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Babcock's Construction Equipment business has introduced the Volvo EC550E crawler excavator to the local market. See story on pg 6.



Behold the Beating Heart

Africa is home to the largest diamonds ever produced – from the 3106.75 carat Cullinan diamond, discovered at Premier Mine in South Africa in 1905, to the 1.109 carat *Lesedi La Rona*, the second-largest colourless diamond found in the Karowe mine (Botswana) in 2015, to the third placed 995.2 carat Excelsior Diamond, discovered at the Jagersfontein Mine, in South Africa, to the 968.9 carat Star of Sierra Leone from the Diminco mine, in Sierra Leone, and the 910 carat, Lesotho Legend, from Letšeng mine in Lesotho. But the latest find was an anomaly, with the Beating Heart – a diamond within a diamond – being discovered in Surat, India.

The diamond was recovered by De Beers Group and highlighted by its Sightholder VD Global. The 0.329 carat, D-colour, Type IaAB diamond was found to have an internal cavity enclosing a smaller diamond that is trapped, yet free to move around within the space. According to De Beers, the original ‘core’ would have consisted of good-quality diamond growth. However, a subsequent layer of growth was likely poor and fibrous, followed by a further ‘outer coating’ of gem-quality crystal.

While diamonds have been discovered in about 35 countries worldwide, Southern African mines are some of the leading diamond producers, with South Africa widely regarded for its top-quality diamond deposits. However, from a production point of view, Russia remains the top diamond producing country followed by Botswana with Canada, Democratic Republic of Congo, South Africa, Angola, Namibia, Australia, and Lesotho ranking as among the top diamond producing countries.

As featured in this issue, diamonds are a hot topic. In fact, the Venetia Diamond mine, South Africa’s largest producer of diamonds since 1995, is in the spotlight as it transitions from opencast operations to underground. Diamond miner, De Beers, highlights how its ‘open pits are bowing out in style’ (pg 14) while mine ventilation and refrigeration specialist, BBE Projects – contracted to provide refrigeration and air-cooling systems for the Venetia underground mine – emphasises how it successfully delivered on its contract (pg 16). First production from Venetia Underground mine – which extends Venetia’s life to at least 2046 – is expected within 2023.

Modern Mining also spoke to De Beers about its Small Beneficiators’ Customer pilot programme, which is helping small-scale beneficiators to ensure future sustainability (pg 12).

Mining production and sales

Although diamonds are a key contributor to the local economy, the latest mining production results from Statistics South Africa for the month of February, show that diamond production has been a drag on the economy.

According to Stats SA, mining production decreased by 5% year-on-year, with the largest negative contributors being coal (-12,6% and contributing -3,7 percentage points) and diamonds (-45,3% and contributing -2,5 percentage points). Iron ore, however, was a significant positive contributor at 30,6%, contributing 3,1 percentage points.

Mineral sales at current prices decreased by 6,9% year-on-year in February 2023, with the largest negative contributors being:

- ❑ PGMs contributing -8,3 percentage points
- ❑ Coal contributing -3,1 percentage points
- ❑ ‘Other’ non-metallic minerals contributing -1,4 percentage points
- ❑ Iron ore contributing -1,0 percentage point.

However, chromium ore was the star contributor at 3,6 percentage points and gold at 2,1 percentage points.

In this edition

Modern Mining caught up with coal producer, Ndalamo Resources, which is on an exponential growth trajectory as it diversifies into other energy related metals and expands into the renewable energy space (pg 20). We also spoke to consulting engineering firm, Bara Consulting, which is growing its geographical footprint and making a play for the Canadian market. Bara Consulting Canada will provide the company with access to the lucrative Central and South American mining markets (pg 32).

In our cover story, Babcock’s equipment business has introduced the Volvo EC550E crawler excavator to the local market. Sales of the 55-tonne machine have got off to an excellent start, with five units ordered and some already working on site, the company says (pg 6). ■



Nelendhre Moodley.

Editor: Nelendhre Moodley
e-mail: mining@crowm.co.za
Advertising Manager: Rynette Joubert
e-mail: rynettej@crowm.co.za
Design & Layout: Darryl James
Publisher: Karen Grant
Deputy Publisher: Wilhelm du Plessis

Circulation: Brenda Grossmann and Shaun Smith
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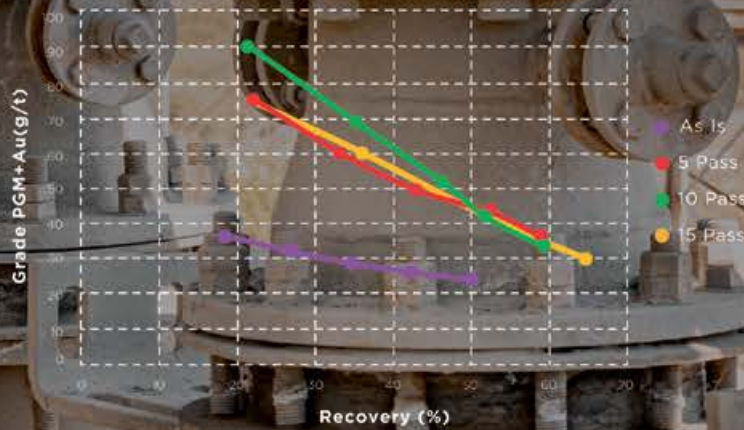
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West African increases reserves to 6.4 m ounces gold

Unhedged gold mining company West African Resources Limited (WAF) has announced its updated 2023 Resources, Reserves and 10-year production outlook for its Sanbrado Gold Operations (Sanbrado) and the Kiaka Project in Burkina Faso.

Highlights

□ Exploration success and targeted under-

ground drilling in 2022 delivers robust 10-year production plan.

- Mineral Resources increased by 1.0 moz to 12.6 moz gold.
- Ore Reserves increased by 4.7 moz to 6.4 moz gold.
- Maiden Mineral Resource for MV3 prospect delivers 257 000 oz gold.

West African Resources CEO Richard Hyde commented: “West African

Resources remains on track to achieve its goal to become a +400 000 ounce per annum gold producer with the development of our second gold mine at Kiaka. Our unhedged 10-year production outlook estimates production of more than 200 000 oz gold per annum in 2023 and 2024, and more than 400 000 oz gold per annum from 2025 to 2032. Our mine development team delivered drilling success, increasing underground reserves at M1 South by 398 000 oz, replacing all of the underground ore mined since the project commenced in 2020. WAF will continue creating value through the drill bit in 2023, while investigating the potential of developing a second underground mine at Sanbrado beneath the M5 open pit. Our 31 December 2022 Mineral Resource and Ore Reserve Statement and 10-year production plan shows WAF has a long and sustainable future and will continue making a positive difference to our stakeholders in Burkina Faso over the next decade.” ■



West African Resources provides 2023 Resources, Reserves and 10-year production outlook.

Zambia’s Mopani Copper Mines awarded Kite Mark for ethics



Mopani Copper Mines is awarded Kite Mark for ethics.

Copper miner, Mopani Copper Mines, is setting the standard for Africa’s mining sector after achieving the prestigious Chartered Institute of Procurement & Supply (CIPS) Corporate Ethics Kite Mark for its commitment to investing in ethical practices in its procurement and supply chain professionals and activities.

The company is playing a crucial role in Zambia’s efforts to increase copper mining output to three-million tonnes a year by 2032, a target high on President Hakainde Hichilema’s agenda since coming to power in August 2021, the company said. Mopani Copper Mines is going to great lengths to become a world-class operation and, to this end, has aligned its 71 supply chain employees with CIPS, a UK-based global professional body representing the procurement and supply chain profession, to ensure they are benchmarked against the highest international standards. Mopani has also become a CIPS member.

Craig O’Flaherty, Head of CIPS for Business, CIPS Africa, says, “The CIPS Corporate Ethics Kite Mark reinforces Mopani Copper Mines’ commitment to ethical sourcing and supply chain management and is a shining example to other organisations in Zambia to do the same”. ■

Giyani appoints Danny Keating as CEO

TSX-listed Giyani Metals, developer of the integrated K.Hill battery-grade manganese project in Botswana, has announced a number of senior management changes, including the appointment of Danny Keating as CEO with immediate effect. Keating brings almost 30 years of mining and resources industry experience, including several senior leadership roles as CEO of privately held Alufer Mining and Dynamic Mining, as well ASX-listed Lindian Resources. Jonathan Henry will remain as Executive Chair working closely with Keating to ensure a smooth transition. ■



Anglo American partners with H2 Green Steel

Diversified miner, Anglo American, has signed a memorandum of understanding with H2 Green Steel, the Swedish hydrogen and steel producer, to work together on the advancement of low carbon steelmaking processes. The agreement includes studying and trialling the use of premium quality iron ore products from Anglo American's Kumba mines in South Africa and Minas-Rio mine in Brazil as feedstock for H2 Green Steel's direct reduced iron (DRI) production process at its Boden plant in Sweden.

Peter Whitcutt, CEO of Anglo American's Marketing business, said: "Our work with H2 Green Steel will focus on exploring ways for premium, responsibly produced iron ore from our operations to be used as feedstock in the Boden plant's low carbon production process, paving the way to a cleaner, greener way to produce steel – one of the backbone materials for the roll-out of energy transition infrastructure and for ongoing global socio-economic development."

H2 Green Steel was launched in 2021 to accelerate the decarbonisation of the steel industry by using green hydrogen. ■



Anglo American partners with H2 Green Steel to advance low carbon steelmaking.

Brendan Harris is Sandfire's new CEO

ASX-listed Sandfire Resources has appointed Brendan Harris as its new CEO. Sandfire's Non-Executive Chair, John Richards, said that Harris' appointment positions Sandfire to execute the next phase of its growth strategy and to capitalise on its emerging position as a multi-mine producer of copper, a critical metal required to support the world's transition towards renewable energy and net-zero emissions.



Sandfire has appointed Brendan Harris as its new CEO.

Harris, said: "I am passionate about copper's role in the electrification and decarbonisation of the global economy, and believe Sandfire holds a very attractive portfolio of copper assets that will support the green energy transition. I look forward to continuing the excellent work the team has underway to establish the organisation as a truly sustainable, global copper producer of significance, while building positive relationships with our surrounding communities and delivering tangible value to all stakeholders." ■

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New Volvo excavator punches well above its weight

Babcock's equipment business has introduced the Volvo EC550E crawler excavator to the local market. Sales of the 55-tonne machine, which delivers the type of performance normally associated with excavators in the 60/65 tonne class, have got off to an excellent start, with five units ordered and some already working on site.



The EC550E is available with a range of heavy-duty rock buckets.

The EC550E fills the gap between the highly successful 48-tonne EC480D excavator and the 75-tonne EC750D, also a very strong seller. It is one of the most advanced excavators in the Volvo line-up and offers class-leading productivity and fuel economy. According to Babcock, it is the perfect partner to Volvo's 30-t and 40-t capacity articulated haulers, the A30G and the A40G, with the ability to reduce the number of required passes and dramatically improve cycle times.

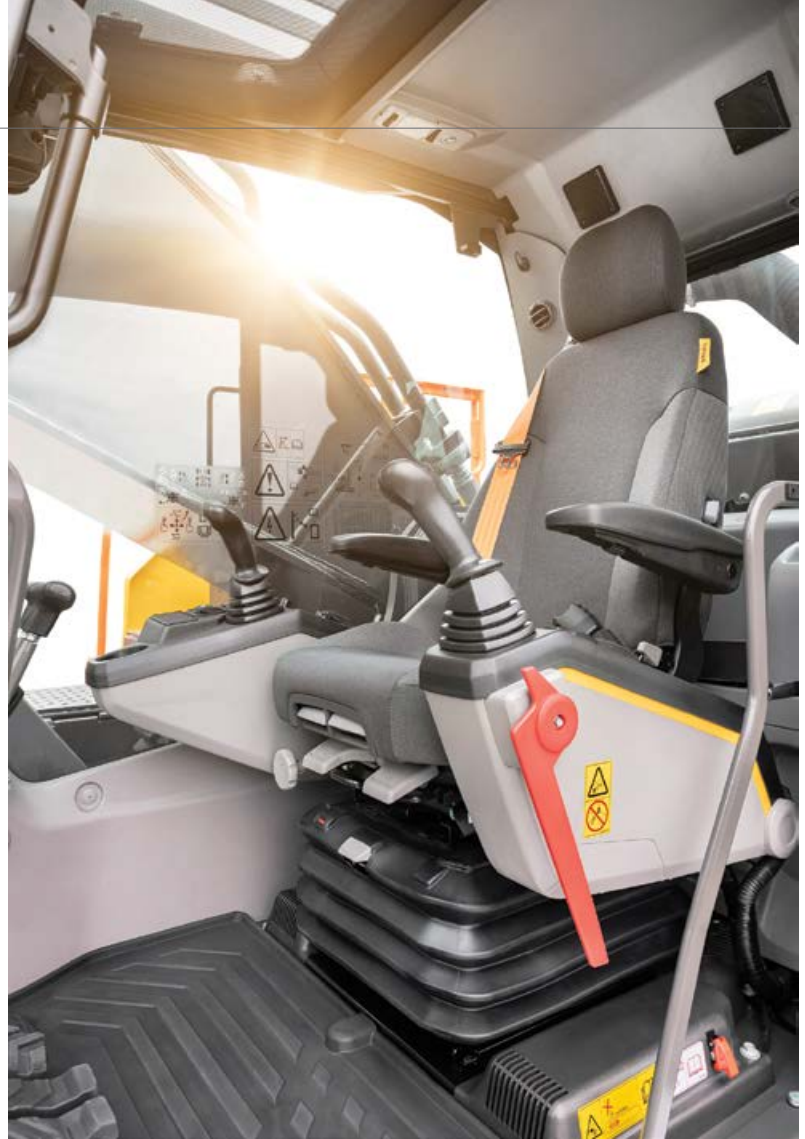
The new Volvo EC550E excavator.



"We are extremely excited by the capabilities of the EC550E," says David Vaughan, MD of Babcock's Equipment division. "It offers 25% better fuel efficiency than other machines in its weight class and up to 40% higher productivity, and we believe it is going to be a real winner. We see it repeating the success we've had with both the EC480D and the EC750D, which are both market leaders."

Lance Mannix, General Manager— Sales, says the EC550E even stands up well against the EC750D. "We've put the two machines up against each other in the field and the EC550E keeps up with its bigger brother in ways that we would never have anticipated. It can do almost everything that the EC750D does in light to medium applications although, of course, it will fall behind in more demanding heavy-duty applications in very hard rock."

Features that enable the EC550E to punch above its weight are a powerful Volvo diesel engine delivering



a maximum power of 320 kW at 1 600 rpm and a robust undercarriage of 60/65-tonne calibre, which provides superior levels of stability and durability. The transport dimensions, however, are roughly equivalent to the EC480D. Breakout force is an impressive 251 kN and tear-out force 220 kN.

The EC550E is available with a range of heavy-duty rock buckets – from 2.5 to 3.5 m³ – designed for use in abrasive conditions, with the Volvo Tooth System making easy work of teeth replacements thanks to its place, push and click functionality.

Customers can take further control of their productivity with On-Board Weighing, helping to ensure the optimum amount of material is loaded. This optional system provides real-time information to eliminate under and over-loading of haul trucks and also records total tonnage for complete production management.

A major contributor to the EC550E's fuel efficiency is the next-generation electro-hydraulic system with Independent Metering Valve Technology (IMVT), which replaces the conventional spool-type main control valve. It is the latest pioneering innovation from Volvo and is said to be the most high-performing hydraulic system in the industry. It provides significantly more precise control than conventional systems.

"The new electro-hydraulic system has resulted in a very clean design with far fewer hydraulic hoses than you would find in machines using conventional

technology," Vaughan says. "This is a real plus and, of course, makes maintenance that much easier."

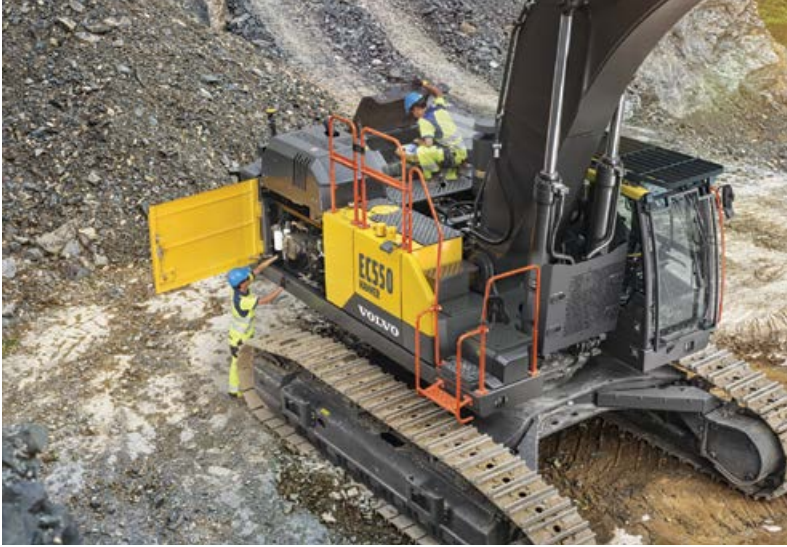
Another feature of the machine that has impressed Vaughan is the optional Volvo Smart View system, which uses front, rear and side cameras to provide a real-time, overhead view of the machine, which is especially helpful when working in confined spaces. "The system is really impressive and definitely enhances safety and operator productivity," he says.

The five units sold so far are going to three separate customers, two of whom are repeat buyers. "They've added to their initial orders and are each taking two machines," says Mannix. "This speaks volumes about the product and the impression it makes once it is operating in the field."

The EC550E forms part of a comprehensive 12-model line-up of Volvo crawler excavators ranging from a compact 4-tonne machine through to the 95-tonne EC950E, the flagship of the range. The most popular machine locally is the EC750 model, with total sales now numbering around 200 units. The EC950E has also done extremely well with nearly 50 machines purchased since its launch in South Africa in 2017, an impressive figure given the limited market for heavy excavators in this class.

On the subject of business generally, Vaughan says that Babcock's equipment business has just completed a year in which sales have been at record levels. "Units are being sold the moment we receive

Operators will appreciate the excavator's ergonomic and comfortable cab.



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them. This is particularly the case with our articulated haulers, especially the highly popular A40G model, and some of our wheel loaders, such as the top-selling L150H, which is a 24-tonne class machine.”

According to Vaughan, the general tight supply situation with respect to machines is a result of the problems currently affecting the global supply chain, which were precipitated by the Covid-19 crisis and have been made worse by the war in Ukraine.

“All OEMs have been affected,” he says. “Assembly lines at factories have slowed because of delays in sourcing materials and components. On top of this, getting completed machines to markets around the world is a challenge in itself because of a shortage of containers and vessels. In conjunction with Volvo, we are very working hard to mitigate these problems. We’re not yet where we want to be but the situation is improving.”

Looking at some of the sales highlights for Babcock over the past year, Vaughan says that particularly noteworthy are the continuing success of

the A60H, the largest true articulated hauler in the market with a payload capacity of 55 tonnes, and the growing popularity of the Volvo rigid truck range.

“The success of the A60H has been a revelation to us,” he observes. “We always expected it to do well but sales have surpassed our expectations, with around 170 units now in the field. It allows operators to use an articulated hauler in applications that were previously the preserve of rigid trucks and it is very clear that it is filling a market need.”

On the subject of Volvo’s rigid trucks, which were launched globally in 2018, Vaughan says while there was a ready market for the R60D, a versatile workhorse in the 60-ton payload class, the flagship model, the R100E in the 100-ton class, got off to a slow start.

“With the R100E we entered a market that is dominated by two global suppliers and it was initially difficult to gain traction,” he notes. “I’m pleased to say, however, that sales are picking up. We’ve recently received an order for 10 machines, which is our biggest order to date. These are destined for the Copperbelt, where they will join five R100Es that are already working there.”

A R100E working in South Africa for a long-time Babcock customer has racked up over 7 600 hours working 20-22 hours a day at an anthracite mine. According to the customer, the machine offers high productivity, low fuel consumption and low maintenance requirements and has also proven a hit with operators who appreciate its ergonomic and comfortable cab.

Turning to Babcock’s aftermarket business, Vaughan says it has never been better. “Sales of parts and componentry are excellent and we also have more machines on either service or service and maintenance contracts than ever before. Increasingly, customers are seeing the benefits of allowing us to look after their machines, which I think is testimony to the quality of service we provide.”

Although Volvo’s machines sell on the strength of their quality, durability, and performance, financing them can be a challenge for some customers. “We recognise this, and are able to assist through Volvo Financial Services (VFS), which was launched in South Africa in 2017,” states Mannix. “VFS offers a range of innovative, customisable solutions, including instalment sales agreement and finance leases. It represents a one-stop solution for customers.”

On the outlook for growth, Vaughan says he is optimistic. “Coal mining has been one of the drivers of recent growth in mining and we see this continuing. Other sectors of mining are also quite buoyant, both here in South Africa and in many of our close neighbours such as Botswana, Namibia and Zambia. The market we operate in is highly competitive, but we have the machines, the people and the branch network to continue the strong growth we’ve seen over the past couple of years.” ■



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CONSISTENTLY DELIVERING

The trouble with Cobalt

By Tom Price, Head of Commodities Strategy at Liberum

The tiny, high value global metal market of cobalt reported one of Commodity World's weakest price performances in 2022, down 40% to US\$43k/t-\$19/lb (LME). Year-to-date in 2023, the signal has managed to stabilise at around the \$20/lb-level.

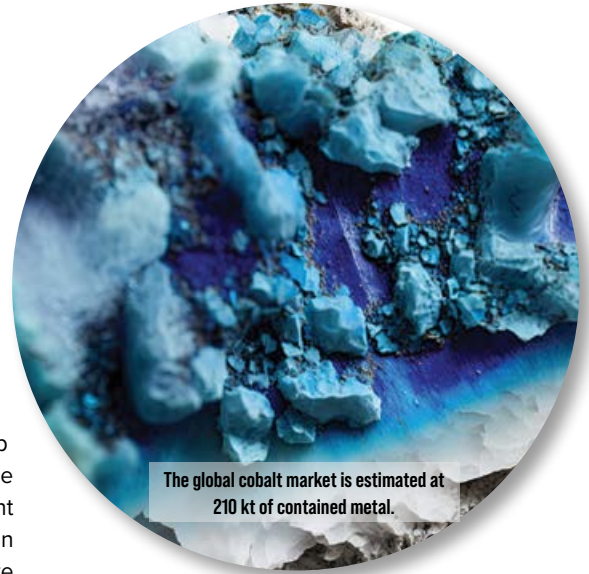
What prompted 2022's sell-off? Popular market view is that China's covid-hit electric vehicle (EV) sales for 2022 rippled up this new auto industry's supply chain, to the miners. It's certainly consistent with the more recent (and on-going) sell-off in lithium's prices – down an extraordinary 60% year-to-date – arguably a more critical input for EV batteries.

And what does mining giant, Glencore – the world's largest cobalt producer (40 ktpa, 25% of global total) – regard as the cause of cobalt's price fall? At its annual earnings get-together in February, the company explained that all three of cobalt's key end-uses – EV batteries, electronic goods, industrial applications – were hit hard by China's 2022 covid-lockdown.

For us though, we see another bear factor driving cobalt's subdued price performance: a structural shift in the China-dominated global EV battery industry, intended to reduce its dependency on cobalt. Here, we explain why they're spurning the metal, and suggest one strategy that could help the miners mitigate this new demand-hit. First, let's review the state of the global cobalt market.

Industry snapshot

We estimate the physical size of the global cobalt market at 210 kt of contained metal which – at spot's US\$40 k/t – values the trade at about US\$8bn. In terms of tonnes, cobalt's market is less than 5% of the size of the other base metals markets of copper,



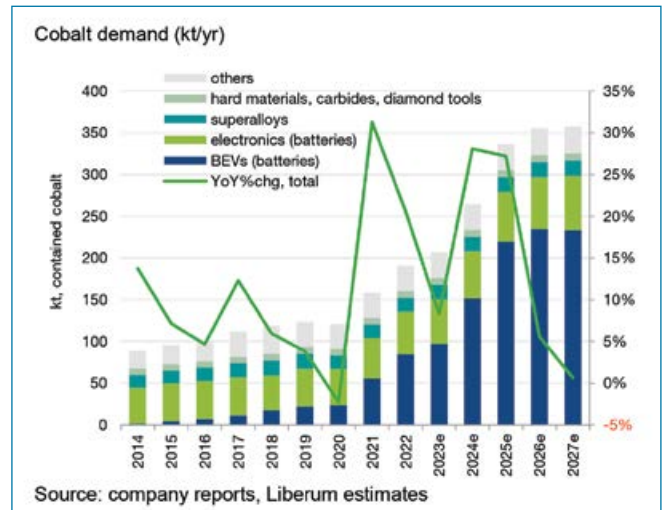
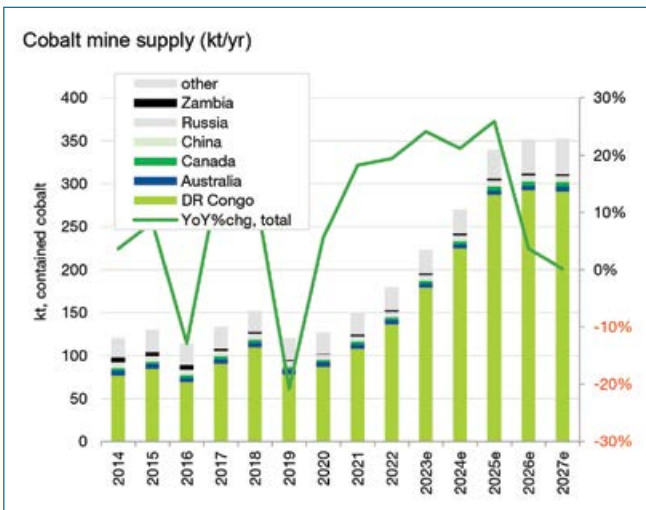
The global cobalt market is estimated at 210 kt of contained metal.

aluminium, zinc, lead, nickel.

Still, cobalt's industry has expanded at 5%/yr over the last 20 years, one of the strongest growth rates across all metal markets, driven mainly by a sustained lift in demand for battery-bearing consumer goods. Note, batteries for electric vehicles only emerged as a meaningful cobalt demand growth driver in recent years.

Right now, cobalt's end-uses are split roughly equally three ways: EV batteries, electronic goods, industrial applications (i.e. about 60-80 kt/yr for each). Of these, electric vehicles' battery demand growth is by far the strongest, up by about 50%/yr since 2015. Total EV sales worldwide in 2022 topped 10.5 million units (+62%YoY; 13% of all forms of auto sales). We forecast this to lift by another 25% in 2023, to over 13 m units.

What are the key sources of cobalt? Most metal is delivered from mines, typically as a by-product of either copper (DR Congo) or nickel (Australia, Canada) operations. DR Congo has long-been the single largest source of mined cobalt, extracted from Africa's regional-scale, sedimentary-hosted 'Copper Belt'. The DRC currently mines/exports more than



Source: company reports, Liberum estimates

180 kt/yr of cobalt, 80% of the global total (together with 2 mt/yr copper). It follows that DRC-related industry events can dominate price action.

While scrap flows are tiny for this market, the rise of both EV battery use and ESG-prompted recycling capabilities should see this supply source expand in coming years, reducing demand for mined supply.

Glencore's 'Mutanda shuffle'

At its annual results presentation in February, Glencore's management team again expressed a willingness to shut its own DRC operations (100%-owned Mutanda and Katanga, each deliver 26-30 kt/yr cobalt) to support cobalt's weak price. Would this work? Together, these mines contribute almost a third of total global supply. So yes, any halt to production there is likely to be a price-driving event. Indeed, Mutanda's closure in 2018 resulted in a price spike to over US\$90k/t.

Glencore's long-standing philosophy on mine management in weak price environments is that operations should be promptly closed, to protect what it regards as under-valued mineral reserves. In the last decade, it has periodically shut down selected copper/cobalt, zinc and coal operations on price weakness.

This supply strategy assumes that short-term demand for the commodity cannot change much, allowing the price to stabilise or even lift when sufficient supply is cut. Specifically for cobalt, the popular industry view is that EV battery technology cannot change for many years. Cobalt miners' rare pricing power seemed secure.

Battery Empire strikes back

However, since Glencore closed Mutanda in 2018, the China-centred global EV battery industry has responded surprisingly quickly to that event's cobalt cost-spike. In just 2-3 years, it developed and commercialised a collection of low-/no-cobalt batteries for EVs.

It's now 2023, and high-quality nickel-cobalt-manganese (NCM) batteries continue to be replaced by mostly cobalt-free lithium-iron-phosphate (LFP) batteries. Concerns about the reliability of LFP variations are easing, helped by the fact that they're about 20% cheaper.

This structural shift to the demand-side of cobalt's market clearly contradicts that widely held view of battery technology being fixed, not flexible. But battery technology itself is complex, and the rigorous testing-approval-deployment process is expensive and time-consuming. So how was the industry able to switch so quickly?

We suspect the general structure of the industry is key here: top-10 battery producers deliver over 90% of total EV battery supply; six of them are China-based; intel on new/evolving technology circulates quickly; all are highly cost-competitive – because



their EV-producing customers are busily cutting costs too.

So, yes – Glencore may possess short-term pricing power in the world's highly consolidated, DRC-based cobalt mining industry. But it's now clear that cobalt miners are up against an even smaller group of cost-focused buyers who can/do engage new technologies, just to cut costs. Economists describe cobalt's 'Mine-versus-Battery Producer' market structure as an 'oligopsony'. That is, in the long run, the buyer possesses the pricing power.

Most troubling for cobalt's demand outlook is that the battery industry is unlikely to expand investment in cobalt-based technologies. Why? Supply is unreliable. If this is true, the situation is probably not helped by Glencore announcing that it may shut mines to support the price again.

A better strategy for cobalt miners?

Is there a better strategy here? Yes, there is. Glencore should lift production, taking cobalt's price to a lower/stable/still-profitable level, and seek to secure a larger market share by marginalising higher-cost competitors. Battery World may be encouraged by this new pattern of Glencore's behaviour. This, together with some miner-led trust-building, may help Glencore restore the critical EV-element of cobalt's demand outlook. ■

Cobalt's key end-uses are in EV batteries, electronic goods and industrial applications.

Glencore is the world's largest cobalt producer at 25% of the global total.



De Beers achieves success with Small Beneficiators Customer project



Kagiso Fredericks, De Beers Beneficiation Manager.

Following De Beers' success with its Small Beneficiators Customer (SBC) pilot programme, which is helping small-scale beneficiators to ensure future sustainability, the diamond producer will officially launch the project in May. By Nelendhre Moodley.

The company partnered with key industry players – The South African Diamond and Precious Metals Regulator, South African Diamond Manufacturers Association, South African Diamond Dealers Club and the State Diamond Trader – to identify players in industry keen to participate in its SBC pilot programme.

The project, initiated in early 2022, identified seven businesses in need of assistance in areas including requisite business strategy, networking opportunities, marketing, and access to smaller more affordable parcels of rough diamonds.

According to De Beers Beneficiation Manager, Kagiso Fredericks, the pilot project proved to be extremely productive with the miner now rolling it out as a regular programme.

“South Africa is a rich source of rough diamonds and, aside from helping to upskill industry, it is important for us as diamond producers to afford small beneficiation customers access to affordable parcels of rough diamonds,” he explains.

The small businesses that formed part of the pilot project are D&D Diamonds, House of Phoenix, Luteja Diamond Cutting works, MACS Diamonds, Neluwa Meregi Trading, Net diamonds, and Vivid Gems.

Although the miner initially estimated that it would take ten small businesses under its wing, only seven businesses met the prerequisites.

“At the onset of the programme, about 20 small

businesses showed interest in participating in the pilot project. However, a number of them did not make it through our selection criteria, which included compliance to the South African Diamond Act and adhering to the De Beers Group Best Practice Principles.”

Research informs SBC programme

According to Fredericks, prior to initiating the programme, the diamond miner conducted extensive research to determine the reasons why Small, Medium and Micro Enterprises were not managing sustainable businesses in the diamond cutting and polishing sector.

“The research flagged four key aspects that were a challenge for small beneficiation businesses, namely: entrepreneurial ability, access to finance, access to markets and access to rough diamonds in smaller quantities at reasonable prices.”

Fredericks says that being equipped with technical prowess is not enough to succeed in this sector; businesses need to be able to make opportunities for themselves.

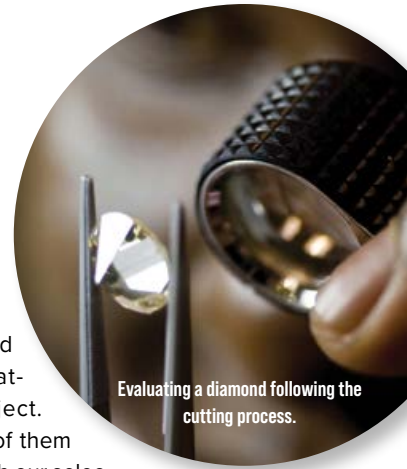
Given that South Africa's diamond industry has a long history of time-honed players equipped with decades of industry knowledge and experience, it is essential that new entrants have the entrepreneurial skills to navigate this sector.

“Successfully establishing a cutting and polishing business takes time and it is vital to ensure that SBCs are working with people who have a similar mindset, which is to have a long-term view. De Beers itself celebrates 135 years in business.”

The research also found that a key deterrent to potential beneficiates is limited access to funding, which stymies a business's ability to acquire the requisite parcels of rough diamonds.

De Beers Group sells its rough diamonds through two channels: Global Sightholder Sales and Auctions.

Currently, rough diamonds are offered to De Beers International Sightholders – a top tier customer base, that meets the company's stringent requirements – on a three-year contract. However, the sizes of parcels offered are generally out of



Evaluating a diamond following the cutting process.

The cutting and polishing process of a diamond.





reach in terms of affordability for SBC.

To help emerging businesses access affordable rough diamond parcels, De Beers is offering SBCs parcels of diamonds consisting of a mix of diamonds from its diamond producing mines in Namibia, Botswana, Canada, and South Africa.

Another barrier is access to markets and suitable marketing strategies and platforms.

Although Africa is a top producer of diamonds, diamond consumption is dominated by the US market, which accounts for half of global consumption, followed by China and India which together account for roughly 20% of consumption.

“South Africa, however,” Fredericks explains, “is a small consumer of beneficiated product – this means that SBCs often do not have access to the larger more dominant markets.”

To help SBCs gain access to markets, and thereby key platforms for networking, De Beers has exhibitions, including an in-house exhibition, which it initiated in 2022, held at its new premises in Rosebank. The in-house market caters to a select set of De Beers’ customers and its staff.

According to Fredericks, the exhibition provides beneficiaries across its programmes, including participants in the Enterprise Development Programme and alumni from the De Beers Group Designers Initiative (Shining Light Awards), an opportunity to sell their exquisite diamond products to identified clientele.

“In this way, we provide small businesses with a platform to sell their goods and our staff members get an opportunity to purchase their diamonds at competitive prices.”

Following the success of the in-house exhibition, it will be rolled out at least twice a year, going forward.

Other networking and exhibition offerings to help small businesses include De Beers’ partnership with the State Diamond Trader, which takes local businesses to exhibitions such as the Jewellery & Gem WORLD – the world’s biggest B2B buying event, held in Singapore in 2022, as well as the Jewellery Council of South Africa exhibition, which was held at Montecasino last year.

“Not having financial resources inhibits potential



beneficiates from entering the diamond manufacturing space and, by affording emerging businesses access to smaller parcels of rough diamonds and helping them to establish the required networks, we are able to assist small businesses in the sector become sustainable,” says Fredericks.

In-house exhibition

At the time of the interview, *Modern Mining* had an opportunity to interact with some of the small businesses exhibiting at the in-house exhibition.

Aside from being extremely grateful for being given the platform to participate in the programme, the small group of participants agreed that the SBC and EDP programmes opened doors for them, with the exhibitions offering platforms to network and grow their businesses. Importantly, De Beers’ offer of smaller rough diamond parcels is helping them to set their up businesses for sustainable growth.

According to small business owner, Vivid Gems’ Andile Gcaba, the pilot project has been life-changing, allowing him to adapt his outlook as an entrepreneur in the diamond beneficiation sector.

“I am now able to purchase consistently high-quality affordable parcels of rough diamonds. Prior to being part of the SDC programme, the parcels of rough diamonds purchased from other producers were not of consistent quality. Moreover, there is a regular source of diamonds which means that my business can be sustainable. Aside from learning the intricacies of running a business, the SBC programme is helping me to establish key networks to grow my business. Essentially, the programme is allowing me to use jewellery as a driver to get me to where I want to be as a businessman.” ■

Above: Andile Gcaba, owner of Vivid Gems at the in-house jewellery exhibition hosted by De Beers Group for its staff.

Top left: In-house exhibition for De Beers staff members in Rosebank.

Left: Close up of a rough diamond sight parcel packed into a Sight case.

Beneficiation

Beneficiation is the transformation of a mineral, or a combination of minerals, into a higher-value product, which can either be consumed locally or exported. Beneficiation is a driver for empowerment of HDSAs and enables the development of new entrepreneurs in downstream and side-stream industries.



Venetia's open pits bow out in style



Outgoing General Manager of Venetia Mine, Gerrie Nortje.

Outgoing General Manager of Venetia Mine, Gerrie Nortje and employees pose for the camera at the pit closure celebrations.



Three decades of continuous open pit mining at De Beers' Venetia diamond mine came to an end in December 2022 when the last load of ore was hauled out of the K1 pit. A total of three open pits were mined over the life of the mine. According to Venetia's outgoing General Manager, Gerrie Nortje, the open pit operation ended on a strong note, with the main pit, K1 working so efficiently in 2021 and 2022 that carat production was at near-record levels during these years. *Modern Mining* recently spoke to Nortje about the highlights of his tenure as GM.

The ore from the open pits will ultimately be fully replaced by ore from the US\$2 billion Venetia Underground Project (VUP), which will commence production in 2023. The VUP's ramp-up will be complete around 2026, at which point the mine will be producing at a rate in excess of 5 mt/a (with up to 5.9 mt/a expected at peak).

According to Nortje, Venetia will rely on stockpiles to bridge the short gap between the end of open pit production and the start of the VUP. "This stockpiled material will be fed to the plant for the next few years," he explains. "In parallel, the VUP

will be producing ever increasing tonnages of ore one month by month as it ramps up. Inevitably, there will be some impact on carat production in the short-term but this was always expected and, fortunately, was partially offset by the excellent results achieved in 2021 and 2022."

Elaborating, he says Venetia produced 5.3 million carats (mct) in 2021 and 5.5 mct in 2022. "These were the best figures since 2008 and significantly higher than the annual average of 4.6 mct recorded over the life of mine," he states. "When open pits are coming to an end, you normally expect a gradual falling off in production. We achieved the opposite."

Nortje notes that in 2017 the Venetia management team studied ways and means of optimising the open pits to ensure that maximum value could be extracted from them during their last few years of operation without the development of the underground mine being in any way negatively impacted.

"Basically, we looked at the open pits and the underground as an integrated business," he says. "The timelines generated by this study suggested that we would finish open pit mining during 2023, a target we bettered by a full year. We also managed to add a few benches and go deeper in K1 than originally planned by pursuing late-stage optimisation opportunities. In all, we added around US\$400 million in value while still finishing early. It's a phenomenal achievement."

Over its life, the open pit mine moved 838 mt ore and waste and produced 143 mct of diamonds. Mining took place in three main pits, K1, K2 (which was mined out in January 2018) and K3, which ceased operations last year, a few months before K1. The final depth of K1 was 492 m, making it one of the deepest pits in South Africa. The plant fleet deployed varied over time but in recent years numbered about 43 haul trucks and six shovels, with the biggest units being Cat 793 haulers and Cat 6060 shovels.

Nortje, a mining engineer, has been with either Anglo American or De Beers for almost his entire career, with the exception of a couple of years with Xstrata. He was appointed GM of Venetia in 2017. With that role now over, he is moving to the De Beers head office in Johannesburg where he will be taking up a strategy role in respect of De Beers' Managed Operations.

Looking back on his time at Venetia, Nortje says that managing one of the world's top diamond mines was an absolute honour. "At the same time, it was very challenging, given that we've had two major operations proceeding in parallel – the open pits and the VUP – which resulted in a very busy site with around 6 500 people being employed. Prior to the VUP, the total labour force would have been about a third of this figure."

A particular achievement that Nortje highlights is the fact that the mine is transitioning to underground operations without a single De Beers employee being retrenched. "Through careful planning, we've managed to save every job," he states. "Many open pit employees have been trained to work in the underground mine or the processing plant while others have been redeployed in a range of other activities, a notable one being our rehabilitation programme which we are conducting in-house."

On the subject of safety, Nortje says that a traumatic event for him – and indeed the whole mine – was a fatality that occurred in March 2018. "We lost a highly valued employee, Maggie Semata, as a result of an accident in our processing plant," he recalls. "Since then, we've looked at safety through an entirely new lens. While nothing can make up for this tragedy, I can report that we've had no further fatalities or near fatalities and that we recently hit 8 million fatality-free shifts."

Nortje also takes pride in the great strides that Venetia has made with its community, social and conservation programmes. These initiatives all form part of De Beers' Building Forever vision designed to ensure that mines such as Venetia have a positive impact throughout their lives and after closure.

"We are making a real difference to the part of Limpopo Province in which we operate. We've supported schools, clinics and hospitals, built water infrastructure and constructed roads, including many in Musina, and maintained a world-class conservation area – the 36 000 ha Venetia Limpopo Nature



Venetia Mine processing plant.



Shot of Venetia Mine processing plant with the underground project.



Shovel loading a haul truck with the last load of ore from the Venetia Open Pit.

Reserve. We're also busy creating thousands of sustainable off-mine jobs, with a particular focus on agriculture," he says.

As a final comment on Venetia, Nortje says the mine is well set up for the future. "The open pits may be finished but Venetia will undoubtedly go from strength to strength as the VUP ramps up. I'm confident that it will continue to rank as one of the world's top diamond mines through to the 2040s and perhaps even beyond." ■



Andrew Branch, Director at BBE Projects.

BBE completes refrigeration and air-cooling system for VUP

Mine ventilation and refrigeration specialist BBE Projects was recently contracted to design, supply, construct and commission a turn-key air-cooling system for the Venetia Diamond Mine, which is approaching the final stages of its transition from open pit to underground mining.

De Beers' Venetia Diamond Mine has been South Africa's biggest producer of diamonds since 1995. Today, the mine produces 5.5 million tons per annum and will ramp up to 5.9 million tons per annum with the underground contribution.

About a decade ago, De Beers embarked on the Venetia Underground Project, a \$2 billion project designed to transition the mine from open pit to underground. The underground infrastructure comprises two vertical shaft systems for personnel transport, ore transport, routing of services, lateral access levels on 54, 94, 100 and 103 level, and shaft bottoms at 107 level. In addition, the need for cooling was identified as part of the ventilation and occupational hygiene planning for the underground mine.

BBE Consulting, a company of the BBE Group, has been involved in the Venetia Underground Project since the Pre-Feasibility phase, engaging from an early stage to help with the planning for the transition to underground mining. As a result, BBE was in the

position where it could deliver the air-cooling system relatively quickly – from submitting a bid to contracting for the project. The first contract was signed in April 2018. BBE Group is unique in the market in that mine ventilation and cooling is its sole business. However, a major challenge proved to be the outbreak of the Covid-19 pandemic, with lockdowns and additional health and safety protocols affecting productivity on site and manufacturing off site, as well as the availability of parts and equipment. Despite this, work continued, and the air-cooling system is now in the final stages of being commissioned.

The air-cooling system constructed by BBE Projects includes two water-chilling refrigeration machines housed in a central plant that distributes chilled water to several users, as part of a distributed cooling approach. The main air cooler, a direct-contact spray chamber located adjacent to the plant building, will eventually feed cold air to the underground workings via a large downcast shaft, which is currently being raise-bored by a specialist contractor. BBE Projects will return to the project within the next eight to ten months to install the final piece of duct connection between the spray chamber and the downcast shaft once the raise boring is complete.

There are three subsidiary air-coolers operating – a secondary spray chamber feeding a satellite downcast shaft, which supplies cold air to the development workings; and two finned-coil dry heat exchangers in the air intakes to the sinking fans which force-ventilate the production shaft. These cool the air as it enters the shaft for workers performing shaft sinking, equipping and underground development work.

“One of the main reasons BBE was chosen to participate in the Venetia Underground Project is its proud history of success in South Africa and internationally,” says Andrew Branch, Director at BBE Projects. ■

De Beers' Venetia Diamond Mine.



DE BEERS GROUP

RISE OF A NEW DAWN

De Beers Venetia Underground Mine will deliver its first production in 2023. Ultimately, the US\$2 billion mine will become one of the most mechanised and automated mining operations in the world.



New eBook from TOMRA Mining

Tomra Mining has made available a new, free-to-download publication that outlines the different ways today's advanced digital sorting data services can help mining operations stay in control.

According to Tomra Mining, the digitalisation of sorting-related services is opening up a world of new possibilities. The new e-book, titled 'The Benefits of Data-driven Quality Control', focuses



The digitalisation of sorting-related services is opening up a world of new possibilities.

on how to efficiently produce high-quality product with maximum control and minimum waste.

"From a quality management perspective, every sensor in the sorters is a valuable source of information about the products that pass through them. Today's sorting data services turn sorters into connected devices and provide a secure, near-live monitoring dashboard for the mine's sorting lines. Mining processors are able to continuously monitor and optimise the sorting line's output quality. On-site observation, manual sampling and time-consuming reporting and communication become a thing of the past: the sorter itself provides a constant feed of information based on continuous product sampling on every object," the company said.

Automatically recorded, remotely accessible, data sets are available on any computer or mobile device, easily accessible by all members of the team. Managers can monitor remotely distant or difficult-to-reach mining sites from their offices, enabling them to make operational and business decisions based on experience and hard facts, also comparing and benchmarking data from different sites.

All these features enable mineral processors to optimise their decision-making and efficiency, ultimately increasing the profitability of their operations. These benefits are accessible through TOMRA Insight, the cloud-based data platform available to TOMRA machine users as a subscription-based service. ■



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6 - 7 JUNE 2023

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FOR EXPLORERS, DEVELOPERS & INVESTORS IN JUNIOR MINING

Resources 4 Africa is pleased to announce the 9th edition of its annual **Junior Indaba**, a popular meeting place for junior miners which is enjoyed by all for its incisive, informative and frank discussions tackling the challenges and opportunities for exploration and junior mining companies in South Africa and elsewhere in Africa. Discussion topics this year include:

- What will it take for junior mining in South Africa to succeed?
- What is needed to create a conducive policy and regulatory framework for junior miners in South Africa?
- How are commodity prices faring in 2023 and what will this mean for juniors?
- Do we have the geological endowment to support junior mining in South Africa?
- What lessons can be learned from successful junior miners who are already operating in SA and beyond?
- The battery hype: should miners go beyond mining?
- Experiences of juniors in South Africa, Botswana, Zambia, Zimbabwe, Namibia, Côte d'Ivoire, Burkina Faso and Tanzania
- And much more...

We will feature a number of **junior mining success stories**, as well as our regular features - Myth Busters and a showcase of presentations from junior miners across the continent.

Early confirmed speakers include representatives from: **Minerals Council South Africa, DMRE, Council for Geoscience, Wood Mackenzie, DRA Global, Afrimat, Orion Minerals, Osino Resources, Andrada Mining, Botswana Diamonds, Cape 360, Manganese Metal Company** and more.....

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The 2023 Junior Indaba, for explorers, developers and investors in junior mining, is brought to you by Resources 4 Africa, the organisers of the Joburg Indaba.

Ndalamo Resources on exponential growth

Mid-tier coal producer, Ndalamo Resources, which celebrates a decade in business, has many irons in the fire as it targets an aggressive growth path including diversifying into other energy related metals and expanding into the renewable energy space, executive head for energy, Nikash Rughubir, tells *Modern Mining*.
By Nelendhre Moodley.

Ndalamo's recently established subsidiary, Ndalamo Energy's, vision is underpinned by a three-pronged strategy focusing on primary energy generation, decarbonisation and energy verticals.

Ndalamo Resources (Ndalamo) was established in February 2013 with a focus on coal mining. Its coal projects are located predominantly in the Mpumalanga province. The company's growth path is focused on advancing its existing suite of assets through organic growth, consolidation and acquisition of adjacent assets that have a strategic fit with the existing business, as well as new investment opportunities outside of coal into commodities such as iron ore, chrome, battery and EV minerals.

Ndalamo's recently established subsidiary, Ndalamo Energy's, vision is underpinned by a three-pronged strategy focusing on primary energy generation, decarbonisation and energy verticals.

According to Rughubir, the first stream will focus on primary clean energy generation to produce onsite power, not just to feed its current operations but to also supply emerging and junior miners that are in proximity. It is estimating a phased approach of generating 20 megawatts alternating current (MWac) as a start for self-consumption, with an ultimate resource potential of as high as 150 MWac.

"The intension is to scale up onsite generation in anticipation of market liberalisation. Ndalamo Energy has identified a critical need to develop energy solutions for emerging and junior miners that do not have the internal capacity to self-develop. In addition, this stream will also opportunistically look to expand its generation footprint into the Renewable



Energy Independent Power Producer Procurement Programme (REIPPP) and commercial, industrial, and institutional (C&I) related projects," Rughubir explains.

The second stream targets decarbonisation services and will see Ndalamo Resources developing a suite of return-based solutions that allow emerging and junior miners access to solutions that have been validated at Ndalamo's current operations. The third stream will consider energy verticals, such as energy trading.

Trainees at NCC. Right: Fronted loader trainees.



trajectory



“The intention is to obtain an energy trading licence and actively participate in the green hydrogen value chain as well as other transition energy solutions,” says Rughubir.

Further to this, as part of its diversification strategy, Ndalamo Resources is currently investigating options related to chrome, iron ore and other key minerals that support energy transition.

“Green energy has been at the world’s forefront for many years and has led to the decrease

in demand for coal, despite the need for it. This, in turn, has decreased investment in coal companies and we find it exceptionally difficult to fund new projects. Collaboration with traders for trade finance is our current solution while we expand our ESG portfolio for a more attractive investment portfolio,” says executive head for business development, Ashleigh Hodge Dajee.

Power play

The mainstay for the 100% black owned entity remains its three coal operations, namely North Block Complex (NBC), New Clydesdale Colliery (NCC) and Ubuntu Colliery, which supply into both the domestic and export markets.

All Ndalamo Resources’ operations have supply contracts with various Eskom power stations. “It is critical that we have a base of long-term contracts which provide a guaranteed revenue stream, especially in the volatile export market we have witnessed over the past few years.”

More than 50% of Ndalamo’s coal is supplied to local power producer Eskom, with the balance sold into the export market.

“We are proud that our operating model has led to the successful acquisition and profitable operation of various mothballed opencast and underground mines, including NCC and NBC that were acquired from Exxaro. In addition, we have two development projects, namely the Eloff and Springboklaagte coal operations, which we are currently advancing,” says Rughubir.

The New Clydesdale Colliery (NCC), located in Kriel, Mpumalanga Province, consists of the Roodekop and Diepspruit West opencast sections and the Diepspruit underground section. It is situated near Eskom’s Kriel Power Station, which it supplies with coal. The company is also in the process of expanding the NCC operation and recently commenced the development of its Middeldrift pit, which will extend the LOM of the operation by an additional 8-10 years. The Middeldrift pit will

“We are proud that our operating model has led to the successful acquisition and profitable operation of various mothballed opencast and underground mines, including NCC and NBC that were acquired from Exxaro. In addition, we have two development projects, namely the Eloff and Springboklaagte coal operations, which we are currently advancing,” says Rughubir.

Below: Conveyer-belt trainees.





Ndalamo Resources aggressively targets growth.

predominately focus on the production of export coal.

The North Block Complex (NBC), is located near the town of Belfast and includes the newly developed Paardeplaats opencast section. It is situated close to Eskom’s Arnot Power Station, which it also supplies with coal. “At NBC we developed the Paardeplaats resources and have successfully concluded a 10-year contract with Eskom for the coal. We are also working on expanding the life of mine of this operation.

“Both NBC and NCC are operating at a steady state of production and have proven consistent in meeting the required off-take agreement tonnages from both ESKOM and export customers,” says Rughubir.

The Ubuntu Colliery in Delmas, Mpumalanga Province, an opencast operation that is concentrated on an Eskom grade crushed and screened product, is situated near Eskom’s Kusile Power plant, which it supplies with coal.

Aside from existing operations, Ndalamo is developing its Eloff coal mine – an operation that is a standalone project and an extension to the current Kangala operation. Eloff coal mine is scheduled to come onstream in the third quarter of 2023.

“Eloff Colliery, also in Delmas, will provide strategic near-term flexibility and upside as it will enable the potential for low-cost expansion of life of mine to the neighbouring Kangala Colliery, as well as the potential for additional extensions within the broader project area. We are finalising our Eloff standalone contract with Eskom,” Rughubir explains, adding that the Eloff Project is a greenfields project being developed for the production of coal destined for Eskom power stations.

The development of the Kangala-Eloff project – a 20-year plus operation – is going through the various project phases and is set to be an integral part of Ndalamo Resources future business.

Further to this, on its recently purchased Springboklaagte – a greenfields operation also situated in the Delmas area, the company is busy with a prefeasibility study. It intends commencing production from Springboklaagte in 2024. The underground operation is earmarked for export focused production with a small middlings product destined for the domestic market.

“The recent export demand has brought huge success to Ndalamo as we are known for our consistent and reliable supply of export products,” says Rughubir.

As such, the company is focusing on building up its logistics and marketing segments to ensure that it is able to provide a niche all-encompassing service to end users.

“In addition to the expansion of our current operations, we are also participating in a coal disposal process which is a huge strategic alignment for our NBC operation. This acquisition will provide Ndalamo with RBCT allocation, siding capacity of rail to both Richards Bay Coal Terminal (RBCT) and *Terminal da Carvao da Matola* (TCM), and foster life of mine expansion overall for Ndalamo’s Resources Belfast portfolio,” says Dajee.

Having thrived from the divestment of coal by major producers in industry, Ndalamo’s operating model consists of a competent management team



on each of its operations who oversee the daily operations and its contractor operated model.

According to Rughubir, Ndalamo’s operational methodology targets the extraction of maximum value out of its operations.

“Our operations are also nimble enough to adapt to changing markets and changes in demand. Our management team and head office team are small enough that decisions are made quickly, and our teams have a full suite of expertise across the scope of mining.”

Environmental, social, and corporate governance (ESG)

Ndalamo will, for the first time, publish a comprehensive ESG report in Q3 of this year. This is a significant milestone for for company, which demonstrates not only its intent to responsibly disclose on ESG, but its intent of improving on ESG related matters.

“It is important to note that it is a voluntary publication as Ndalamo is not a listed entity where mandatory disclosure is required. This demonstrates our commitment to our ESG journey,” says Rughubir.

Ndalamo Resources is currently completing a baseline study on its ESG metrics across the entire group.

“We have initiated our energy business that will target decarbonisation opportunities across operations. We will investigate technologies and digital offerings that have high decarbonisation potential and have assembled an experienced internal team to drive these initiatives,” adds Dajee.

Challenges facing the industry

With the mining sector’s performance largely stymied by a logistics crisis driven by poor performance of Transnet Freight Rail and Transnet Port Terminals, Ndalamo Resources has focused on Free on Truck (FOT) sales instead of free on board (FOB) sales.

However, this has meant the company has had to forgo on huge profits for the business. As such, Ndalamo is focusing on developing its own logistics

and marketing department, which will help it eliminate the need for third party assistance. In the meantime, the company is collaborating with traders who have logistics solutions for a full value-chain service.

Further to this, given the unpredictability of international coal prices, the company has inked long-term domestic coal agreements with Eskom.

“By creating a stable domestic product base, we are able to weather falling international coal prices,” notes Dajee. A further challenge plaguing industry remains coal theft and coal security, which has led to Ndalamo Resources investing in advanced tracking and remote monitoring of in- and outbound road transporters, which has significantly reduced pilferage.

“As Ndalamo Resources, we are very conscious of our responsibility, as a black South African company, to support the energy needs of South Africa. We understand that an orderly energy transition is required and hence having a reliable and sustainable coal operation for the next decade or so is vital, both for the country’s energy security and energy stability. That remains the greatest motivation for Ndalamo to remain invested in the coal sector for as long as required,” concludes Rughubir. ■

The mainstay for the company remains its three coal operations, namely North Block Complex, New Clydesdale Colliery and Ubuntu Colliery.

Ndalamo Resources

- Ndalamo Resources was established in February 2013.
- Ndalamo Energy is positioned as a credible 100% BEE energy player of choice, leveraging off its current operations and strong balance sheet, strong market networks and industry partners, and a skilled and experienced team.

Ndalamo’s coal product volumes

Operation	Export	Domestic
NBC	40 000 RB1 pm & 30 000 RB3 pm	200 000 pm
NCC	55 000 RB1 pm & 20 000 RB3 pm	135 000 pm
Ubuntu	None	100 000 pm

FLSmidth builds most complete comminution range

With the acquisition of thyssenkrupp's Mining business (TK Mining), FLSmidth now boasts arguably the most complete comminution portfolio in the world.

The TK Mining offering consisted primarily of crushing, conveying, grinding and processing – areas that are broadly complementary to FLSmidth's line-up, according to Craig Brickhill, FLSmidth's Regional Product Line Manager – Milling and HPGR. In grinding, for instance, TK Mining had a strong position with HPGRs, while FLSmidth is a leading provider in other grinding solutions such as semi-autogenous grinding (SAG), ball and stirred mills.

“Under the FLSmidth name, FLSmidth is now able to bring the very best solutions, equipment and expertise from across the flowsheet to our customers,” says Brickhill.

According to Demetri Kokoroyanis, Regional Product Line Manager - Crushing and Screening for FLSmidth, among the enhancements in FLSmidth's pit-to-plant range of technology and equipment are market-leading High Pressure Grinding Rolls (HPGRs) and Eccentric Roll Crushers (ERC®s).

“Our combined technologies on the crushing side now put us well ahead of competitors,” says Kokoroyanis. “Our Top Service Gyratory Crushers have been a significant step forward in ultra heavy-duty design, where leading lean design within the industry was leveraged resulting in balancing installation height, weight, erection and maintainability.”

With FLSmidth's range of Top Service Gyratory Crusher models, 95% of the servicing – including the bevel gear and hydraulic servicing – can be conducted from the top, without having to venture underneath the crusher. This makes maintenance easier and safer; and reduces operational downtime. The larger openings and high crushing power of these machines play an important role in helping



Craig Brickhill, FLSmidth's Regional Product Line Manager - Milling and HPGR.



Demetri Kokoroyanis, Regional Product Line Manager - Crushing and Screening for FLSmidth.

mines deal with large feed rocks and higher throughput demands, while minimising energy costs.

“The large top feed size capability and high throughput capacities make the Top Service Gyratory Crusher models a popular option for many customers,” Kokoroyanis says.

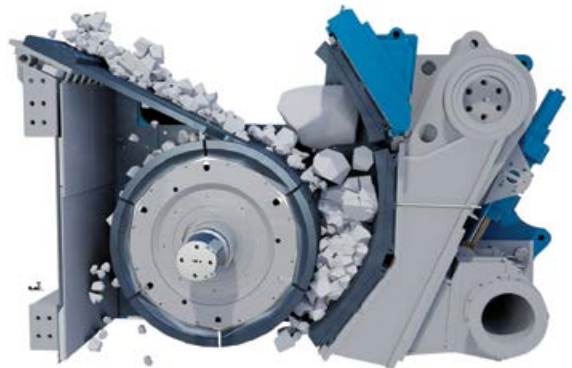
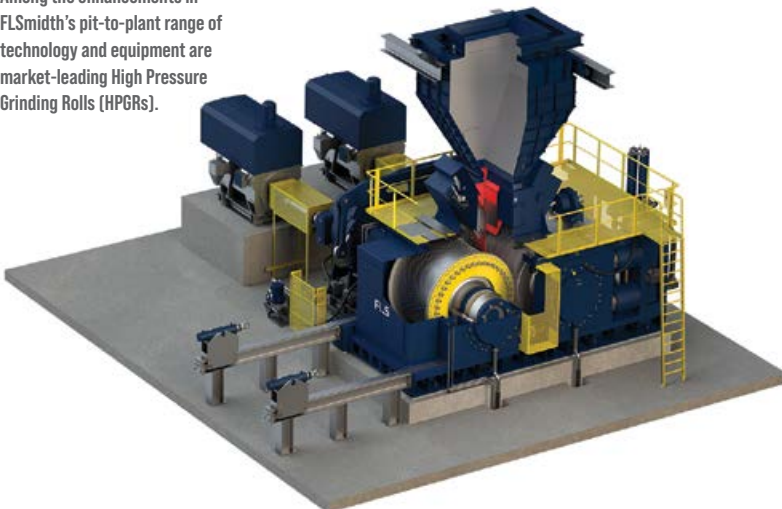
Another differentiator for FLSmidth is its Jaw Gyratory Crusher Pro. He explains that this technology was designed for block cave mining and above surface crushing applications and is also capable of



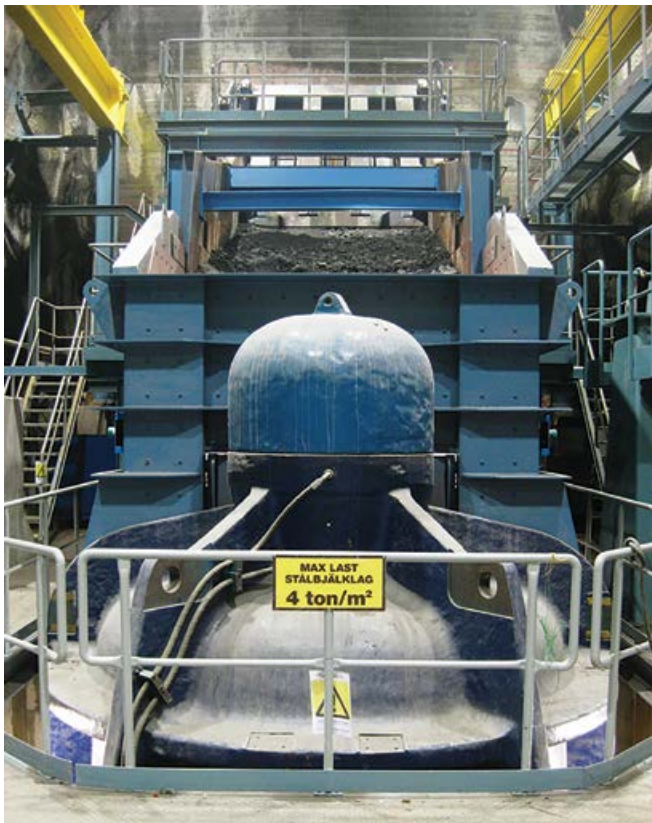
Another development has been the introduction of the larger Jaw Crusher Pro models with improved nip angles and stroke.

“The large top feed size capability and high throughput capacities make the Top Service Gyratory Crusher models a popular option for many customers,” Kokoroyanis says.

Among the enhancements in FLSmidth's pit-to-plant range of technology and equipment are market-leading High Pressure Grinding Rolls (HPGRs).



The FLSmidth Eccentric Roll Crusher ERC® can accept large rocks and produce a suitable size for conveying and secondary, or directly to tertiary, crushing if applicable.



A large top feed size capability and high throughput capacities make the FLSmidth Top Service Gyrotory Crusher models a popular option for many customers.

handling larger feed sizes than standard gyrotory crushers on the market.

Yet another development has been the introduction of the new larger Jaw Crusher Pro models with improved nip angles and stroke. These crushers can crush harder material and are capable of increased capacities. The base of the machine can be installed in a matter of two to three hours and is designed with an optimised concept, reducing service time by up to 20%.

“Our Eccentric Roll Crusher ERC® – released in 2019 – is also an exciting development and here we also have no competitor,” Kokoroyanis says. “Fitting into our range between jaw crushers and large gyrotory crushers, these can accept large rocks and produce a suitable size for conveying and secondary crushing or directly to tertiary crushing, if applicable.”

The ERC has a built-in static grizzly screen situated before the crushing zone to allow removal of the fine material. Large rocks are fractured at the opening of the jaw to increase throughput and reduce power consumption.

“This is what makes the equipment special. It allows a great deal of power to be put into the material and can handle very hard material up to 350 MPa, and even higher,” he says. “We are planning an installation in Angola in the coming months, which will be a good reference for southern Africa.”

Its wide range of offerings allows FLSmidth to integrate its equipment into an entire semi-mobile in-pit crushing plant for customers. So successful have these complete plants been that there are today over 285 installations worldwide.

“These plants can encompass direct feed with mainly gyrotory crushers, and indirect feed with an apron feeder before a gyrotory, ERC, jaw crusher, double roll crusher or double roll sizer,” says Kokoroyanis. “We can take care of everything from the truck tip to



Its wide range of offerings allows FLSmidth to integrate its equipment into an entire semi-mobile in-pit crushing plant for customers.

the discharge conveyor, and the plant comes complete with auxiliary equipment ensuring smooth operation.”

A key asset in the newly combined offering within FLSmidth has been the HPGR range, explains Brickhill. “This,” he says, “was a particularly exciting aspect of the acquisition given TK Mining’s decades of experience in the technology. The FLSmidth population of HPGR units in the field now rises to almost 160.

“It is a highly energy efficient alternative to traditional milling, as it transfers energy directly into the rock. It is also a dry process, so is useful for water-scarce locations or where mines are trying to reduce water consumption.”

The other important benefit of HPGR technology is that it promotes micro-cracking within rock. This essentially weakens the integrity of crushed material, opening pores that expose it better to metallurgical processes.

“The high pressures in the equipment are able to reduce the rock to a permeable cake,” Brickhill says. “Canals are created to the precious metals inside the rock, allowing better recoveries from processes like heap leaching.”

The HPGR Pro is the latest addition to the range, and further improvements have been incorporated, including a rotating side plate (RSP) that rotates with the rolls – rather than being stationary. This has allowed the crushing to take place efficiently across the full width of the roll. “The rotating side plates mean that there is less recirculating load of oversized material, and so it has higher throughput,” Brickhill notes.

FLSmidth remains a leader in autogenous grinding (AG), SAG and rod-and-ball and stirred mills, with an installed base of over 3 000 mills worldwide. The trunnion-supported range has now been augmented with the shell-supported products from TK Mining’s legacy.

The acquisition has also brought a state-of-the-art 1 700 m² engineering facility for the refurbishment of HPGRs, into FLSmidth. Located in Chloorkop near Midrand, it is another addition to the company’s service capability. The facility will also service the company’s DRS sizers and Buffalo machines, which are used mainly in coal and softer materials, such as bauxite. The facility includes a test centre where material can be tested for suitability for processing by HPGR and for sizing of full-scale units.

The expertise base of FLSmidth has, of course, been considerably broadened by the acquisition, further expanding the footprint of expert services to assist customers with equipment, critical operational and maintenance support. ■

Optimising plants with Sandvik screening solutions

To suit the mined material and output requirements on a mining site, the settings and parameters on both the crushers and screens in a process circuit need to be perfectly aligned for best results.

“In any mineral processing plant, the crushers and screens are two critical lines of equipment that need to be well integrated if the performance of both is to be optimised,” says Mayhew-Ridgers.

This is where the Kwatani product, stemming from being part of the Sandvik family, now gives customers added benefits, explains Kenny Mayhew-Ridgers, Screening Solutions Business Director at Sandvik Rock Processing Solutions. The advantage is that the Kwatani screens can be specified and optimised with Sandvik’s range of crushers – ensuring that the key elements of the circuit are perfectly matched.

Kwatani and the mining related business of Schenck Process Group (SP Mining) were incorporated into the Sandvik group within Sandvik Rock Processing Solutions South Africa.

“In any mineral processing plant, the crushers and screens are two critical lines of equipment that need to be well integrated if the performance of both is to be optimised,” says Mayhew-Ridgers. “Too often, operators and service technicians are focused on one item without due regard for the other.”

He notes that if the screen is developed for a certain size distribution of material – and the crusher is not delivering within that envelope – the screen will not perform to expectation. In a greenfields application, the company is now able to specify a Kwatani vibrating screen with a Sandvik crusher, he explains. Based on the material and the results required by



Kenny Mayhew-Ridgers, Screening Solutions Business Director at Sandvik Rock Processing Solutions.



Gavin McLaggan, Lifecycle Services Manager for Africa at Sandvik Rock Processing Solutions South Africa.

the mine, an optimal solution can be designed for both the crusher and the screen.

“The advantage of the Sandvik solution is that the screen and the crusher can be specified and sized together and, as the OEM, we bring our in-depth insight into the operation of both lines of equipment,” he says. “It is also important to continuously monitor the respective performance of screens and crushers in the plant, as any change in how well each is working will affect the other.”

The integrated solution is based on a careful assessment of the nature and size distribution of the material that will be fed into the crushing and screening circuit – with the crushers and screens specified to perfectly suit each other’s performance. This allows for increased efficiency and bottom-line profitability, adds Gavin McLaggan, Lifecycle Services Manager for Africa at Sandvik Rock Processing Solutions South Africa.

“The main increases in efficiency we can achieve by optimising the circuit include reduced liner costs in the crusher, reduced energy consumption and more throughput,” says McLaggan. “In an existing circuit where the orebody has changed, it may even be possible to change the particle size distribution (PSD) and raise the throughput – optimising the crusher and screen to achieve better profitability.”

He notes that another advantage to customers is the prospect for package deals that the company can offer comprising both screens and crushers – when there are greenfields projects making capital expenditure plans for process circuits.

Kwatani double deck banana screens for a crushing plant.



Combined crushing and screening solution with digital monitoring.

feature



“This is basis of a smart crushing and screening solution, with many parameters and settings to consider when sizing a combination for the required throughput,” says Mayhew-Ridgers. “After the user gets the basics right – by aligning the crusher and screen perfectly – then you can look at the options for monitoring and analysing performance on an ongoing basis.”

He highlights that Sandvik’s screening solutions can now draw on the legacy of three leading screens: Sandvik’s traditional range of mainly construction screens, the well-known Kwatani product, which is engineered for tonnage and the Schenck Process Mining product. This improves the company’s ability to provide customers with added benefits and choice.

McLaggan points to the prospects for the Kwatani products within the wide global footprint of the Sandvik group. As Kwatani screens can be offered to an even broader market worldwide, there will also be the necessary support to service this equipment, he says.



“Sandvik’s established infrastructure in many countries provides customers with easier access to Sandvik’s custom-engineered screen solutions,” he says. “The extensive skills base built up over the years to service its offerings, that Sandvik has acquired through its acquisition of Kwatani, is being shared with the group, giving us a solid foundation from which to support customers as we reach into new markets.”

Mayhew-Ridgers points out the growing knowledge base on screening technology that has resulted from Kwatani’s inclusion into Sandvik. This is being achieved due to the considerable research and development activity being carried out in Sandvik.

“By sharing and combining the results of our R&D, we can further enhance our technology development without duplicating our efforts,” he says. “By putting together our respective R&D focuses, it is very exciting to be part of a global team.” ■

Above: Kwatani double deck banana screen with sub-frame.

Left: Kwatani run-of-mine grizzly screen, which will feed a crusher.

Kwatani double deck banana screen on route to the customer.



feature



Theo Hendricks, Product Manager for Comminution at Weir Minerals Africa.

Leveraging quality to build crushing, screening plants

Positive commodity demand has spurred mining development in recent years, with many projects expanding process plant capacity and drawing, not only on Weir Minerals' range of screening and crushing solutions, but on its design and project management capability for a complete plant.

Theo Hendricks, Product Manager for Comminution at Weir Minerals Africa, notes that many companies have looked to deploy smaller crushing and screening plants – on a constrained budget. These facilities are usually limited to throughputs of around 500 tonnes per hour, so need to be completed cost effectively and within relatively short lead times.

“We are well known for our range of Trio jaw and cone crushers, Trio feeders, Enduron high pressure grinding rolls (HPGRs) and Enduron vibrating screens,” says Hendricks. “However, our capability extends well beyond this, as we have the in-house design capacity to provide the entire solution – from the run-of-mine (ROM) hopper onwards.”

He emphasises that these projects focus on modular solutions – on a smaller scale than the large, fixed installations required in major mining operations. Despite the size, there is no compromise on design standards, says Karabo Moalamedi, Advanced Applications Engineer at Weir Minerals Africa.

“We apply best practice in our engineering and design,” says Moalamedi. “This not only ensures optimal performance of all the equipment, but also gives operators safe and ready access to all components for maintenance purposes.”

Engagement with customers therefore begins with gathering as much data as possible on the application and material to be processed, explains Hendricks. With many smaller companies, he notes,



Enduron HPGR crushers offer a low energy consumption, low maintenance crushing solutions.

there may not have been detailed sampling of the material – and here Weir Minerals Africa is also in a position to help.

“Because we have been operating for so long – and in so many different areas of Africa – we have an extensive database of our equipment in the field and the material it has processed,” he says. “We are therefore able to offer valuable insights into the conditions that customers’ plants will encounter.”

Moalamedi adds that there is also a depth of experience in the Weir Minerals Africa team when it comes to plant design and this includes metallurgists, mechanical engineers and process engineers. The legacy of their combined working experience feeds into the design and ensures a high level of confidence in those assumptions on which technical decisions must be made.

An important element of the design quality is the

Weir Minerals offers a range of Trio cone crushers and screening equipment.



Weir Minerals in South Africa is the technology hub for designing Enduron vibrating screens which are locally manufactured.

feature



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Karabo Moalamedi provides support during a project installation at a customer site.

use of powerful software to simulate the full plant process – visualising for the customer how exactly the material will move through the flowsheet. This confirms the required mass balances and the expected particle size distribution at every stage in the process.

The primary station typically comprises a ROM hopper, a Trio® vibrating grizzly feeder, a Trio® apron feeder where the material has high clay or moisture content, a Trio® jaw crusher and Enduron® screen. In the secondary stage, there is generally a combination of Trio® cone crushers and Enduron® screens, while Enduron® HPGRs are also included in the tertiary phase when finer crushing is required.

“For customers wanting a turnkey solution from us, we are able to provide structures for the equipment as well as the conveyors to move material between different sections of the plant,” says Hendricks. “We also provide the chutes at the various transfer points within the plant.”

The plants can be customised to the extent required, but at the same time can draw from a range of standardised equipment in the Weir Minerals offering. This equipment may be available ex-stock, removing months of lead-time from the planning equation.

Weir Minerals Africa is a technology hub for the group’s Enduron screens and the Trio apron feeders, meaning both products can be locally manufactured at its Alrode facilities in Gauteng. All these factors

Through the branch network, Weir Minerals offers technical support to customer plants once they are operational.



feature



The Weir Minerals team engages with customers to gather as much data for the application as possible.



Weir Minerals has the depth of experience to offer customers sound technical decisions.

make for shorter lead times and less uncertainty in the supply chain – considerably reducing project risk for customers.

Where these plants must be positioned within or adjacent to an existing facility, 3D scanning is conducted to ensure accurate positioning of all aspects. The value of 3D visualisation is that the customer and design team can see clearly – and in advance – where any improvements could be made. This avoids any unexpected complications down the line, says Moalamedi, and smooths the project rollout.

To further confirm the integrity of the plant, a trial erection is conducted before the plant is sent to site, explains Hendricks. This allows any potential issues to be identified and resolved – without impacting on the project’s overall schedule.

“This is done within the controlled conditions of our own manufacturing facilities, to which the customer is also invited to conduct inspections,” he says. “This helps to give the customer peace of mind about the progress of the plant, and further builds our relationship with them.”

When the time comes for on-site commissioning, a product support team of specialist technicians will supervise the installation and the commissioning. This intervention also creates another opportunity for Weir Minerals Africa to share skills and provide on-site training.

Moalamedi concludes that, once in operation, these plants can benefit from ongoing technical support from Weir Minerals Africa’s branch network around the continent – ensuring reliable performance and maximum uptime. ■

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WEIR
Minerals

Bara Consulting targets growth through diversification

Engineering consultancy firm, Bara Consulting's new management structure and shareholding, underpin its strategy for geographical diversification aimed at ensuring future sustainability. The company, which celebrates a decade in business this year, already has a firmly established presence in the South African and UK markets and is now making a play for the Canadian market, chairman Jim Pooley and MD Etienne de Villiers tell *Modern Mining*.

Given that sustainability is a key part of our strategy our management team initiated the process of shareholder diversification last year. Initially, we had three shareholders and, following the retirement of one of our UK directors, we identified three new shareholders. In essence, the plan is to have six shareholders – well experienced, dynamic, young people – by the end of this year,” says Pooley.

The management shake-up saw de Villiers take up the position of MD in January, this year, with Pooley as the new chairman tasked with the crucial role of opening a new branch in Toronto, Canada.

“Having established the business ten years ago, it is the right time to hand over the reins for the next generation to take over the business while I carve out a new role for myself. The idea is to spend more time on business development, not just for South Africa, but for the wider group,” explains Pooley, founder of Bara Consulting.

Aside from the management role, Pooley is playing an active role in the UK arm of the business, while de Villiers, who has been with the company for eight years, is tasked with the day to day running of the South African business.

De Villiers, Eddie Byrne (Project Manager with MetC) and Pooley at Omitiomire.



Canadian office

With the niche market engineering consultancy eyeing geographical diversification, the Canadian market with its strong, well established, mining presence offers Bara Consulting an opportunity to access new markets in a different time zone.

“When we established the company in 2013, the drive for the Johannesburg office from a projects point of view, was to grow but keep the team small and agile, with a maximum of 25-30 people, after which we would look to diversify the business in other jurisdictions,” explains Pooley. The company subsequently established the UK office (in 2014), which was headed up by Pat Willis, who recently retired.

The decision to open an office in Toronto was conceived prior to the onset of the Covid-19 pandemic, which saw the initiative put on hold. Following the revival of the plan, Pooley and Andrew Bamber, Bara Consulting's new MD from the UK office, recently attended *The Prospectors & Developers Association of Canada* (PDAC) four-day event to determine interest in the Canadian market for South African expertise.

According to Pooley, interactions with miners and explorers at the event indicated a great interest in and appetite for engineering consulting services.

“We made contact with a number of people at PDAC and are now in the process of following up on these leads.”

This demand for key services is driven largely by the commodities super-cycle which sees massive requirement for minerals and metals, and subsequently, the need for associated services, such as those of consulting engineers.

Bara Consulting, which registered its Canadian branch in 2019, says the Toronto Stock Exchange is strong and offers miners the opportunity to access capital from affluent north American markets.

Aside from access to the Central and South





Above: Underground at Rutongo Mine, Trinity Metals, Rwanda.

Left: Site preparation at the Qala Shallows Project.

American mining markets, Bara Consulting Canada provides the company with an opportunity to establish an office in the South American market, sometime in the future.

“As an experienced team, Bara Consulting offers value for money. We have worked in as many as 40 countries worldwide and have close to a hundred different clients, so it makes sense to expand our geographical footprint in the resource rich regions of the American market. A number of our clients are TSX-listed companies with projects in Africa, such as Alphamin’s Bisie Tin mine, amongst others.”

Pooley explains that one of the key reasons for geographical diversification is the shrinking pool of work in South Africa, which is largely because of extensive regulatory red-tape, and unattractive policies. Essentially South Africa is a challenging environment in which to do business.

A decade of growth

Despite the cyclical environment in the mining industry, Bara Consulting has shown consistent steady growth over the past decade with de Villiers attributing the company’s success to the quality of work produced as well as working closely with its client-base.

“As a small company, a big focus remains on keeping our overheads low and on being highly efficient. As such, we are able to pay our engineers competitive rates to ensure that we attract and retain a good quality skills set. This also ensures that we are in a position to charge more competitive rates, which is borne out by the fact that as much as 70% of all work is repeat business.”



Bibiani Open Pit Operations, Asante Gold, Ghana.



Franco Labuschagne at Chirano, Asante Gold, Ghana.

In line with delivering the best service to its clients, the engineering firm remains heavily invested in acquiring the latest technologies and software to be able to offer clients options for improved safety



Inspecting core at Omitiomire.

and greater project optimisation and efficiencies, etc.

“Aside from adopting the latest innovations aimed at driving down costs and improving production, miners are increasingly looking to adopt sustainable energy alternatives, with many miners evaluating options to replace their diesel operated fleets with battery electric vehicles. We are busy with the development of lithium projects in Europe and find that clients are keen to embrace clean energy technologies at operations that align with lowering

their carbon footprint. Many miners are also looking for innovative ways to manage their ventilation systems and are keen to adopt solutions such as vent on demand,” explains de Villiers.

However, he points out that while some clients are keen to adopt innovative technologies, others are more reticent, taking the wait and see approach, and will only consider adopting solutions once they have been proven successful.

While Bara Consulting’s client-base is extensive and includes junior to mid-tier and mining majors, such as Sibanye-Stillwater, Harmony Gold and Glencore, among others, given its high level of expertise and value for money offering, a vast majority of its client-base remains junior miners.

“We are a dynamic group of highly skilled engineers and I believe that, as small and flexible niche market experts delivering solutions cost-effectively, we appeal to the junior mining segment. Essentially, we are a cultural fit for juniors and we work closely with them,” says de Villiers.

However, like its peers in the local mining industry, Bara Consulting bemoans the challenging state of infrastructure – including power, water and rail – coupled with extensive corruption and growth inhibiting policies, which have seen the South African mining sector once again lose out on the



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Preparation and rehabilitation of the Qala Adit.

commodities super-cycle. Owing to this negativity, investors continue to avoid investing in local mining projects.

“There are fewer new projects under development with the majority of projects being operational projects. Increasingly, we are doing more work outside of South Africa,” notes Pooley.

Although Bara Consulting’s Johannesburg office remains busy, “there is room for more work”. Interestingly, Bara Consulting’s office in the UK, which is not as strong a mining destination as South Africa, is “busier than ever”, while the Canadian mining sector is “pumping” and reaping the rewards of the commodities super-cycle. “This is the right time to be diversifying into the Canadian market,” says Pooley.

Projects

Bara is currently assisting ASX-listed European Metals with the development of the Cinovec Project Definitive Feasibility Study. The Cinovec project is the largest lithium resource in Europe, and one of the largest undeveloped tin resources in the world. The project is located in the Czech Republic, 100 km north-west of Prague on the border with Germany, and has ready access to end user car makers and companies involved in energy storage.

Locally, Bara is assisting ASX-listed West Wits Mining with the Witwatersrand Basin Project (WBP) in Johannesburg, which is set to transform West Wits into a long-term gold producer. The Qala Shallows Definitive Feasibility Study, which is Phase 1 of the WBP, was completed by Bara in 2021. The DFS study was revised in August 2022 to accommodate escalation in significant cost centres such as diesel. The project has since advanced to implementation and early works and West Wits is in the process of securing project funding for further development of the mine.

Bara is also assisting Craton Mining and Exploration with the Omitiomire Copper Project, located 140 km by road northeast of Windhoek in Central Namibia. Bara is contributing to the overall Definitive Feasibility Study through open-pit optimisation, pit design, scheduling and mining related infrastructure design. ■

Bara Consulting

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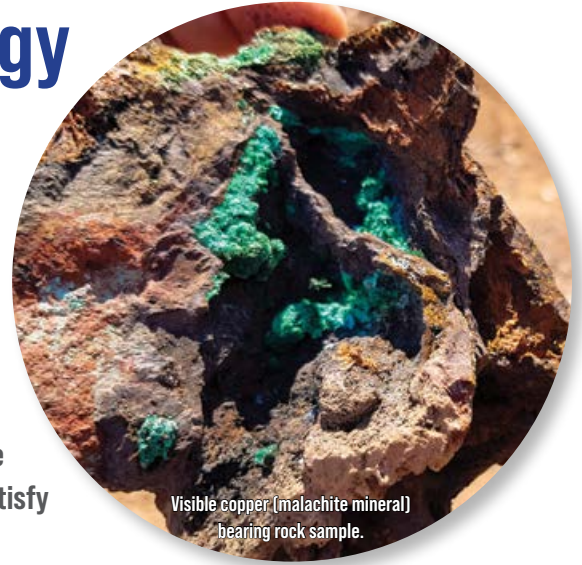


Glycine Leaching Technology

The future of mining

By Jackson Briggs: corporate development manager at Draslovka

If we are to achieve our goal of decarbonisation, we need more, not less, mining – to a tune of three billion tons according to the IMF. In fact, to reach Net Zero, the International Energy Agency's Net-Zero by 2050 Roadmap shows we will need 60% of energy demand to be supplied by renewables. Benchmark Mineral Intelligence reports more than 300 new mines will need to be built over the next ten years to satisfy demand for electric vehicles and energy storage batteries.



These are worthwhile goals but there is an elephant in the room – where will we find the necessary new deposits of these critical metals? Over the past several years, the mining industry has suffered from severe underinvestment which has impacted its ability to source new deposits and encourage innovation. A report from Wood Mackenzie states the gap between miners' current capex commitments and the level needed to secure a 2°C scenario is almost US\$2 trillion over the next 15 years.

However, even if we had the capital, would we be able to source and develop the assets? The mining industry continues to fight a major PR war and faces many headwinds. Miners have a maligned

reputation due to mistakes and poor governance in the past, which has given way to public skepticism and anger against new projects. This is compounded by the public's lack of education about the important role mining plays in our lives. Unfortunately, while everyone wishes to see an energy transition, few people understand the integral role mining plays to secure it.

If we are unable to locate fresh supplies of metals – especially those considered critical and strategic – not only do we risk failing to achieve the energy transition we so desperately need but we will find ourselves in a situation mired in 'minerals inflation' whereby metal prices are prohibitively expensive thereby stymieing the intention to

MPS (or Draslovka Mining Innovation) Development laboratory, Perth. Wet testing area.



transition to new forms of low-carbon energy.

Finding new deposits is costly and, because the mine development cycle can take up to several decades, requires local buy-in for the long term.

Luckily, our future is not restricted by exploration. An even better option is maximising the deposits that are currently in production by making previously uneconomic resources viable. In fact, this is the ideal situation as mines will already have a defined resource/ reserve base, the necessary permits and infrastructure required to access and process the ore (including haul roads, conveyer belts, mills and housing), experienced workforce and, importantly, the support of local residents and governments.

Draslovka has the key to accessing mineral wealth that has already been identified through our cutting-edge proprietary Glycine Leaching Technology (GLT) – GlyCat™ for gold and GlyLeach™ for copper, nickel and cobalt.

GLT is a safe, simple and cost-effective way to give a new lease of life to assets with minimal investment, little to no impact on opex and low production implementation risk. I foresee GLT saving mining companies billions of dollars in the long term.

GLT also supports companies' environmental and social objectives as using fewer chemicals and reagents leads to an improved environmental footprint and stronger relationships with communities, NGOs and other stakeholders.

GLT was first piloted at a small African mine where gold and copper were recovered from historical mine tailings. Today, some of the world's largest mining companies are piloting and implementing the technology to improve the value and sustainability of their assets.

The GlyCat process is a simple and effective method to reduce cyanide consumption caused by the presence of copper in gold ores and concentrates while also increasing recovery benefits. Gold ores with elevated base metals or pyrites benefit from a >70% reduction in cyanide while most free milling gold ores see a reduction of 20% - 50% in cyanide use, leading to a substantial reduction in processing costs. Moreover, by eliminating detoxification, companies can save an addition 5% - 10% in processing costs.

With copper, GlyLeach significantly improves the economics and unlocks new production potential from previously unviable deposits through an environmentally benign lixiviant. It is a superior solution for stranded copper oxide deposits, where distance from acid supply sources renders cost of acid uneconomical; carbonate-hosted deposits, where carbonate/limestone deposits are high



6 m columns fully loaded and used to confirm heap leach parameters.

acid consumers rendering them uneconomic; and, with oxides with precious and base metal credits, GlyLeach enables co-leaching of other metals concurrently. With approximately 30% of the world's copper coming from heap leaching oxides and increasing demand due to the energy transition, Draslovka sees a massive market need.

With nickel and cobalt, two metals critical to battery production, GlyLeach offers a disruptive and environmentally friendly solution that is cost effective, enables production from tailings, and removes the need for smelting.

In addition to high recoveries, GlyLeach leads to very low dissolutions of iron and magnesium, making it a clean pregnant liquor solution that produces a high-purity product for a nickel and cobalt sulphate

Mini-columns used to do initial discovery tests for heap leach amenability.





In house mineralogical examination of samples.

battery precursor material. This eliminates the need to move large volumes of concentrate over long distances and eliminates the significant cost and carbon emissions that smelting entails.

Currently, nickel and cobalt producers are unable to recover any metal from their tailings and the industry sends 350 000 tonnes of nickel sulphides to tailings every year. GlyLeach is a game changer as it will allow producers to recover 80% of nickel and cobalt from sulphide tailings, extending the viability of mines.

Barrick Gold is the first major mining company to recognise the potential GLT offers and recently signed an agreement with Draslovka to roll out a global testing and implementation programme across several mines, starting at Bulyanhulu Gold Mine in Tanzania. Large scale test work programmes will be undertaken at each mine to quantify the operating cost savings from the reduction of cyanide use, potential improvements in gold recovery, and lowering of cut-off grades, all of which will allow Barrick's operations to treat ore types that may have previously been uneconomic.

As Simon Bottoms, mineral resource management and evaluation executive at Barrick, said, "Rates of major gold and copper discoveries have been in steady decline over the past decade, which when combined with a rapidly evolving set of global challenges, is resulting in global supply challenges

to meet the growing global demand for such critical metals. As a result, it is imperative that the industry takes the necessary steps to maximise the value from existing mines that are already operational or currently under development."

Over the course of the next few months Draslovka will share similar agreements with other Tier One mining companies that have decided to use GLT to make their operations more sustainable.

I am excited about the impact GLT can have on the future of Africa's mining sector. If any region in the world can make the energy transition happen, it is Africa, which holds around 30% of the world's mineral wealth – including more than 40% of the world's gold. DRC alone is responsible for almost two-thirds of the world's cobalt production. I cannot generalise as there are 54 different countries that make up Africa. They run the gamut as far as their perspective about business goes, and each has its own regulations, political parties and histories. However, it goes without saying that if we want African governments to be pro-mining and develop their wealth of natural resources, the mining sector needs to set itself up for success and commit to the highest level of environmental and social standards.

GLT is not a panacea, but it does solve several issues at large-scale mines by reducing the amount of toxic chemicals required, maximising asset bases and their tailings for the long term and ensuring meaningful and steady employment for locals by extending the lives of mines. Moreover, the conversation around the formalisation of artisanal small-scale miners is pertinent here as artisanal gold miners use cyanide, in addition to mercury, without the necessary human and environmental safety protocol, thereby leading to cyanide poisoning, deforestation, soil degradation, and air and water pollution.

Most African countries have succumbed to the 'resource curse' owing to the boom-bust commodities cycle. Here again, GLT is helpful. Mining companies using GLT can better manage price cycles thanks to the cost savings it offers.

I believe GLT will revolutionise the mining sector by addressing the pain points miners suffer from and by making the overall industry more sustainable, profitable and responsible. ■



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Corruption is a cancerous curse

By Ross Harvey, director of research and programmes at Good Governance Africa (GGA)



Ross Harvey, director of research and programmes at GGA.

South Africa inherited a mess in 1994, a country governed by elites for elites for centuries, not just inadvertently excluding the majority, but purposefully doing so.

Moving from a self-serving norm to a self-sacrificial one requires nothing short of moral revival.

In their excellent 2009 book, *Violence and Social Orders*, the late Douglass North and his co-authors make a compelling case that, throughout history, the central problem of development is violence. To develop, actors must agree to pool rents and disarm. This only occurs when warring elites recognise that the value of pooled rents is greater than rents gained through war. They must also be mutually assured that their opponents will credibly disarm and share the rents as agreed. To achieve this, there has to at least be credible ‘rule of law’ among elites.

North and his co-authors divide the world into three states. On the left side of the continuum is Chaos – countries with little to no governance. In the middle are the majority, defined as ‘limited access orders’ (LAOs), in which citizens have limited access to political and economic opportunity. Elites call the shots. On the far right of the continuum are a handful of countries defined as ‘open access orders’ (OAOs). Here, institutions function for the benefit of citizens and elites are held accountable by those same citizens for how they allocate public resources.

Within LAOs, countries are categorised as fragile, basic or mature. By 2008, I’d have argued that – on several criteria – South Africa was moving towards a mature LAO. At the time of writing, I’d have to argue that the country has entered the ‘fragile’ category. We still have some functional institutions, but by and large we are flailing and the markers of heading towards chaos are all too clear. Before we go further, it is helpful to adopt Avner Greif’s definition of institutions – the social systems (norms, values and culture) that motivate regular human behaviour. They are not

just organisations, though organisations are expressions of institutions. Put another way, institutions provide the scaffolding that generates the incentives that govern a country’s trajectory.

South Africa inherited a mess in 1994, a country governed by elites for elites for centuries, not just inadvertently excluding the majority, but purposefully doing so. The rent pool was large and distributed among a small band of beneficiaries. Making governance decisions in that context was extremely challenging. An unlikely institution evolved out of this negotiated revolution – a constitution. Constitutions are typically the key institution under which all other institutions operate. Our constitution upholds the rule of law as the key governing principle. But a constitution is only as strong as the judicial system that supports it. That judicial system, and other arms of government – the executive and the legislature – are only as strong as the underlying norms, values and culture that characterise our society.

So, the million-dollar question is what has changed so radically since 2008? Aside from a global financial crisis and multiple exogenous shocks, the truth is that corruption has permeated our society. Corruption is best defined as the misappropriation of public resources for private gain. It typically starts in so-called ‘petty’ ways – the bribing of a traffic officer, for instance. But it soon metastasizes if left unchecked. Contract skimming, for instance, becomes normalised. Note that this is not only perpetrated by the public sector. The private sector always plays a facilitating role in corruption, as financial institutions either launder money or fail

to engage in the due diligence required to prevent ill-gotten gain from being legitimised. Once corruption has moved into the domain of permeating both the private and public sectors, organised crime can gain a foothold, as it has done so prominently in South Africa. There is only one state worse than this, and that is when the state itself is essentially run by a corrupt organisation. The extent of ‘state capture’, for instance, is evidence of grand corruption in South Africa.

Corruption, in turn, has corroded the very institutions that were arguably moving us towards a mature LAO, and were once capable of at least stemming corruption. On the one hand, it is a





saving grace that we have a judiciary capable of providing the Zondo Commission's findings and ruling against members of the executive without fear or favour. On the other hand, it is a travesty that the National Prosecuting Authority has been so hollowed out under 'state capture' that it is now incapable of bringing to justice those who have stolen billions from the country.

This state of pervasive corruption moves us towards chaos because it makes it extremely expensive and difficult for responsible companies to do business in South Africa. Our recent grey listing, for instance – for failure to adequately prevent money-laundering from organised crime and potential terrorism financing – doesn't just tarnish our reputation, it affects our credit rating outlook. This in turn increases our debt servicing costs. The more of the annual budget that goes towards debt servicing, the less can be spent on necessary items like energy security and infrastructure upgrades and maintenance.

To put it theoretically again, veering towards fragility, and even Chaos, moves South Africa further away from what economists Daron Acemoglu and James Robinson call a *Narrow Corridor*. When government effectiveness and citizens' ability to hold their governments to account improve simultaneously, it creates the right environment for economic dynamism to flourish and generate broad-based development. But falling outside that corridor makes growth rather challenging. Corruption has a direct bearing on a state's ability to deliver services effectively, provide justice and protect property rights. These are basic requirements of the state. South Africa's inability to perform them has resulted in outrage from the business sector. Large corporates

are increasingly voicing their disapproval in public, a relatively unprecedented feature of our post-1994 society.

The mining industry, to its credit, has always been vocal and honest about the government's failures. To survive, it will now have to pour resources not only into sustainably extracting resources from the ground, but into anti-corruption institutional capacity too. The private sector, more broadly, will have to strengthen the national prosecuting authority and Chapter Nine institutions (the organisations that Chapter Nine of the Constitution has enshrined to ensure accountability and uphold the rule of law).

Mining remains a key to unlocking South Africa's growth potential. The corruption that permeates the Department of Mineral Resources and Energy, and the more overt mine-gate extortion exercised by armed gangs, are just two challenges that have to be urgently overcome. One quick way to prevent corruption in the licensing allocation system, as I've repeatedly argued in these pages, is to implement a digital online cadastre system that is incorruptible. That it hasn't happened yet is only too obvious a sign that too many officials think that it's their 'time to eat.'

It is, in summary, difficult to imagine that South Africa can reverse its trajectory and move back towards maturity unless there is a change in power at the highest level. Even then, such a change will not necessarily lead to a change in the norms, values and culture that have generated the current situation. When corruption is normalised, the belief systems that led to its normalisation have to change from 'it's our turn to eat' to 'how can we best serve the citizens of this country'? Moving from a self-serving norm to a self-sacrificial one requires nothing short of moral revival. ■

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Bureau Veritas accelerates compliance standards in intra-African trading countries

Bureau Veritas, a leader in testing, inspection, and certification (TIC) services, recently hosted a breakfast to discuss exporting within Africa and the African Continental Free Trade Area (AfCFTA) agreement. The company's commitment to accelerating regulatory practices including conformity, compliance standards and protecting countries against the importation of sub-standard products was high on the agenda at the panel conversation. Bureau Veritas facilitates the safe passage of intra-country trade on the continent, supporting clients to achieve market access for made-in-Africa products. With recent investments into laboratories to ensure compliance standards and the pre-Export Verification of Conformity programmes in place, Bureau Veritas, together with its partners, is determined to enhance inter-country exporting within Africa.

Bertrand Martin, Senior Vice-President Africa, explained: "As the AfCFTA becomes a reality, governments and businesses need to be aware of product standards and regulations to protect traders and society. We are committed to a safe environment for the export of goods within countries in Africa. To this end, we have collaborated

with Afreximbank to develop the African Quality Assurance Centre (AQAC) in Nigeria, which is a prime example of ensuring compliance with standards for made-in-Africa products. In addition, the pre-Export Verification of Conformity programmes, such as SONCAP in Nigeria and Consignment Based Conformity Assessment (CBCA) in Zimbabwe, protects countries against the import of sub-standard products. Our role as an expert, independent third party company is crucial to create the conditions for trust and we will deploy all our efforts to help our clients protect the health and safety of its citizens."

Bureau Veritas is a leader in Single Window concessions, innovative digital systems that cut customs clearance times and improve trade and transparency. "We envision Single Windows to be launched in Southern Africa going forward," Martin stated.

Gavin Hefer, District Chief Executive Bureau Veritas Southern Africa, added:



Bertrand Martin Senior Vice President Africa at Bureau Veritas.

"We remain committed to the construction, mining and commodities, manufacturing, healthcare (pharmaceutical), buildings and infrastructure, agriculture, food, oil and gas, marine, power and utilities sectors. More than ever, our role as an expert, independent third party company is essential to shape a world of trust."

Bureau Veritas' objectives are to:

- ❑ Support trade within the continent.
- ❑ Enable trade facilitation through co-operation on standards, technical regulation and conformity assessment.
- ❑ Assist clients to achieve market access for made-in-Africa products.

The network of laboratories Bureau Veritas has invested in ensure compliance with regulations and drive ethical standards across mining and food production value chains, amongst others.

The company has a presence in 45 African countries and has implemented at least 30 trade facilitation verifications of conformity programmes in various countries. Through its dedicated trade web portal, Bureau Veritas plays a pivotal role in promoting intra-African trade by sharing country specific compliance requirements on one platform for ease of access by traders in various countries, thereby enabling them to have key market penetration information and the regulatory framework of each jurisdiction. ■



Bureau Veritas remains committed to the construction, mining and commodities industries.

Bell delivers solid performance driven by strong demand for ADTs

JSE-listed Bell Equipment (Bell) recently released final results for the year ended 31 December 2022.

According to CEO Leon Goosen, increased demand for commodities, country-specific post-Covid-19 stimulus packages, and increased infrastructure spending in several markets has driven demand for ADTs in particular. He added that an improvement in the supply chain in the last quarter of the year meant that Bell was able to catch up on production and that product was invoiced and delivered to customers by the end of 2022. "This ensured that we closed the year much more strongly than we did the first half of the year," he said.

The group improved significantly on the 2021 results, with profit after tax increasing

by 63% to R478,9 million (2021: R294,3 million). Strong market conditions resulted in all regions surpassing the previous year's volumes. Group sales were up by 28% on 2021, largely due to an improvement in the supply chain in the last quarter, which meant production could be caught up and products invoiced and delivered to customers by year end.

Outlook

From a production perspective, the volume outlook for 2023 is strong, work in progress has normalised and supply chain issues should not be a major constraint in the second half of 2023.

Goosen indicated that the order book is being maintained at record levels and the group is already taking orders for 2024. ■





Bell delivers strong financial performance in 2022.

Security first at VEGA

VEGA, a global manufacturer of sensors, is on a security mission, and in January 2023 delivered to its customers the VEGAPULS 6X radar sensor – the world's first level sensor with built-in cyber security features. With this new development VEGA wants to send a strong message, namely, that it recognises the increasing threat of cyber criminality in industry and is taking action to combat it. For the first time, VEGA sensor comes with cyber protection as an integral component. It was developed in compliance with Industrial Cyber Security Standard IEC 62443-4-2 and thus meets the highest standards currently implemented in the process industry, the company said. "Being able to use secure measurement data at all times is now one of the most important requirements of our customers", says Florian Burgert, who was involved in the conception of the universal level sensor. When it comes to cyber security, plant operators want equipment they can depend on in order to stay one step ahead of the latest threats. ■

VEGA develops VEGAPULS 6X radar sensor.



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SBTi approves SKF's near and long-term emissions reduction targets

Innovative solutions provider SKF has received validation of its Scope 1, 2 and



SKF targets emissions reduction.

3 emissions reduction targets from the Science Based Target initiative (SBTi). The SBTi has verified SKF's net-zero target by 2050, validating both SKF's near and long-term science-based emissions reduction targets.

As the global body enabling companies and financial institutions to set ambitious emissions reductions targets in line with the latest climate science, SBTi validation means that SKF's targets comply with their criteria and that targets are in line with climate science and the goals of the Paris Agreement.

SKF has committed to reducing its absolute scope 1 and 2 GHG emissions by 95% by 2030 from a 2019 base year,

and to reduce its scope 3 emissions by at least 31% by 2030. In addition, SKF has committed to reach net-zero GHG emissions across the value chain by 2050. This includes a commitment to maintain at least 95% absolute reduction of scope 1 and 2 GHG emissions from 2030 to 2050 from a 2019 base year.

Furthermore, SKF commits to a reduction in absolute scope 3 GHG emissions from purchased goods and services, fuel and energy related activities, upstream transportation and distribution and use of sold products by 90% by 2050 from a 2019 base year. SKF also commits to neutralising any residual emissions in its value chain to reach net-zero by 2050. ■

BME steps up pace of global growth with joint venture in Indonesia



BME inks JV with Indonesian player.

South Africa-based blasting and explosive solutions specialist, BME, recently inked a joint venture (JV) with a leading Indonesian player. The mining subsidiary of Omnia Holdings, BME, signed a Conditional Sale and Purchase of Shares Agreement with PT Multi Nitrotama Kimia (MNK), an Indonesian market leader in the provision of explosives and blasting services. The JV – called PT Kemitraan MNK BME – combines BME's innovative technology, prod-

ucts and solutions with MNK's local networks, experience and resources. The JV creates an integrated offering with an expanded suite of products and services for both surface and underground mines. According to Ralf Hennecke, Managing Director of BME, the JV marks a step change in BME's international growth. It will allow a broadening of its business base to include MNK's current contracts, which will be ceded to the JV in a phased manner.

"BME will have faster access to market, greater diversification and will be well positioned for the future as a major player in the growing Indonesian and Asian markets," said Hennecke. ■

Orica expands BlastIQ™ to quarries

ASX-listed Orica recently released a new integrated digital solution for the quarry market to streamline and optimise blasting operations. BlastIQ™ Quarry is a smart solution that harnesses the power of digital technologies to help quarry operators optimise their drill and blast activities in

near real-time. Developed by Orica Digital Solutions, BlastIQ™ Quarry allows quarry operators to design blasts according to performance objectives and presents drill and blast insights for continuous blast optimisation. Head of Blast Design and Execution for Digital Solutions, Cu Luu, details the key benefits of the new blast control solution, saying: "Overall, BlastIQ Quarry is a powerful and comprehensive solution that can help quarries improve the efficiency of their drill and blast operations, reduce overall cost, ensure data accuracy, drive productivity, and maintain regulatory compliance. Its integrated and connected components provide a complete solution that delivers real results and drives continuous improvement for the industry." ■



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