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For people who are serious about mining

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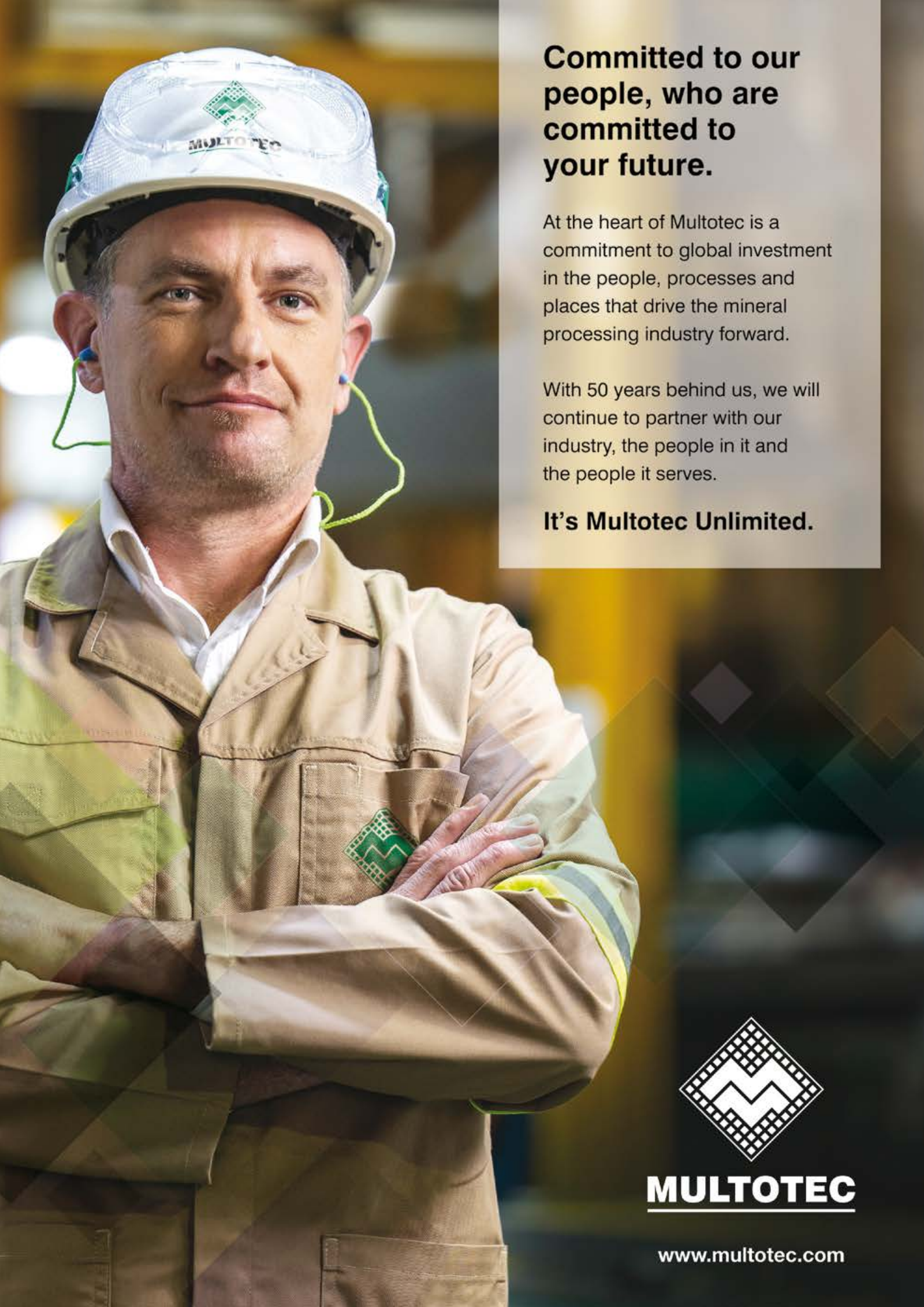

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AECI Mining Explosives spearheads technology and innovation advances in mining explosives sector. See story on pg 8.

COMMENT

Staying power

Everything negative – pressure, challenges – is all an opportunity for me to rise.

This quote by American professional basketball player, *Kobe Bryant,* aptly sums up the sentiment held by some leaders who refuse to be among the throngs of people making a speedy exit from this country.

Nelendhre Moodley.

South Africans are fed-up of dealing with the challenges associated with persistent load-shedding, lack of clean water, corruption, high rates of unemployment, failing infrastructure and a poor-performing economy. There is certainly a deep sense of despair permeating the South African landscape.

As a result, a large number of wealthy countrymen and women have made their exit, with over 32 000 people said to have changed their residences in the period 2017 to 2021.

This exodus of highly skilled people should have been a clear signal to our leadership that all has not been well for some time. Nevertheless, those who remain must be applauded for their staying power.

In a recent interview, Afrimat CEO Andries van Heerden noted that it would be easy to follow the throngs, but who then would take care of the poor who rely on businesses to keep them employed and thereby fed and housed. Afrimat, which is on a growth trajectory, recently delivered sterling results. Keep an eye out for the Afrimat story in the August edition of *Modern Mining*.

The private sector, mining companies in particular, continue to play a key role in 'filling in the gaps' and taking up the gauntlet to improve the skills base and provide opportunities to host communities, education and employment for the youth and ensure a pipeline of young leaders.

In fact, Nkwe Platinum, a subsidiary of Zijin Mining Group, recently handed over its Social and Labour Plan (SLP) Water Supply Projects to the Sekhukhune District Municipality. To date, Nkwe Platinum has spent R53 million on its SLP, which includes upgrading the Garatau community access road, adult training and education, bursaries, learnerships, internships, traditional leadership training and excavator operations, all of which have benefited the surrounding mine communities of the Zijin Garatau Platinum Mine (pg 16).

DRDGOLD's CEO Neil Pretorius said in a discussion that, with many citizens and businesses investing in alternative sources of power, the country's energy mix will be in a very different place five years from now. The miner recently invested in 20 MW of solar energy with the second phase of the project set to add a further 40 MW, bringing the total to 60 MW of solar capacity and 140 MW of battery storage (pg 22).

Pan African Resources too has been on a renewable energy drive, targeting a 50% renewable energy uptake by 2030. Aside from wheeling considerations and battery storage options, the gold producer is also considering wind energy. After labour costs, electricity is the next biggest outlay for mining companies (pg 24). As a result, there is a massive uptake of energy related minerals such as lithium, with lithium explorer, Leo Lithium's Goulamina project eyeing lithium spodumene production in 2024 (pg 12), while Giyani Metals, which is intent on becoming Africa's first low-carbon producer of high-purity manganese sulphate monohydrate, is finalising its demonstration plant, and aiming for production in three years' time (pg 20).

Meanwhile, the FSE reports that local miners are taking up the Global Industry Standard on Tailings Management (GISTM) challenge, with Sibanye-Stillwater, Gold Fields, DRD GOLD, Pan African Resources and Harmony Gold, all working towards the implementation of some of the principles of the GISTM (pg 28).

Finally, our cover story, AECI, remains focused on spearheading technology and innovation advances in the mining explosives sector and is investing significant money and resources into R&D. The explosives supplier recently announced the development of the DigiShot® Ranger, which has been designed to cater for smaller mines, quarries and civil blasting operations (pg 8). ■

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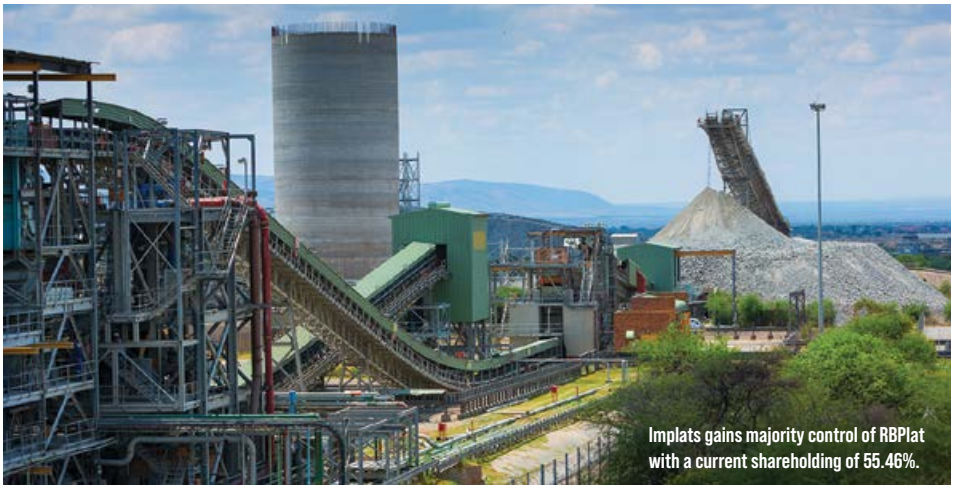
Implats secures control of RBPlat

Platinum miner, Impala Platinum Holdings (Implats), has concluded an agreement with the Public Investment Corporation to acquire a shareholding of 9.26% in Royal Bafokeng Platinum (RBPlat). This results in Implats gaining majority control of RBPlat with a current shareholding of 55.46% and secures Implats' commitment to implementing broad-based equity ownership in the South African PGM sector through a proposed empowerment transaction at Implats' subsidiary, Impala Platinum Limited (Impala) and Royal Bafokeng Resources (RBR), the RBPlat subsidiary which holds the RBPlat operating assets.



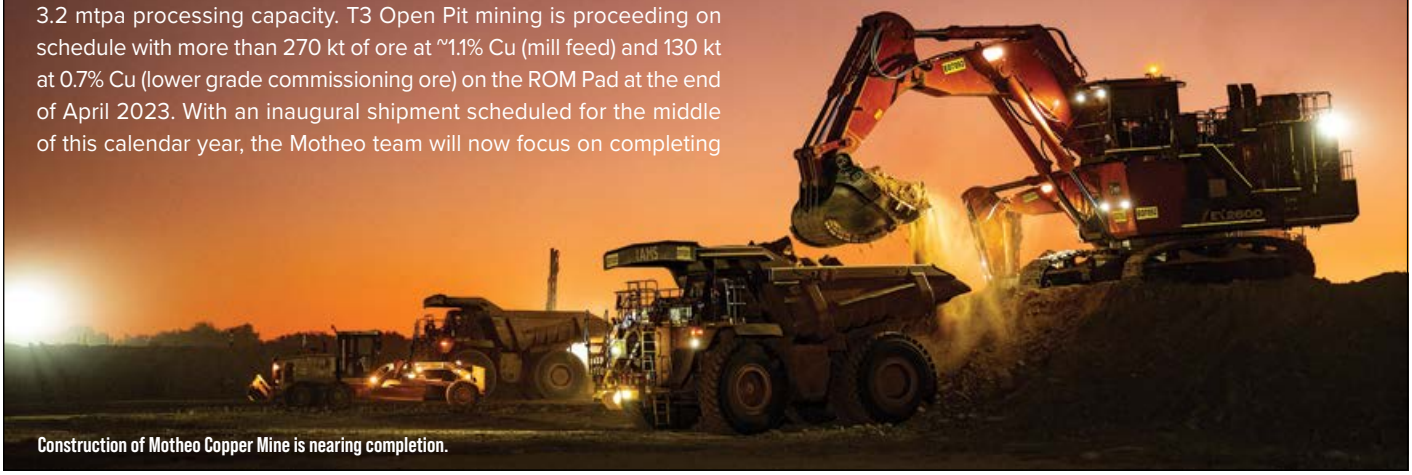
Implats gains majority control of RBPlat with a current shareholding of 55.46%.

Implats CEO, Nico Muller, said: "Implats is strongly committed to growing and securing the competitiveness and sustainability of the Southern African PGM sector. Through our significant investments in life-of-mine extensions, growth and beneficiation, and with our ongoing support and facilitation of socio-economic development in our mine host communities, we are dedicated to creating a better future and delivering enduring benefits for all stakeholders.

Our capital investment programme, together with our acquisition of a controlling stake in RBPlat, will position Southern Africa more competitively as a stable and responsible global mine-to-market PGM producer." ■

Sandfire Resources produces first concentrate at Motheo

ASX-listed Sandfire Resources has successfully produced first copper concentrate at its Motheo Copper Mine (Motheo) in Botswana. Construction of the Motheo Copper Mine is nearing completion, with equipment commissioning activities over 92% complete for the initial 3.2 mtpa processing capacity. T3 Open Pit mining is proceeding on schedule with more than 270 kt of ore at ~1.1% Cu (mill feed) and 130 kt at 0.7% Cu (lower grade commissioning ore) on the ROM Pad at the end of April 2023. With an inaugural shipment scheduled for the middle of this calendar year, the Motheo team will now focus on completing commissioning activities and ramping-up the processing plant to its initial 3.2 mtpa processing capacity, which is expected to be achieved during the September Quarter of FY2024, the company said. ■



Construction of Motheo Copper Mine is nearing completion.

Hummingbird Resources Kouroussa Gold Mine begins hot commissioning

AIM-listed Hummingbird Resources has initiated the start of the hot commissioning phase at the Kouroussa gold mine in Guinea, the next step being first gold pour, which is expected within this quarter, Q2 2023. Phase one of testing the processing plant's mechanical, electrical and overall functionality has performed per design, allowing next phase, hot commissioning to begin. First ore was introduced to the one million tonne per annum (mtpa) plant at Kouroussa on 20 May 2023.

Dan Betts, CEO of Hummingbird, commented: "The commissioning phase of the Kouroussa mine is performing well and reached another important milestone with the commencement of the hot commissioning phase, ahead of the first gold pour. While commissioning of the plant continues and nears its final stages, our operations team is preparing Kouroussa to become fully operational with the intention to reach commercial and name plate production in the second half of 2023."

Kouroussa gold mine in Guinea begins hot commissioning phase.

Anglo American re-organises senior management team

Themba Mkhwanazi has been appointed to Regional Director, Africa & Australia.

Diversified miner, Anglo American, has announced a number of changes to its senior management team and to its organisation. The company's production businesses will be consolidated into two regions: Americas and Africa & Australia, each led by a Regional Director to be based in Brazil and South Africa respectively. They are accountable for safe and responsible operations, optimising current performance, future options and commercial value, in line with the Group's strategy, and will work to ensure effective functional support and service delivery to their operations in each country.

Regional Director, Americas – Ruben Fernandes.
Regional Director, Africa & Australia – Themba Mkhwanazi.
CEO of De Beers – Al Cook.
CEO of Crop Nutrients – Tom McCulley.
CEO of Marketing – Peter Whitcutt.

Mantengu Mining commissions chrome plant

JSE-listed Mantengu Mining has confirmed the successful commissioning of Langpan Mining's first of three chrome processing plants, located in Thabazimbi, Limpopo. This is the culmination of an 18-month process, which commenced in December 2021 with the finalisation of a Competent Persons Report.

Mike Miller, Group Chief Executive Officer, Mantengu Mining, says the report estimated Langpan's chrome reserve at 2.17 million tonnes, underpinning Langpan's valuation of R851 million.

"The successful commissioning of the chrome plant has enhanced production capacity to a throughput of 36 000 tpm or 100 tph, as opposed to the previously anticipated 30 000 tpm or 70 tph. The plant is expected to produce approximately 18 000 tonnes of chrome concentrate, with a chrome content of between 42% and 44%, a month."

First deliveries of chrome concentrate from this plant are expected to commence on or about 8 June 2023. ■

Mantengu Mining has commissioned the first of three chrome processing plants.

Mzila Mthenjane – new CEO of Minerals Council South Africa

The Minerals Council South Africa has appointed Mzila Mthenjane as its new CEO. Mthenjane will leave his role as Executive Head for Stakeholder Affairs at Exxaro Resources to join the Minerals Council. He has more than 30 years of experience in the South African mining industry and financial services. Mthenjane replaces Roger Baxter who leaves the Minerals Council at the end of June. During his nine years in a leadership role, Baxter oversaw a fundamental repositioning and rebranding of the then-Chamber of Mines to become the Minerals Council South Africa. ■

Minerals Council South Africa has appointed Mzila Mthenjane as its new CEO.

Andrada Mining commences trading on OTCQB

Anthony Viljoen, CEO of Andrada Mining.

AIM-listed Andrada Mining, an African technology metals mining company with a portfolio of mining and exploration assets in Namibia, has commenced trading on the OTCQB® to access US retail investors and to broaden shareholder register.

Anthony Viljoen, CEO of Andrada, said: "Admission to the OTCQB® Market is a key step in Andrada's strategy to broaden the company's investor base by making its shares more accessible to the North American institutional and retail investors. This investor base is known for its understanding of, and strong appetite for, mining companies, particularly in lithium equities. To that effect, Andrada will start marketing and outreach efforts to US based investors in the coming months to increase awareness of our significant near-term lithium project." ■

UMS brings high-tech digital solutions to mining

UMS, a leading provider of engineering and contracting services to the mining industry, has partnered with 1Worx to deliver cutting-edge IIoT (Industrial Internet of Things) and Augmented Reality (AR) technology to the conceptualisation, design, construction and operational management of mining projects and mining operations.

"We have signed a shareholder agreement which has resulted in the establishment of a new joint venture company, UMS 1Worx, which is based at UMS's headquarters in Sandton," says Digby Glover, CEO of UMS.

"Not only will UMS 1Worx broaden the UMS service offering but it will also act as an independent business within UMS, with its own customer base." Heading the new venture as MD is Charles Anderson, who has enjoyed a long career in the IT industry and who has extensive professional experience in robotics and mechanical engineering.

The GM is Martin Hobbs, a well-known figure in mining circles who was previously the MD of one of South Africa's best-known shaft-sinking and mining contracting companies. Anderson co-founded 1Worx in 2016 to market a leading US-developed IIOT development platform in South Africa.

"We initially aimed simply at selling this product to customers, who could then use it to develop their own solutions," he says. "What soon became apparent, however, was that clients were not interested in doing their own in-house development. What they wanted was for us to provide ready-made solutions using the platform and this then became our primary focus." ■

UMS partners with 1Worx to establish UMS 1Worx.

Spearheading technology and innovation advances in mining explosives sector

Innovation and technological development have been an essential component of business strategy in every sector across the globe. Mining is no exception. Technological progression is yielding far-reaching improvements in safety, sustainability and operational efficiency throughout the value chain. In South Africa, and globally, AECI Mining Explosives is celebrated for being at the forefront of innovation.

The company continues to invest significant money and resources into research and development (R&D) in its quest to assist the mining industry to achieve better blasting outcomes.

"We pride ourselves on developing innovative solutions in the initiating systems and commercial explosives space. That's how we remain at the forefront of technology and constantly pursue sustainability and continuous improvement," says Ashlin Pillay, Product Portfolio Manager – Electronic Initiation Systems at AECI Mining Explosives.

"With over 30 years of experience in pioneering the electronic delay detonator industry and developing class-leading blast initiation technologies, AECI Mining Explosives possesses some of the most talented minds delivering robust and reliable systems that are aligned to inherently safe design principles."

The DigiShot® Ranger in action.

Inherent safety

Pillay explains that inherently safe design principles span the entire product range. This ensures there is no compromise and, as a result, all our electronic initiation systems and detonators benefit from the same intrinsically safety features," he says.

The company has tested its electronics extensively. "As an example, we've subjected them to high voltage, which simulated a lightning strike. This resulted in uninitiated detonators due to the designed protective circuitry. We've ensured by design that our detonators are only initiated by our control equipment," he explains.

AECI Mining Explosives is thrilled to announce a further development in its extensive electronic initiation systems offering. The DigiShot® Ranger has been purposely designed to cater for smaller mines, quarries and civil blasting operations. In line with inherently safe design principles, the DigiShot® Ranger's built-in long-range antenna enables the system to transmit a safe encrypted blasting signal up to 3 km away from the blast as long as there's a line of sight maintained. This affords the user options to blast remotely if required. As a result, fewer people are close a potentially hazardous area during blasting times. Considering that mines are constantly faced with the safety and wellbeing of their people, employing AECI's DigiShot® Ranger is a certain way of mitigating risk.

"We've been working tirelessly to improve our offering for mid-tier open cast mines, civil blasting activity and quarrying operations. The original DigiShot® system is a reputable and accomplished product. However, advancement in technology allows us to better support modern-day customer and system requirements," says Pillay. "The lessons we have learned from the DigiShot® system have been engineered onto a technologically advanced platform concurrently integrating new technology, data and third-party requirements to create the DigiShot® Ranger."

Building on strong foundations

Pillay adds that the DigiShot® Ranger works with AECI's fourth-generation

detonators. This enables storage of a wide variety of data on the detonator and tagger, including bench activity. The last detonator check function also ensures that all detonators on the string receive the blast command.

"The new system keeps the portability and ease-of-use of the original DigiShot® system requiring minimal training, but the DigiShot® Ranger doubles the detonator capacity (600 detonators vs the original's 300), and gives the operator flexible tagging options, plus automatic detonator detection," says Pillay.

LogShot® is a complementary software package that informs users of the blasting activity and allows operators to extract detailed, post-blast, activity logs. "This is very useful for consolidating the activity of the blast itself, along with the inventory management of detonators, while highlighting typical problems users may have experienced," says Pillay.

"The DigiShot® Ranger also logs user interface activity, which makes it easy to conduct operator safety audits as it can be used to determine if there is supplementary operator training required."

Customers can now easily build their very own blast library on ViewShot® Express, detailing blast design parameters, which may be used for future blasts in similar geological conditions during blasting. This is an important safety aspect, but can also help to improve operational efficiencies.

Attention has been given to device ergonomics and user-friendliness, with the DigiShot® Ranger offering improvements in both areas. The flexibility in tagging methods defines multiple options for the user to select when tagging to allow for both traditional tagging (for users who are comfortable with this methodology), as well as the more modern tag-by plan option (where the blast design is created on the ViewShot® Express and downloaded to the CE4 tagger via USB or WiFi). The latter allows for tagging on-bench with delay and location from the pre-designed blast plan, which mitigates user input errors.

With smarter tagging methodologies, movement on the bench can be reduced and optimised. The tagger has been designed to function as an inherently safe device and cannot generate the required blast voltage or blast commands to initiate the blast – the blast command is stored in a Near Field Communication (NFC) Blast Card.

"As a responsible supplier, we also focus on recovering equipment at the end of its life cycle, to manage the responsible disposal of the entire system," says Pillay.

ESG considerations

ESG is a fundamental element in the way that AECI Mining Explosives conducts business across all its operations and product ranges. Tenacious consideration is afforded to all three aspects of ESG – social, environmental and governance.

With the DigiShot® Ranger, for example, the focus on safety and operational efficiency addresses the social part of ESG, while the improved blast efficiencies irrefutably contribute to the environmental aspect.

Furthermore, excessive wastage is reduced through the long-range communications capabilities of the device, which directly translates to the reduction of on-bench harness wire consumption. The detailed blast logs that are generated assist with governance by improving reporting and compliance.

"At AECI Mining Explosives, our focus is on continuous improvement along the whole value chain," says Pillay. "The DigiShot® Ranger evolution is just one example of the Company's holistic and flexible approach, which aims to help customers on their unique journey to better blasting outcomes." ■

Mobile Manufacturing Unit that forms part of the unique surface offering.

Lithium: a 'critical' input

By Tom Price, Head of Commodities Strategy at Liberum

Over the last 20 years, the global lithium trade has expanded at an extraordinarily strong rate of 20%/yr, driven generally by the rise of lithium-ion battery-bearing consumer goods, and more recently by electric vehicle batteries (now >80% of total demand).

This has been a brutally bearish year for investors of lithium – a critical commodity input for the batteries of electric vehicles. They were all first drawn to this diminutive, high-value metal market by its spectacular post-lockdown price bounce of 2020-21 – up 580% in 18 months, peaking above US$80k/t in November 2022. Once invested, these players then convinced themselves that growth in the lithium trade was somehow underpinned indefinitely by the ESG-backed programme to 'green' Auto World: replacing internal combustion engines with carbon-free, lithium-rich electric vehicles.

Seems a reasonable investment case. So, why have lithium prices collapsed this year, down some 70% from those record-highs of 2022?

Basically, the case lacked macro-context as almost all commodity prices lifted sharply post-lockdown. Why? To offset the growth-hit of 2020's global lockdown, central banks rendered capital universally cheap. This prompted investors to use it to boost exposure to growth and risk. And for any resurgent market, commodities offer both. Of these, lithium promised even more upside – with its compelling 'green' story.

Bear factors

Three dominant, partly-related bear factors acted on lithium prices over the past 3-6 months:

- Mine supply growth: 2022's global lithium mine supply growth was weak (+1% YoY to 575 kt). For 2023 though, we forecast a 20% YoY lift in production to over 650 kt, creating a trade surplus. Most growth occurs in Australia and Chile – a competitive industry response to recent, record-high prices.

Lithium is a critical commodity input for the batteries of electric vehicles.

2022's global lithium mine supply growth was weak.

- Subdued demand growth: For 2022, global lithium demand was a relatively modest (+5% YoY to 575 kt, well below that of previous years). This year, we forecast even weaker growth. It's a China-centric view (takes >70% of lithium): economic activity and consumer demand there appears set to remain subdued. Biggest risk to this quiet outlook? A government-led push to hike China's aggregate demand, to secure its 5% GDP annual growth target – most likely via on-going credit injections.
- 2023's contract talks: About three-quarters of the global lithium trade is executed on long-dated supply/price contracts (annual, & longer). From 2021, major new buyers (e.g. VW, Ford, Volvo) expressed a willingness to pay a substantial premium for any supply. This competitive push with established players (Tesla, China's battery/EV) boosted 2022's price spike. This year's ballooning surplus has hit spot hard, encouraging a buyers' strike, quickly undermining 2023's contract terms too.

Following a bounce off the US$25 k/t-level in April, lithium prices (carbonate, hydroxide) now seek a new equilibrium at around US$40-45 k/t. Likely conditions that may help the market re-balance at these levels include a paring of the still-long global project list at this much lower price level (i.e. via deferrals, closures), and China's on-going, albeit choppy post-lockdown recovery of EV-sector activity.

Geo-politically critical too

We see one other, quite new, bullish lithium demand-/price-driver in play: strategic stockpiling and reserve development. In recent months, various agencies of the US government have moved to secure sources of a range of what it regards as 'critical' minerals, which includes lithium (Australia-US Climate, Critical Minerals, and Clean Energy Transformation Compact; signed May-2023; US-Argentina talks on lithium-related FTA, May-23; US-Japan 'critical minerals' agreement, Mar-23).

Has a new Cold War begun? Based solely on

the evolving commodity supply strategies of major economic powers, we think so. In fact, the US is not the only one securing its raw material supply chains. All key players of the last Cold War – the US, EU & Japan – have recently identified commodities they regard as 'critical' inputs for stable economic growth. They're now protecting all sources, mainly by activating old trade alliances (The Geopolitics of Critical Minerals Supply Chains, J. Nakano, 11-Mar-2021). And which commodity has been flagged as 'critical' by all three? Lithium. It seems the imperative to de-carbonise Auto World persists, even in a Cold War.

Industry perspective

At about 650 kt, the global lithium market is just 1-4% of the size of its higher profile global metal market cousins of copper and aluminium. Applying a spot price of $45 k/t, this little metal market is currently worth about US$30bn (i.e. 15-23% of copper's/aluminium's).

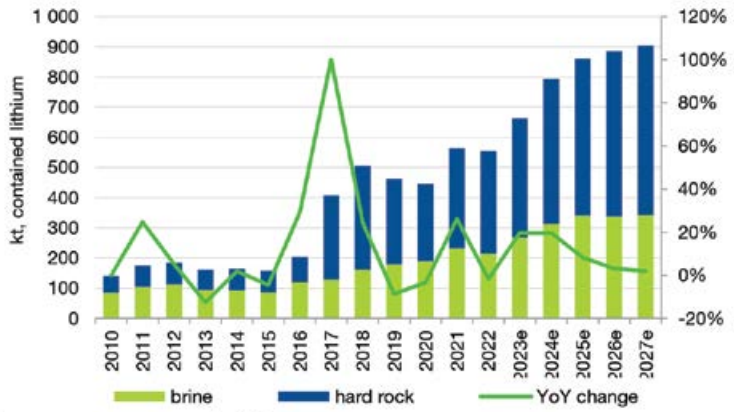
Over the last 20 years, the global lithium trade has expanded at an extraordinarily strong rate of 20%/yr, driven generally by the rise of lithium-ion battery-bearing consumer goods, and more recently by electric vehicle batteries (now >80% of total demand).

Lithium is predominantly derived from two mined sources: 1. hard rock (primary spodumene, mostly Australia; 61% of total, 2022 estimate); 2. brine (sedimentary deposits of Chile; 39%). Recent high prices have spurred investment in new, higher cost sources of China (brine & lepidolite), the US and Argentina (brine). Over the medium- to long-term, we expect battery scrap to emerge as a significant Li-unit source, reducing demand for mined supply.

General price outlook

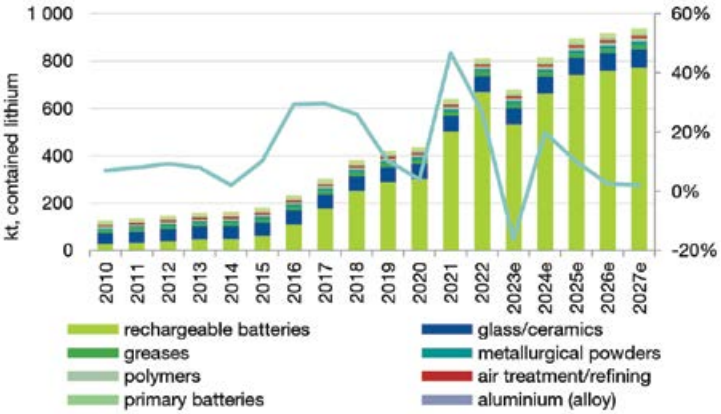
Again, key prices for lithium products bounced off a $25/t-floor in late April, after falling by over 70% vs. November 2022's peaks of above US$80k/t. The battery feedstock's sell-off has reported to spodumene prices too, down 15-20% to below US$4,000/t-level by mid-May.

Lithium mine supply (kt/yr)



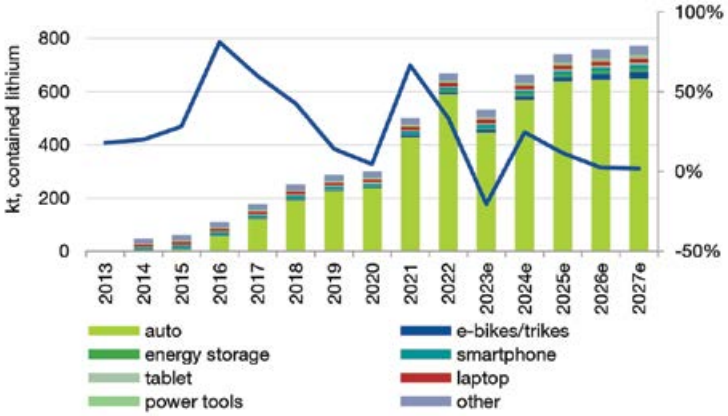
Source: company reports, Liberum

Lithium's key end-uses (kt/yr)



Source: company reports, Liberum

Lithium's rechargeable battery demand (kt/yr)



Source: company reports, Liberum

From here, we see three short-term bullish price drivers: 1. again, emerging geo-political push to secure strategic lithium reserves, 2. project delays, on now sharply lower spot prices, 3. Chilean government's push to take a greater direct share of its national mining industry profits (restricts local supply growth; bullish global price). ■

Leo Lithium's CEO, Simon Hay.

Leo Lithium's Goulamina project targets

The outlook for lithium, which is being driven by the global need for clean energy sources, remains extremely bullish. For Leo Lithium, the new kid on the mining block, its Goulamina Lithium Project in southern Mali underpins an extremely positive looking future. The project, which is targeting spodumene production at the end of the second quarter 2024, is close to 30% complete on the construction phase, MD Simon Hay, tells *Modern Mining*.

Drill cores from Goulamina.

Global management consulting company, McKinsey Battery Insights' team, has projected that the entire lithium-ion (Li-ion) battery chain, from mining through recycling, could grow by over 30% annually from 2022 to 2030, when it will reach a value of more than $400 billion and a market size of 4.7 TWh.

"Batteries for mobility application, such as electric vehicles (EVs), will account for the vast bulk of demand in 2030—about 4 300 GWh; an unsurprising trend seeing that mobility is growing rapidly," McKinsey said.

According to Hay, to meet demand for lithium-ion batteries for the electric vehicle industry more lithium producing mines need to come on-board sooner rather than later.

"The lithium industry is currently pegged at between 650 000 and 700 000 lithium carbonate equivalent (LCE). By the end of the decade, the industry would need to grow between 2.5 and 3.2 million tonnes of ICE per annum. Essentially, in the next six and a half years, the industry will need to, at least, triple and even quadruple output to meet projected demand."

Goulamina targets production in 2024

ASX-listed Leo Lithium, a spin-off from Australian-listed, Firefinch, which held a 50% stake in Goulamina, prior to its sale last year, remains on-track to complete construction on Stage 1 of the project by year-end.

The pure play lithium company, which floated its shares on both the Australian and Frankfurt Stock Exchanges in June last year, where it raised A$100m, has a first mover advantage in Mali, a country renowned as a leading gold producer.

Mali currently has an estimated 18 gold mines in operation, with lithium mining at an infancy stage, but set to play a leading role in diversifying the local economy.

The battery metals developer is set to become West Africa's first spodumene producer when the project comes online to deliver product into a booming lithium-ion battery industry.

"Leo Lithium is less than a year old and already has a workforce of over 400 Malian and 30 Australian employees working to get the project into production. We are halfway through the construction period and are pleased with our progress to date. Importantly, we are a fully funded project through our 50/50 joint venture with Jiangxi Ganfeng Lithium (Ganfeng), the world's largest lithium chemicals producer by production capacity," explains Hay, an experienced lithium miner, who joined the company in March last year.

The project, which has a Stage 1 price tag of some $318 million ($285 million allocated to construction capital and $33 million to working

Below right: Construction of the grinding area.

Below: Construction of the primary crushing facility.

2024 lithium spodumene production

capital), is a two-stage project, with Stage 1 targeting 330 000 tonnes per annum of spodumene to be ramped up to 506 000 tpa in Stage 2. Stage 2 will lag Stage 1 by between 12 to 18 months.

"Although, the throughput of the Ball Mill is 2.3 million tonnes per annum in Stage 1, the throughput capacity for Stage 2 is yet to be finalised. Interestingly, we are building an additional capacity of 4 million tonnes per annum in the crushing circuit in Stage 1. The plan is to take advantage of that capacity when Stage 2 comes online."

Discussing construction progress, Hay explains that in mid-May the mining contractor had mobilised, initiated earthworks, cleared the site, and moved the first overburden, which allowed the company to commence with concrete works.

"A large portion of the key equipment such as the Ball Mill, crushing equipment, magnetic separators, etc, fabricated in China, has been delivered to West Africa. Our procurement process is well advanced. Although we have recruited the mining contractor and workers, we are busy recruiting key personnel, including board executives, senior managers, and the operations team."

According to Hay, given the global supply chain pressures not many projects that are currently under construction, are on schedule. The Goulamina Lithium project is, however, on schedule for commissioning next year.

How does Goulamina stack against its peers?

Goulamina is a long life, large-scale, hard rock open pit lithium mine considered to be one of the world's top hard rock lithium assets in terms of scale and cost of production when compared to peers with similar sized projects.

A key advantage of Goulamina is the quality of the 6% Li2O spodumene concentrate (SC6) product, being high in grade and low in iron and mica impurities. Furthermore, the project's low strip ratio and life of mine, which is more than 23 years, enhance its financial standing.

"With the deposit being open at depth and along strike, our drilling initiatives continue to expand the resource and reserve base. There exists a potential to increase the size of the open pit mineral resources and ore reserves through infill and extension drilling – we believe that the resource will continue to grow strongly in scale. The grade is also excellent and, when compared to some of our Australian peers, the Goulamina deposit has a much higher grade of 1.5 to 1.6 bg/t where most mines in Australia contain grades in the region of 1.1 to 1.2 g/t. Given

Aerial view of the Goulamina Lithium Project.

Below left: Construction of the permanent accommodation camp.

Below: Earthworks underway on the embankment.

Drilling undertaken at Goulamina.

our high grades, relatively low costs of production and capital costs, we believe these characteristics make Goulamina an important strategic asset for the world's growing demand for lithium chemicals."

Goulamina's all-in-sustaining-cost of $365 per tonne, which is significantly lower than the AISC of $1 000/t of spodumene currently produced by peers, makes this an extremely attractive project.

"Spodumene is currently being traded at around $4 000/t, which means Goulamina is at the vastly lower end of the cost curve and will ensure that good margins are achieved. If Goulamina were already producing at 330 000 tpa, the company would rank as one of the globe's top five lithium producers. There are not many lithium players that will be producing at this scale and if we add the target production of a further 506 000 tons per annum from Stage 2, the company will rank as one of the world's top three lithium producers, which makes this a really significant and highly attractive project."

Leo Lithium team meeting the Goulamina village elders.

The imminent miner has already inked an off-take agreement with Ganfeng for its spodumene from Stage 1; however, off-take agreements from Stage 2 are yet to be finalised, which offers the company great upside as lithium is expected to fetch higher prices from the fourth quarter of this year onwards.

According to Hay, an essential part of the company's strategy is to sell its stockpiled direct shipping ore (DSO) before year-end and it "will have shipments going out in the fourth quarter of this year". The lithium developer will ship 90 000 tons of DSO in the fourth quarter of this year with 90 000 t earmarked for the first quarter of 2024.

"We anticipate a further improvement in the price of spodumene and have therefore only allocated DSO for the last quarter of this year and early next year. Our JV partner (Ganfeng), which has acquired the spodumene from Stage 1, foresees strong demand for its product lines in China. Ganfeng's products are sold to major automotive producers, such as BMW, Tesla, and Chinese car manufacturers, amongst others. As such, it is safe to assume that Goulamina lithium will end up at top tier vehicle manufacturers."

The early revenue generation will enable Leo Lithium to commission parts of its project ahead of the scheduled spodumene production. "Although we have an idea of how the product will behave, the DSO will verify how the mine will actually operate and how the ore will behave," explains Hay.

He adds that, aside from the projected price boon, the company has been able to unlock opportunities associated with logistics. "We will transport our spodumene down to Abidjan port and expect to achieve some backhaul product on the way out. Importantly, we believe that the roads are in better condition than initially thought, which means the cycle time for the trucks will be shorter than initially anticipated."

Further to this, Hay says that the company itself is highly undervalued when compared to its peer groups with projects of the same scale. "While some imminent Australian miners, with projects of a similar size, are valued at around A$5 billion, Leo Lithium is only valued at A$700 million, which presents an ideal opportunity to investors. Apart from the valuation upside, the project is set to make a major contribution to Mali's economy and become a frontrunner in creating a new industry in the country. Importantly, Goulamina lithium brings employment to an area which currently has very little opportunity. We have a comprehensive sustainability and community development programme in place to ensure that we make a meaningful contribution to the region," concludes Hay. ■

De Beers Sightholder Sales South Africa unveils new sorting facility

De Beers Sightholder Sales South Africa (DBSSSA) officially unveiled its new rough diamond sorting, valuation and sales facility in Johannesburg at an event attended by the Minister of Mineral Resources and Energy, Gwede Mantashe, Gauteng MEC of Economic Development, Tasneem Motara, and De Beers Group CEO, Al Cook.

Minister Gwede Mantashe and De Beers Group CEO, Al Cook.

De Beers Group announced in January 2023 that it was relocating its Sightholder Sales activities in South Africa from Kimberley, where it has been operating since 1974, to Johannesburg following a review of its sorting activities in South Africa. The relocation supports the government's strategy to consolidate the country's mineral beneficiation sector into one area at the Gauteng Industrial Development Zone, close to the OR Tambo International Airport.

A total of 87 employees were successfully relocated from Kimberley to the new 6747 m^2 facility in Sky Park Industrial in Johannesburg, which has two floors comprising Sightholder offices, hand and machine sorting areas, a training academy and a diamond cleaning plant.

Gwede Mantashe, Minister of the Department of Mineral Resources and Energy, said: "Whilst we congratulate De Beers for the grand opening of the Sightholder Sales facility, we also welcome the R35 billion investment in underground mining in Limpopo. We encourage you to continue investing in South African mining, particularly in the Northern Cape and other provinces. Doing so will help us change the economic architecture which stands on three legs Gauteng, KwaZulu-Natal and the Western Cape."

DBSSSA is part of the Global Sightholder Sales network that sells rough diamonds for beneficiation purposes in South Africa, Botswana, Namibia and Canada. It is also responsible for the distribution of De Beers rough diamonds in South Africa and seeks to support the industry at large in maintaining a sustainable diamond manufacturing industry through its beneficiation strategy.

In South Africa, DBSSSA has nine Sightholders to which it sells rough diamonds 10 times a year. The consistent and predictable supply of rough diamonds to South African Sightholders supports their ability to invest in local cutting and polishing factories and, together, they have employed 620 cutters and polishers since 2020.

Last year, De Beers Group and several key industry players – including the SA Diamond and Precious Metals Regulator, the SA Diamond Manufacturers Association, the SA Diamond Dealers Club and the State Diamond Trader – partnered to launch a Small Beneficiator Customers (SBC) pilot programme with seven identified cutting and polishing businesses receiving assistance.

The objective of this programme is to broaden supply and access of rough diamonds to small South African owned beneficiation companies. To further assist emerging businesses with access to affordable rough diamond parcels, De Beers Group is offering SBCs parcels of diamonds consisting of an aggregated mix of diamonds from its mines in Namibia, Botswana, Canada and South Africa.

Moses Madondo, MD of De Beers Group Managed Operations, said: "South Africa is a significant source of rough diamonds and, aside from helping to upskill the industry, it is important for us as diamond producers to assist small beneficiation customers with access to affordable parcels of rough diamonds. South Africa is sharply focused on being internationally competitive, and with government's support as envisaged through the GIDZ, the country is well placed to support the growth of its beneficiation sector." ■

New diamond sorting and valuation facility in Sky Park Industrial.

Nkwe Platinum hands SLP Water Supply Projects to Sekhukhune

Zhiyu Fan, CEO of Nkwe Platinum.

Nkwe Platinum, a subsidiary of Zijin Mining Group, recently hosted a ceremony to hand over its Social and Labour Plan (SLP) Water Supply Projects to the Sekhukhune District Municipality.

Nkwe Platinum's water supply projects support 1 742 households within the communities with 320 000 litres of water per day and have created a total of 72 job opportunities for members of these communities.

The event marked the completion of Nkwe Platinum's SLP water supply projects for its mining communities that fall under the local municipalities of Makhuduthamaga and Fetakgomo-Tubatse.

The projects provide communities and livestock surrounding the Zijin Garatau Platinum Mine with access to clean and safe drinking water. A total of 31 boreholes, supported by the installation of 52 JoJo water tanks, were drilled and/or equipped for the water supply projects across all four of the mine's communities, i.e. Garatouw, Maandagshoek, De Kom and Hoepakrantz, . This clean water supply is distributed to the communities via 92 taps, which are stationed at various strategic points to cater for both community and livestock.

Nkwe Platinum's water supply projects support 1 742 households within the communities with 320 000 litres of water per day and have created a total of 72 job opportunities for members of these communities.

The water supply projects include the mine's first solar-powered water supply system for the Ga Mpuru Village in the Garatau community. In addition to providing round-the-clock water for members of the community, the solar system also powers an electric security fence for the water supply infrastructure. The water supply system pumps over 55 000 litres (continuous flow) of clean water from a pipeline, which spans over two kilometres within the community.

"Nkwe Platinum firmly adheres to the co-development belief of 'Mining for a Better Society' and believes that the development of enterprises is closely related to the sustainable development of our surrounding communities. Through education, industrial support, infrastructure construction and joint projects, the company is committed to developing and working together in a mutually beneficial and harmonious way for the benefit of all," said Zhiyu Fan, CEO of Nkwe Platinum.

To date, Nkwe Platinum has spent R53 million on its Social and Labour Plan. The investment includes the upgrade of the Garatau Community Access Road, as well as adult training and education, bursaries, learnerships, internships, traditional leadership training and excavator operations, which have benefited the surrounding mine communities of the Zijin Garatau Platinum Mine.

Community empowerment initiatives include contracts awarded to communities and local businesses, such as R7.6 million for the site preparation work for the box cut in 2021, and around R36 million for the supply of crusher material and tipper trucks and diesel.

The Zijin Garatau Platinum Mine is currently in its construction phase, with construction scheduled to take five years to complete. Phase 1 production from the Merensky Reef is set to reach 3.4 mt/y within two years, while Phase 2 production, which will take a further two years to achieve, will increase production by another 1.8 mt/y from the UG2 reef. In essence, it will take four years after completion of the mine construction, to reach peak and a steady output of 5.4 mt/y.

"Whilst the mine is still in the construction phase, we have honoured our SLP commitments to our stakeholders, including government and our mine communities," said Fan. ■

Water Supply Projects.

A view of the water tanks.

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Exceptional pilot hole accuracy achieved for vent shaft at Ivanplats Platreef

In one of the most accurate pilot holes to be drilled on a South African mine, Murray & Roberts Cementation recently completed a 950 m borehole for a ventilation shaft at Ivanplats' Platreef Project near Mokopane.

"The accuracy of the pilot hole was critical to the success of the ventilation shaft, which will serve a second purpose as a man hoisting facility in cases of emergency," says Dirk Visser, Senior Project Manager at Murray & Roberts Cementation. "This hoist facility will travel on rope guides through the shaft, which requires tight tolerances."

At the completion of the hole, a depth of over 950 m, the results showed that the drilling team was not more than 0,05% off its closure distance. With the pilot hole measuring 381 mm in diameter, the highest deflection over this distance was only 452 mm. He explains that the deviation at final depth had returned to 0,02%, or just 226 mm off centre – still within the diameter of the pilot hole.

"Murray & Roberts Cementation has long been recognised for its high level of accuracy achieved with directional drilling of pilot holes for shafts," Visser says.

At the completion of the hole, a depth of over 950 m, the results showed that the drilling team was not more than 0,05% off its closure distance.

Murray & Roberts Cementation recently completed a 950 m borehole for a ventilation shaft at Ivanplats' Platreef Project.

He notes that "anything can happen" in terms of the ground conditions a driller will encounter. Poor ground conditions such as a mud intersection could cause a drill to deviate considerably from its course, for example. However, the company's track record has consistently shown very good results, he says.

On the Platreef Project, success was achieved on the strength of decades of experience with the German-built, highly specialised Rotary Vertical Drilling System (RVDS). He says the team has perfected the art of this drilling method.

"The RVDS works on a close loop system, with instantaneous correction while drilling and therefore the high accuracies achieved. Drilling to these demanding specifications with this highly technical equipment demands a very experienced team," he says. "The most 'junior' person in the team has worked with this machine for 15 years, while another member has 28 years of experience in raiseboring."

He explains that the RVDS is a self-steering tool, set up in advance to drill vertically downwards. It measures its progress using two-axis gyro inclination sensors, which continuously determine if there is any deviation from the vertical course. If there is variation beyond certain set limits, the hydraulic steering system is activated automatically to put the drill back on course.

"The direction of the drill is automatically adjusted by extendable stabilising ribs on the RVDS tool," he says. "Any deviation is picked up by the sensors and a signal is sent to one of four ribs, which can extend itself to rectify the angle."

The system is energised by water pumped from surface, and this water also flushes out the chippings and cleans the hole. A needle valve opens and closes, sending pressure waves through the water to a transducer on surface which is used to monitor the condition of the steering tool and the accuracy thereof. The operator monitors the critical parameters from a laptop in the operator cabin to ensure the tool functions within specifications, and if they pick up that the drill is not keeping to these parameters, there may be an aspect of the equipment that needs attention."

This requires prompt action from the team, which may have to withdraw the drill string and replace certain components before continuing. This attention to detail, he explains, ensures that the accuracy of the hole is maintained while the pace of drilling is optimised. The RVDS tool may, for instance, need to be substituted after certain intervals with a new unit, as the old one receives its scheduled servicing.

The electrical power driving the RVDS is generated by water pumped from the surface. Importantly, the operator must monitor the voltage being fed to the unit; if the voltage is too high or too low the unit will shut off to protect itself. The water flow to the unit and out of the hole must also be monitored carefully. He noted that the team on the project gave special attention to water cleanliness, ensuring that water exiting the borehole reported to a settling dam. The water circulated down the hole from the dams was therefore free of cuttings, which will damage the drilling tool.

To ensure continuity whilst drilling, Murray & Roberts Cementation always has a back-up RVDS unit on site.

"Using Micon's RVDS tool ensures that the pilot hole will intersect the mine's horizontal development at the 950 m level, as planned," concludes Visser. "This saves the mine any extra time or cost spent locating and intersecting with the hole, from which the vent shaft can now be reamed accurately." ■

Above: Success was achieved on the strength of decades of experience with the German-built, highly specialised Rotary Vertical Drilling System (RVDS).

Left: Collaring of the pilot hole, for the ventilation shaft at Platreef.

Below: With the pilot hole measuring 381 mm in diameter, the highest deflection over this distance was only 452 mm.

Giyani Metals CEO, Danny Keating.

Giyani Metals finalises demonstration

Since taking the helm in April, Giyani Metals CEO, Danny Keating, has been busy looking to bring the company's flagship K. Hill battery metal manganese project in Botswana into production in the next three years. By *Nelendhre Moodley*.

The Canada-based mineral resource company is intent on becoming Africa's first low-carbon producer of high-purity manganese sulphate monohydrate (HPMSM), a precursor material used by electric vehicle (EV) battery manufacturers for the expanding EV market.

Giyani Metals is also developing a portfolio of high-quality manganese oxide assets within the Kanye Basin, located in south-eastern Botswana, including the Otse and Lobatse manganese prospects, each of which has seen historical mining activities.

Image of K.Hill Core.

According to Keating, the company is looking to become the next large-scale producer of HPMSM, a market expected to grow ten times by 2030. In a market currently producing around 300 000 tons a year of HPMSM, predominantly from China, K.Hill will deliver a sizable contribution and much needed opportunity for off-takers to diversify their supply chain.

"Given that we are coming in as a material player in the industry, we are already attracting sizable interest in the project from off-takers and potential funders."

He explains that given the strong demand for critical metals, the climate for funding battery metals projects is extremely favourable.

"We are seeing the emergence of new money from a wide variety of sources, including battery manufacturers and original equipment manufacturers (OEMs)."

This push is being driven largely by legislative requirements from the US, UK and Europe, with the call to phase out internal combustion engine (ICE) vehicles in favour of EVs. As such, OEMs and battery manufacturers are keen to ensure security of supply for EVs.

"Two of the biggest issues facing the EV market are: the sharp growth of the market itself; and the deficit in supplies of key raw materials used in batteries. The latter is exacerbated by the desire for a shift away from Chinese dominated production of precursor materials and towards responsible, low-carbon supply, which has been driven partially by regulations in the West. As most countries phase out the ICE, manufacturers are eager to ensure security of their battery materials supply chains."

Importantly, as manganese is a lower cost metal to produce when compared to nickel and cobalt, Keating remains optimistic that the "time for manganese, which is often considered the forgotten battery metal, has arrived".

"There is a keen appreciation for green energy projects to be developed in the Southern African region. South Africa itself has a large car manufacturing industry and most locally manufactured cars are exported into the US and Europe, with OEMs such as BMW, Mercedes and Ford already present, and Stellantis recently concluding agreements to establish operations in the country."

Aerial view of K.Hill.

K.Hill's path to production

With K.Hill project construction pegged at some $280 million, Keating remains highly focused on aligning strategic partners "who can be involved in the project both in the short- and longer-term".

"My focus over the next 18 months is to align the company for financing – we are currently putting in place a team to ensure we secure funding not only for the short term, but for our larger funding requirements as we get K.Hill into production."

When complete, the K.Hill project, which is targeted to commence mine and plant construction in 2025 with first production in 2026, will look to produce up to 89 000 tpa of HPMSM and has been designed to cater for future expansion as further resources are brought into the mine plan.

In particular, the additional 3.1Mt of Inferred Resources, combined with the potential additional resources of the nearby Otse and Lobatse deposits, hold significant potential to extend K.Hill's operating life and production capacity significantly and place the company as a premier global producer.

plant – targets production in three years

Above: Demonstration plant crystallisers.

Left: Excavation of sample feedstock material for K.Hill Demo Plant.

In March, Giyani's wholly owned subsidiary, Menzi Battery Metals, submitted its Environmental Impact Statement (EIS) to the Department of Environmental Affairs for Botswana (DEA) as part of the Environmental Impact Assessment (EIA) process. Once awarded, the EIA will enable the company to apply for a 25-year Mining Licence for K.Hill.

Further to this, Giyani Metals has been constructing a massive HPMSM demonstration plant in Johannesburg, which has been designed to validate the process flowsheet, de-risk commercial development of K.Hill, and facilitate off-take contracts with customers.

Discussing the technology, Keating explains that parts of it have been adopted in different leaching applications.

"We are creating a new way of extracting manganese, using existing, well understood technologies in a novel way to produce material for the battery sector. The technology effectively leaches different materials, eliminating the impurities, to end up with high purity manganese that meets the stringent specifications of our potential EV customers.

"To date, we have done a large amount of testing on the process at a laboratory scale and demonstrated it works. We are now in the process of constructing our large-scale demonstration plant (100 m in length), which will be used to validate the technology on a big scale and allow us to produce material for our customers to progress offtake discussions."

"We are making strong progress; recently the fabrication of the crystallisation unit, which is over 15 m tall and a key component of the plant, was completed and is awaiting transportation to the demo plant site."

The $10 million demonstration plant is being built on the West Rand in Johannesburg by MET63, a South African engineering firm focused on the development of mineral beneficiation and hydrometallurgical processing plants, is a game-changer for the emerging battery metals developer.

"In April, the Botswana Department of Mines approved the shipment of 100 t of K.Hill manganese oxide material to the demo plant site – this will provide representative feedstock for the HPMSM for qualification by potential off-takers. The 100 t subsample was selected from over 200 t of material collected from three outcrops around the K.Hill resource, with the sub-sample crushed and packed into one-tonne bags and delivered to the demo plant. The plant will demonstrate how the company's low carbon process can adapt to the variability of K.Hill material and produce consistent battery-grade HPMSM. The successful delivery of samples of our low carbon HPMSM to off-takers will cement our position as an early mover in the battery-grade manganese market."

The demo plant plays a pivotal role as it will help test the team's project management and cost management skills and offer an opportunity as a training facility to upskill its workforce.

It remains on track to produce HPMSM samples for testing by potential offtakers in late 2023.

"Giyani has an early-mover advantage to meet the growing demand for HPMSM from the EV sector, which is prioritising responsible, low-carbon producers outside of the dominant Chinese supply chain. Our hydrometallurgical process, which treats our captive ore without the need for power-intensive calcining or electrorefining, saves both cost and carbon emissions," says Keating. ■

Botswana – attractive mining jurisdiction

- ❑ Botswana cemented its status in the Fraser Institute's latest annual survey of mining companies, which is heavily focused on exploration.
- ❑ Under the category "most attractive jurisdictions for mining investment", Botswana ranked 10th out of 62 and was No 1 in Africa.

Crown Mines Complex rehabilitation.

DRDGOLD reduces mining's environmental legacy

Can mining ever be 'green'? By its very nature, minerals extraction disturbs the natural environment, makes use of a wide range of chemicals in the process and forever changes the composition of the area mined. While mining in South Africa has a history spanning over a hundred years, for the first 60-70 years environmental consciousness was not a priority, In the recent past, however, local miners have been inclined towards a model that is more sustainable and environmentally-friendly, says DRDGOLD's CEO Niël Pretorius. By *Nelendhre Moodley*.

"The removal of remnant mining residues not only restores the environment, but also frees up previously sterilised land for sustainable land use. In addition, the quality of life of those living close to these installations is enhanced because of the removal of sources of airborne dust and effluent," says Pretorius.

South African gold miner, DRDGOLD, a specialist in the recovery of metal from the retreatment of surface tailings, believes that mining is moving towards a circular economy model, which means that operations are gravitating to a net positive contribution to the environment and society; and working with the wider metals supply chain to promote the responsible use and recovery of metals.

DRDGOLD, which transitioned from deep level underground mining to the large-scale retreatment of mine dumps and tailings dams, is rolling back the environmental legacy of mining through strategic focus points that are aligned to the United Nations Sustainable Development Goals and the Responsible Gold Mining Principles by the World Gold Council.

The JSE-listed entity relocates waste material to an area where it is better contained and then processes the waste material.

According to Pretorius, the scale of the poor legacy of mining in South Africa is extensive. In the Johannesburg area alone, there are more than 800 million tonnes of surface waste.

DRDGOLD gold pour.

"For as long as our process involves the storage of waste, I don't believe we can regard ourselves as a green miner. Although we are not creating new waste, we are also not completely getting rid of the waste – just relocating it. Our storage methodologies, however, do have a better impact on the environment in the long-term when compared to in situ material. Secondly, there is an environmental impact on our operations while we undertake the minerals treatment process, in that mining triggers outcomes, such as acid mine drainage (AMD) and dust."

Mining relies heavily on the use of chemicals to process minerals, including cyanide which results in the production of AMD. There are, at this point, no solutions to neutralise their impact on the environment other than through containment, explains Pretorius.

As a result, the company has partnered with Wits University in support of research for alternatives to the chemicals currently used in the mining process that would be less harmful to the environment.

"Although, we don't expect to achieve results in the near-term, we do anticipate that these studies will, in the next 10-15 years, give rise to new technologies and processes which will aid in better minerals processing that will be less harmful to the environment."

Renewable energy

While the miner is largely reliant on fossil fuel generated power, its recent investment in solar energy will, from early August onwards, see the company unlock 20 MW of solar energy. Second phase development includes the addition of another 40 MW and a battery storage facility.

"In total we will have 60 MW of solar capacity and 140 MW of battery storage with the excess energy being fed back into the grid. We are in talks with Eskom to allow us to feed the solar generated power to our Far West operations," explains Pretorius.

Using renewable energy will help DRDGOLD reduce its carbon emissions by roughly 154 000 tCO_2e

In line with driving its biodiversity agenda, the tailings processing specialist has cladded its tailing storage facilities (TSF) in Johannesburg and Brakpan with natural soil, which has led to the growth of indigenous flora and fauna and a return of wildlife

feature

Above: Aerial view of a section of DRDGOLD's Ergo plant at Brakpan.

Centre: Cyclone deposition of tailings at DRDGOLD's Brakpan tailings deposition facility, following retreatment of reclaimed mine dump material to recover gold.

Left: Reclamation of mine dump slimes material by remotely operated high pressure water jet, ahead of retreatment at Ergo to extract gold.

to the area, including, amongst others, jackals, small antelope, and warthog, amongst others, as well as abundant bird life.

"It is impressive that we have been able to trigger the return of biodiversity that is consistent with the natural environment of the area," enthuses Pretorius.

Reducing water consumption

"Ten years ago, we resolved to reduce potable water use by at least 10% per year. This systematic reduction over time has reduced potable water to below 10% of total water usage, and then typically only where absolutely required, for example, for human consumption and sensitive componentry," explains Pretorius.

The miner uses a large portion of grey water, treated AMD and water from its tailings facilities for its operations. The company draws a small quantity of water from the natural environment, including streams and containment ponds.

"We have adopted a closed-circuit approach which means that water is recycled and remains in the circuit. In turn, the cost of the water is reduced; this translates to increased profitability and means that both the environment and the business benefit. Essentially, we are less burdensome on the environmental and natural resources, whilst generating higher returns."

Investing in host communities

By investing in initiatives that improve the environment and the quality of lives of host communities surrounding DRDGOLD's operations, the miner is contributing towards a more stable society, says Pretorius.

"Businesses need a stable societal environment within which to function. As communities immediately adjacent to our operations are, in many instances, impoverished; by investing in initiatives to improve their quality of life, we are contributing towards a more stable society. However, we are careful not to create a culture of dependency, but rather foster a culture of self-empowerment through enablement."

DRDGOLD's initiatives, which include the appointment of teachers for voluntary maths and science classes, contributing to available skills sets for the miner, and broadening horizons for the learners who take advantage of these classes.

Diversifying into other metals

DRDGOLD's relationship with diversified metals producer, Sibanye-Stillwater, sees the gold producer potentially enter the complementary metals space, which includes PGMs and battery metals.

Aside from offering opportunities to diversify its portfolio, the relationship could add to its cashflow and de-risk the business "as different metals run different cycles".

"The relationship with Sibanye-Stillwater holds promise for further expansion and similar unlocking of value in terms of non-core surface assets in their portfolio, including the possibility to expand into other minerals, such as PGMs," concludes Pretorius. ■

Broad-based livelihoods community project.

Pan African targets 50% renewable energy

Gold miner, Pan African Resources, which is on an aggressive renewable energy drive, is looking to lift its clean energy consumption from 5% to at least 30% by 2030, Investor Relations head, Hethen Hira, tells Modern Mining. By *Nelendhre Moodley*.

Hethen Hira with Juwi site manager at the Evander solar plant – Shafts 7 and 7A behind.

The mid-tier African miner has a production capacity of 200 000 oz gold per annum with some projects in its portfolio that have been operational since the 1920s. It spends a significant portion on electricity and, according to Hira, after labour costs, electricity is the next biggest outlay.

Power costs for Pan African's highly mechanised surface operations account for between 10% and 12% of all-in-sustaining-cost (AISC), while the more labour and energy intensive underground mines account for between 20% and 25% at current Eskom tariffs.

The company's assets include Barberton Mines, high-grade underground operations comprising Fairview, Consort and Sheba mines; the Barberton Tailings Retreatment Plant (BTRP); and Evander Gold Mining, made up of the Evander underground and surface assets (shaft headgears and metallurgical plants) as well as the Elikhulu Tailings Retreatment Plant.

In May 2022, the gold miner was the first South African mining company to successfully commission a utility-scale, grid-tied solar PV plant with Evander Mines' 10 MW_{AC} (12 MW_P) solar PV renewable energy facility (Evander solar facility). The EPC works for the project were completed by JUWI, a leading international solar, wind and hybrid project developer.

"Our main aim is to ensure security of energy supply. However, as a responsible mining house, our focus is also on lowering our carbon footprint, which talks to being environmentally responsible. Aside from reducing costs, and thereby improving margins and increasing sustainability around our mines, and ensuring that the lives of our mines are extended, our objective is also to contribute to the economy through employment creation and delivering a better operating environment. Importantly, when our operations reach the end of their mining life, the renewable energy drive sets us up for electricity supply to the eventual benefit of the country," explains Hira.

"Aside from further wheeling considerations and battery storage options, we are also considering wind energy options," says Hira.

Evander solar plant with Twin Shaft 7 and 7a and Elikhulu plant in the background.

Although the JSE-listed entity's renewable energy output is currently at around 5%, scheduled ramp up of self-generated solar projects and from PPAs will contribute more than 30%, or 80 megawatts, of the Group's energy mix by 2025 and target up to 50% by 2030 with expansions to current facilities and other PPAs.

In addition, given that mines operate 24/7, the company is seeking clean energy options for use during night time hours, and is engaging with industry specialists on battery storage technology.

"Aside from further wheeling considerations and battery storage options, we are also considering wind energy options," says Hira.

Renewable Energy initiatives

Pan African's renewable energy roadmap to decarbonisation includes:

- The construction of its 10 MW_{AC} Evander solar PV facility, the first utility-scale, grid-tied solar PV plant to be commissioned in South Africa.
- The construction of an 8.75 MW_{AC} solar PV facility at Fairview Mines.
- The entering into of the 40 MW_{AC} Sturdee Energy PPA for the provision of wheeled power over a period of up to 15 years.
- The development and construction of a second solar PV facility with a minimum output of 12 MW_{AC}

feature

uptake by 2030

Elikhulu plant at dusk – 30% of Elikhulu's power is from renewable energy.

at Evander Mines for its expanding underground mining operations.

- ❑ The construction of a 10 MW*$_{AC}$ solar PV facility at its Mogale operations (*prefeasibility study is in progress).

In early 2020, the company signed its first agreement with JUWI, one of the world's leading renewable energy companies specialising in the development, EPC, operation and maintenance of private and public utility scale solar and wind energy projects.

More recently, Pan African commenced studies for the development of the 8.75 MW$_{AC}$ Fairview solar facility at its Barberton operations. The facility is now fully permitted, including its water use licence, environmental approvals and its registration with the National Energy Regulator of South Africa (NERSA). To accelerate the site work at the Fairview solar facility, an early works phase was undertaken by JUWI and is nearing completion.

This phase included various activities such as the facility design and conducting specialist studies that are essential for completing the detailed design, and cost estimation for the subsequent EPC work. The Fairview solar facility's plant is expected to generate around R2.2 million in monthly cost savings in year one.

"Assuming an estimated annual tariff increase rate, by Eskom, of 10% per year, a payback period of around eight years is estimated. Based on preliminary studies, Fairview's solar facility will reduce the Group's carbon emissions by some 22 000 t of CO_2 per annum. The solar facility is expected to have an economic life in excess of 25 years, which is sufficient for the mine's current 20- year life of mine, based on current Mineral Reserve estimates," explains Hira.

The company's ongoing projects include a feasibility study being progressed to expand Evander Mines' 10 MW solar PV renewable energy facility by at least an additional 12 MW to secure additional capacity for Evander Mines' long-life 24, 25 and 26 Level projects and a feasibility study has also commenced on a solar PV renewable energy facility for the Mogale Tailings Retreatment Plant. Following the successful implementation of these projects, and based on preliminary feasibility studies, Pan African will generate around 28% of its power requirements through renewable energy, with a cumulative estimated reduction of 137 000 t in CO_2 emissions annually and projected annual cost savings of up to R154 million for the Group, at current estimated Eskom tariffs and projected future price increases.

Further to this, Pan African has entered into a PPA with Sturdee Energy for a wheeled renewable energy solution of 40 MW from its Bela-Bela Project (Bela) solar PV facility in Limpopo to any of the Group's operations.

The initial PPA term is for 10 years, with the option to extend it for another five years. The indicative tariffs over the extended 15-year period will be significantly lower than those expected from Eskom. The Bela solar PV facility is expected to provide some 112 399 MWh of renewable energy per annum to Pan African, resulting in an estimated R646 million NPV10 savings over a 10-year period and R884 million over a 15-year period.

The Bela solar PV facility has already obtained the key permits required for construction. These include environmental approvals, water use license, and rezoning approvals. The facility will be connected to the Eskom grid via a 132 kV line in the area of Bela Bela.

"With the majority of our renewable energy projects scheduled to come online by 2025, Pan African's clean energy sources will account for around 30% and realise estimated annual cost savings of R130m (at current Eskom tariffs) and carbon emissions reduction of around 137 000 tons per year," concludes Hira. ■

"Assuming an estimated annual tariff increase rate, by Eskom, of 10% per year, a payback period of around eight years is estimated. Based on preliminary studies, Fairview's solar facility will reduce the Group's carbon emissions by some 22 000 t of CO_2 per annum," explains Hira.

The paradox of green metal demand and the Just Energy Transition

By Spencer Eckstein – Director, Ukwazi Mining Studies

At COP26, in Glascow 2021, the USA and certain EU members promised to provide $8.5bn over five years to support South Africa's Just Transition. That funding now seems in jeopardy owing to a potential decision by government to extend the life of certain coal powered stations and to relax air emissions standards for some of Eskom's power plants.

South Africa is uniquely poised to take advantage of the increased demand for green metals.

In the EU, some members have backtracked on commitments to reduce their usage of fossil fuels (e.g. in September 2022, the German government passed legislation to extend the life of three of its major coal-fired power stations) as the energy crisis caused by the Russian/Ukrainian war deepens. In contrast, others have embraced renewables more completely; the ports of Rotterdam and Antwerp have done feasibility studies to assess the viability of operating off hydrogen. In 2022, 41% of the UK's total energy mix came from renewables. Norway has indicated that its entire energy supply will be 100% from renewables by 2030, Denmark by 2040 and Sweden by 2050.

Due to loadshedding, where Stage 6 seems to be the current dominant trend , mining companies with ESG considerations in mind, have been quick to embrace renewables. In June 2022, the Minerals Council South Africa said that the mining industry had a pipeline of 73 projects, from 24 mining companies, to generate 5.1 GW (5,116 MW), valued at more than R65bn. Roughly one year later, the Auctus Metals report (May 2023) suggested that the renewable project pipeline in the private sector in South Africa stood at around 13 000 MW.

The gold sector, via Gold Fields and its renewable projects at South Deep, and the PGM sector, with players such as Anglo Platinum and Sibanye-Stillwater, have been quick out of the starting blocks to focus on solar projects and the use of hydrogen for vehicles, green steel making, and power generation, amongst others.

In contrast, vanadium players, such as Bushveld Minerals, have focused on processing vanadium oxides to supply battery materials, particularly to China. The coal sector for obvious reasons has been less excited about renewables. The usual refrain is that renewables cannot supply baseload power and are expensive. Experience and evidence from other countries suggests this is not the case. The exceptions in the coal sector have been Exxaro, which is transforming itself from a coal producer to an energy company, and Seriti, which has invested in a wind farm.

The paradox of the quest for green metals and battery solutions, particularly for EVs and the transition to renewables such as solar, wind or hydrogen, is that it requires more mining and more commodities,

In the EU, some members have backtracked on commitments to reduce their usage of fossil fuels.

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South Africa is uniquely poised to take advantage of the increased demand for green metals.

not less! So, the transition will be built on metals and minerals as core ingredients in the energy transition. Accordingly, the tension between demand and supply dynamics on one hand and ESG on the other needs to be managed and mitigated. However, as a recent banking advert stated: It is not either net profit or net zero emissions, it can be both.

According to a relatively recent IMF report (Jan 2021), the demand for green metals will require increased investment in mining in an uncertain economic climate locally and globally between now and 2050 because the demand for green metals is likely to increase by 25% to 30% (compounded annually). It also implies that there are likely to be supply shortages in the short to medium term, where demand will outstrip supply, causing prices to tick upwards. A typical electric vehicle battery pack, for example, needs around 8 kilograms of lithium, 35 kilograms of nickel, 20 kilograms of manganese and 14 kilograms of cobalt, while charging stations require substantial amounts of copper. For green power, solar panels use large quantities of copper, silicon, silver and zinc, while wind turbines require iron ore, copper, and aluminium.

In the Presidential Climate Commission report on the Just Energy Transition Investment Plan (issued on 15 May 2023), the authors advocated in-depth consultation with stakeholders to ensure access to affordable electricity for vulnerable communities and to mitigate potential job losses. It suggested that the implementation should be in two phases to allow for skills development and capacitation, which implies that implementation will require roughly double the time required for implementation than originally envisaged. The report also suggested that EV and the hydrogen economy components be developed as a sector under the Investment Plan and that public private partnerships be used to finance the upgrades to the national grid within the context of the National Transmission Company of South Africa, once established under Eskom Holdings.

South Africa is uniquely poised to take advantage of the increased demand for green metals as we can supply most of them: provided we make smarter policy choices, streamline our permitting systems and processes; and create sufficient space for the industry to contribute capital and skill to the Just Energy Transition in a manner that optimises implementation. ■

Mining companies with ESG considerations in mind, have been quick to embrace renewables.

CEO of the Federation for a Sustainable Environment, Mariette Liefferink.

South African mines take up the GISTM gauntlet

The launch of the Global Industry Standard on Tailings Management (GISTM) in August 2020, following the failure of the Córrego do Feijão mining facility in Brumadinho, Brazil, which killed 270 people and caused significant environmental damage, has seen the global mining industry aligning with the GISTM. *Modern Mining* recently caught up with CEO of the Federation for a Sustainable Environment (FSE), Mariette Liefferink, to find out how proactive the local mining industry has been in meeting the targets set out by the GISTM. By *Nelendhre Moodley*.

"Shortly after the disaster in Brumadinho, a call to industry was issued, supported by key investors. A Global Industry Standard on Tailings Management (GISTM) was developed and subsequently launched in August 2020," says Liefferink.

She explains that tailings storage facilities (TSFs) are among the largest dams and structures in the world that will stand in perpetuity.

"As most of the TSFs in South Africa are upstream TSFs, they are considered low cost but high-risk developments. If poorly designed, constructed, or managed, TSFs present a significant risk to local communities and ecosystems, especially in downstream environments. A catastrophic release of a large amount of tailings could lead to long term environmental damage with huge clean-up costs."

TSF poses high risk to people and the environment

According to Liefferink, historic tailings storage facilities have several associated challenges including, amongst others, that most of the historic TSFs are unlined (which poses challenges regarding ground and surface water contamination); have steep slopes (making the establishment of vegetation difficult and resultant erosion and dust fallout); as well as the fact that a number of TSFs have historically been constructed in wetlands.

"Due to the encroachment of residential developments onto TSFs, risks and hazards to local communities, such as radioactivity, windblow dust, contaminated water and soil, etc, have increased. To manage mining facilities responsibly, the TSF owner must understand the physical and chemical risks associated with the TSF and implement controls to reduce risks relating to potential health, safety, environmental, societal, business, and economic impacts in line with regulations."

Liefferink cites a 2008 report titled *A Remote Sensing and GIS Based Integrated Approach for Risk Based Prioritization of Gold Tailings Facilities*

TSF failures include slope failures of two TSFs, owned by the Mintails Group of Companies. (Photo: Mark Dalde)

(Photo: Mark Olalde)

TSFs are located close to residential areas.

— *Witwatersrand, South Africa*, which states that there are 270 TSFs within the Witwatersrand gold fields alone, containing over 6 billion tons of iron pyrite tailings.

The situation is further exacerbated by the fact that South Africa has been left with a legacy of abandoned tailings storage facilities, the majority of which have unstable slopes; no dust or erosion control or stormwater management systems; no functioning piezometers and no penstocks or toe paddocks, access control, warning signs or fences.

This has resulted in several TSF failures (the most recent were slope failures of two TSFs, which were owned by the Mintails Group of Companies), which have impacted ground and surface water resources, air quality, sensitive and protected eco-systems, and the health and safety of local communities and the environment.

(Photo: Mark Olalde)

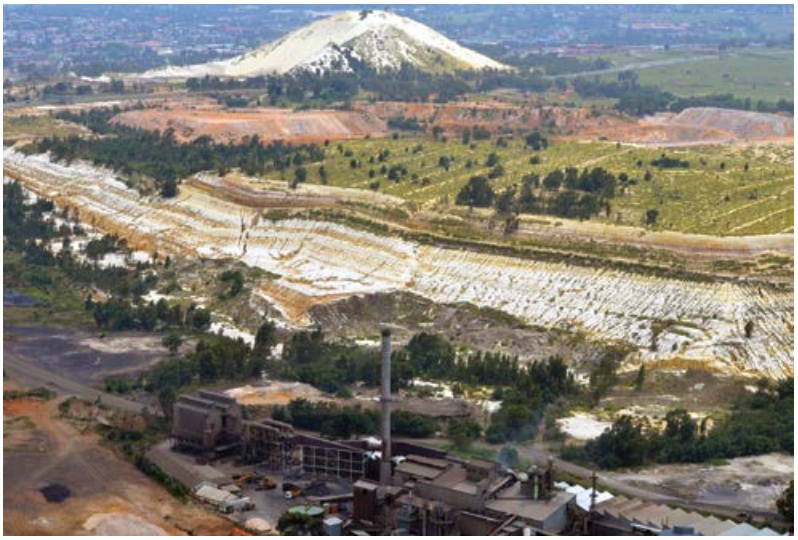
Legislating TFS

Liefferink says the requirement to rehabilitate any environmental damage that occurred during mining, and to make financial provision for the rehabilitation and management of environmental impact or damage only became a legislative requirement in 1956 with the promulgation of the Mines and Works Act (27 of 1956).

To a large extent tailings dams were unregulated throughout the first half of the 20th century.

Speaking of the road to TSF legislation, Liefferink explains that in 1978, the Chamber of Mines' *Guideline for Environmental Protection – The Design, Operation and Closure of Metalliferous and Coal Residue Deposits*, provided the first structured guideline for the design and operation of tailings dams in Southern Africa. It was subsequently updated in 1983 and again in 1996.

"In 1998, the South African Bureau of Standards' Code of Practice: Mine Residue, although not legally binding, provided guidelines for the siting, design, construction, operation, management, surveillance and closure of tailings dams in Southern Africa. In South Africa, SANS 10286 (SABS, 1998) has been adopted by many mining companies. Since the adoption of SANS has been so pervasive, it is likely



(Photo: Mark Olalde)

A close-up of Mintails' TSF.

that the courts referred to it as a benchmark in the absence of other legislation," she notes.

Interestingly, it was only in 2001 that the South African Department of Mineral Resources (DMR) required that the owner of a TSF have a mandatory Code of Practice for the facility.

The Code of Practice documented areas of responsibility for any mine residue deposit and required that it be updated on a continual basis.

Currently, there are a number of legal documents governing the construction and operation of TSFs in South Africa and compliance with the National Environmental Management Act, (NEMA), Mine Health and Safety Act (MHSA), National Environmental Management Waste Act, National Water Act, and the Constitution of South Africa (1996), amongst others, is required.

The South African Constitution states that everyone has the right to an environment that is not harmful to their health or well-being; to have the environment protected for the benefit of present and future generations through reasonable legislative and other measures that prevent pollution and ecological degradation; promote conservation; and secure ecological sustainable development and use of natural resources while promoting justifiable economic and social development.

Dwellings are located close to TSFs.

Given the individual's rights to a clean and healthy environment, legislation has identified who is to bear responsibility for TSF related issues – i.e. firms, directors and those in management positions are to be held accountable should there be a failure in duty of care in the construction, operation and management of TSFs.

Liefferink explains that Section 34 of NEMA makes provision for firms (including companies and partnerships) and their directors (including board members, executive committees or other managing bodies or companies or members of close corporations or of partnerships) to be held liable, in their personal capacities, for environmental crimes.

"This personal liability also applies to managers, agents or employees who have done or omitted to do an allocated task, while acting on behalf of their employer."

The Mine Health and Safety Act (MHSA) states that a general obligation rests on every employer to identify the relevant hazards and assess the related risks to which non-employees are exposed and to ensure that non-employees who are directly affected by the activities at the mine, are not exposed to any hazards to their health and safety.

"To this end, the employer must establish a policy concerning the protection of non-employees who are directly affected by the activities at the mine."

In the case of TSFs at abandoned mines, the Mineral and Petroleum Resources Development Act contends that these become the responsibility of the Department of Mineral Resources and Energy (DMRE).

The DMRE has, in cooperation with the Council for Geoscience, developed a national database of abandoned mines, with some 6 000 mines having been identified (2008 statistics).

These mines, which include gold mines, asbestos mines, copper mines, bismuth and molybdenum mines, have been found to pose a high environmental risk.

"Within the Witwatersrand gold fields there are no ownerless TSFs except for the Davidsonville Dump and the Tudor Dump of which the ownership is uncertain. There are, however, several dumps in care and maintenance," explains Liefferink.

South African miners play their part

The International Council on Mining and Metals (ICMM), which represents the world's top 30 largest global mining companies, requires compulsory compliance to GISTM requirements by its members.

As such, ICMM members have committed to work towards designing, constructing, operating, monitoring and decommissioning tailings facilities that conform with the Global Industry Standard on Tailings Management.

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"The Standard strives to achieve the ultimate goal of zero harm to people and the environment with zero tolerance for human fatality. It requires operators to take responsibility and prioritise the safety of tailings facilities, through all phases of a facility's lifecycle, including closure and post-closure. It also requires the disclosure of relevant information to support public accountability and the establishment of an Emergency Preparedness and Response Plan."

According to Liefferink, although compliance with the GISTM is mandatory only for the current 30 members of the ICMM, financial institutions and insurers are likely to look increasingly tat the standard of management of tailings storage facilities when assessing dealings with mining houses; which makes it all the more imperative that mining houses adhere to the standards set by the GISTM.

"The FSE has knowledge of Sibanye-Stillwater and Gold Fields, as members of the ICMM, ascribing to the GISTM not only within the Witwatersrand gold fields but worldwide while other mining companies, such as DRD GOLD, Pan African Resources (a mid-tier gold mining company) and Harmony Gold, are all working towards the implementation of some of the principles of the GISTM. Other companies, include African Rainbow Minerals, Anglo American, Anglo Gold Ashanti, BHP, Glencore, Rio Tinto and South 32."

Sibanye-Stillwater rolls-out its TSF strategy

Multinational mining and metals processing group, Sibanye-Stillwater, has been proactive in aligning with the standards set out by the ICMM and recently co-opted the services of the FSE to deliver presentations on tailings and the management of tailings storage facilities – as an independent and unrestricted party – to Sibanye-Stillwater's host communities. The FSE's mandate relates to:

- ❑ Inform interested and affected parties of the hazards, risks and impacts of tailings and tailings storage facilities.
- ❑ How to minimise the risks to communities from tailings and tailings storage facilities.
- ❑ Prepare the host communities in the event of the failure of a tailings storage facility.

TSFs on the East Rand with dwellings established on site.

- ❑ Involve interested and affected parties in decisions regarding closure and closure objectives, post-closure and future land use.

Sibanye-Stillwater, the world's largest primary producer of platinum, second largest primary producer of palladium and third largest producer of gold, has already developed an Emergency Preparedness and Response Plan and Trigger Action Response Plans (TARPs), which are tools used to identify and manage risk.

TARPs describe pre-defined trigger alert levels (green, yellow, orange, and red) that are based on risk controls and critical controls of the TSF.

Liefferink explains that Sibanye-Stillwater has installed warning sirens in strategic places within the communities where it can be audible to all affected community members, should an emergency arise and evacuation is required, and has prepared a safety card (what to do and what not to do in the case of an emergency).

"Sibanye-Stillwater has also entered a MOU with the Gift of the Givers Foundation to provide humanitarian aid in case of a TSF failure. This information is currently presented to Sibanye-Stillwater's host communities as well as the findings of the dam breach assessments."

According to Liefferink, some of the leading local mining companies in South Africa continue to work proactively towards meeting the targets set out by the GISTM, with initiatives by companies, such as Sibanye-Stillwater, being a case in point. ■

The Victoria Falls Stock Exchange: A pathway to success for junior mining companies in Zimbabwe

By NSDV's Methembeni Moyo: Lawyer Foreign Qualified Mining and Construction & Dominic Varrie: Candidate Attorney

Methembeni Moyo: Lawyer Foreign Qualified Mining and Construction.

Dominic Varrie: Candidate Attorney.

Zimbabwe is renowned for its geological wealth, skilled mining labour force and a generally well-developed mining sector. With recent world class lithium discoveries and the seemingly insatiable global demand for battery minerals, Zimbabwe should be poised to become a global mining superpower. However, progress is perennially obstructed by economic and political challenges which render Zimbabwe a high currency risk mining destination. If the currency risk issues that affect Zimbabwe's mining sector can be addressed, foreign and local investors will be more inclined to inject funding that could afford junior to mid-tier miners the much-needed capital to take advantage of Zimbabwe's vast natural resources.

The mining sector is a critical feature of Zimbabwe's economy, accounting for around 12% of the country's gross domestic product (GDP) and around three-quarters of Zimbabwe's export earnings in 2022. While some economists are sceptical, the Zimbabwean government remains optimistic that the country's mining output will reach US$12 billion by year end of 2023.

Currency risk and economic challenges faced by miners in Zimbabwe

The fundamental deterrent to investing in Zimbabwe's mining sector is unfavourable and uncertain exchange control, currency and fiscal policies. Investors need to be assured that they can put money into the country and take out their gains without undue restriction. Zimbabwe's laws and prevailing economic conditions do not provide investors that comfort. This makes raising foreign currency, externally or locally, for expensive capital-intensive mining projects difficult.

Large multinationals operating in Zimbabwe's established platinum sector, for example, have the balance sheet to mitigate Zimbabwe's foreign currency risk. However, with mining costs on the rise due to inflation, junior to mid-tier miners are finding it challenging to raise the capital required to take advantage of the favourable commodities price cycle in precious metals and battery minerals.

However, there are some innovative avenues available to junior and mid-tier miners to raise the much-needed funding to thrive in Zimbabwe's challenging economic environment.

The Victoria Falls Stock Exchange (VFEX)

One such exciting innovation is the introduction of the Victoria Falls stock exchange (VFEX). The VFEX is an alternative stock exchange established in 2020 as a subsidiary of the main Zimbabwe Stock

Caledonia raised US$7.8 million, used in part to fund a 12 MW solar PV plant.

Exchange (ZSE) to operate in the Victoria Falls special economic zone.

The bourse incentivises listings with the prospect of raising capital in hard currency. These incentives include that:

- ❑ All the cash inflows raised on VFEX are considered free funds and can be kept in FCA Investments Foreign currency accounts.
- ❑ There is allowance to use offshore settlement for trades conducted on the VFEX.
- ❑ VFEX also offers tax incentives for shareholders and exemption from capital gains and withholding tax for the bourse investors.
- ❑ VFEX has provided an avenue for international investors into Zimbabwe without the associated currency risk. The success of the bourse is undeniable, with an over 400% increase in market value in the last year, with it currently sitting at US$1.4 billion. The value of stocks traded during the first quarter of this year amounted to more than US$13 million.

VFEX has created a procedure for listing specifically applicable to junior mining companies. A junior mining company is a company whose principal activity is that of mining. However, it does not qualify to list on the main board, though it does qualify to list on the junior board.

The criteria for the listing of junior mining companies prescribes that they must have:

- ❑ A subscribed capital of US$250 000.
- ❑ Not less than 5 million equity shares in issue.
- ❑ A satisfactory profit history for the preceding three financial years, if applicable.
- ❑ At least 20% of each class of equity shares must be held by public shareholders, unless otherwise agreed with the VFEX.
- ❑ The number of public shareholders of listed securities must be at least— (i) 50 in respect of equity shares; (ii) 25 in respect of preference shares; (iii) 10 in respect of debentures.
- ❑ Minimum spread criteria should be complied with on a continuous basis.

Tharisa and Caledonia's VFEX listing

The listing of Caledonia Mining Corporation (Caledonia) in 2021, demonstrated the funding potential of the VFEX. Caledonia received incredible support from Zimbabwean investors who oversubscribed by more than 50% for the Caledonia Depository Receipts. Caledonia ended up raising US$7.8 million, much more than the originally targeted US$3 million. The capital raised was used in part to fund a 12 MW solar PV plant that became operational in November 2022 to reduce on-mine costs.

Caledonia Mining's smelter operations in Zimbabwe.

Bindura Nickel project in Zimbabwe.

Tharisa Minerals' (Tharisa) successful listing in December of just over US$30 million in 3-year bonds is another example of the immense fund-raising potential of the VFEX for mining operations. The funds raised on the VFEX by Tharisa will be critical in enabling Tharisa to finance the proposed US$391 million Karo Platinum project in Zimbabwe.

Another Zimbabwean miner that is listed on the VFEX is Bindura Nickel Corporation, which listed on 17 December 2021.

The funding potential of the VFEX model has been successfully demonstrated through the Caledonia listing and subsequent fund raising as well as the Karo Platinum project listing, for example. Listing on the VFEX in addition to other funding strategies could be the answer to funding mining projects in what has historically been a difficult cash environment. Couple that with an unprecedented commodities price cycle, and there may be a pathway to finding the capital needed to build a successful mining project in Zimbabwe. ■

Precious Metals Act, the gateway to responsible sourcing of precious metals

By ENSafrica's Ntsiki Adonisi-Kgame (Head of department: Natural Resources and Environment), Mihlali Sitefane (Senior Associate: Natural Resources and Environment) & Zinzi Lawrence (Senior Associate: Natural Resources and Environment)

The precious metals industry is a vibrant industry given the relatively stable prices of precious metals around the globe. In recent years, there has been a rise in the number of small players that supply precious metals to large-scale mining companies and refineries and this has put a spotlight on the applicable regulatory framework to ensure the lawful dealing in precious metals.

Ntsiki Adonisi-Kgame : Head of department: Natural Resources and Environment.

Zinzi Lawrence : Senior Associate: Natural Resources and Environment.

Mihlali Sitefane : Senior Associate: Natural Resources and Environment.

The precious metals industry is a vibrant industry.

Responsible sourcing of precious metals entails a due diligence exercise by both the supplier and acquirer of precious metals. In order to avoid liability, companies must undertake due diligences before dealing in precious metals.

The primary legislation regulating the trade of precious metals is the Precious Metals Act, 2005 (PMA). The PMA seeks to regulate 'unwrought precious metals' and 'semi-fabricated precious metals'. The PMA goes into detail as to what constitutes 'unwrought' or 'semi-fabricated' precious metals and, upon interpretation of these definitions, the PMA is concerned more with metals and ores, as opposed to manufactured wrought articles or end use products.

Section 20(1) of the PMA provides that it is not only unlawful to possess precious metals without being authorised to do so, but it is equally unlawful for anyone to receive precious metals if the recipient has not satisfied itself that the deliverer itself is authorised to possess and deliver. Any person who contravenes the prohibitions outlined in section 20(2) of the PMA is guilty of an offence and is liable, on conviction, to a fine not exceeding one (1) million rand or to imprisonment for a period not exceeding 20 (twenty) years or both. In addition, the rise of ESG considerations has heightened the importance of responsible sourcing of precious metals for all parties involved.

Having regard to the above, it is imperative for both the supplier of precious metals and companies that acquire such precious metals to understand the permitting that should be in place before dealing in such precious metals.

Sections 4 and 5 of the PMA contain prohibitions for any person wanting to acquire, possess or dispose of (either as principal or as agent) any unwrought precious metal or semi-fabricated precious metal unless such a person is i) a holder of a refining licence; ii) an authorised dealer iii) the person who has mined the precious metal pursuant to a valid mining title in terms of the Mineral and Petroleum Resources Development Act, 2002 (MPRDA) iv) a person who has obtained a certificate from the South African Diamond and Precious Metals Regulator authorising him or her to acquire or to dispose of such unwrought precious metal or semi-fabricated precious metal v) a holder of a precious metal beneficiation licence vi) a holder of a jewellers' permit (this exception only applies to semi-fabricated precious metal – not unwrought precious metal).

Having regard to the above provisions, for purposes of responsible sourcing of precious metals, some of the key questions that parties must pose before acquiring precious metals is the source and ownership of the precious metal. This includes, among others, an enquiry into whether the party has a valid mining title under the MPRDA and therefore qualifies as a producer under the PMA. In addition, it is important to note that where a holder of a mining title obtains precious metals from third parties and processes the precious metals at its own mine operations and/or on-sells the precious metals to buyers, the holder of the mining title is not a producer for purposes of the PMA in respect of the precious metals sourced elsewhere. In such instance, the holder of the mining title is required to obtain an authorisation in terms of the PMA in order to acquire, possess, sell, transfer or otherwise dispose of precious metals

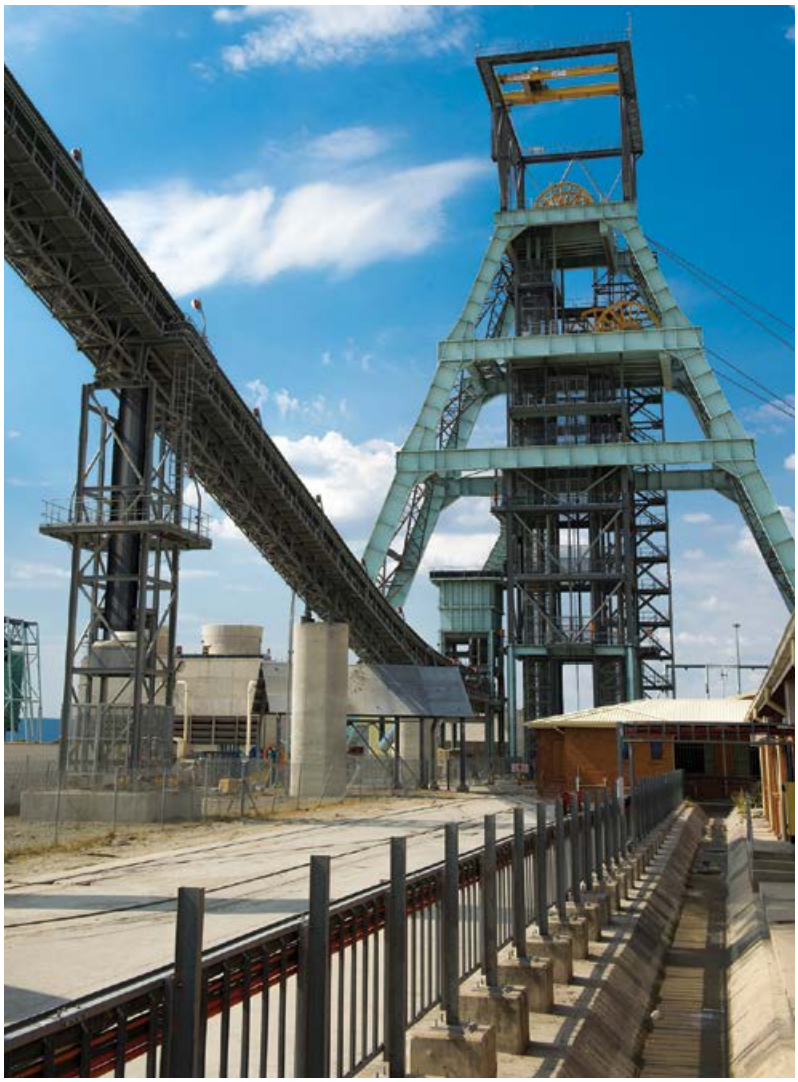
Responsible sourcing of precious metals entails a due diligence exercise.

not sourced from its mining area by virtue of its valid mining title

Of late, there has been an emergence of directives issued by the Department of Mineral Resources and Energy in terms of section 28 of the National Environmental Management Act, 1998 (NEMA) authorising environmental rehabilitation/clean-up exercises for historical/abandoned slimes/waste rock material (which usually contain gold bearing material). Although the authorised activity relates to rehabilitation of the site, persons issued with such directive regard this directive as a form of authorisation to possess, treat and dispose of the material in the tailings for purposes of commercial gain, when in law, such a directive does not authorise them to do so.

Another key consideration for responsible sourcing is whether the third party has the licencing required in terms of NEMA or any other relevant environmental legislation depending on the source of the material. This is particularly important given the wide ambit of liability under the duty of care in terms of section 28 of NEMA, which requires every individual to prevent harm and damage to the environment, in the event that such harm and damage cannot be prevented, it must be minimised and remediated.

Responsible sourcing of precious metals entails a due diligence exercise by both the supplier and acquirer of precious metals. In order to avoid liability, companies must undertake due diligences before dealing in precious metals. This will become all the more significant as the pressure mounts for companies to implement ESG practices in their business strategies. ■



The Precious Metals Act is the gateway to responsible sourcing of precious metals.

Ross Harvey, director of research and programmes at GGA.

Sympathise with the Reserve Bank's Monetary Policy Committee

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

Spare a thought for the poor monetary policy committee (MPC) members who manage monetary policy for South Africa. The Reserve Bank, an entity fully independent of the state, has a mandate to target inflation (to keep it under 6% per year). Conventional economic wisdom is that inflation eats value, and stable prices help to create the right conditions for economic growth. Inflation is typically understood as too much money chasing too few goods.

Limiting the money supply is, theoretically, the way to curb inflation. Of course, the reality is more complex. It's complex because the Reserve Bank only really has one instrument at its disposal: interest rates. Technically, pushing up the interest rate is meant to induce savings and reduce spending. In the South African context, though, most consumers are indebted and higher interest rates simply mean more money spent on servicing that debt. It might tame inflation, but only within a closed model.

Limiting the money supply is, theoretically, the way to curb inflation. Of course, the reality is more complex. It's complex because the Reserve Bank only really has one instrument at its disposal: interest rates.

There is also a global reality. South Africa is a tiny economy, highly dependent on imports. Imported goods such as refined fuel are largely priced in US dollars. So, the Reserve Bank must consider not only the volume of money in circulation locally to tame inflation, but what interest rate movements might do to the value of the Rand. There is a reason, for instance, that the MPC typically follows the US Federal Reserve's interest rate decisions or tries to pre-empt them by moving our interest rates to get ahead of the curve.

If you're still following, this is how it works: the US Fed also has an inflation-targeting mandate, and US inflation has been out of order lately, resulting in the Fed continuously hiking rates. This makes US bonds relatively attractive to hot money, and so liquid investment chasing yields tend to move out of emerging market currencies and back to safe havens like the dollar. Our MPC then hikes our rates to try and least keep some hot money chasing bond yields and thus buoying the value of the currency to temper import-driven inflation. However, this only works ceteris parabus (all else remaining relatively stable). But nothing in our context – local or global – is stable. The MPC, in a highly considered statement on 25 May, decided to increase the repo (repurchase) rate by 50 basis points to 8.25% a year – commercial banks operate at 400 basis points higher than the Reserve Bank, so they're retailing interest at 10.25%. Unusually, it was a unanimous MPC decision. In light of the global outlook, the tightness of global oil markets and sticky core inflation outlooks across the world, it took out the big guns. Normally, the Rand strengthens a bit when interest rates go up. This time, it tumbled substantially. It was trading at R19.26 to US$1 on 24 May. After the 25 May announcement, it dropped to a record R19.82. At the time of writing, it had recovered to R18.35. But the point remains that the Reserve Bank has a blunt instrument with which it is trying to put out fires that it didn't start and are sustained by villains elsewhere. There are three major fires currently destroying South Africa, and the fire hydrant to solve them is not fiddling with interest rates. It is nothing less than wholesale political and economic reform.

First, our foreign policy is killing us. As I write this column, *Business Day* reports our foreign minister, Naledi Pandor, as saying that the country "will not be coerced into changing its non-aligned foreign policy stance on the conflict between Russia and the Ukraine" for the sake of trying to remain eligible for the US trade pact commonly known as AGOA

South Africa is a tiny economy, highly dependent on imports.

(the African Growth and Opportunity Act). She is playing dangerous games. It's not a 'conflict'; it's a war started by an utterly unwarranted invasion by Russia. And losing AGOA would cost South Africa in the region of R60 billion a year in lost exports, thanks to privileged access to US markets currently protected under AGOA. It's not just that the ruling party is clearly putting its own warped interests ahead of those of the country, it's that South Africa appears to actively be supporting the Russians. A confidential briefing I've just seen indicates that the idea of South Africa having supplied arms to Russia is unlikely but not impossible, especially given that the President has ordered an inquiry into the matter.

Second, loadshedding continues to plague the economy. No power, no economy. It's really as simple as that. The Reserve Bank has forecast growth recovery to 1% next year. I don't see it happening, as even if loadshedding does not stay at stage 6 or worse into 2024, the very reason for recovery will be because energy-intensive businesses – mining, construction and manufacturing – are in decline. The FNB/BER Building Confidence Index, just released, indicates that "more than 70% of respondents are dissatisfied with prevailing business conditions."

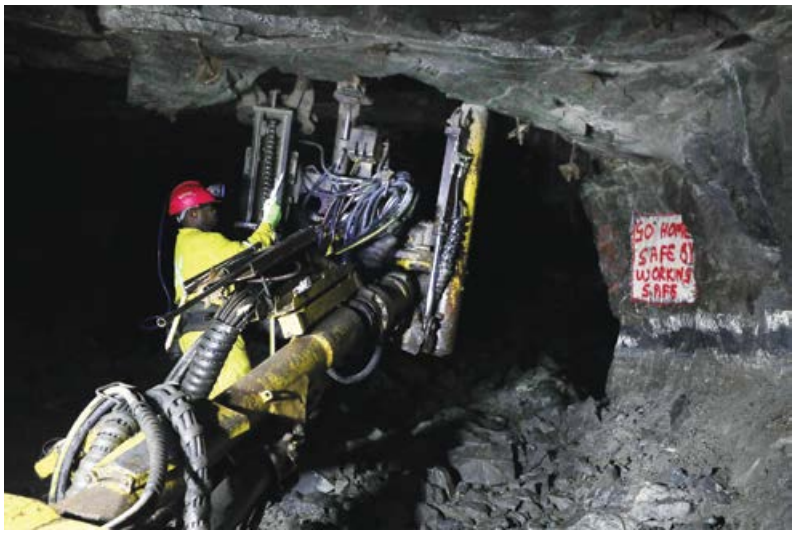
Third, organised crime continues to destroy not only Eskom's ability to deliver power (never mind the grand corruption that is partially responsible for Medupi and Kusile being perennially sub-optimal), but also Transnet's ability to provide rail and port services efficiently. Of course, one cannot only blame organised crime – rampant corruption and blatant incompetence at the highest levels play a substantial role too.

What is the upshot of these matters? Well, big business eventually stood up and said, "we've had enough and we're here to help" – they've set up various workstreams and there's some positive momentum. Of course, they'll see quickly enough why nothing gets done – the state is utterly disorganised and largely inept at delivering on its core mandate to provide public goods such as justice and basic services (water, roads, rail, health and education). So, even if these workstreams manage to find some solutions, they won't be sustained unless there's irrevocable insistence on institutional reform. Moreover, big business would be well advised to invest prudently into institutions that help government to become more effective, but also that help citizens to hold the government to account. Institutionalised constraints on executive power remain the critical building block of any society that hopes to have a future. Our chapter 9 institutions and the national prosecuting authority need to be strengthened. You can fix potholes today, but tomorrow they'll fall apart because the basic structures of managing contracts in non-corrupt ways haven't been put in place.

Even with big business stepping up to the plate, we have to face the reality that those 'for sale' signs going up all over the place in wealthy suburbs are not just a bunch of wealthy know-it-alls semi-grating to the Cape; they're a sign of real wealth leaving the country. As Rob Rose reports in the *Financial Mail*, the Africa Wealth Report reveals that the number of high-net-worth South Africans with more than $1m in "investable wealth" has fallen by 690 in the past year. This is mostly due to emigration. Over the last decade, the number of local dollar millionaires has fallen by 21%. Applications by South Africans for citizenship elsewhere rocketed by 340% in the first quarter of 2023 year-on-year. These are mostly from people who are trying to get out before it becomes too difficult. Either way, emigration of the wealthy is unfortunately often a harbinger of middle-class departure too, who are hardest hit by the double whammy of inflation and interest rate hikes.

Of course, people leave for various reasons, but the trends are not encouraging. For those of us committed to staying, we must do the hard work of fighting for institutional reform alongside identifying the opportunities that will help to move us out of this morass. ■

No power, no economy.



Energy-intensive businesses – mining, construction and manufacturing – are in decline.

New Cat® D10 Dozer is more productive, durable and serviceable

Construction equipment manufacturer, Caterpillar (Cat) has introduced its New Cat® D10 Dozer which burns less fuel, increases productivity and improves uptime. Featuring a stator clutch torque converter and load-sensing hydraulics, the new design is up to 6% more efficient than the Cat D10T2. Its combination of improved technology, longer component life, extended oil changes and increased serviceability reduces maintenance and repair costs up to 8%, helping the new D10 deliver industry-leading low cost of ownership, the company said. The new D10 is powered by the Cat C27 engine, which offers aftertreatment solutions to meet U.S. EPA Tier 4 Final/EU Stage V as well as Tier 2 equivalent emissions standards for meeting the needs of the global market. Maximising material moved per litre of fuel, the C27 switches power settings based on travel direction to offer up to 20% more power in reverse, reducing cycle times. In addition to delivering productivity gains of up to 3%, the new D10 offers up to a 4% fuel consumption advantage over the D10T2 and up to 10% over the D10T. ■

New Cat® D10 Dozer.

Epiroc launches new construction drill rig SmartROC T25 R

Epiroc launches new construction drill rig SmartROC T25 R.

Equipment manufacturer, Epiroc, recently launched a new surface flagship radio remote drill rig, SmartROC T25 R. The construction rig offers a number of valuable features such as an exceptional coverage area, excellent terrainability, application versatility and a smart Rig Control System (RCS) – which future-proofs digital functions and helps to reduce the rigs climate impact through fuel savings, the company said. The new compact drill rig, developed for construction and quarrying, will be equipped with several valuable features and technologies. The Smart technology includes a smart RCS control system, providing the rig with the highest technology and automation level within its segment. "We are really excited to present this construction drill rig to the market, a rig that´s built on a completely new platform. SmartROC T25 R has the possibility to lead the way within its segment. This rig can make a real difference for our customers' productivity," says Marcus Leü, Global Product Manager at Epiroc. ■

Danfoss celebrates 30 years in South Africa

Danfoss, a multi-national Danish engineering company, has celebrated its 30th anniversary in South Africa, marking three decades of growth and expansion in the region. Founded in 1933 by Danish engineer Mads Clausen, Danfoss has evolved into a global enterprise employing over 42 000 people worldwide.

Following several strategic acquisitions, the company recently focused on integrating its local presence in South Africa, with the aim of leveraging its operations in the country to drive further expansion throughout Africa. Danfoss offers a wide range of energy solutions and expertise, with a strong commitment to energy efficiency and decarbonisation.

The company's portfolio includes solutions for reducing power consumption, improving cooling and heating systems, optimising wastewater treatment, and enhancing mining productivity. The company has embraced an 'energy efficiency first' principle and is actively working towards achieving carbon neutrality in its global operations by 2030.

"To mark 30 years of pioneering sustainable growth together, and looking forward to going from strength to strength, both locally and on the continent, we crowned this anniversary with a local celebration for our partners, customers and colleagues, " said Emil Berning, Country Manager for Sub-Saharan Africa.

Danfoss's Roy Naidoo, Ziad Al Bawaliz, Emil Berning, and Shikantha Naidoo.

Pumping innovation underpins GEHO success

As mines look for ways to improve their sustainability performance, reducing energy and water consumption are key goals. Weir Minerals' GEHO® positive displacement pumps have been helping mining customers achieve both, while innovating continuously for longer equipment life and greater reliability.

The GEHO® pump range is well known in various pumping applications including tailings, backfill, ore transportation and dewatering. Weir Minerals Global Product Manager for GEHO® positive displacement (PD) pumps, Erik Vlot, highlights the pumps' ability to pump highly viscous slurry, allowing mines to conserve water. The energy efficiency of pipeline transportation also helps cut energy costs and reduces mines' carbon footprint.

"The foundation of GEHO pumps' success is our ongoing attention to technical innovation and improvement," says Vlot. "This also allowed us to be pioneers in the pumping of very acidic material at high temperatures, such as nickel slurry at more than 200°C at a mine in Madagascar."

Weba Chutes Systems secures contract for Marikana operation

Weba Chutes Systems, a manufacturer of custom engineered chute systems, has secured a contract to supply four chutes to Sibanye-Stillwater's Marikana operation in South Africa. These systems will replace existing conventional chutes that have been underperforming and failing to meet the required standards set by Sibanye-Stillwater.

Weba transfer chutes being fabricated at Weba Chute Systems' facility in Germiston.

The four surge bin discharge chutes supplied by Weba Chute Systems will be responsible for feeding UG2 ore with a chrome content of 25% onto a vibrating feeder at the Marikana operation. The vibrating feeder operates at a peak capacity of 250 tons per hour, conveying fines with a maximum lump size of 90 mm and a bulk density of 3.8t/m^3. According to Dewald Tintinger, Technical Manager at Weba Chute Systems, the existing conventional chutes at the concentrator had been causing frequent blockages as well as exhibiting high wear, both of which were unacceptable.

"As always, when faced with such situations our objective is to custom-engineer a chute system that will address these issues and consistently perform according to the required specifications in the long term," he says. While Weba chutes have been applied primarily in the mining industry for the transfer of materials such as copper, gold, iron ore, diamonds, coal and platinum, the company has noted a growing demand from other sectors including aggregates and sand quarrying, power generation, steelmaking, cement production and food processing. ■

Bosch Rexroth Africa welcomes new Zambian distributor

Bosch Rexroth Africa welcomes Blumaq Zambia.

Bosch Rexroth Africa Development, a Bosch Rexroth Africa company, continues to grow the Group's footprint in Africa and recently welcomed a new Zambian distributor. The company, Blumaq Zambia, provides spare parts for the mining industry and entered into a distribution agreement with Bosch Rexroth Africa Development in February 2023.

Blumaq will supply the Group's services and offerings across Zambia, which will include aftersales service and support. Blumaq's staff will be equipped to deliver these services efficiently through tailored training provided by Bosch Rexroth Africa's renowned training department.

The services and product offerings will primarily be used in the mining sector and will involve the provision of mobile hydraulic solutions. "The partnership with Blumaq gives Bosch Rexroth Africa the opportunity to broaden its service offering in the region through Blumaq's pre-established presence," says said Bosch Rexroth Africa Development Manager, Lennox Joubert.

The agreement will be up for review in 2025. ■

Becker Mining South Africa and verope mining to supply mine winding ropes

Becker Mining South Africa and verope mining have partnered to supply high-performance mining winder ropes, with a full package of rope attachments, to the South African mining sector, as well as neighbouring states.

Becker Mining SA and verope mining team up.

In a joint venture with verope mining, Becker Mining now offers the latest steel wire rope design suited to both drum and friction winders.

"Through collaboration with verope mining, a global specialist in steel mine winder ropes, we have introduced an unmatched cost-to-performance ratio product into the South African market," explains Tom Searle, Senior General Manager: Capital, Becker Mining South Africa. "This advanced rope attachment system, which meets stringent quality and safety standards, is custom-designed to suit the specific winding requirements of each mine." ■

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FOR PEOPLE WHO ARE SERIOUS ABOUT MINING

Published 12 times a year, Modern Mining covers the entire spectrum of the mining industry from 'grassroots' exploration through to beneficiation. Modern Mining's goal is to deliver objective reporting and incisive articles not only on the technical aspects of mining but also on broader issues such as empowerment, sustainability, and regulatory issues. The emphasis is on original writing and reporting based on face-to-face interviews and visits to mining operations, both in South Africa and further afield. In terms of layout, it features a crisp, modern design which complements the high-quality editorial.

People who are 'serious about mining' read Modern Mining. It contains high quality and credible editorial which is valued by engineers and non-technical readers alike. For advertisers it offers a focused approach as well as tailored, integrated marketing campaigns. In terms of circulation, Modern Mining ranks among the mining monthlies with the highest ABC certified circulation. It reaches mining people throughout Africa and across the globe and is proud to offer advertisers a list of more than 30 countries as part of its mailing list. The print edition is distributed to a managed target audience. This is complemented by PDF replicas nearly 11 657 in total – of which 8 156 are distributed locally and 3 501 into Africa – which are mailed out each month and make up a significant total of the distribution.

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- Mining Indaba Preview

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- Motors & Drives

March
- Opencast Mining Contracting & Equipment
- Mining Indaba Review

April
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- Pumps & Valves

May
- Crushing & Screening
- Commodities Focus (Diamonds, precious metals, etc)

June
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July
- Green Mining (Environmental Management & Sustainability)
- Finance & Legal

August
- Women in Mining
- Suppliers to Mining Industry

September
- Regional Focus – West Africa
- Mining Technology (incl. shaft-sinking/raise-boring)

October
- Health & Safety
- Digital Mine

November
- Consulting Engineers / Project Houses
- Commodity Focus – Energy Minerals

December
- Materials Handling
- Explosives & Blasting

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