meanwhile, K+S Potash Canada’s new Bethune mine produced its first tonnes of...
The latest is Vanguard PotashCorp, a joint venture formed in April 2017 by Gensource PotashCorp and Essel Group ME Ltd. (EGME), which says it could have a mine that does not require surface tailings deposits operating near Tugaske by 2019.

“The first one is a huge deal for us,” says Mike Ferguson, a potash industry veteran who steered Potash One Inc. to its 2010 friendly takeover by K+S AG before forming Gensource with the notion of “disrupting” the industry.

That disruption hinges on building small “selective dissolution” mines roughly one-tenth the size of most conventional underground operations and then selling 250,000 tonnes of potash on long-term contracts each year.

Vanguard’s formation was a significant victory for Gensource, but the joint venture still has major hurdles to clear before it can start work on the mine northwest of Moose Jaw, which could create 400 construction jobs, 46 permanent.

marketable potash in June this year. The K+S-owned mine, located in Bethune, 60km northwest of Regina, is the first potash mine to open in Saskatchewan in 40 years. The company calls it “the most modern potash facility in the world”. The mine held its grand opening in May. K+S intends to produce 600,000 to 700,000 tonnes of potash at Bethune this year. Eventually, annual production is expected to reach two million tonnes by the end of 2017.

ESSEL GROUP ME, GENSOURCE JOINT VENTURE LEADS NEW GREENFIELD PROJECTS

A number of advanced potash projects are under development around Saskatchewan. After months of aggressive cost-cutting, the province’s beleaguered potash industry appears to be turning the corner, with established mining companies recording higher profits and several new firms working to develop greenfield projects.
Other proposed projects include:
• YanCoal Canada, a wholly owned subsidiary of Yanzhou Coal Mining Co. Ltd., which received conditional approval from the Saskatchewan Ministry of Environment in August 2016 for their proposed Southey potash solution mine, 60km north of Regina
• Western PotashCorp announced a strategic investment of $80 million from a Chinese private equity firm in September 2015 toward construction of their 100 per cent-owned Milestone Property, 30km southeast of Regina
• Karnalyte Resources announced financing for construction of their potash mine at Wyndail, Saskatchewan, in March 2015. As of September 2016, they had successfully commissioned the second stage and testing was under way in increase previously reported potash concentrations
• The final feasibility study for Vale’s Kronau Project’s has been completed and the company is currently determining the next steps for the initiative
• Also progressing slowly is BHP Billiton’s 89.4 billion Jansen Project, 140km east of Saskatoon, which is approximately 60 percent complete
• There has been no news on a buyer for the Russell-McAuley potash project, an estimated one-billion-tonne high-grade potash deposit in Manitoba. Four companies were said to be interested in the deposit in late 2015, but no new announcements have been made.

Looking ahead, there seems to be little doubt that the potash market will recover to meet the demands of farmers producing food for a growing global population. Saskatchewan mines are gearing up to increase production in 2017 as supply and demand even out after a tumultuous few years.

“Fertiliser markets have been under pressure [beginning] the first six months of 2016, however we believe the uncertainty that weighed on the potash market sentiment is now lifting and a recovery is beginning,” said Jochen Tilk, PotashCorp president and CEO, in a company news release in July 2016.

“With key Asian contract prices settled by a number of producers – and buyer inventories at reduced levels – we are seeing improved engagement in all key markets,” Tilk added.

The Danakil region of Eritrea is known to have significant reserves of potash
ERITREA’S DANAKIL REGION: A GAME CHANGER FOR GLOBAL POTASH INDUSTRY

Eritrea is a country in the Horn of Africa with a population of approximately 6.4 million. The Eastern African nation is bordered by Sudan to the west, Ethiopia to the south, and Djibouti to the southeast.

The northeastern and eastern parts of Eritrea have an extensive coastline along the Red Sea. The capital of Eritrea is Asmara. The African country mostly has climatic conditions ranging from hot and dry desert-type climates to a semi-arid climate. The country covers a total area of approximately 117,600 km².

ECONOMY AND NATURAL RESOURCES

The economy of Eritrea has experienced considerable growth in recent years and the gross domestic product (GDP) is estimated to hover around $4 billion. Eritrea has an extensive amount of resources such as copper, gold, granite, marble, and potash. The country is also hoping to develop a number of international mining projects that will contribute a lot to its economy.

Eritrea has an extensive amount of resources such as copper, gold, granite, marble, and potash.

Eritrea’s key natural resources include natural gas, gold, copper, oil, zinc and potash. Almost 70 per cent of the country is covered by the greenstone belt, which contains deposits of both precious metals and volcanic massive sulfide (VMS).

Deposits of barite, copper, asbestos, silver, lead, iron ore, potash, zinc, tale and feldspar were exploited in 2010. Domestic requirements were met by importing refined petroleum products in 2010.

PLUSH WITH POTASH

The Danakil region of Eritrea is known to have significant reserves of potash. More than six billion tonnes of potassium-bearing salts have been identified to date and thereby the region has attracted a number of major fertiliser players.

If one is to believe experts in the field, the Danakil region could prove to be a “game changer for the global potash industry”.

The UNISOL Magazine | 27
Danakali Limited’s Colluli mine and EGME’s Bada mine – both in Eritrea – are among the main potash projects in the region full of potential.

Since drilling commenced in early 2010 at Colluli, one of the largest potash reserves in Eritrea, more than one billion tonnes of potassium-bearing salts suitable for the production of potash have been identified. The project is expected to output potash ranging between 300 and 500 million tonnes.

Danakil’s location has another geographic advantage – it is at the epicentre of the world’s forecast population growth hotspot, which will require more fertiliser to grow more food on less available land.

The deposit is also the shallowest known deposit globally, is located only 75km from the Red Sea coast, and is geographically favourable relative to the key potash markets of the future.

There is a simple demand structure for Colluli’s fertiliser products – the world’s growing population is expected to increase 30 per cent by 2050 and require a 70 per cent increase in agricultural yield.

The project itself is in a prime position to help feed a growing population – Africa is forecast to account for a quarter of the world’s population by 2050.

EGME’S BADA PROJECT

Recognising the potential of Eritrea in potash production, EGME-owned Interu Mining and Trading acquired the Bada Potash Exploration License, located in the East African nation’s Danakil region, in August 2015.

Interu Mining and Trading was granted the exploration license by the Eritrean government of an area covering 626km². The Bada mine has an estimated reserve of more than one billion tonnes of potash.

“It is favourably located close to existing infrastructure and is approximately 320km from the capital city Asmara and 230km from established port facilities in Massawa, which provides direct and highly cost-competitive access to key end markets. We are also looking at the feasibility of constructing a jetty on the Red Sea coast, a mere 40km from the Bada project(25,18),(983,987), to further improve access,” Punkaj Gupta, Joint Managing Director and Group Chief Executive of EGME was quoted as saying in an interview with World Fertilizer.

“We are currently conducting early stage testing across the site and anticipate that we will commence production in 2018,” he added.

Gupta, however, stressed there are a number of important milestones to achieve before production begins. “We are currently conducting electrical resistivity tests at the site to delineate the potash deposit trend and identify any geological and structural disturbances. After that, we will start direct core drilling to help better estimate our inventory resources. At the same time, we will proceed with the environmental baseline study, social impact assessment, feasibility report and EPCM (Engineering, Procurement, and Construction Management).”

Although EGME hasn’t faced any unforeseen challenges in their activities at Bada mine so far, Gupta said the group is prepared for any eventuality. “As with any underdeveloped asset, you are always going to encounter small setbacks in the early phases. Bada is situated in a fairly remote location, so it will take time to complete the testing phase on the asset. We remain extremely confident about the prospects for Bada and are looking forward to commencing core drilling later this year.”

Africa is forecast to account for a quarter of the world’s population by 2050
CREATIVE AUDIO-VISUAL HUB

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POTASSIUM: AN INDISPENSABLE NUTRIENT

While potassium is obtained by plants from the soil in which they grow, humans obtain potassium from either eating plants or other animals that have fed on plants.

BY KEVIN BRIDGES
It is a well-known fact that potassium is one of the key elements for life on earth. It is required in large quantities by all plants, animals and humans to maintain a healthy life. While potassium is obtained by plants directly from the soil in which they grow, animals and humans obtain their potassium from plants, either directly or by eating other animals (and animal products) which have fed on plants.

**IMPORTANCE TO PLANTS**

Potassium has two roles in the functioning of plant cells. First, it has an irreplaceable part to play in the activation of enzymes which are fundamental to metabolic processes, especially the production of proteins and sugars. Only small amounts of potassium are required for this biochemical function. Second, potassium is the “plant-preferred” ion for maintaining the water content and hence the turgor (rigidity) of each cell, a biophysical role.

A large concentration of potassium in the cell sap (i.e. the liquid inside the cell) creates conditions that cause water to move into the cell (osmosis) through the porous cell wall. Turgid cells maintain the leaf’s vigour so that photosynthesis proceeds efficiently.

Photosynthesis is the process by which plants harvest the energy of sunlight to produce sugars. These sugars contain carbon derived from the carbon dioxide in the air that has entered the leaf through the stomata, tiny openings mainly on the underside of the leaf. These tiny openings are surrounded by “guard cells” and it is only while they are turgid that the stomata remain open and carbon dioxide can pass through into the leaf.
Today, some 95 per cent of the total potassium output is used as fertilizer. Plant and wood ashes containing potassium carbonate were used for making soap and glass in antiquity and small amounts of potassium salts are still used for this purpose today. In glass making, potassium gives a hard, heat resistant glass. There is a range of other minor industrial applications. Potential uses include (i) water softening, to replace calcium and magnesium salts that make water "hard" and (ii) as a de-icer. Using potassium salts for these two purposes would be more expensive than the alternatives, but the wastewater would contain a valuable plant nutrient.

OSMOSIS IN PLANTS

Osmosis is defined as the passage of water from a region where the concentration of salts is low through a semi-permeable membrane to a region where the concentration of salts is higher. In plants, water moves from cells with a low salt count, to those with a higher concentration of salts. This process is responsible for the movement of water within the plant and also the uptake of water from the soil by the roots. These conditions that lead to water movement are termed the 'osmotic potential'. Much of the potassium in the plant is in the liquid within the cell and its presence increases the salt concentration and thus controls the movement of water. When plants take up water by osmosis their cells become gradually more turgid (swollen) until no more water can enter the cell. Turgidity is very important to plants because it maintains the rigid structure of most annual crops which do not have a woody structure of trunks and branches. In all plants, turgid leaves have a large surface area and this optimises the process of photosynthesis in the green chloroplasts in the cells.
Humans require both potassium, from food, and sodium. A high sodium intake, together with a low potassium intake, influences vascular volume and tends to elevate blood pressure. Consuming plant products rich in potassium, especially those that are consumed raw such as fruits, particularly bananas, and milk and fruit juices, redress the balance. It is possible to calculate the proportion of the daily potassium intake that is met by different foods. For example, a medium sized banana contains 0.4 grams potassium, approximately 11 per cent of the suggested daily intake, while a medium-sized potato will supply 21 per cent.

In drinking water

The potassium content of drinking water varies greatly depending on its source. It tends to be larger in mineral and spa waters than ordinary tap water. However, on average, the daily water consumption by adults supplies less than 0.1 per cent of their potassium intake. But tap water is also used to make beverages such as tea and coffee.

The average total potassium intake in beverages can supply about 13 per cent of the total daily intake of adults. In recognition that potassium in drinking water poses no risk to human health, the European Commission has removed the limits it set on the allowable potassium concentration in drinking water from December 2003.

In soil

Soils have to be fertile to be productive, whether that means producing forest, grassland or agricultural crops. Fertile soil has the ability to hold reserves of many available essential plant nutrients, including potassium. This nutrient retention depends on the clay and organic matter in soil; potassium does not leach except to some extent from very sandy soils. The reserve of potassium provides a secure store which is available to the crop as it grows.

However, the harvesting and removal of crops from the field will also remove the nutrients they contain, so depleting the soil reserve (also called soil mining). An adequate reserve of potassium in the soil is necessary because of the large quantities required by the growing crop, and the function of potash fertilizers is to replenish this soil reserve.

The quantity of potassium which is available in a soil can be determined by laboratory analysis. This is a standard procedure in good farming practice and helps to inform the farmer of the quantity of potash fertilizer or manure which is required to ensure that his crops will not be deficient.
KEY TO HUMAN WELL BEING
Potassium is a mineral necessary for the proper function of many of our body systems. It is also often referred to as one of the key electrolytes in our body. Potassium, along with sodium, the other electrolyte, plays a vital role in regulating the fluid levels in our body. Potassium has many roles and responsibilities within the body, these include:

◆ Maintaining electrolyte balance in the body’s cells
◆ Managing blood pressure and healthy heart
◆ Assists nervous system by aiding in the correct function of tissues needed for sending nerve impulses
◆ Helps the muscles contract
◆ Releases energy from protein, fat and carbohydrates during the metabolic process
◆ Aids in the waste removal process
◆ Enhances muscle control, the growth and health of your cells
◆ Promotes efficient cognitive functioning by helping to deliver oxygen to the brain

EFFECTS OF DEFICIENCY
Dietary deficiency of potassium can lead to a variety of mental and physical problems for you. Mental symptoms can include insomnia, anorexia, depression and some nervous disorders. Physical symptoms include muscular cramps and twitching, fatigue, muscular weakness, poor reflexes, irregular heartbeat and other cardiovascular problems, fragile bones, lung and kidney failure and heart attack. If you experience any combination of these symptoms, you should speak with your doctor immediately. A simple blood test can determine if your potassium levels are too low or your sodium levels too high.

REASONS FOR DEFICIENCY
There are several reasons for potential potassium deficiency. Among them include: excessive alcohol consumptions, high stress, poor overall health, diarrhoea and vomiting for prolonged periods. During periods of diarrhoea or vomiting or excessive sweating, potassium levels can fall much more quickly and, therefore, need to be replenished as quickly as possible. This is very common in children, infants and the elderly.
The many preventable reasons for deficiency can include excessive caffeine consumption, imbalanced diet of excessive consumption of processed foods and excessive consumption of sodium. A balance has to be maintained between sodium and potassium, since consuming excess amounts of sodium can lead to an increase in your blood pressure.

MAINTAIN A BALANCE
The human body is an intricate system with sensitive chemical balances. For your body to be healthy, it's important that this delicate balance be maintained. Any disruption in the balance can have a cascading effect, with some more severe than others. To prevent any disruption or disturbance, it is vital to maintain a healthy diet. When you make sure to get the daily recommended total for potassium and stay below the daily recommend amount of sodium, you will be able to better maintain the balance your body needs to operate at optimal health.
The best way to maintain a healthy body is to have a nutrient-rich, well-balanced diet, while avoiding added sugars, junk foods, fats, and excessive carbohydrates. Sources of potassium: potatoes, bananas, cooked spinach, bamboo shoots, oranges, apricots, prunes.
Source: European Fertilizer Manufacturers’ Association/Potash Development Association
POTASH LEADS TURNAROUND IN FORTUNES FOR FERTILISER COMPANIES

Emerging countries’ dependence on agriculture and rise in population boosts potash mining market

BY ASHOK SHARMA
As long as humanity exists the world will always have mouths to feed; more and more with every passing year. It seems only natural, therefore, that there will always be a ready market for food and agricultural produce.

This is the most simple and compelling argument for long-term growth and potential of agriculture and all the ancillaries that serves this primary sector – particularly the big fertiliser companies, such as Potash Corp of Saskatchewan Inc, Agrium Inc, Mosaic Co and CF Industries Holdings Inc.

The agriculture sector forms the economic backbone for most of the developing countries. Presently, emerging economies such as China, India, Indonesia and Ghana are still heavily reliant on agriculture for the growth of their economies. This-dependence, coupled with the rise in population, is a key driver of the potash mining market.

GLOBAL OUTLOOK: PRICES RECOVERING AFTER DECADE OF WEAKNESS

According to a Bloomberg report released in April, potash prices are recovering after a decade of weakness, lifting the prospects of a turnaround in fortunes for fertiliser companies, following a slump in farm spending.

Potash Corp of Saskatchewan Inc, the world’s second-biggest producer, boosted its full-year earnings forecast and said strong demand will continue for the rest of the year as North American farmers seek to replenish soil nutrients after record harvests. Chinese potash shipments are expected to increase in 2017, it added. The Canadian company’s performance suggests the potash recovery is in “full force”, the Bloomberg report quoted Sanford C Bernstein & Co analyst Jonas Oxgaard as saying.

Canpotex, the joint venture handling overseas sales for Potash Corp and its two largest
North American peers, Agrrium Inc and Mosaic Co, has kept the market tight and driven up prices, while volumes have exceeded expectations in North America and export markets; a positive sign for the companies, he said. “I think we’ve seen the turnaround already,” Oxogaard told Bloomberg. “We expect continued price increases in potash.”

Potash Corp maintained its forecast for worldwide industry potash shipments of as much as 64 million metric tonnes this year, up from 60 million in 2016. It raised its prediction for Latin American shipments. China, the largest market, is now consuming as much as 15.5 million tons.

Meanwhile, Russia’s Uralkali, the world’s largest potash producer, said it expects total global potash demand to rise by 1 to 2 million tonnes in 2017 to 62 to 63 million tonnes, driven mainly by China.

Last year the world’s top potash importers – India and China – delayed signing new purchase contracts until the end of the second quarter and start of the third quarter, putting downward pressure on the global market.

Uralkali forecast China would buy between 14.8 million and 15 million tonnes of potash this year, while India would purchase 3.9 million to 4.2 million tonnes. Lower potash prices and carry-over stocks could lead to higher demand for Chinese imports this year, Uralkali said.

Expectations for a good monsoon season and low carry-over stocks are expected to support India’s import demand, but India’s potash subsidy reduction may be a challenge for demand growth, it said.

A report by research and analytics company Market Realist, released in June this year, says “potash fertiliser capacity is expected to expand year-on-year. In 2016, total global potash capacity stood at 65 million metric tonnes, and this amount is expected to increase by 2.2 million metric tonnes to 67.2 million metric tonnes in 2017.”

“PotashCorp is expected to add 0.8 million metric tonnes of capacity, but the majority of potash capacity additions, that is 2.1 million metric tonnes, are expected to come from other producers. As production costs are rationed amid falling fertiliser prices, capacity closures are expected in 2017 as well,” according to Market Realist. “This capacity closure likely indicates that the market for potash is shifting to larger, lower-cost producers that will see the benefits of protecting their margins by lowering costs through economies of scale.”

Potash prices have been on a downward trend for a decade, due to a combination of excess mining capacity coming on line and weak

WHAT IS POTASH?

POTASH IN THE SPOTLIGHT

Potassium was first isolated in 1807 by a British chemist from Cornwall, Sir Humphrey Davy. It is a soft, silver white metal that reacts so violently with water that the metal does not occur in nature. The chemical symbol for the element K derives from kalium, the Latin version of the Arabic word for alkali. In agriculture, potassium is often referred to as potash. This name derives from the ancient practise of obtaining potassium salts by burning wood, extracting the ash with water and evaporating the resulting solution in iron pots – hence “pot-ashes”. The resulting solid would be a mixture of potassium salts, mainly potassium carbonate, chloride and sulphate. In agriculture and horticulture potash is the common term for nutrient forms of the element potassium (K). The name derives from the collection of wood ash in metal pots when the beneficial fertiliser properties of this material were first recognised many centuries ago.

POTASH IN NATURE

Potassium occurs abundantly in nature. It is the seventh most common element in the Earth’s crust. Certain clay minerals associated with heavy soils are rich sources of K, containing as much as 17 percent potash. Sea water typically contains 390 mg/l K, representing a huge total amount of the element globally.

Small quantities of K naturally occur in rain – up to 4 ppm. Large potash-bearing rock deposits occur in many regions of the world deriving from minerals in ancient seas which dried up millions of years ago. Most potash for fertiliser is derived from one of these potash rocks, sylvinite, requiring only separation from the salt and other minerals, and physical grading into a form suitable for fertiliser manufacture or farm spreading.

FUNCTIONS OF POTASH

Potassium fulfils many vital functions in a wide variety of processes in plants, animals and man. It is typically taken-in in greater quantities than required and surpluses are naturally excreted. This process occurs in animals and humans via the kidneys and urine, and in plants by the return of potash in senescent tissue at the end of each season (leaves from trees, cereal stubble and roots, etc). K is therefore naturally recycled widely and in large quantities. Soil reserves are an essential requirement for adequate nutrient supply of K to plants, which commonly contain more potassium than any other nutrient, including nitrogen.
demand, as lower crop prices undermined farmers’ spending power. While crop prices are still lacklustre, Potash Corp has been reducing production to help balance the market.

However, the merger deal between Potash Corp and Agrium, that will create the world’s largest crop-nutrient supplier, has helped in lifting the prospects of the industry. The new company will be known as Nutrien and is expected to be fully operational in the coming months.

The major producers of potash include: Canada, the US, Russia, Germany, Belarus, Spain, the UK, China, Chile and Brazil. In recent times, Eritrea has emerged as a potential producer of potash in Africa.

The major consumers of potash include: China, the US, India and Brazil. According to Potash Brazil Limited, Brazil imported approximately 90 percent of its total potash requirement. Presently, Brazil accounts for approximately 80 percent of total potash consumption in the Latin America region.

AN ESSENTIAL CROP NUTRIENT
Since its discovery in 1807 by Sir Humphry Davy in England, potassium – the third major plant and crop nutrient after nitrogen and phosphorus – has emerged as a major fertiliser for the agricultural sector.

Potassium is also one of the key elements for life on earth. It is required in large quantities by all plants and animals, and is obtained by plants from the soil in which they grow. Animals obtain their potassium from plants, either directly or by eating other animals (and animal products) which have fed on plants. The harvesting of plant materials, such as grains, fruits or foliage, removes from the field the potassium they have taken from the soil.

As the global population and food production has grown, so too has the amount of potassium removed from farmland. This has to be replaced to maintain the fertility and productive capacity of the soil and support sustainable global food security.

A proportion of this replacement potassium is provided by recycled manures and crop residues on farm. However, the greater part of the potassium in human food produced on farms is not returned; it is effectively lost to the ocean from the many sewerage systems in operation in towns, villages and cities around the world. This non-recycled potassium is replaced by the use of potassium fertilisers, or potash, on the fields which originally produced the food.
Before the beginning of the 20th century, potassium was mostly derived from the ashes of trees leached in metal pots, giving rise to the term potash, although much of this leached potassium salt was used in the manufacture of soap, needed particularly for washing wool fleeces. The word potash is now almost universally used when referring to potassium fertilisers. The requirement for potassium by plants was discovered through the mineral analyses of the ash of plants.

Despite the very large quantities of potassium which are contained in harvested crops, the amount required by the crops when they are growing is even larger. In almost every case, the quantity of potassium in a crop is far greater than any other nutrient, including nitrogen.

Potassium plays a major role in the ability of plants to tolerate externally induced stress, such as drought, frost, high light levels and attack from pests and disease. Crops which are potassium deficient are more likely to suffer from the effects of these stresses, whereas yields of well-fertilised crops will be much less affected. Potassium is also essential for many of the major plant functions, including enzyme activation, protein production and photosynthesis – found in all.

By far the largest proportion of the potassium in plants is in the cell sap, where it ensures that the cells of the plant are rigid and under pressure from the water absorbed into the cell by osmosis. Plants have a high demand for potassium while they are growing and this must be available from the reserves in the soil. An adequate supply of potassium is indispensable to the quality of the harvested crop.

FROM THE PAGES OF HISTORY
Potassium salts were first mined commercially in Germany in 1861 after noted chemist Justus von Liebig’s doctrine of mineral nutrition had demonstrated the need for potassium as a valuable fertiliser nutrient. The use of potash as a crop fertiliser was slow to develop, however. For example, on average, only 90,000 tonnes of potash per year was being used in US agricultural production by 1900.

When the US became involved in World War I and its supply of potash was cut off, the price jumped from $50 to $500 per tonne. This triggered an intensive search for North American potash. In the following decades, the industry was developed in the US, the Soviet Union, Canada and several other countries.

The essentiality of potassium as a plant nutrient has been recognised since the work of Liebig in his Chemistry in Its Application to Agriculture and Physiology, published in 1840.

WHAT IS POTASH?

HUMAN NEEDS
An adult human requires approximately 2 grammes/day of potassium and typical intakes are 2.8-4.5 grammes/day. Not surprisingly, therefore, there are no health risks associated with this element. Milk, fruit juice, root vegetables and crops, such as bananas, are rich sources of this nutrient in the human diet.

Estimated annual removal of potash (K₂O) in the harvest of the 10 agricultural products (crops and milk) with the greatest output, excluding grass, forage/fodder crops and meat.

<table>
<thead>
<tr>
<th>Commodity</th>
<th>FAO global production estimate</th>
<th>Estimated quantity of K₂O in products</th>
</tr>
</thead>
<tbody>
<tr>
<td>Soybeans</td>
<td>261.6</td>
<td>5.0</td>
</tr>
<tr>
<td>Sugarcane</td>
<td>1,685.4</td>
<td>4.7</td>
</tr>
<tr>
<td>Maize, grain</td>
<td>844.4</td>
<td>4.2</td>
</tr>
<tr>
<td>Vegetables, fresh</td>
<td>1,036.3</td>
<td>4.0</td>
</tr>
<tr>
<td>Wheat, grain</td>
<td>650.9</td>
<td>3.6</td>
</tr>
<tr>
<td>Rice, paddy, grain</td>
<td>672.0</td>
<td>2.2</td>
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<tr>
<td>Potatoes</td>
<td>324.2</td>
<td>1.9</td>
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<tr>
<td>Fruit</td>
<td>602.9</td>
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<td>Cow milk, whole, fresh</td>
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</tr>
<tr>
<td>Barley Grain</td>
<td>123.5</td>
<td>0.7</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td></td>
<td>28.9</td>
</tr>
</tbody>
</table>

This table excludes the potash in grass, forage/fodder crops and meat products and indicates an annual flux of potassium in harvested crops of about 29 Mt K₂O. If meat products were to be included, the total flux could be well in excess of 35 Mt K₂O per annum.

Source: International Potash Institute (IPI)

POTASH IN PLANTS AND THE ENVIRONMENT
To ensure healthy and nutritious plant growth, adequate supplies of potash must be maintained in the soil by judicious use of fertilisers and manures and there are no environmental risks associated with this nutrient. In fact, potash makes a positive contribution to the environment by balancing other nutrients, especially nitrate, to make sure they are taken-up and used by plants efficiently, avoiding losses which might be harmful.
Liebig defied the prevailing concept that plants fed on organic matter (humus theory), and argued that only inorganic or mineral materials are taken up by plant roots.

The term 'potash' actually pre-dates the potash fertiliser industry. In the early colonial days of America – in the 1600s and 1700s – the production of potash from wood ashes was an important industry. Potash was a chief export of the colonies to Europe, where it was used in making glass, soap and gunpowder. It is interesting to note that the very first US patent issued, signed by the then US President George Washington, was for the process of making potash.

Liebig’s revelation of the essential nature of potash in plant growth, while a scientific milestone, had little practical effect for more than ten years. In 1851, while drilling for salt, the Germans ran into a brine that was high in potash. They capitalised on Liebig’s concepts and the potash fertiliser industry was born. From that point, the development of the industry has been based on the essentiality of potassium in plant-nutrition, even though its functions were not understood then and are not clearly defined even today.

**EARLY MINING IN NORTH AMERICA**

Potassium is widely distributed throughout the earth’s crust, being the seventh most abundant element in the world. All naturally occurring potassium contained in the soil originates from the disintegration and decomposition of the potash feldspars and micas. Most soil potassium is bound in insoluble mineral forms, up to 98 per cent of it being unavailable or only slowly available for crop growth.

Agricultural soils, in the US and around the world, were largely depleted of their available potassium prior to the development of the fertiliser industry. In the past 85 years, many of those soils have had their fertility and, thus, productivity restored through the use of commercial fertilisers. Fertilisation is an essential production input which must be done regularly to maintain soil productivity.

When the US potash supply was cut off during World War I, the government allocated funds for exploration and development in this country. Originally, the potash came from evaporation of brines in Searles Lake. In 1925 oil drillers discovered the Carlsbad, NM, deposits. These deposits came into production in
1931. Through the 1950s Carlsbad potash was the primary North American source.

The rich potash deposits in Canada, primarily Saskatchewan, were developed in the mid-20th century. In 1943 potash was discovered in Saskatchewan, in the process of drilling for oil. Active exploration began in 1951. In 1958, the Potash Company of America became the first potash producer in Canada, with the commissioning of an underground potash mine at Patience Lake. However, due to water seepage in its shaft, production stopped late in 1959 but following extensive grouting and repairs, resumed in 1965. The underground mine was flooded in 1987 and was reactivated for commercial production as a solution mine in 1989.

CANADA: HOME TO LARGEST POTASH DEPOSITS

Today, some of the world's largest known potash deposits are spread all over the world from Saskatchewan, Canada, to Brazil, Belarus, Germany, and the Permian Basin. The Permian basin deposit includes the major mines outside of Carlsbad, New Mexico, to the world's purest potash deposit in Lea County, New Mexico (not far from

THE GLOBAL POTASH CYCLE

Fertiliser potash forms part of a long-term global cycle of potassium which is both sustainable and natural as illustrated in the diagram.
the Carlsbad deposits), which is believed to be roughly 80 percent pure. Osceola County, Michigan has deposits 90-plus percent pure, however, the only mine there was recently converted to salt production.

Canada is the largest producer of potash, followed by Russia and Belarus. The most significant reserve of Canada’s potash is located in the province of Saskatchewan and controlled by the Potash Corporation of Saskatchewan.

The Canadian potash industry comprises 11 mines, 10 of which are in Saskatchewan and one in New Brunswick. Of these mines, nine are underground operations and two are solution mines. Western Canada’s potash deposits occur in the Prairie Evaporite Deposit — the largest known potash deposits in the world. The deposits extend from central to south-central Saskatchewan, a few kilometres into Manitoba, and 200km to 300km into northern North Dakota. In New Brunswick, significant reserves occur in the Windsor Group rock formations, and Potash Corp operates a mine near Sussex.

Essel Group ME (EGME) entered into a partnership with Canada’s Gensource Potash Corp earlier this year to form a joint venture company by the name of Vanguard Potash Corp to develop potash projects in the Vanguard area in Saskatchewan, Canada.

ERITREA: A NEW ENTRANT IN THE WORLD OF POTASH

In Africa, Eritrea is emerging as a potential producer of potash. The geology of this Horn of Africa country has proven to be quite attractive for investors in the mining sector. What has been achieved in the mining of gold and base metals is expected to be followed by potash in the coming years. This will apparently push the development of Eritrea’s mining sector forward.

The Colluli mine is a large potash mine located in southern Eritrea. Colluli represents one of the largest potash reserves in Eritrea having estimated reserves of 1.08 billion tonnes of ore grading 18 percent potassium chloride metal. Danakali Ltd is developing the world-class Colluli potash project in Eritrea.

Eritrea’s coastal areas have well-established access routes to the major potash-consuming nations such as India, China, Indonesia and Malaysia. This makes the African nation a lucrative destination for potash production and investors from China, India, Qatar, the UAE, Oman and other Middle Eastern countries. Eritrea is naturally targeting Asian countries as its main clients.

EGME acquired the exploration license for the Bada potash mine in Eritrea’s Danakil region in May 2015 and is looking to start production in 2018.

IMPACT ON ENVIRONMENT

During recent decades, attention and concern have been focused increasingly on the environmental impacts of human activities, especially industrial activities such as mining. The public perception of the mining industry has been tainted by a legacy of environmental damage from past practices combined with a number of highly publicised failures of metal mining tailings dams, according to a study conducted jointly by United Nations Environment Programme (UNEP) and International Fertiliser Industry Association (IFIA).

The study, titled ‘Environmental Aspects of Phosphate and Potash Mining’, goes on to say that “as the scale of operations and the area disturbed by the mining industry continue to grow, so too has the public’s concern over the industry’s capacity to manage and mitigate environmental impacts. In response, most governments have imposed stricter legislative and regulatory requirements on the mining industry in order to protect the ecosystem, to maintain a safe and secure environment and to protect people living in the vicinity of the mine-site.”

Leading mining companies have taken up the challenge and are pushing beyond minimum legal requirements, through voluntary initiatives, to ensure their continued ‘license-to-operate’ from the community, as well as increasing their competitive advantage through continuous, voluntary improvements.
in environmental performance. As with all mining activities, the extraction and beneficiation of phosphate rock and potash to produce mineral fertiliser raw material has the potential to cause environmental impacts. These impacts can take the form of changes to the landscape, water contamination, excessive water consumption and air pollution, the UNEP-IFIA study reveals.

“The landscape may be disturbed through the removal of topsoil and vegetation, excavation and deposition of overburden, disposal of processing wastes and underground mining induced surface subsidence. The quality of surface and groundwater may be adversely affected by the release of processing water and the erosion of sediments and leaching of toxic minerals from overburden and processing wastes. Water resources may be affected by de-watering operations or beneficiation processes. The quality of the air can be affected by the release of emissions such as dust and exhaust gases. The fertiliser raw material mining industry, as a sub-sector of the global mining industry, is not exempt from the prevailing social and political climate,” the study adds, detailing the impact of potash and phosphate mining.

In the case of phosphorus and potassium, although the best quality and most easily accessible deposits are mined first, the total available resources are sufficient for hundreds or thousands of years. But no mineral resource is infinite and the efficient extraction and use of phosphate and potash are an important contribution to a certain degree of sustainability.

The mining industry has an important role to play in this respect:

- Rehabilitation allows the land disturbed by the extraction of the mineral resource to be returned to the pool of land available for other uses
- Optimisation of the recovery of the resource may be encouraged via the use of the most efficient techniques and technologies available
- Any unrecovered resources can be left in a condition such that possible future improvements in technological capability and economics will be able to access and recover the resource
- The development of more efficient mining and processing methods and techniques can extend current resource life, and help to recover, recycle and reuse minerals

“The principles have application across all sections of the mining industry, including that of the phosphate rock and potash mining industry. The mining industry has responded to the sustainability issues that are challenging it on a number of fronts,” the report concludes.

The fertiliser raw material mining industry, as a subsector of the larger global mining industry, is not exempt from the prevailing social and political climate...
STORM COMING

Storm clouds gather above Highway 55, Saskatchewan, Canada
Photo: Bob Stefko

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PICTURE ESSAY

ESSEL GROUP ME

CANADA AND ERITREA IN FOCUS
SEEING RED

Edmonton, Alberta, Canada
Photo: Dan Jurak
HILLSIDE RETREAT

Looking out over the mountains along the road from Massawa to Asmara, Eritrea
Photo: Michael Runkel / robertharding
PICTURE ESSAY
PICTURE ESSAY

CAMEL CARAVAN

Danakil Desert, Eritrea
Photo: guenterguni

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PICTURE ESSAY
WATER VIEW

Al-Gash River descends from the highlands of neighbouring Eritrea
Photo: Bashar Shgella
SOYBEAN HARVEST
Field Tractor, Canada. Photo: Dave Reede
FUTURE OF AGRICULTURAL GROWTH

POTASH

A FEW CLOUDS MAY HANG OVER THE POTASH MARKET, BUT SHORT-TERM PAIN WILL LEAD TO LONG-TERM GAIN

BY PUNKAJ GUPTA
No one can deny that the global potash market is facing challenges right now. While we are seeing strong levels of demand, increased supply by the mega-producers is keeping a lid on prices. This has been compounded by increased production from China and India, the world’s largest consumers of the commodity, resulting in prices actually falling to near-five-year lows of $2.97 per tonne.

I imagine that this is not what you might expect to hear from the CEO of a company currently developing two potash projects – Bada in Eritrea and Vanguard in Canada. You might think we would be nothing but optimistic about the outlook for potash, but it is fair to say that my short-term prognosis for the commodity is bearish and, at Essel Group ME (EGME) we are quite happy with that.

So, why do we take this relaxed approach? Like all markets, the trajectory for potash does not follow a straight line. The market will not always be like this and the mid- to long-term fundamentals for the commodity remain strong. We are long-term investors, which is why we are investing capital in two projects to bring more production on-stream.

Potash is a key fertilizer component, meaning the market is underpinned by the global demand for food, which, in turn, is driven by population growth and dietary changes. With the global population increasing by 80 million every year, there is a growing need to make agricultural land more productive, supporting the potash market. Likewise, as the standard of living in developing countries increases, so does the demand for food, again supporting long-term prices.

So we believe now is the right time to invest. We see the market starting to improve as early as 2018.

This timing ties in nicely with our flagship Bada project in Eritrea, which is currently under development and is set to come on-stream next year. Bada is one of the very best deposits in the world and has distinct benefits over the majority of its competitors.

The project contains some of the highest-grade potash deposits globally, which gets us off to a great start. More importantly, however, is the depth of these deposits – the potash seam at the project area begins 16 metres below the surface and stretches to 750 metres. To put this in perspective, the industry average is for mining to begin 750 metres below the surface.

What this means for us is that our production costs stand to be some of the most competitive globally. Bada’s mining costs shouldn’t go above $25 per tonne, compared to the industry average of $245 per tonne, meaning that the profitability of our project will be well protected.

Moreover, located in East Africa, Bada enjoys similar geographical benefits to our oil and gas assets in Kenya – namely, proximity to the resource-hungry end markets of India and China, which lie far from producers in Russia, Belarus and Canada. Bada is also well located within Eritrea, just 40km from the Red Sea coast and 230km from the country’s main port facilities in Massawa. Again, these factors will drive significant cost benefits, further strengthening our place at the bottom of the cost curve.

Eritrea is also open to foreign investment. It has a very favourable tax regime and is starting to attract its own set of overseas investors, which makes us still more optimistic about Bada’s prospects.

Our interest in potash doesn’t stop there – we are also developing the Vanguard project in Saskatchewan, Canada. Here we have teamed up with leading potash producer Gensource to leverage their technical expertise. Located in a global hub of potash production, the Vanguard project nicely balances our portfolio and provides another attractive entry point into the market. Here we are planning to use solution mining to keep costs down and are on track to produce at below the industry average cost per tonne, which is a real testament to the project’s strong fundamentals.

So, potash prices may be experiencing some growing pains, but the long-term benefits of entering this market, through two such competitive assets, are clear. I, for one, am excited about the potential, not only for our potash business, but for the industry as a whole.

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OP E D
Krishna Peraiah Gadde, Assistant General Manager, EGME Mining Division, discusses what goes into managing and overseeing a major project.

THE BADA POTASH PROJECT IS UNIQUE AND CHALLENGING

One of my most important roles is ensuring that the on-site team is working in a safe environment.

The Bada potash project is an exciting time for the team, as we prepare to start shallow drilling. The team is

1 Can you describe your current role? As a project manager, I am currently working on three projects: the Bada project for potash, the Gedem Project for iron ore and Gash Barka for limestone.

For the Bada potash project, we have finished the electrical resistivity test and the geological mapping of the area, and we have entered the drilling phase. We are in a very critical stage where the discovery of the ore has to be recorded in a proper manner.

I’m responsible for the day-to-day oversight of works at Bada. As well as managing the activities’ schedule and budgeting, I provide technical guidance to our teams and check in with them and the management on a weekly basis. I am also responsible for controlling the costs and taking calls on the site to take the project further.

One of my most important roles is ensuring that the on-site team is working in a safe environment. For example, I arrange first aid and technical classes, and oversee safety awareness programmes.

I've been in the job for more than a year and a half now and, during that time, I've built relationships with the government and various companies who carry out geophysical and drilling works.

There are many other dynamics that have to be controlled and watched over on a day-to-day basis to ensure the success of the project.

2 What is your team currently working on? This is an exciting time for the team, as we prepare to start shallow drilling. The team is
finalising the drilling proposals, which involves arranging for seven or eight holes of varying depths (up to 200 metres) to be drilled, modifying our drilling machine as required. This will enable us to identify and confirm the stratigraphy data of the geology and to establish the quality of rock salt and the potash content in it.

We’re also establishing the camp surrounding the project area, as well as our own local laboratory at the site to process the samples.

3 Can you describe the team that you’re working with?
At any one time, we have close to 15 people working on this project. This includes a technical team of approximately ten people, which comprises two geologists and two mining engineers, as well as mechanical and electrical engineers, who are either directly employed by EGME or employed via consultants on a contract basis. We employ contractors for their specialised expertise on areas such as data analysis, geological surveys and water sampling, amongst other things. We also call on geologists from the government as and when we require technical guidance and fieldwork.

We also have five people providing crucial support functions, such as arranging the necessary permissions and visas, overseeing accounting and finance, and ensuring that safety and security procedures are in place. We are also in the process of setting up a mechanical shop to support the maintenance of our own machinery, such as drilling rigs, earth-moving machines, cranes, etc.

The team will increase significantly when the drilling work starts and we bring on more direct and indirect employees.

4 What makes this project challenging?
From a technical standpoint, there is a lot to get excited about with this project, in terms of both the challenges and the potential it represents.

There is a high level of geological uniqueness in the project area, with two major faults but no transit faults in the region. This region is called the Danakil Depression – it’s an ancient sea that is now dry. Its geology is very complex, which makes it a unique and challenging deposit to prove and explore.

The climate of this area is challenging as well. It is hot and arid, with high temperatures in the day and strong winds in the evening, coupled with irregular sandstorms. The geology and the climate are what make this project very challenging.

5 What is the working environment like?
The working environment at the Bada site is very challenging due to its geology and climate.

Also, as the project area is far from major cities, the communications network is poor. However, a new mobile tower was recently built, so this should improve things.

As it is so remote, we have to start from scratch with even the most basic of arrangements, from food and water, to transport and medical supplies. What I must stress, though, is how cooperative the local people have been in all aspects and how supportive every team member is of their colleagues. The government has also supported the project in every aspect.

6 How have you adapted your techniques to work in this environment?
There is no particular technique. We work more on a humane basis, such as connecting with the local communities and authorities, and involving them in our day-to-day business by employing them. We fulfill their everyday needs, proving them medical facilities and clean water. We also have a compliance with the government and the local community to create a safe and healthy work environment. Safety is always our number one priority on-site, but it is even more important in such a remote environment. Consequently, one of our first actions was to arrange HSE (health, safety and the environment) awareness training for all employees. We’ve also introduced flexible working hours to ensure our teams are not working in the intense heat of the day.

7 What has been the most interesting aspect of this project for you so far?
The most interesting part about the project is the project itself, especially the uniqueness of the product – potash – and that of the geology of the Danakil Depression. The potash deposit in this region is one of the shallowest in the world and the commercial and logistic environments are also extremely conducive.

8 When is production expected to begin on this project?
We plan to see first production of ROM (run-of-mine ore) in 2018. Simultaneously, we will be working on the construction of the production facility, so we can hope for the final production of MOP (muriate of potash) and SOP (sulphate of potash) to be refined and produced from 2019 onwards. After seeing the team work so well together and so diligently, I’m confident we will achieve that.

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ALL EYES ON EAST AFRICA

Large onshore oil finds in Uganda in 2006 and in Kenya in 2012 fuel optimism over the region’s prospects
Recent oil and gas discoveries in East Africa are expected to change the face of the region as an energy producer and exporter.

East Africa has followed a long road of highs and lows in developing its oil resources. On the back of high global oil prices between 2004 and 2014, a rush of new exploration put the region on the map as a new frontier for African oil.

Large onshore oil finds in Uganda in 2006 and six years later in Kenya fuelled optimism over the region’s prospects. In total, nearly $13 billion, 32% of investment in Africa’s oil and gas industry, went to East Africa in 2012.

Commercial quantities of oil were discovered in Kenya and Uganda very recently and both the countries want to become oil exporters soon. Tanzania with significant oil and gas reserves is also looking for pipelines to connect its oil with ports on the Indian Ocean.

British oil firm Tullow Oil raised Kenya’s hopes of becoming the first oil exporting country in East Africa after it started producing oil from Turkana earlier this year.

Industry experts believe that the Uganda and Kenya onshore projects will break even at a Brent price of between $40 and $60 a barrel, which is positive for Tullow Oil with its joint venture partners.

Unisol Petroleum is an active explorer in Kenya on Block 2A, which is a highly promising 7,802km prospect in Eastern Kenya with estimated resources of 3 billion barrels of oil.

Companies interested in East Africa’s hydrocarbons have started putting their capital into countries with proven resources and decent fiscal terms.

The region still offers significant opportunities for investors taking future strategic positions, but it is not attracting attention as a hotspot of oil and gas exploration.
investment due to declining crude prices. Data from Oslo-based consulting Rystad Energy shows that capital spending in East Africa by exploration companies was $4.6 billion in 2012, $4.7 billion in 2013, dropping to $4.3 billion in 2014 and $2.5 billion in 2015, as crude prices declined.

PricewaterhouseCoopers (PwC) says governments in East Africa that want to attract oil and gas investors now have to offer an attractive environment by reforming their regulatory, fiscal and licensing systems.

PROJECTS IN EAST AFRICA
The discovery of oil, gas and mineral deposits in East Africa has paved the way for ambitious infrastructure projects that have attracted at least $3.4 billion from international lenders in the past year. The World Bank, the European Union and China are the region’s main infrastructure financiers.

According to the Deloitte African Construction Trends Report 2016, Kenya initiated the highest number of projects, 11, followed by Ethiopia and Uganda, with nine projects each, and Tanzania with eight.

China and the EU have been the biggest financiers of Kenya’s infrastructure projects, with roads taking the biggest share of the funds.

PIPELINE PROBLEMS
It’s very important to pump oil from fields to port through a pipeline. Land routes take a lot of time and there are several other issues. A pipeline is any easy option to transport oil from field to port, but the cost of building the pipelines is huge.

The largest political risks facing oil industries in East Africa are associated with regional politics and pipeline infrastructure. Without access to regional pipelines, the largest oil reserves in the region, dwindling resources in South Sudan and still untapped reserves in Uganda, cannot be monetised. Even oil resources in Sudan and Kenya are located inland and require functioning pipeline systems. For Uganda and Kenya, the regional pipeline debate is not only about finding the most efficient...
Kenya’s oil industry is in its infancy, but it’s showing signs of growing up fast.
The UNISOL Magazine

armed conflict since independence more than five years ago. When it broke off from Sudan in July 2011, South Sudan took control of three-quarters of the once united country’s oil resources, some 325,000 b/d in production and 3.5 billion barrels in reserves. But South Sudan was inheriting an ageing oil industry. Production was already declining sharply before South Sudan’s independence from Sudan. The South Sudanese government’s decision to shut down the industry in January 2012 for a 15-month period because of a conflict with Sudan over pipeline transit fees has only undermined the industry further.

MOZAMBIQUE
Mozambique has been catapulted onto the international investment radar by a nascent natural gas and coal boom. Major gas finds in Mozambique’s northern Rovuma basin – potentially in the region of 180 trillion cubic feet (Tcf) – could represent an economic game changer for one of the world’s least developed countries. The operators and government alike are brimming with confidence.

Al Walker, chairman of Anadarko, the operator of the gas-rich Offshore Area 1 block, says that: “We believe, as we go into the next decade, Mozambique will emerge as the third-largest exporter of LNG in the world.” With plans to construct one of the largest liquefied natural gas (LNG) plants after Qatar, President Armando Guebuza’s government expects the Rovuma basin to produce first cargo by 2018.

HISTORY OF OIL IN EAST AFRICA
Exploration in East Africa started early last century, beginning with Anglo-American’s Dudley Expedition to Abyssinia in 1920. The biggest effort was in Uganda and the Eritrean Red Sea where there was extensive shallow drilling around oil seeps. Systematic exploration did not start until the 1950s.

Exploration activity increased slightly in the 1960s but permit areas decreased in Ethiopia and northern Somalia. The number of large and small companies was balanced, although the large companies were still the dominant players.

The 1970s brought an influx of major companies, primarily into Kenya and Ethiopia, with Chevron, Elf, Total, Tenneco and Exxon all making their entry to the region. Over the decade, 27 wells were drilled. Tanzania enjoyed the Songo Songo gas discovery, while Tenneco’s Calub and Hilala gas discoveries and oil show established Ethiopia’s western Ogaden as a potential new hydrocarbon province. The enthusiasm of the large companies for East Africa saw activity rise to a new peak in the 1980s, driven by the soaring oil price and encouraged by big discoveries nearby in Sudan and Yemen. This increase was largely in Somalia and in Kenya, where exploration moved into the Anza Graben.

The 90s were a different story. The oil price had collapsed in the late 80s and got worse through the 90s. Local problems exacerbated the situation. Promising exploration efforts in Somalia were aborted after the 1991 Somalia coup and the anarchy. In Kenya, Shell’s Loperot well discovered an uncommercial oil accumulation in the Lokichar Basin near Lake Turkana, but a perceived lack of structure discouraged further activity.

In the 2000s the oil price hike saw a swarm of exploration companies across East Africa, but, for the first time, the larger oil companies were not part of the onshore scene. There has been a massive surge in permitting since 2010 in response to the discoveries and almost all basin areas are under permit, save for most of Somalia, where security remains a major problem; 95 wells were drilled until the end of 2013.
PROVEN TRACK RECORD OF GENERATING VALUE FOR OUR CLIENTS

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The project was unveiled at the IAEA conference on fast reactors in June.
A team of LeadCold experts made presentations on the SEALER (Swedish Advanced Lead Fast Reactor) project at a conference on fast reactors (FR17), organised by the International Atomic Energy Agency (IAEA) in Jekaterinburg, Russia.

The event, held from June 26 to 29, drew more than 600 participants from 30 countries, who deliberated about projects on developing sodium-cooled, lead-cooled, gas-cooled and molten salt fast reactors.

Three LeadCold representatives – Prof. Janne Wallenius, Dr Staffan Qvist and Dr Sara Bortot – made, in total, five oral and three poster presentations. The general presentation of SEALER, made by Dr Qvist, was part of a plenary panel on small modular fast reactors, attended by an audience of more than 400 people. A more detailed technical presentation on SEALER, made by Prof. Wallenius, attracted approximately 100 persons to the session on advanced reactor concepts.

Moreover, Prof. Wallenius was invited to present the SEALER project during a special session on MBIR, the Russian sodium-cooled research reactor. He was also nominated to the international advisory board of the MBIR project.

The LeadCold presentations were followed by a large number of questions and expressions of interest from the audience. Several conference participants commented that the SEALER project had been intensely discussed among the Russian host community. After the conference, LeadCold received a formal expression of interest for collaboration from subsidiaries of Rosatom, the Russian state-owned company that is developing the BREST lead-cooled reactor.

These were the key highlights of the three-day event:
- The commercial operation of BN-800, an 800 MWe sodium-cooled reactor in Beloyarsk, close to the conference site
- The imminent commissioning of PFBR, a 500 MWe sodium-cooled reactor in Kalpakkam, India
- The start of construction of the BREST-OD-300, a 300 MWe lead-cooled reactor in Tomsk, Russia
- The start of construction of MBIR, a 150 MWth sodium-cooled research reactor, in Dimitrovgrad, Russia
- The start of construction of MBIR, a 150 MWth sodium-cooled research reactor, in Dimitrovgrad, Russia
- The LFR-AS-200 design of Hydromine, a 200 MWe commercial lead-cooled reactor
- The ALFRED project of Ansaldo Nuclear, aiming to build a 130 MWe demonstration reactor in Romania
- The SVBR-100 project of ACME engineering, a 100 MWe lead-bismuth-cooled reactor for commercial power production in remote areas
- The MYRRHA project of SCK-CEN, a 100 MWth lead-bismuth-cooled multi-purpose research reactor

The SEALER project had been intensely discussed among the Russian host community.
ESSEL GROUP ME SUBSIDIARY DIGS DEEPER INTO THE POTENTIAL OF

POTASH, IRON AND LIME

INTERU MINING AND TRADING HOLDS THREE EXPLORATION LICENSES IN ERITREA WITH THE AIM OF EXPLORING AND DEVELOPING COMMODITIES
Interu Mining and Trading (IMT), a subsidiary of Essel Group ME (EGME), holds three exploration licenses in Eritrea: Bada Potash Exploration License (626km²), Gherem Iron Exploration License (23km²) and Aghameda Iron Exploration License (120km²) with the aim of exploring and developing potash, iron and other commodities in the country and diversifying EGME’s business in the mining sector.

POTASH

The Bada Potash Exploration License is regionally located in the northernmost part of the Danakil Depression, roughly 40km from the Red Sea coast of Eritrea. An emerging potash province, it hosts an extensive evaporite basin situated below sea level. It is one of the largest unexploited potash basins globally and has been a focus for potash exploration for more than a century, along with the historical Musley potash deposit around the Dallol area.

In the Eritrean portion of the basin, 20km southeast of the Bada potash prospect, the Colluli potash deposit, the shallowest potash deposit in the world, owned by the Colluli Mining Share Company (CMSC), has been identified recently. A definitive feasibility study of 1.289 billion tonnes of ore reserves was completed for the production of potassium sulphate and, accordingly, CMSC has recently received a mining license from the Government of Eritrea.

Driven by the above facts and since the Bada exploration license shares a common evaporite depositional environment, deep graben covered by alluvium and evaporite succession eastward (anhydrite-gypsum) with Dallol and Colluli areas, IMT has until now accomplished previous work studies on the basin, including historical holes (mostly recently on NGEX’s holes drilled in the concession), geophysical surveys (gravity and magnetic) and regional geological maps.

With these as a background, IMT has advanced on collecting geological data, including identifying major structures in the Bada graben, conducting a stratigraphic review of old Bada drill holes, correlating regional
IMT has acquired the historical Ghedem iron exploration license

IRON
Considering the growing demand for iron in the global market, IMT acquired the historical Ghedem iron exploration license, an area of 22 km², in May 2015. The main aim of IMT is to explore, develop a mining operation to exploit the resource in an efficient way and export the produced iron ore to the international market.

Previous work done by other companies in the area includes some geological, geochemical, geophysical and limited resource/reserve estimation studies. Historical data also shows that iron was mined from the deposit and directly shipped. Recently, resource estimation of nearly four million tonnes of iron was reported in the concession by Beijing Donia Resources Co Ltd, but this was based on inadequate and limited surface data.

To date, IMT has conducted detailed geological studies, including rock chip sampling and geochemical analysis, geological mapping, trenching and topography surveys. Lenses of isolated iron ore outcrops along the margin of the ridge have been identified and the mineralisation is iron and manganese hosted in quartz-muscovite schist and diorite. The ore is thought to be a structurally bound, originally continuous deposit, which is folded and subsequently faulted. Results of chemical analysis showed iron commonly ranging between 40 and 60 percent, with 0.54 percent MnO, and MnO rich lenses depict up to 14.4 percent MnO.

stratigraphy, interpolating data from field and available data, identifying target areas, stratigraphic description and regional evaporite basins, investigating drainage and graben physiography and identifying tentative locations of prospective boreholes.

Highly experienced consultants on potash deposits have been contracted by IMT. This team of Germany-based experts (Ercosplan Ingenieurgesellschaft) has performed an evaluation of all available data, conducted gap analysis, proposed well design and drilling mud composition, proposed exploration strategy, and established a target area with suggested locations for two deep (approximately 900m each) exploration drill holes.

In addition, an electrical resistivity geophysical study was conducted, tracing fault zones and the thickest alluvial section in the basin. Currently, IMT is at the final stage of setting up a suitable camp in Bada before the imminent drilling programme commences.

Key driving factors for the exploration of potash are the global population, growing by 80 million per annum, and the reduction in arable land, growing calorific demand and changing dietary mix – which is tantamount to saying that an increase in population will cause an equivalent increase in demand for food, which in turn will proportionally increase the demand for fertiliser and, hence, an increased potash demand.
Presently, IMT has the immediate plan of conducting RC (reverse circulation) drilling holes to confirm ore dip extension and an environmental and socioeconomic baseline study is under way. Resource estimation, reserves calculation and economic evaluation of the deposit will follow.

Parallel with the exploration programme, IMT plans to install a rolling mill in the port city of Massawa, 25km north of Gedem, aiming to produce channels, bars and rods for local usage, using its own power plant with total capital of $15 to $20 million. The government has green-lit the project and asked IMT to submit a proposal for further sanctions/permissions from the authorities of the State of Eritrea.

LIME
Considering the growing demand for lime inside the country and in the global market, IMT is also committed to exploring and developing resources to produce lime in Eritrea. Towards this goal, IMT is a shareholder in Tensae Ghobo Akrieb GEE Square PLC (TGS).

The main aim of this project is to generate quick income either locally or to be exported abroad to the East African markets, obtain substantial foreign exchange and generate employment opportunities.

The project has identified huge resources of marble, the primary source for lime, in its concession, which has been known for decades for small-scale lime production using traditional extraction methods. Aimed at producing lime in an environment-conscious manner, TGS has finalised the delineation of marble occurrences in the license area, as well as topographic and detailed geological maps, rock chip sampling for chemical and bulk density analysis, assessing and locating geological structures, and estimation of resources.

IMT studies have estimated the existence of 112.1 million tonnes of marble above ground level in the license area (Sites A and B) and, even though deep drilling should be conducted to attest the extension of the deposit below ground, by considering 30m quarriable depth, an additional 84.17 million tonnes of marble are estimated to exist below the ground surface. Chemical analysis shows good-quality white marble with high calcium (up to 55 per cent of CaO) and low magnesium (up to 0.14% of MgO).

Currently, TGS is planning to build a modern kiln that has a larger capacity of lime production and is on the verge of awarding a contract to a reputed company to build a modern kiln in the license area, with a planned production of 150 tonnes of lime per day. Moreover, a financial feasibility study of the project is being updated. The management has decided to invest and bring the plant into operation as early as possible.
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UPDATES

FINAL RESULTS OF 2D SEISMIC DATA FROM KENYA’S BLOCK 2A - EXPECTED SOON

EGME HAS CONTRACTED PGS DATA PROCESSING MIDDLE EAST SAE FOR THE 2D SEISMIC PROCESSING
With the completion of 2D seismic acquisition of approximately 520 line kilometres (Lkm), Essel Group ME (EGME) has contracted PGS Data Processing Middle East SAE, a UK/Cairo-based company, for the 2D seismic processing. The processing was undertaken in the Cairo processing centre, which possesses state-of-the-art technology.

The complete processing was conducted under stringent supervision and guidance from EGME’s geological and geophysical team, along with a third-party audit. The final results are impressive in terms of the quality of data, which is a prime requirement for fruitful interpretation and forms an important guidance for oil and gas exploration operations.

At the time of data acquisition, the data and quality control were supervised by EPI, a UK-based renowned QC company, along with Xodus Group Ltd, another UK-based company in the same stream of business.

After the successful completion of processing 2D seismic data, the enriched data has been planned for detailed interpretation and resource estimation by an in-house exploration team, along with alternate interpretation services from Xodus group (UK) and CGG (UK).

Sproule, a Canada-based company, has also been deployed for interpretation and NI51-101 resource certification. Results of these reports shall be used to identify the best location for drilling wells.

Currently, the seismic interpretation is progressing well and final results are anticipated soon. The initial results are promising in terms of the identification of several leads, which will
later be evaluated for associated geological risks and ranking.

The top-ranking prospect would then be further evaluated for well planning, estimation of depth to targets, economics and logistics prior to well spudding.

EGME has been doing its preliminary ground work in the formulation of solutions on equipment hire, specialised service-oriented work, local CSR activities, transport and logistics, and legal requirements for the smooth start of exploration wells in the region.

PROJECT SUMMARY
EGME owns a 60 percent participation interest in the onshore Production Sharing Contract held by Simba Essel Energy Inc (Simba Essel), covering Block 2A in northeastern Kenya, a highly promising 7,802km² prospect in Eastern Kenya. Falling within the confines of Block 2A are sections of two basins, the Mandera and Anza basins, which already have proven petroleum systems. A 2D seismic survey is under way to evaluate the basins, which have approximate estimated resources of three billion barrels of oil.

Block 2A is ideally situated within easy access of Kenya’s two transport corridors, Lamu and Mombasa, enabling EGME to minimize transportation costs and take advantage of significant export opportunities.

This will be one of the first operational oil fields located on the eastern coast of Africa, giving EGME an advantage over companies with assets in Nigeria and other West African nations, which are currently exporting oil to Asia and South Asia.

The group estimates that daily production levels of up to 40,000 barrels is possible from its Kenyan project, once fully operational.
HERE’S A LOOK AT GEE SQUARE’S MOST RECENT ACHIEVEMENTS:

1. Gee Square provided UNIFIL solar water heater system to Beirut Port, Lebanon.
2. The firm has received a new order for the supply and delivery of electrical circuit breakers from MINUSMA, Mali.
3. It has also received an order for the supply and delivery of optical fibre cables from UNMISS, Juba, South Sudan.
4. Gee Square will also be servicing an order for plumbing materials from UNMISS, Juba, South Sudan.
5. The firm successfully completed all three lots of FRP ice boxes to FAO, Yemen.

Gee Square Holdings SRL is a supplies and logistics company that provides goods, services and industrial solutions to a wide range of organisations, including international relief agencies and engineering companies. Gee Square was founded in March 2015 and is owned by Essel Group ME.
Supplying to international institutions including the UN, the EU and IOM

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www.geesquare.com

An Essel Group ME Enterprise
MORGAN GATSBY

FINDING ITS VOICE

Morgan Gatsby’s Brand Voice is being featured on the Forbes Middle East official website. The Brand Voice will help the financial services group to market its brand through in-depth research on industry relevant topics. Morgan Gatsby Brand Voice can be viewed at: http://www.forbesmiddleeast.com/en/company/morgan-gatsby/

PORTFOLIOS LAUNCHED

Morgan Gatsby recently launched three model portfolios, Conservative, Balanced and Aggressive, keeping in mind the different risk-return requirements of clients in the region. The targeted returns on these portfolios are five to seven percent, seven to 10 percent and 10 to 15 percent per annum respectively.

POSITIVE PARTNERSHIP

Morgan Gatsby is in the process of signing a mandate with Positive Nutrition, a company looking to reshape the health and wellness, food and beverage market in the Gulf region with their unique recipes and highly experienced team.

PROFILE

Morgan Gatsby, formerly known as Sidra Capital, was acquired by Essel Group ME in April 2017. Headquartered in Dubai, Morgan Gatsby is a diversified financial services group, specialising in providing investment banking, wealth management and corporate advisory services to a range of clients, including high-net-worth individuals, family offices and small-to-medium-sized regional businesses.
FOUR 2 FOUR

TO CELEBRATE THE END OF THE SCHOOL YEAR AND ALL THAT HAS BEEN ACHIEVED, FOUR 2 FOUR HOSTED ITS VERY OWN GRADUATION CEREMONY.

THIS YEAR'S EVENT WAS WONDERFUL, WITH MANY PARENTS IN ATTENDANCE. THE CHILDREN HAD BEEN PRACTICING THEIR SONGS FOR DAYS AND ALTHOUGH THE BIG AUDIENCE MIGHT HAVE SCARED A FEW, THEY SANG THEIR HEARTS OUT AND GRADUATED WITH A SMILE.

“I WANT TO THANK THE STAFF FOR A LOVELY END-OF-TERM GRADUATION PARTY. IT WAS REALLY NICE TO INVITE ALONG AND TO SEE ALL THE OTHER KIDS AND PARENTS. PLUS IT WAS A LOVELY TOUCH TO HAVE OFFICIAL GRADUATION GOWNS FOR THE PHOTOS. THIS IS A NICE MEMORY WE CAN KEEP FOREVER,” SAID A MOTHER OF A FOUR 2 FOUR STUDENT.

“FOUR 2 FOUR NURSERY HAS BEEN SUCH A GREAT EXPERIENCE FOR MY SON CHARLIE. HE HAS BEEN INVOLVED WITH SO MANY FUN AND EDUCATIONAL ACTIVITIES, WHICH HAS HELPED HIM GROW AND DEVELOP INTO SUCH A HAPPY, INTELLIGENT LITTLE BOY,” SAID ANOTHER PARENT.
ESSEL GROUP ME ACQUIRES SPANISH MEDIA PRODUCTION FIRM SERENA’S DUBAI ARM

Essel Group ME, part of Indian conglomerate Essel Group, has acquired Serena Middle East, the Dubai-based arm of Spanish media and production company Serena. The acquisition, announced in late June, is part of the company’s growth strategy and will help it enter the region’s fast-growing media and production industry, Essel Group ME said in a statement.

Serena is a post-production studio in Spain and works with companies such as Proctor & Gamble, Nestle, Coca-Cola, Unilever, Vodafone and Etisalat, said the company. Serena was established in Spain in 2002 and Serena ME was started in Dubai in 2012.

Essel Group ME’s chairman and managing director, Gagan Goel, said: “Serena is unique in the industry for its craftsmanship, advanced technology and deep understanding of the audio-visual business.”

Walid Saad, vice president of Middle East at Serena, said the deal with Essel Group ME will strengthen the leading positions of both companies in the region.

EGME is building a diversified portfolio across Europe, the Middle-East and Africa (EMEA) and is actively seeking growth opportunities for its other businesses. The parent group, Essel, operates in a broad spectrum of industries including media, packaging, infrastructure and technology.

In the EMEA region, Essel Group ME through its affiliate Interu Mining and Trading, acquired potash mines in Eritrea in 2015.

The same year, EGME signed an agreement with Canadian firm Simba Energy Inc to acquire a 60 per cent stake in its African oil and gas exploration projects.

In India, Essel Group has closed several acquisitions in the financial services and infrastructure sectors. It is also planning to take its infrastructure unit, Essel Infra Projects Ltd, public.

PROFILE

Headquartered in Dubai, Essel Group ME was founded in 2012 to lead the global expansion plans of Essel Group, the Indian multinational conglomerate operating in a broad spectrum of industries, including media, packaging, infrastructure and technology. Essel Group has net assets worth in excess of $20 billion. Building on the parent group’s 90 year history of developing and promoting businesses, Essel Group ME has successfully led its expansion in diverse sectors, such as natural resources, industrial supply and logistics, and education.

In 2017, Essel Group ME further diversified into the financial services sector through the acquisition of Morgan Gatsby, the Dubai-based group focusing on investment banking, wealth management and corporate advisory.
EGME TRADING: MOVING COMMODITIES ACROSS THE GLOBE

Essel Group ME Trading has global capability, covering a wide range of goods including oil and gas, coal, steel, nonferrous precious metals and soft commodities. EGME’s clients include multinational energy and chemical companies, global coal and metal traders, utilities and soft commodity trading houses.

EGME Trading’s close ties with some of the world’s leading suppliers have given it a competitive edge over other companies in our sectors. It is well placed to deliver specialised and highly reliable services to its clients and has a track record of moving commodities across the globe reliably, efficiently and responsibly.

EGME has successfully executed Kraft Paper trade in the GCC (Gulf Cooperation Council) and is initiating further orders in the Middle East, and supplying writing and printing paper to the converting industry in the African continent.

The group looks forward to building a prominent presence in the paper packaging industry, sourcing and distributing a wide variety of packaging paper and board products, such as Duplex board, folding box board (FBB), test liner, corrugating/fluting media, etc.

With Eastern Africa being the most optimistic target with its upcoming ban on plastic bags, the consumption of paper bags has increased considerably, creating a sharp growth in the demand for Kraft/Brown paper varieties.

In the oil and gas and downstream sector, EGME is driving trading opportunities with major suppliers of LPG and methanol for exports to the Far East.

Similarly, the group is at advanced stages of trading in the fertilizer space, as well as coal requirements for the power sector in South Asia, in addition to iron ore, limestone, agri products and plantation commodities.

Active discussions for long-term sales in East Africa for industrial chemicals have begun, as EGME receives strong support from some of the largest producers of industrial chemicals.
IN PICTURES

ESSEL GROUP

CELEBRATION TIME

EMPLOYEES FROM ESSEL GROUP ME, INCLUDING MORGAN GATSBY, SERENA ME TEAM AND THE OIL AND GAS TEAM, GATHERED FOR IFTAR AT THE PALACE DOWNTOWN DUBAI ON JUNE 1 TO CELEBRATE THE HOLY MONTH OF RAMADAN

(Main, bottom left and right) Essel Group ME employees enjoy the celebration

Mr. Ajay Arora (Left) with Mr. Punkaj Gupta (Right)
We Light Up Your Future