CROWN PUBLICATIONS

MODERN MINING

December 2022 | Vol 18 No 12

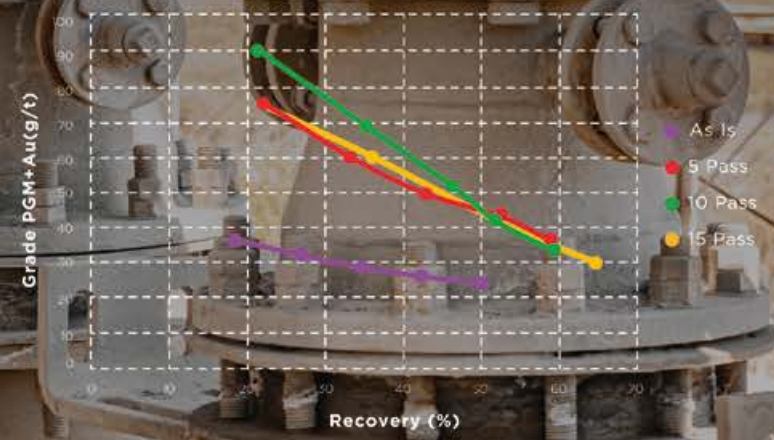
For people who are serious about mining

2022 – The best year yet for Brelko

- **Afrimat's diversification strategy** underpins its success
- **Southern Palladium's Bengwenyama** eyes production by 2028
- **Minerals Council South Africa advances the agenda** of junior miners
- **Jagersfontein tragedy draws attention to** increasing TSF failures

Improve your ESG and boost your profitability with the MACH REACTOR™

Now that is what we call Flotation Euphoria!



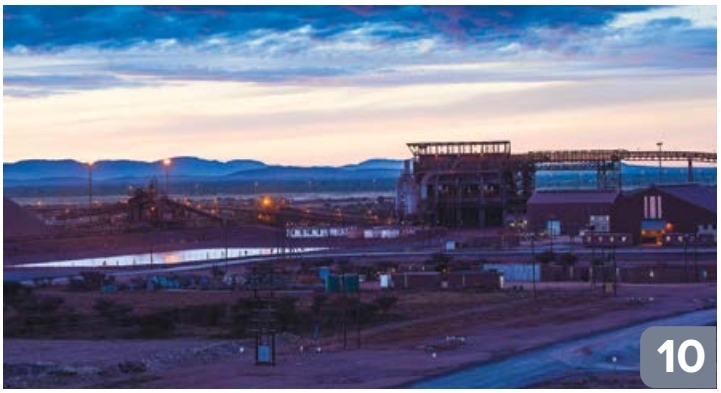
Invest in a MACH & boost your leach today!

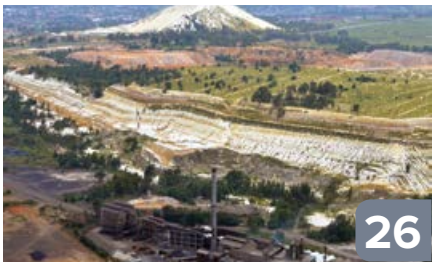
adrian@goldore.org | www.goldore.org

GOLDORE
TOMORROW'S TECHNOLOGY TODAY

MACH REACTOR™ Technology *is proudly South African, operating internationally.*

CONTENTS





ARTICLES

REGULARS

ON THE COVER

Brelko Conveyor Products' hefty investments in product development and expansion of its facility has set the company on a path to success. See story on page 8.

COMMENT

Population growth underpins demand for resources

Nellie Moodley

In mid-November, the world population clocked in at a staggering 8 billion people – just 12 years after hitting the 7 billion mark – placing further pressure on the earth's natural resources needed to feed, clothe, and progress modern society. India is set to surpass China as the world's most populous country, rising to 1.515 billion people in 2030 from 1.417 billion in 2022, with the USA, Indonesia, Pakistan, Nigeria, Brazil, Bangladesh, Ethiopia, and Russia, set to feature in the top ten of the world's most populous countries just eight years from now.

Industry pundits are already forecasting greater demand for minerals and metals, in particular precious metals, industrial metals, and new age minerals. In fact, The World Platinum Investment Council (WPIC) revised its calculation, now forecasting a deficit of 303 koz in 2023 as global platinum demand is expected to increase by 19% (to 7 770 koz) while supply is scheduled to increase by just 2% (to 7 466 koz). According to the industry body, the profound swing in market balances between the 2022 surplus and the 2023 deficit is anticipated to be more than 1.1 moz.

And, as the world works to drastically reduce its carbon footprint, it is turning to platinum – an integral component in the renewable energy space, in fuel cell electric vehicles and in driving green hydrogen as well as for its use in the construction of energy-efficient fibreglass – to meet its aspirations.

Southern Palladium's CEO, Johan Odendaal, whose flagship asset, the Bengwenyama project, is eyeing production by 2028, says the move towards clean energy sources is driving demand for PGMs, which bodes well for the new kid on the PGM block (pg 18).

Further to this, Dr Dave Lawie of IMDEX advises that demand for copper is expected to outstrip supply soon, and that 9.7-million tonnes of new copper supply is needed over 10 years from projects yet to be sanctioned. This is equivalent to nearly a third of current refined consumption if the industry is to meet the Paris Climate Agreement targets (pg 12).

Population growth also underpins iron ore miner Afrimat's success as the company's diversification strategy sees it focused on future materials and metals. In fact, given the globe's need for increased crop yields, Afrimat's latest acquisition – the Glenover Phosphate operation, which consists of rare-earths, phosphate, and vermiculite – is set to play a key role in meeting the needs of the population in terms of new age minerals and in augmenting crop yields (pg 14).

Given that more people means more pollution, more fossil fuels being burnt and greater deforestation, which, in turn, triggers changes in climate, and air and water quality, the mining sector, which is a key contributor to several negative impacts, is at the forefront of driving sustainable initiatives.

In line with this, *Modern Mining* spoke to the FSE's Mariette Liefferink about the impact of abandoned mines on communities surrounding mining operations. Abandoned mines, such as the Jagersfontein mine, have been in the spotlight for tailings dam's failures; however, as the industry aligns with the Global Industry Standard on Tailings Management, there is hope of better managed tailings storage facilities (pg 26).

Also featured in this edition is the Minerals Council South Africa, which has placed its foot firmly on the pedal to address concerns faced by the junior mining segment. This includes amping up its financial resource allocation to aid the junior and emerging miners' desk and engaging experts on the drafting of a fit-for-purpose policy for the sector (pg 22).

In our cover story, Brelko continues to gain traction in its global expansion strategy, especially in the Middle East where it has already provided products to Ma'aden, the Saudi state-owned mining company, to the tune of over $500 thousand this year alone (pg 8).

The December edition is our last edition for 2022 and we would like to wish our *Modern Mining* readers and advertisers a peaceful and happy year end break. ■

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

Circulation: Brenda Grossmann and Shaun Smith
Published monthly by: Crown Publications (Pty) Ltd
P O Box 140, Bedfordview, 2008
Tel: (+27 11) 622-4770
Fax: (+27 11) 615-6108
e-mail: mining@crown.co.za
www.modernminingmagazine.co.za

Printed by: Tandym Print

Average circulation
July-September 2022: 13 141

Latest generation of our flagship product, for large mining operations.

Scan to contact us today!

bme
Technology Solutions

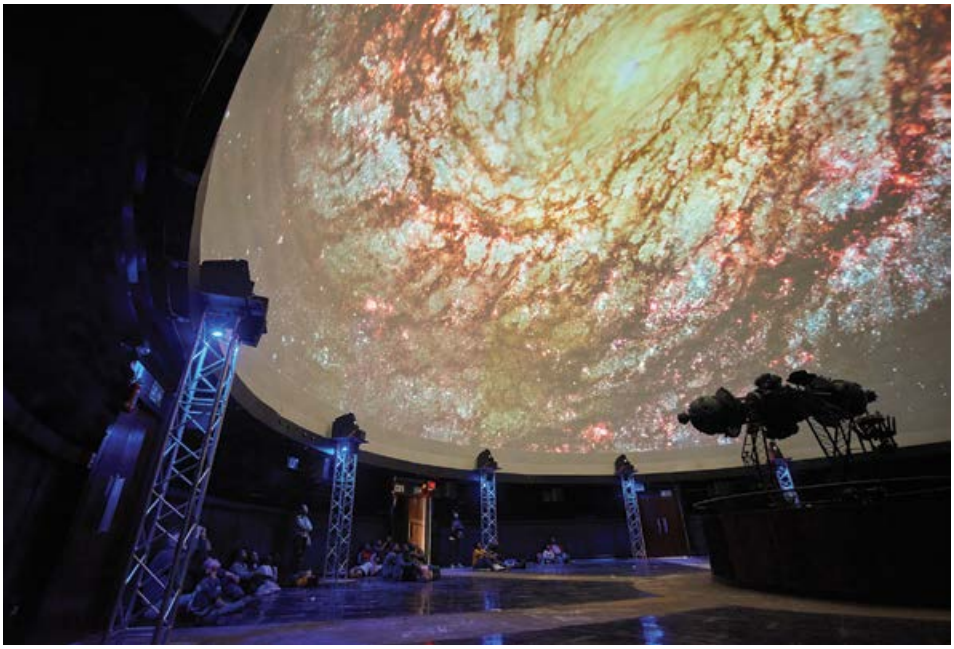
bme.co.za/
axxis-titanium

Tailored for small mining operations that don't require large blast capability.

New Digital Dome catapults Johannesburg Planetarium into the future

Wits University and Anglo American have partnered to fund the refurbishment, expansion and digitalisation of the 62-year-old Johannesburg Planetarium into a new, future-savvy, multidisciplinary research, training and science engagement events hub.

"A facility like the new Wits Anglo American Digital Dome is a way of honing a more intuitive and immersive understanding of big data, where we will be able to visualise our work, whether it is in teaching anatomy to first-year medical students, visualising the myriad particle showers in the Large Hadron Collider at CERN, exploring the first galaxies in the Universe, or testing new games, built by Wits' gaming design students," says Professor Roger Deane, Director of the Wits Centre for Astrophysics and the SKA Chair in Radio Astronomy at Wits.



Wits University and Anglo American fund the refurbishment of Johannesburg Planetarium.

Together, Wits and Anglo American have provided R75-million to fund the first two stages of the three-stage project, with the Wits University Council committing R20-million and Anglo American providing R55-million.

During the first stage, the Planetarium will be refurbished and digitised with a state-of-the-art digital projection system, auditorium seating, and a Science and Technology Exploratorium. The second stage sees a north wing expansion for a new suite of operational offices, an exhibition area, as well as a seminar room and meeting space for Digital Dome show planning and design.

In the third stage, which is yet to be funded, a new east wing research-focused building will house open-plan office space for visiting multidisciplinary research teams to interface with in-house data visualisation and Digital Dome show rendering experts. It will include a creative studio, film and sound production facilities, to enable Wits to develop much of its science engagement digital content on site. Stage 1 and 2 will be completed in 2023 and open to the public in 2024. ■

MMP hands over Au and PGM Resource Atlas to Council for Geoscience

The Mandela Mining Precinct (MMP) recently handed over the Au and PGM Resource Atlas to the Council for Geoscience (CGS). The Resource Atlas was developed by the MMP in 2018 on one of the world's leading geographic information systems, ArcGIS, with the aim of developing mineral resource models to better understand PGM and gold mineral resource opportunities in South Africa.

ArcGIS offers several tools to facilitate streamlining data acquisition and loading processes by allowing data custodians to upload new datasets via a web interface.

"The Au and PGM Resource Atlas is the first of its kind in South Africa and gives end users access to mineral resource and reserve information on a single platform. Its purpose is to give a holistic visualisation of the remaining gold and platinum group metal mineral resources in South Africa and, ultimately, promotes collaboration among mining companies to access contiguous mineable blocks using alternative mining techniques," says MMP director, Johan Le Roux.

The portal enables collaboration between academia and industry, as well as mining and exploration companies. It also encourages the ongoing collection and digitisation of valuable geological data and helps familiarise undergraduate students with the PGM and Au mining industries. ■

MMP hands over Resource Atlas to the Council for Geoscience.

AfriTin Mining's exploration yields positive results

AIM-listed AfriTin Mining, an African technology metals mining company with a portfolio of mining and exploration assets in Namibia, has announced significant mineralisation potential at surface, 35 km from Flagship Uis Mine. The results follow an update on the exploration activities undertaken over its mining licence ML133.

The exploration programme was conducted over a 12-month period commencing in Q4 2021, and included aerial surveys, regional and high-resolution geological mapping, and surface chip sampling. The programme targeted outcropping pegmatites, many of which were found to contain lithium, tin, and tantalum.

CEO Anthony Viljoen commented: "We are especially excited about these initial exploration results. They confirm our belief that the pegmatites of the ML133 licence could contain significant lithium, tin and tantalum mineralisation. We intend to advance the next stage of our work programme over this area, including exploration drilling and initial metallurgical test work. Proximity of the test area to the Uis Mine, which is our operating facility with comparable types of mineralisation, presents potential development synergies. AfriTin's portfolio of operating and exploration assets in Namibia underpins our goal of becoming a major producer of technology metals. We believe the prospectivity of our tenements justify accelerating the exploration and development programmes aimed at realising near-term value for our stakeholders." ■

AfriTin Mining's latest exploration yields positive results.

Inyosi Coal signs lucrative deal

Anglo Coal's BEE partner, Inyosi Coal, has acquired shares in JSE-listed Thungela valued at over a R1-billion in a landmark transaction that marks a watershed moment for empowerment in the coal sector. The deal enables Inyosi Coal to acquire a 3% stake in Thungela and, more importantly, to transform its previously unlisted interest into a liquid position in a publicly traded entity with no long-term restrictions on realising its investment.

Inyosi Coal is a broad-based black economic empowered company that was created in partnership with Anglo Coal to warehouse key current and future domestic and export focused coal operations. At the time of its formation in 2007, it acquired 27% of Anglo American Inyosi Coal. "As Inyosi we retained our cohesion as a consortium of four shareholders. This deal catapults us from the periphery of the coal sector into the nucleus of the industry where we areable to unlock value and play a meaningful role in this important industry," says Yoli Balfour, chairperson of Inyosi Coal. ■

Inyosi Coal acquires shares in Thungela Resources.

SEIFSA partners to empower young black woman

The Steel and Engineering Industries Federation of Southern Africa (SEIFSA) has partnered with the Italian-South African Chamber of Trade and Industries (ItalCham) and the Imbokodo Trust with the aim of empowering young black woman and assisting companies to improve their B-BBEE compliance. The three organisations signed a Memorandum of Understanding (MOU) aimed at exchanging information – including reports and market analyses – organising events that provide networking opportunities and introducing potential partners to each other.

SEIFSA CEO Lucio Trentini, said: "We are confident that our exciting partnership with the ItalCham and Imbokodo Trust will afford SEIFSA's affiliated membership an opportunity to address the many challenges faced by young black woman in the sector and contribute to a better South Africa." ■

SEIFSA partners with ItalCham and the Imbokodo Trust to empower young black woman.

Solar plant powers Caledonia Mining's Blanket Mine

Gold miner, Caledonia Mining Corporation's new solar plant at Blanket Mine has started generating power, the company said. Blanket Mine currently receives its power from ZESA, Zimbabwe's national electricity supplier; however, in recent years this supply has been subject to load-shedding and unstable power, which has economic and safety implications for an underground mine such as Blanket Mine. Recognising the economic, environmental and logistical challenges of running large-scale diesel generators for extended periods, Caledonia started constructing the 12.2 MWac solar plant late in 2021. The solar plant now provides power to Blanket and will soon provide around 27 per cent of Blanket's average daily electricity demand.

Solar plant powers Caledonia Mining's Blanket Mine.

Commenting on the announcement, Mark Learmonth, CEO, said: "With 21 per cent of Blanket's on-mine costs relating to energy usage, this solar plant is a very important project for the company as it will improve the quality and security of Blanket's electricity supply and provide environmental benefits through cleaner energy. The solar power will displace more expensive power from the grid and from diesel generators and is expected to reduce Caledonia's consolidated cost per ounce of gold produced by approximately $37." ■

Emmerson in offtake MOUs with Keytrade AG and Hexagon Group AG

Moroccan-focused potash development company, Emmerson, has signed a Memoranda of Understanding (MOU) for offtake of potash and salt from its Khemisset Mine in Morocco with Keytrade AG for the sale of a minimum of 245 000 tpa of Muriate of Potash (MOP) for a period of 10 years; and with Hexagon Group AG for a minimum 245 000 tpa of MOP and a minimum of 500 000 tpa of salt product (NaCl), both for a period of 10 years.

Graham Clarke, CEO of Emmerson commented: "I am delighted to present our first offtake MOUs to the market as we continue our process of advancing towards construction readiness at Khemisset. These MOUs are an important milestone in this process and will account for more than 65% of MOP production and 50% of salt production." ■

Emmerson inks offtake agreements for product from its Khemisset Mine in Morocco.

New Global MD for RMI Pressure Systems

RMI Pressure Systems has appointed Joe Keenan as Global MD: Industrial Fluid Flow Solutions. Keenan brings with him over 25 years of experience in the mining industry, having held senior positions with companies around the world, including Orica Mining Services, where he served as Senior Vice President for USA and then President: Latin America. As the global leader for the RMI Pressure Systems' mining and industrial business, and head of the North American Gas Transmission business, Keenan will oversee the sales, engineering, product management, operations and services functions in the UK, EMEA, USA, China, India and Australia. "The business has aggressive growth plans and a deep R&D pipeline, which is grounded in the voice of our customers. I feel confident that the business has the right market focus and technical expertise to drive RMI forward," Keenan notes. ■

Platinum deficit of 303 koz forecast in 2023 as 2022 surplus reduces

The World Platinum Investment Council (WPIC) recently published its Platinum Quarterly for the third quarter of 2022, with a revised forecast for 2022 and first forecast for 2023.

The market is forecast to be in a deficit of 303 koz in 2023 as global platinum demand is expected to increase by 19% (to 7 770 koz) while supply will increase by just 2% (to 7 466 koz).

Supply constraints, combined with increased bar and coin demand, have seen the market surplus forecast for 2022 revised downwards by 17% (-170 koz) to 804 koz. The profound swing in market balances between the 2022 surplus and the 2023 deficit is forecast to be more than 1.1 moz.

In addition, exceptionally strong import volumes into China continued throughout the third quarter, contributing to ongoing physical market tightness despite the global surplus. Like previous quarters this year, these imports were significantly above identified demand in China and were met largely by sizeable flows from platinum ETFs and exchange stocks. Year to date, these excess imports into China, which are not captured in published supply and demand data, are already 1.2 moz – far in excess of the forecast 2022 surplus. ■

WPIC forecasts platinum deficit for 2023.

Palabora Mining Company appoints IPP

Palabora Mining Company (PMC) has partnered with Mzansi Energy Consortium (Mzansi Energy) to develop a 132 MWp solar photovoltaic (PV) plant and battery energy storage system (BESS) capable of storing 310 MWh of electricity. The power plant, branded Marula Green Power, is expected to be rolled out over two stages, with Stage 1 being construction and Stage 2, operation and maintenance. The project is expected to reach financial close in the second quarter of 2023 and commence operations in the second quarter of 2024. Once deployed, the project will be one of South Africa's largest private Independent Power Producers (IPPs) and is intended to provide the mine with security of supply and affordable energy, which will result in significant cost savings.

Wessel Wessels, CEO of Journey2Green (a founding partner in Mzansi Energy), says a long-term Power Purchase Agreement (PPA) will be finalised between the parties at the end of a Detailed Feasibility Study in the next six to eight months, commencing in October 2022 and is expected to end in May 2023. "Mzansi Energy will design, finance, install, operate and maintain the plant for 12 years".

"The plant will be based within the municipal jurisdiction of Ba-Phalaborwa, Limpopo, about 20 km from the mine. The location is strategically chosen to allow for direct supply to the mine without connection to the Eskom grid," Wessels explains. ■

Palabora Mining Company appoints Mzansi Energy to develop solar photovoltaic plant.

2022 – The best year yet for Brelko

Brelko Conveyor Products' hefty investments in product development over the past decade and in the expansion of its facility in Booysens, south of Johannesburg, have set the conveyor-belt cleaning equipment designer and manufacturer on a path to success, with the company posting a 15% increase in revenue from 2021. By *Nelendhre Moodley*.

Brelko Training Centre.

"Although this year has been challenging for most businesses across the globe, 2022 is proving to be one of the best years yet for Brelko; for aside from making headway into new markets, we are expanding product sales in existing markets. Essentially, our product improvement investments see our premium quality products in high demand locally and internationally," says MD Kenny Padayachee.

Importantly, after having made inroads into numerous international markets, the equipment specialist "is gaining traction in the Middle Eastern, South American – especially Mexico – and North American markets," key future growth nodes for the company, says Padayachee.

"We have made great progress in establishing a presence in the Middle East and have already provided products to Ma'aden, the Saudi state-owned mining company headquartered in Riyadh, to the tune of over $500 thousand this year alone," he adds.

Ma'aden is a fast-growing mining and metals company, and the largest mining company in the Middle East, which produces a variety of metals, including gold, base metals and aluminium, amongst others.

Aside from continuing to supply product into key projects across Africa – including Ivanhoe Mine's Kamoa-Kakula Copper Mine and Platreef projects in the Democratic Republic of Congo, Barrack Gold's Loulo gold mine in Mali and Resolute Mining's Syama gold mine, also in Mali, and the Sukari Gold Mine project in Egypt – the conveyor belt cleaning equipment specialist continues to supply product to local power utility Eskom and recently began supplying product to iron-ore miner Kumba Iron Ore Sishen mine's Koketso Project, for which Brelko has been contracted to supply 1 000 m Keyskirt® chute sealing equipment valued at R4 million.

"We have made great progress in establishing a presence in the Middle East and have already provided products to Ma'aden, the Saudi state-owned mining company headquartered in Riyadh, to the tune of over $500 thousand this year alone," Padayachee says.

Brelko belt scrapers.

Streamlined Johannesburg facility

With an eye on future growth, Brelko continues to expand its facility from 7 500 m² in 2010 to 18 000 m² in 2021 and most recently invested a further R40 million to enhance the factory, adding a double deck which expands the space by 2 000 m².

"The extra space is a boon, especially as we are faced with product delays for months at a time. In fact, our spacious facility allows us to comfortably house two forty-foot containers which have been delayed for more than two months because of supply chain delays, and the recent strike by Transnet workers," explains Padayachee.

Further to this, its most recent expansion endeavour sees Brelko revamping its facility to accommodate a one-stop polyurethane shop. Currently, the processes related to polyurethane manufacturing, which include moulding, casting, cutting, CNC machining and assembly, are located in different parts of the factory.

"We are revamping the facility to house the various components related to polyurethane manufacturing in a single space and acquired a custom designed CNC machine, valued at R10 million, to cut the steel to size seamlessly and slot the required holes into the steel tubes. We have also invested in two fully automated polyurethane mould dispensing machines. The one-stop polyurethane shop will allow for a smooth workflow, thereby saving time and increasing efficiency."

The facility is scheduled for completion in December.

Further to this, and in keeping pace with step changes in the transport of bulk materials using conveyors, Brelko invests heavily in product

enhancements, including research and development and innovating industry-leading products. To date, the company has over 18 patents worldwide to its name, testimony that Brelko is serious about providing premium quality products.

"Engineers are building wider and faster conveyor-belts to transport larger quantities of product and, as suppliers of equipment to this sector, Brelko has had to innovate to keep pace. Over the past 30 years, conveyor belt speeds have increased from 2 m/s to 6 m/s."

Mitigating the challenges faced

Like its peers Brelko, which celebrates 35 years in business this year, faced logistics challenges in October with the strike by workers of Transnet, coupled with global supply chain challenges translating to further delays to end-users. This in turn lead to delayed payments from the client.

"Brelko relies heavily on product export and, because of supply chain difficulties, is taking a huge hit to the bottom-line of around R1 million per month. The wage strike by Transnet workers further exacerbated the supply chain delays," says Padayachee.

Although the manufacturer's expanded facility can accommodate the additional stockholding, what it is unable to mitigate are the sky-rocketing prices of raw materials such as steel, rubber and polyurethane.

"This year the biggest concern has been the soaring prices of raw materials. In fact, from October last year to October this year, there has been a 70% increase in the price of steel, a 48% increase in the price of polyurethane, a 40% hike in the price of rubber and a 9% increase in labour costs."

Coupled with price escalations, manufacturers face loadshedding and water shedding, which is fast becoming a way of life for South Africans.

"Loadshedding and water shedding wreak havoc on many businesses, especially in the manufacturing sector which relies heavily on these necessities to survive. In a bid to become self-reliant, Brelko is investing in renewable energy projects," says Padayachee

Besides investing more than R6,5-million in solar projects to date, the equipment manufacturer recently invested R12 million in a 300 kW inverter and in 800 kW of battery power. The company is also evaluating the option of sinking a borehole to ensure a constant supply of water.

"We have engaged the services of a borehole specialist to test the availability of water on the property and advise on the feasibility of accessing this scarce commodity," says Padayachee, who explains that Brelko is looking to become self-reliant in terms of security, power and water supply.

Meanwhile, following the Covid-19 pandemic, numerous companies closed shop, forcing skilled personnel to take up opportunities in different sectors. This, coupled with a large portion of the population relocating to new geographies, has left the country facing a severe skills shortage.

Brelko Nip Guard safety device.

Brelko's facility has been revamped to accommodate a polyurethane plant.

"Industry is now calling on retired personnel to return to work as consultants," says Padayachee, explaining that an unintended consequence of the severe skills shortage is that cost conscious clients who have long haggled on price, no longer do so, given the realisation that quality trumps price.

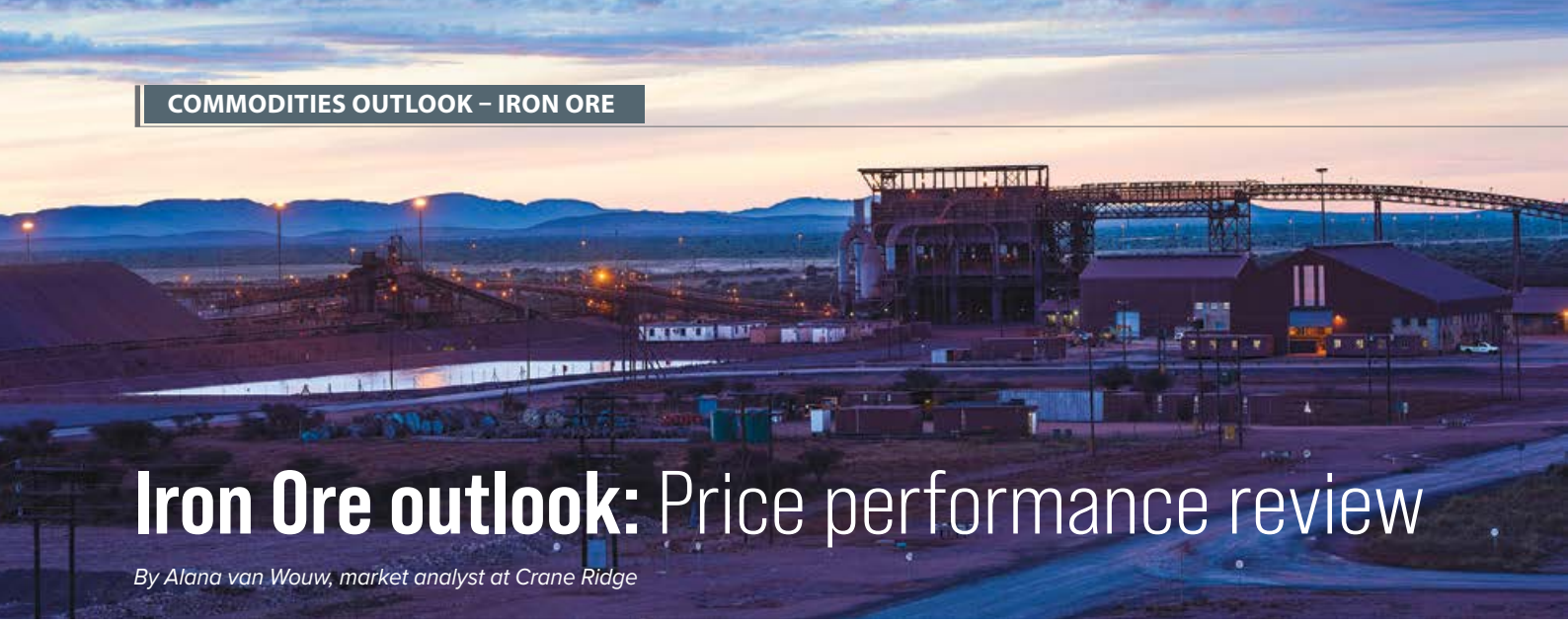
"Premium quality products come at a price and the price is high for top-quality raw materials and the skilled labour needed to manufacture premium quality product."

In a bid to close the skills gap, Brelko, aside from hiring highly skilled staff, invests in in-house training and skills development, and learnership programmes for its employees. The company is currently investing R800 000 in learnerships for 16 employees, which will see them enhance their skill sets. MS Teams is used to accommodate remote learning for some staff.

According to Padayachee, training and skills development are integral to Brelko, particularly as it takes a new employee roughly two years to become proficient in the Brelko product range.

"Brelko is reaping the rewards of continued investment in the company and its people and, having made inroads into new geographies, we are looking forward to the next phase of growth," concludes Padayachee. ■

According to Padayachee, training and skills development are integral to Brelko, particularly as it takes a new employee roughly two years to become proficient in the Brelko product range.



Iron Ore outlook: Price performance review

By Alana van Wouw, market analyst at Crane Ridge

Iron ore mining requires substantial capital investments.

Prices have fallen more than 50% from a peak in July 2022 - this on the back of challenges associated with China's property market and policy tightening by central banks in the US, which could result in further US dollar strength.

The iron ore price is currently in the midst of a deflating bubble as metal prices face macroeconomic headwinds, with headlines dominated by interest rate hikes and energy supply concerns.

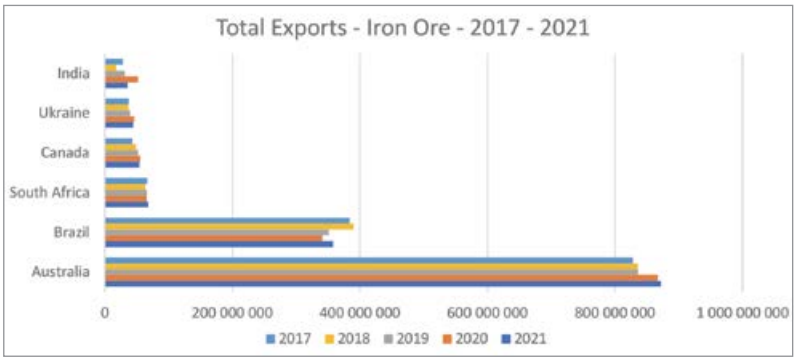
Iron ore extended its route to the lowest level in over two years amid mounting concerns over global steel demand.

Prices have fallen more than 50% from a peak in July 2022 - this on the back of challenges associated with China's property market and policy tightening by central banks in the US, which could result in further US dollar strength. Historically this inversely correlates to the iron ore price. Such strength deflation is like the iron ore price bubbles that took place in the global financial crisis of 2008, and from May 2021 during the pandemic.

Iron Ore outlook: Demand and supply dynamics

Ranked 1 in 2021 – Australia Export Outlook: In the Resources and Energy Quarterly June 2022 report, Australia cut its forecast for the country's iron ore exports for 2022 to 894 mt, down from March's forecast of 919 mt, according to Australia's industry ministry. The revised forecast represented a 2.5% increase year-on-year. The lower export forecast for 2022 was because major Australian producers continued to face persistent supply and labour shortages, which were compounded by the Covid-19 border restrictions that were in place until March this year.

Ranked 2 in 2021 – Brazil Export Outlook: After a disappointing first half of the year, Brazilian iron ore export volumes are showing signs of improvement. Total shipments from the world's second-largest iron ore exporter over the first half of the year stand at 167.7 m tonnes. While this represents a 13% increase on shipments over the same period in 2020, and a 2% increase on those in 2019, these two years were themselves very poor reference points. The former saw exports slashed by poor weather and Covid-19 related disruptions while, during the latter, the Brumadinho disaster temporarily restricted output and severely throttled the flow of cargoes to the water. Compared to the first six months of 2018, YTD shipments from Brazil come in 8% lower.



Ranked 3 in 2021 – South Africa Export Outlook: Turmoil in South Africa has impacted iron-ore exports as ongoing political instability seems to be never-ending, starting with the KwaZulu-Natal protests that emerged in opposition to the jailing of former president Jacob Zuma, and followed by the disruptions (two week strikes) at Transnet-managed ports in South Africa. The next issue facing iron ore exports from South Africa is rail constraints. Morgan Stanley noted that the mismatch between mine capacity and rail constraints would lead to "a resizing of mining operations, which would come into focus during 2023". This could have a direct impact on South Africa's export ability.

Ranked 4 in 2021 – Canada Export Outlook: In 2020, the Canadian steel industry exported 6.9 million tonnes of semi-finished steel products. Canada exported 55.3 million tonnes of iron ore valued at $3.0 billion in 2020, down from 52.2 million tonnes in 2019. Iron ore pellets accounted for 29% of the volume, but 77% of the value. Concentrates accounted for the remaining 71% of the volume and 23% of the value.

Ranked 5 in 2021 – Ukraine Export Outlook: Like other commodities, iron ore was not spared the impact of Russia's invasion of Ukraine. The ongoing war has hampered iron ore shipments from the country; Ukraine was the world's fourth-largest exporter of iron ore, second-largest exporter of pig iron or crude iron and third-largest exporter of semi-finished steel.

Iron ore is expected to endure declining prices and moderate demand from China over the next

few years. Despite growth in China and continued growth in global production, global oversupply will likely affect the industry once again, forcing global iron ore prices to decline and constraining revenue growth. Furthermore, volatile steel demand and price trends will make it difficult for operators in the industry to secure long-term contracts.

Iron Ore outlook: Factors to watch for

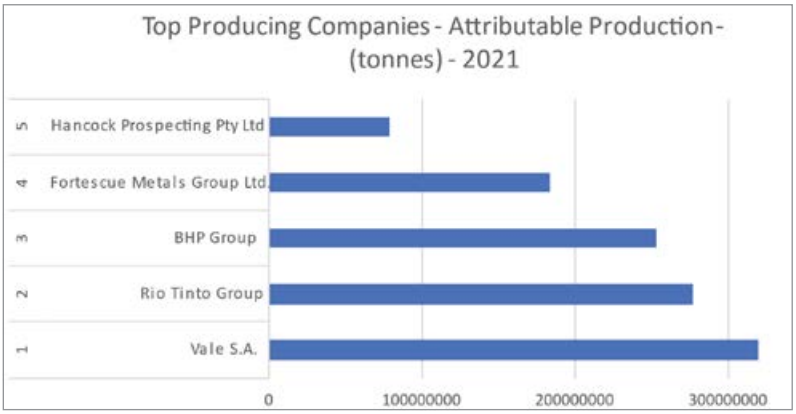
Below are a few challenges in the Iron Ore Industry that we need to watch out for:

- Increasing use of recycled steel - an increasing tendency of manufacturers resorting to using recycled steel has halted the growth of this market. The Spend Edge report on Global Iron Ore Category – Procurement Market Intelligence Report states that around 37% of the global steel production is recycled steel, which is influencing the demand for iron ore.
- Antidumping of steel – governments of various countries in North America and the APAC regions have enacted laws that pertain to the imposition of anti-dumping duties on steel products, and consequently, steel and iron ore export have been hampered. China has faced a significant blow as a result of these laws as it is the biggest importer of iron ore.
- Huge capital requirements: Iron ore mining requires substantial capital investments due to energy-intensive nature of the extraction process. So, to set a lower iron ore price, suppliers need substantial production to achieve economy of scale. Such large capital requirements and investments act as a major growth constraint for this market.
- Land in developing countries: Acquiring land from local communities for mining in developing countries is a long and complicated process with a further growth constraint being that around 70% of the mining sites are in regions where water stress affects the supply of iron ore.

Iron Ore ESG outlook:

COP26's carbon-market agreements could hit Australian miners within the next five years, as reported by numerous analysts. The world's nations reached an agreement on a framework for carbon markets under Article 6 of the Paris Agreement, which analysts expect will free transition capital and raise carbon prices. "Global agreement on carbon mechanisms will unleash market forces, but also increase transition risk," says Credit Suisse in its recent COP26 Watch.

While Article 6 does not have direct implications for voluntary carbon markets, the internationally transferred mitigation outcomes (ITMOs) and the new market-based mechanisms are likely to reduce the pool of available offsets in the voluntary market, pressuring prices.



The EU and US also agreed to a deal to abolish tariffs and restrict access to products that do not meet carbon intensity levels.

With higher carbon prices and the CBAM connection, "Agreement on the rule book should see strong growth in the coverage of emissions trading schemes and the voluntary market: in our view, the foundations of a global carbon price have been put in place," says Credit Suisse in its COP26 Watch. Credit Suisse expects this will result in sharply higher carbon prices and transition risk and estimates the resulting average Carbon Earnings at Risk (CEAR) for miners will increase from 14% to 102%. Bloomberg Green reports Europe's carbon price almost tripled in 2021, and the cost of permits has risen more than 140% this year – a move that favours gas over coal.

The EU's Emissions Trading System is pricing carbon at EUR60 in preparation for the introduction of the carbon border adjustment mechanism (CBAM), which is expected to have a significant impact on Australia's resource companies over the next five years, particularly on iron ore and metallurgical coal exporters, the CBAM applies to steel, aluminium, ammonia, cement, and electricity.

Analysts say that, on a direct basis, the effect of CBAM will not be too bad on Australian iron ore and metallurgical coal exporters, but if the EU extends the tax to upstream products, the risk for Australia will be significant, not to mention the CBAM's effect on Chinese exports is likely to significantly decrease iron ore and met-coal demand within the next five years, aligned with China's recently published green taxonomy.

"Agreement on the rule book should see strong growth in the coverage of emissions trading schemes and the voluntary market: in our view, the foundations of a global carbon price have been put in place," says Credit Suisse in its COP26 Watch.

Turmoil in South Africa has impacted iron-ore exports.

Dr Dave Lawie IMDEX chief geoscientist.

The trouble with copper

By Dr Dave Lawie IMDEX chief geoscientist

Copper is groaning under a weight of expectation. By any measure, demand is expected to outstrip supply by far. Mining companies attempting to find, define and mine copper with enough speed and precision to meet at least some of the demand required for decarbonisation targets, the EV market, power transmission networks and other industrial uses are facing environmental, geological and governmental headwinds.

Failure to meet demand could easily crimp economic growth; there is no doubt we are facing a copper supply crisis; it is only the size of the crisis that could vary. And, don't be lulled into complacency by the likely short-term increase in copper production as some new mines begin production during 2022 and into 2023.

This supply 'sugar hit' will come as global economies struggle to contain inflationary pressures, with government actions to rein in spending potentially flowing through to an easing in demand for electric vehicles and a reduction in economic growth generally.

With copper a barometer of industrial growth, demand may ease — but any demand dip will be short lived and there are not enough new mines under development to make up the supply shortfall when demand inevitably surges.

The issue that remains widely underappreciated outside the mining and associated sectors is the extent to which big copper resources are hard to find, and difficult to mine when they are discovered — and the long lag between exploration and production.

We have been looking for sizeable deposits for decades. We are consuming what we have found faster than ever, and we have not altered exploration methods or increased capital expenditure in response to the looming supply shortfall.

Recessionary risks and geopolitical uncertainty are adding to investor nervousness, reducing the likelihood of spending on the scale required to secure the next big copper mine.

Recent reports from the US and Canada suggest a reduction in copper production to 2026 among major miners. A price dip is not helping, tempering the interest of mining companies to outlay the capital required for big projects.

Grade quality is decreasing, the ratio of waste to ore is increasing, and deposits if, and when, they are discovered are more likely to be deeper and in remote locations, presenting added costs around the provision of infrastructure to and at the mine.

Added to these geological and geographical challenges are Environmental, Social and Governance requirements which can extend the time between discovery and mining by as much as 15 years, depending on the jurisdiction.

BloombergNEF says copper demand is expected to increase 53 per cent by 2040.

Above: Industry is facing a copper supply crisis.

Left: Copper demand is expected to far outstrip supply.

Consultants Wood Mackenzie last month estimated that a US$23-billion investment a year is needed over 30 years to deliver new copper projects to reach zero-carbon targets.

In its report Red Metal, Green Demand Wood Mackenzie says that analysis shows that 9.7-million tonnes of new copper supply is needed over 10 years from projects yet to be sanctioned, equivalent to nearly a third of current refined consumption, if the industry is to meet the Paris Climate Agreement targets.

There is merit in Freeport McMoRan's call for US Government to add copper to its official list of critical minerals. A recent S&P Platts report said that if copper shortfalls follow projected trends, climate goals would be "short-circuited and remain out of reach".

BloombergNEF says copper demand is expected to increase 53 per cent by 2040, against an increase in supply of just 16 per cent.

This alarming outlook is why IMDEX is supporting Copper for Tomorrow, a dedicated cooperative research centre established to focus on research and development priorities to solve challenges across the copper value chain.

The aim is to solve the copper paradox – how to produce the copper needed for a low carbon society while dealing with lower grade ores, without using more energy and water, and producing more waste.

It will do this through new research and technology that will:

- ❑ Dramatically improve copper mining and production.
- ❑ Create processes that move copper production towards zero emissions, waste, and footprint.
- ❑ Incorporate evolving ESG factors into business processes.

IMDEX is invested in finding answers to modern mining challenges. Our commodity agnostic geoscience-lead solutions seek to provide answers that unravel complex ore bodies, allowing for more informed decisions to be made earlier.

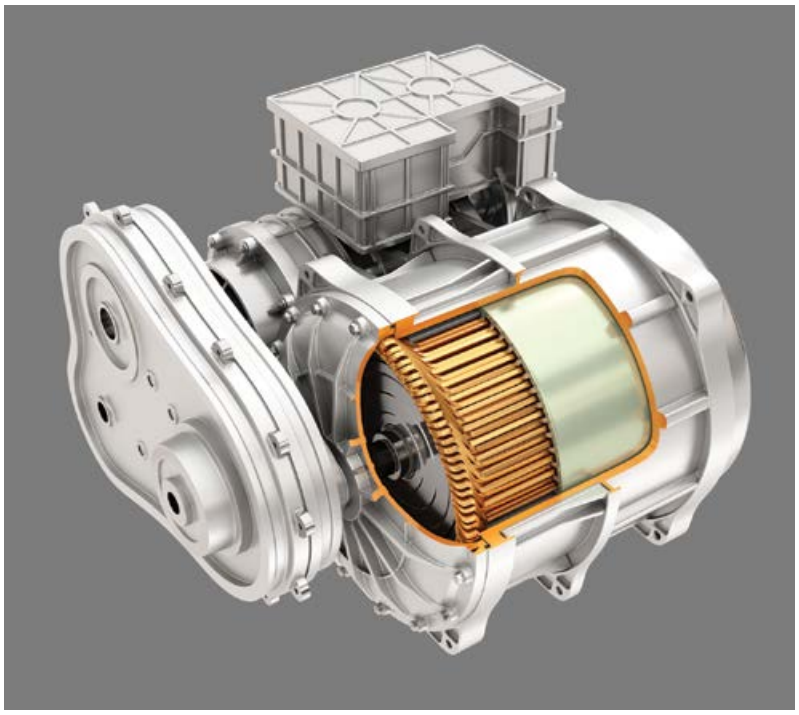
This data-rich decision making is important for all minerals in today's challenging mining environment, but even more so with copper.

The difference between success and failure, between an economic and uneconomic deposit, is greater ore body knowledge, which will deliver improved processing intensity, less waste, less tailings, less water use, and greater overall efficiencies.

Mining companies able to access reliable data as early as possible at each step of the mining value chain from exploration and drilling, to planning and production, will be in the best position to meet the challenges.

It won't solve the supply deficit, but it may help to ease it — and may unlock some of the world's stranded copper assets. ■

Mining companies are attempting to mine copper with speed to meet demand required for decarbonisation targets, the EV market and power transmission networks..



Afrimat's diversification strategy underpins its success

Mid-tier miner Afrimat's diversification strategy continues to unlock value and success with the company advancing its latest acquisition – the Glenover Phosphate operation, which consists of rare-earths, phosphate and vermiculite, and posts yet another successful set of results. By *Nelendhre Moodley*.

Afrimat CEO, Andries van Heerden.

Afrimat comprises four operating units – Construction Materials, Industrial Minerals, and Bulk Commodities and the group's latest addition, Future Materials and Metals, which has expanded Afrimat's product offering and national footprint.

"Diversification, cost reduction and efficiency improvements remain the cornerstone of our strategy and we used these to counter economic impacts, which are beyond our control," says Van Heerden.

Financial success

Delivering Afrimat's interim results for the six months ended 31 August 2022, CEO Andries van Heerden says that strategic initiatives contributed positively to performance in the first six months of the financial year. These included the successful commissioning of the Jenkins iron ore mine, the turnaround of the Nkomati anthracite mine, and the Group's continuous improvement of existing operations.

Group revenue increased by 7,2% from R2,4-billion to R2,6-billion, while operating profit decreased by 12,1% from R582,8-million to R512,2-million, resulting in the operating profit margin settling at 19,7%.

"Diversification, cost reduction and efficiency improvements remain the cornerstone of our strategy and we used these to counter economic impacts, which are beyond our control," says Van Heerden.

Leveraging off Future Materials portfolio

In December last year, the JSE-listed entity acquired Glenover Phosphate, located 90 km northwest of Thabazimbi in the Limpopo Province, for R550-million.

Speaking to *Modern Mining* on the sidelines of the interim results presentation, Van Heerden said that Glenover diversified Afrimat's exposure wider than ferrous metals and aligned to global trends.

"We have the Construction Materials business which is currently not in a great space and the Industrial Minerals business – a small business that's ticking over nicely. However, the big driver of profits at the moment is the iron ore business, but it remains highly exposed to a single point risk with capacity constraints on the logistics systems. Our strategy is to enter new areas of opportunity where we can use the expertise in markets that don't have a high-risk concentration, which is what makes Glenover so exciting."

The Glenover acquisition offers Afrimat threefold exposure – fertiliser for agricultural applications, vermiculite in the construction of fire-retardant partitioning boards and in horticulture as a growth

Afrimat's Demaneng Mine.

Afrimat engaged in drilling and blasting.

medium, as well as in animal feed, with rare earth elements integral in supporting technological advancements such as high strength permanent magnets and battery technology.

"The Glenover acquisition is important as farmers rely on phosphate as a key component in fertiliser, which makes it a highly sought-after commodity both locally and internationally. From a logistics perspective, phosphates can be moved economically via road, which frees it from a reliance on a single service provider."

Further to this, Afrimat says it is well placed as the western world (USA and European countries) looks to reduce its dependence on China for rare earths and actively seeks out new sources of the mineral. The company is targeting rare-earths production in 18 months to two years' time, if not longer, as Afrimat wants to ensure that extraction processes implemented are efficient and reliable.

"We are busy with research and development and test-work on rare earth's minerals from the Glenover asset. As this is a new commodity for us, we are taking time to understand the product and its market, to ensure we know exactly what to expect."

The miner is progressing Stage 1 and Stage 2 initiatives at Glenover – Stage 1 entails mining the high-grade material and phosphate rock from stockpiles acquired earlier in the year as well as building the processing plant for single super phosphate (SSP) production, which involves acid leaching and flotation. Stage 1 further entails the building of a vermiculite processing plant.

Stage 2 – a much more sophisticated process – involves testing for nitro-phosphate and rare earths and developing ion exchange technology. Having achieved success at laboratory scale, Afrimat is in the process of proving it at pilot plant scale.

"We are undertaking intensive test-work at pilot plant scale to ensure that we understand all the associated intricacies before we start building the first plant. To date, we have prepared the product and sent it to potential customers to determine product marketability, and market appetite. So far, we are making good progress and will soon begin the detailed design process which will inform the final capital requirements."

Bulk commodities

Established in 2016, Afrimat's bulk commodities portfolio includes iron-ore (Demaneng and Jenkins iron ore mines), anthracite (Nkomati Antracite) and manganese.

Located in Mpumalanga, the Nkomati anthracite mine, which produces "among the best anthracite in the country" given the product's low sulphur content, is nearing the end of life of the current pit.

Afrimat Iron Ore Lyleveld Siding.

Afrimat is busy with mobile crushing at its facility in the Northern Cape.

Afrimat is investing roughly R200-million in the development of two open-pit areas and an underground operation, scheduled for completion and full production by March next year. Development of the open-pit and underground mine is taking place simultaneously by different teams. The underground decline is relatively shallow at around 100 m below surface.

According to Van Heerden, given that the open-pit area is "especially deep and narrow", Afrimat will need to mine more than one area at a time to meet the required throughput. This benefits the miner as it allows the JSE-listed entity the opportunity to blend product from the different ore sites and thereby ensure consistency of product.

The Nkomati resource is a "highly complex geological orebody consisting of several dykes and sills which creates difficult areas to mine. We took a decision to open more than one area to mine so that if we encounter a dyke or sill, we will mine another area while we address the problem."

Nkomati Anthracite has an extensive orebody containing proven reserves of well over 20 years at projected mining rates.

Afrimat's operations in KwaZulu-Natal.

Discussing the market fundamentals for anthracite, Van Heerden says that the largest producers of anthracite are the Russians, but owing to the Russia-Ukraine conflict, there is no anthracite being produced, which creates a huge opportunity for Afrimat.

"When Afrimat acquired Nkomati mine out of business rescue, in turning the mine around, we entered into long-term supply agreements. This was before the Russian-Ukraine crisis, which has changed market dynamics drastically. Taking a long-term view, we are happy to have stable off-take in place on reasonably good returns." Afrimat supplies its anthracite to local ferrochrome producers.

Iron-ore

Afrimat's Jenkins iron-ore mine in the Northern Cape, acquired two years ago, produces direct shipping ore – high quality material that requires no beneficiation, aside from crushing and screening to the required size.

"The Jenkin's asset, which is part of the mining right that also holds the Driehoekspan and Doornspan projects, has done exceptionally well and has in fact paid back its purchase price of R300-million."

The Jenkins mine, together with the Demaneng mine, produced an increase of 21,9% in iron ore sales volume during the current period compared to the previous period.

During the year, the first blast was undertaken at Driehoekspan, the iron ore asset that will replace Demaneng once it is mined out in about four years' time. Driehoekspan and Doornpan, which have a combined life of mine of more than 20 years, will be brought into production to maintain export volumes

To ensure that it is ready to begin production from Driehoekspan when the time comes, Afrimat started early mining, aiming to put material through the DMS plant at Demaneng as part of a test-work programme.

"The initiative aims to establish the grades and determine if the orebody has any surprises in store, as is often the case when one initially starts mining a new orebody. However, it is important to note that there will be no serious production from Driekhoekspan until it takes over from Demaneng."

Meanwhile, although the company terminated the Gravenhage deal, it still has access to manganese through the Driehoekspan mine where Afrimat is targeting volumes of around 240 000 tonnes per annum.

Interestingly, an innovative technology solution that was rolled out across the Jenkin's mine fleet resulted in optimised efficiency and significant cost savings, which effectively countered the rise in diesel prices and the fall in iron ore prices.

"Our team of young engineers and the Jenkin's mine management have been instrumental in implementing a modern tracking system onto our earthmovers using real-time data. Coupled with the use of artificial intelligence, they have been able to achieve significant operational improvements. The initiative, which delivered a 36% real cost reduction at Jenkins mine from 2021 to 2022, is being rolled out to the rest of the organisation."

Looking ahead, Van Heerden says that the focus in 2023 will be on getting Nkomati Anthracite and the Glenover assets to reach their true potential as quickly as possible and to roll out the cost saving drive, initiated at Jenkin's operation to the entire business.

"Volumes, price and cost are the three improvement levers that we must work on continuously," he concludes. ■

South Africa Zijin Platinum donates feminine hygiene products to community teens

South Africa Zijin Platinum (Pty) Limited (a wholly owned subsidiary of ww, which in turn is a wholly owned subsidiary of the multinational, Zijin Mining Group), recently donated a total of 1 000 feminine hygiene products to young women in the communities of the Zijin Garatau Platinum Mine in Limpopo.

The donation is now in its second year of implementation since the mine broke ground for construction in May 2021.

Approximately seven million South African girls do not have access to, or cannot afford to buy, sanitary products, according to statistics presented at the Menstrual Health Management Symposium in June 2022. Consequently, many girls miss school every month because they cannot afford to buy the necessary feminine hygiene products.

Sanitary products were distributed to underprivileged girls in schools and women in Garatau, Maandagshoek, Hoepakrantz and De Kom.

"Ethical corporate social responsibility and the wellbeing of women in our communities are part of our top priorities. Additionally, we value the importance of education and firmly believe that the empowerment of women is fundamentally tied to their receiving education," says Zhiyu Fan, MD and CEO of South Africa Zijin Platinum (Pty) Ltd.

"Thank you for the gracious offer. We are very grateful for the donation. It may seem like a small gesture, but it goes a long way in ensuring that the girls can attend school regularly and achieve their goals," says Mr Phashe, principal of Phuti Nare Secondary School.

Principal of Marole Secondary School, Mrs Depanyekga, says, "There are many learners whose families cannot afford sanitary products. This donation will give these learners the courage and dignity to attend classes."

In 2021, South Africa Zijin Platinum (Pty) Ltd was appointed as Nkwe Platinum Limited's mining contractor in respect of the Zijin Garatau Platinum Mine in Limpopo. The companies strongly adhere to the co-development belief of 'Mining for a Better Society' and believe the development of enterprises is closely related to the sustainable development of its surrounding communities. ■

Around seven million South African girls do not have access to, or cannot afford to buy, sanitary products.

Above and below: Nkwe Platinum distributed sanitary products to underprivileged girls and women in Garatau, Maandagshoek, Hoepakrantz and De Kom.

Nkwe Platinum has a strong community development programme in play, including a Clothing and Textiles Training Programme.

Southern Palladium's Bengwenyama eyes PGM

The World Platinum Investment Council's (WPIC's) latest report projects platinum deficits from 2023 deepening to 2026, which bodes well for Australian-listed *Southern Palladium*, as it aims to bring its flagship Bengwenyama project in the Bushveld Complex into production by 2028. By *Nelendhre Moodley*.

"Southern Palladium's 70%-owned Bengwenyama project is the last shallow undeveloped PGM deposit on the Eastern Limb of the Bushveld Complex in the hands of a listed junior company. The project sits in a sweet spot between, developed projects in the area, and contains grades of 7,70 g/t across a 71 cm layer on the UG2 reef. And, although the Merensky reef offers lower grades of 2,96 g/t, the PGM producing layer is close to 2 m thick, which lends itself to mechanised mining," explains CEO Johan Odendaal.

Southern Palladium recently listed on the JSE.

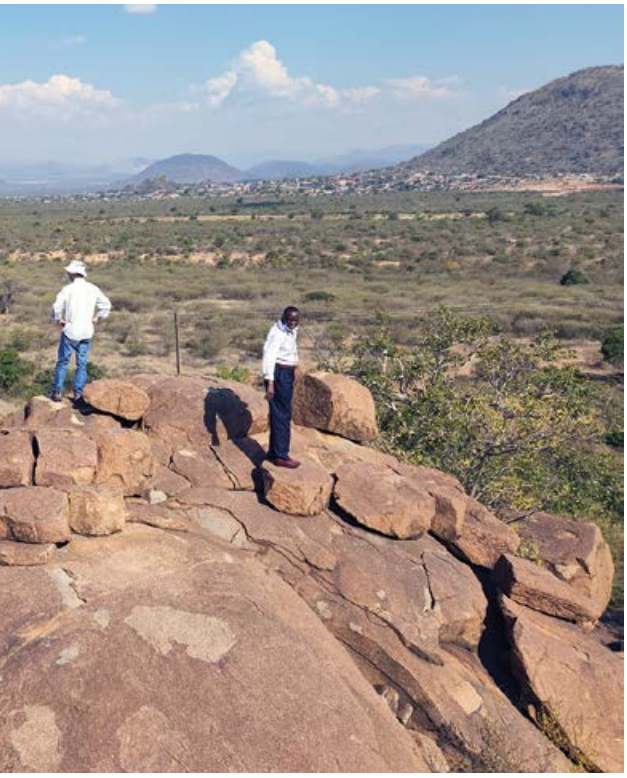
The Merensky and UG2 reefs extend from surface to a depth of 1 100 m over 10 km.

Over the next two years, Southern Palladium intends to complete a scoping study, pre-feasibility study and apply for a mining right, which will be accompanied by a social labour plan and environmental studies.

"One of our milestones is to have an asset with a reserve of at least 2 moz post the current drilling programme and a feasibility study in hand. We are working towards a mining right application at the end of 2023," explains Odendaal. A report by Bridge Street Capital's Dr Chris Baker notes that the mining right is expected to be achieved within a two-year timeframe, followed by project construction.

Odendaal adds that owing to the sheer magnitude

production by 2028



of the project, construction, expected to start by 2025, will take roughly three years to complete.

The Bridge Street Capital report points to a potential PGM production of between 200 000 to 250 000 3E+gold ounces per year.

Progressing the drilling programme

With its eye to production in the next five to six years, Southern Palladium is busy with a two-phase drilling programme that will see the company firm up its resource.

The project developer recently raised A$19-million from leading Australian and high net worth institutions and strategic investors through the simultaneous listing on the Australian Stock Exchange and Johannesburg Stock Exchange in June. The funds are being used to progress a series of drilling programmes aimed at taking some of its 18,8 moz JORC compliant resource from Inferred Resource category to Indicated Resource.

"The Eastern Limb of the Bushveld Complex has been proven to host economic PGE deposits in both the Merensky and UG2 reefs, with numerous operations established along its extent, including mining heavy-weight Anglo Platinum's Modikwa operation, which lies to the north of the Bengwenyama project. Over and above the Inferred Mineral Resource,

Above: Southern Palladium's Bengwenyama project is the last shallow undeveloped PGM deposit on the Eastern Limb of the Bushveld Complex.

Left: Over the next two years, Southern Palladium intends to complete a scoping study, pre-feasibility study and apply for a mining right.

Southern Palladium is busy with a two-phase drilling programme.

The Bengwenyama community is a significant shareholder in the project.

the project also has further upside potential with an additional 134 – 201 mt at 3,5 – 5,2 g/t platinum + palladium + rhodium + gold (3PGE+Au) in Exploration Target," says Odendaal.

The ASX-listed project developer began its programme to firm up its resource with a geophysics flyover in January this year. This provided the company with insight into the structure of the orebody, which was followed by the latest drilling programme, initiated in August.

Southern Palladium's two-phase drilling programme entails drilling 63 boreholes or 25 000 m in Phase 1 and 12 boreholes or 14 000 m in Phase 2.

The Phase 1 drilling programme recently completed three drill holes, all of which intersected the UG 2 reef.

"Our drilling programme is going extremely well – we have sent samples from the first three boreholes for assaying, the outcome of which is expected in November. We currently have five drill rigs on the property."

"What is interesting," says Odendaal, "is that the data that was recently unpacked indicates the potential to extend the exploration programme to the east of the project, which could unlock further precious ounces."

Bengwenyama attractiveness

The Australian listed entity, which had a market capitalisation of A$45-million when it floated its shares on the ASX and JSE at a share price of 50 cents (Australian) has doubled its market value to A$100-million (close to R1-billion) since start, taking its project up the value curve.

According to Odendaal, the company listed at just the right time, when the appetite for "green metals" is strong and there is a renewed interest in PGMs. The company is exploring for minerals such as palladium, rhodium, platinum and iridium – minerals that support the green economy.

"Southern Palladium's shares were oversubscribed, and we raised A$19-million, which is being used to progress our exploration programme. We are in the fortunate position that we sit with a strong balance sheet," he says.

Further to this, he adds that being located on the Eastern Limb of the Bushveld Complex, a well-known PGM bearing area, means the metallurgy is well understood and there is no need to inject further capital to fathom the minerology.

The Bengwenyama shallow deposit lends itself to significantly reduced capital costs as the UG2 and Merensky reefs will be accessed via a decline, a much more cost-effective initiative compared to sinking a vertical shaft.

Given that the UG2 reef starts at a depth of less than 50 m and the Merensky reef outcrops on the surface, gently dipping between 10° - 12° degrees westwards, the Bengwenyama project will require a shallow decline system.

Further to this, the Steelpoort area is an established area containing the relevant infrastructure such as road, power and water, as well as ample and readily available skills.

"In fact, the Lebalelo water pipeline runs past the entrance of our project, and we are currently sourcing water from the pipeline for our exploration initiatives," explains Odendaal.

Mitigating the challenges that plague junior miners

Junior miners are often plagued by myriad challenges, the foremost of which include limited funds, which see teams kept to the minimum number of people and a reliance on consulting companies to provide technical backing and insight for their projects. However, in the case of Southern Palladium, the company teamed up with advisory specialist Minxcon, which acts as technical advisor.

"We have full access to Minxcon's expertise and can interact with a mining engineer, processing engineer or geologist when the need arises. The

standard junior mining team does not always have such expertise on hand," explains Odendaal.

In addition to choosing a well experienced team with knowledge of the PGM industry, the company identified key members with good governance experience to fill board level positions.

A key challenge faced by mining companies operating in South Africa – and particularly by the junior mining sector – is the policy and mineral tenure uncertainty that plagues the sector.

"Given this policy and mineral tenure uncertainty, local mining companies are highly undervalued when compared to our international peers, often discounted to the tune of 50% and more. Unless government can provide surety to investors that South Africa is a stable environment and revise our mineral policies to become more attractive to international investors, local mining companies will have to market and promote their own companies and highlight to investors that our projects are worthy of investment."

Community participation

"The Bengwenyama community, which resides on the tenement, is not just a BEE partner but a significant shareholder in the project. It holds a 30% stake in the prospecting right holder (Miracle upon Miracle) and a 9,3% stake in the listed entity, Southern Palladium. Southern Palladium has a 70% stake in Miracle upon Miracle."

Despite being at an early stage of project development, Southern Palladium has awarded several tenders to the community. These include a tender to fence part of the property which houses the exploration office; provide security services; and provide electrical, plumbing, and general maintenance services to upgrade a building the company uses as exploration offices.

Southern Palladium's drilling contractor and subsidiary currently employs close to 55 people from the community, 19 of whom are female. "A community member who is a junior geologist has shown keen interest in being involved in the project and has since been included in the exploration team. For Southern Palladium it is important to have as much community participation as possible."

The company's relationship with the Bengwenyama community began 16 years ago, when it initiated a play to acquire the asset.

PGM market outlook

The global drive to meet climate change targets and the subsequent focus on clean energy, sees PGMs (platinum, palladium and rhodium), which are used in the manufacture of auto catalysts, being highly sought after.

Even though legislative changes call for the phasing out of the internal combustion engine (ICE), with the expectation that demand for ICE will decline post 2030, the move to hybrid vehicles, which also rely on PGMs, will see the demand for the metals remaining strong.

"PGMs will continue to play an important role in fuel cell electric vehicles (FCEVs) and the development of next-generation battery technology, as well as in the production of green hydrogen," says Odendaal.

According to the WPIC, the primary drivers for demand emanate from the automotive sector's demand for platinum, which is pegged at 7% p.a. through to 2026, supported by platinum for palladium substitution in gasoline vehicles and continued steady but restrained growth in industrial demand. Industrial demand for platinum is forecast to grow by 6% p.a. through to the end of 2026. However, demand from the jewellery and investment segments is expected to remain muted.

The recently completed Phase 1 drilling programme intersected the UG 2 reef.

Taking a closer look at demand from the automotive sector, which accounts for roughly 40%, the WPIC forecasts demand for platinum from ICE vehicles alone to peak in 2028, but with sustained growth thereafter due to FCEVs.

"Our key conclusion is that although long-term growth in vehicle production comes only from BEV and FCEV, ICE is expected to remain a core part of the automotive landscape for some considerable time. ICE will feature in roles and regions that are unsuited to battery electrification. In combination with the latest emission standards, which raise loadings and especially increased platinum for palladium substitution in gasoline vehicles, this results in ICE-related automotive demand for platinum peaking in 2028, with further platinum demand growth thereafter as a result of FCEVs," the WPIC said in the report. ■

Platinum market

- Platinum metal is mined in four main geographies: South Africa, Russia, Zimbabwe and North America.
- South Africa dominates platinum mine supply, typically accounting for +/-75% of total mine supply, except for years of exceptional production disruption.
- As such, small changes in output from South Africa have the greatest bearing on variations in total platinum supply.
- The main end uses of platinum have historically been split roughly one third to catalytic converters for reducing tailpipe emissions in the automotive industry, a third to jewellery and a third split across industrial demand and investment.
- In recent years, the relative importance of jewellery has faded and been replaced by increased industrial and investment demand.

Minerals Council South Africa advances the agenda of junior miners

Grant Mitchell.

The needs of junior and emerging miners often take a back seat to those of mining majors who have greater human and financial resources. More recently, though, the Minerals Council South Africa has placed its foot firmly on the pedal to address concerns faced by this segment of the mining industry, with the industry body amping up financial resource allocation to the junior and emerging miners' desk (JEMD) and deploying experts to advise on the drafting of a fit-for-purpose policy for the sector, says Minerals Council South Africa's lead: Junior and Emerging Miners' Desk, Grant Mitchell. By *Nelendhre Moodley*.

"The history of mining in South Africa has been monopolised by mining majors, as they mined key minerals such as gold, diamonds, coal and iron-ore. However, the demand for green technology is driving the appetite for new mineral sets, which is seeing junior mining companies emerging as potential front-runners in the exploration and exploitation of new age minerals," explains Mitchell.

Aside from the crucial role played by the junior and emerging mining sector in locating and advancing projects to early-stage development, the sector is a significant industry employer providing jobs to between 33 500 (7,5%) and 40 300 (9%) people directly.

In 2018, the sector generated R54-billion (8%) in revenue and contributed R2,7 – R55-billion (4,1%) of capital spend to the mining industry. This is according to research undertaken by HJ Kriel, CEO of Vbkom, and a PhD candidate on the topic, *Junior and emerging mining: The extent, nature and economic impact of the sector in South Africa.*

The demand for green technology is driving the appetite for new mineral sets.

Advancing the agenda

The industry body is focused on overhauling policy to suit the junior and emerging mining sector and is engaged in capacity building initiatives and undertaking industry research to better understand the needs of the sector.

According to Mitchell, there is a growing number of artisanal and small-scale miners, many of whom have the potential of making a significant contribution

South Africa was ranked among the world's ten least attractive mining destinations for investment.

to the mining industry. However, the industry remains hamstrung by a poor policy framework that hampers artisanal miners from fully participating in the sector.

"A proper policy framework will encourage more artisanal miners to join the ranks of small scale and emerging miners and inspire them to become key economic contributors as taxpayers with legal outlets for the sale of their products. Currently, many artisanal miners use parallel markets (illegal channels) to sell their products."

As such, the Artisanal and Small-Scale Mining Framework, released in April this year by the DMRE, which aims to ratify key related challenges, is in the spotlight.

"Given that the Artisanal and Small-Scale Mining Framework has far-reaching consequences, particularly as it relates to illegal mining, the JEMD is engaging with legal experts to unpack the policy framework and its relationship to illegal mining with debates underway on how best to tackle issues such as the rise in criminality, while simultaneously protecting small-scale miners (formal miners) from being invaded by illegal miners. The aim of the policy framework is to regulate the system, discourage illegal mining and ensure that criminals are worked out of the system."

In addition, the JEMD and its team of experts are evaluating the legalities related to mining majors making land available for artisanal miners to mine, on what has traditionally been their mining right.

"Whilst this is a model that has been used successfully in other mining jurisdictions, particularly in Africa, the legalities around this are complex. Inter alia: if a small-scale miner is mining on land over which a major is the existing right holder, the question of rehabilitation liability comes to the fore. These are the kind of legalities we are addressing with the legal consultant," explains Mitchell.

Another thorny challenge is the issue of mine closure. The Jagersfontein disaster is a case in point of entities not adequately equipped to handle environmental aspects associated with mine closure.

In this regard the DMRE appointed Prof Mike Solomon from the University of Cape Town to research mine closure with key stakeholders. One session was run for the Minerals Council's junior members and these findings will form part of the recommendations in the final report.

In its bid to advance capacity building, the JEMD has established a mentorship platform for its members whereby they partner with senior members of big mining companies.

Left: The JSE is encouraging juniors to list on the local bourse.

Below: The JEMD is working to establish fit-for-purpose regulations for the junior and emerging mining sector.

Institutional constraints from Transnet have led to the industry losing out in revenue.

Mitchell explains that while junior members are often qualified professionals, they frequently lack experience in mining and require advice from long-standing miners.

As such, they have been benefitting from information sharing with the Junior and Emerging Miners Leadership Forum, which is chaired by Orion Minerals CEO Errol Smart, as well as from the Junior Mining Accelerator Programme run by Johannesburg Stock Exchange (JSE), which was established to help junior miners gain greater business insight.

According to Mitchell, the JSE is keen to emulate the Toronto Stock Exchange, which boasts 160 listed junior miners and is on a drive to encourage juniors to list on the local bourse. The JSE currently hosts less than ten listed junior companies.

Lastly, the JEMD continues to undertake regular research, including snap surveys among its members, aimed at identifying challenges faced by the sector. In this way, the Minerals Council is able to provide the necessary assistance and support, where required.

A sector stifled by over-regulation and red tape

According to the Fraser Institute's Annual Survey of Mining Companies 2021 report, South Africa's attractiveness as an investment destination is less than optimal. South Africa was ranked among the world's ten least attractive mining destinations for investment, meaning that junior miners' access to foreign direct investment received a body-blow.

The Fraser Institute's survey ranks countries' attractiveness in terms of policy, mineral potential and other metrics to come up with a report card that governments can use to assess whether their policies are attracting or driving away investment.

"From a greenfields exploration point of view (an entry point for most junior mining companies), South Africa has lost ground and there is an urgent need to grow this sector, which remains largely stifled by the regulatory environment and massive red tape. If junior miners are to succeed, there is a pressing need to implement a suitable cadastral system."

For years, the mining industry has been imploring the Department of Mineral Resources and Energy (DMRE) to implement a cadastral system that would allow for transparency and speed up the mining license application process, but so far to no avail.

According to Mitchell, there is an imperative to find a well experienced, commercially viable company to implement a cadastral system for the DMRE.

"Once a cadastral system is in place, it will enable miners to apply for mining licenses online, allow miners to track their application processes and view companies competing for the same application they have set their sights on, and help them to understand why their application has succeeded or not. From an investor's point of view, investors will have access to which projects are being progressed by which companies. One of the biggest challenges investors face is that there is currently no central database from which to access up-to-date project information. A cadastral system would allow this level of transparency and encourage greater investment into junior mining companies."

Mitchell points out that virtually all key mining jurisdictions in the SADC region have online cadastral systems, with South Africa being one of the few laggards. As a result, much of the foreign direct investment is being channeled into destinations that do have a cadastral system in place. Furthermore, their "mining and exploration rights are being managed better and more efficiently".

"Our neighbours, Zambia, Mozambique, Botswana and Namibia, have all embraced attractive policy measures, which encourage foreign investment into the mining sector. South Africa needs to follow suit."

Sector performance in 2022

According to Mitchell, the junior and emerging mining sector performed on par with the broader industry.

Although mining production dropped primarily due to institutional constraints from Eskom and Transnet, which led to the industry losing out in revenue from curtailed commodity exports, revenue increased significantly as a result of the commodity boom.

"The JEMD is working hard in advocating for the establishing fit-for-purpose regulations for the junior and emerging mining sector, but there is much work to be done," concludes Mitchell. ■

Difference between artisanal and small-scale miners

- Artisanal miners are defined as those relying on rudimentary equipment (pick and shovel) as a mining method while small-scale miners adopt mechanised mining methods, including machinery.
- As soon as machinery is used, the miner becomes subject to additional legislation.

CLEANER, SAFER, MORE PRODUCTIVE CONVEYING

OUR NEW BELT CLEANER DELIVERS 5X LONGER SERVICE.

Problem Solved™

One of the world's largest iron ore producers had a very big problem. Conventional belt cleaners wore out much too fast — requiring frequent maintenance, and losing significant time and money. Searching for a more productive, cost-effective solution to this troublesome situation, this operator turned to Martin's award-winning **CleanScrape.**®

Featuring tough tungsten carbide scrapers and low contact pressure that guarantees no damage to the belts, **CleanScrape** has provided vastly improved carryback removal and 5X the service life of typical belt cleaners. Its slim design, simple installation and low maintenance requirements reduced downtime by nearly 40 hours per year, saving more than $20,000.

Money-back guarantee from Martin ensures **CleanScrape** will clean better, last longer and deliver total satisfaction.

martin® engineering

"Celebrating outstanding achievements and successes that have demonstrated innovative practices and superior performances."

— **Award for Innovative Technology**
Australian Bulk Handling Magazine

For factory-direct service, training and sales call **1-309-852-2384**
or to access our professional development options visit **martin-eng.com** and click the **Learning Center** tab.

Jagersfontein tragedy draws attention to increasing TSF failures

The Jagersfontein tragedy that took place in September has shone the spotlight on the increasing rate of tailings dams' failures and the impact such incidents have on lives, infrastructure and the environment. According to Mariette Liefferink, CEO of the Federation for a Sustainable Environment (FSE), research of all serious tailings failures since 1915 shows that the rate of tailings dam failures since 1915 is increasing with half (33 of 67) of serious tailings dam failures in the last 70 years happening in the 20 years between 1990 and 2009. By *Nelendhre Moodley*.

Although there is no comprehensive global registry of tailings dams, it is estimated that there are around 18 000 dams, 3 500 of which are active. If a dam is not active, it is not necessarily abandoned – it simply means there is no longer active deposition of tailings on the tailings dam.

Liefferink explains that the growing rate of tailings dam failures is increasingly propelled by modern mining practices and factors such as non-compliance, the failure to monitor enforcement, and a severe lack of coordination, especially by government stakeholders.

"The increasing rate of failures is directly related to the increasing number of tailings storage facilities (TSFs) larger than 5-million cubic metre capacity, which is necessitated by the economic extraction of lower grades of ore. Moreover, Earthworks, recently released a report which highlights a frightening statistic – that 19 catastrophic tailings dam failures are predicted globally from 2018 to 2027."

With the high rate of abandoned mines and mines under liquidation, all of which house TSFs, this predication does not bode well for the industry and the communities surrounding mining operations.

The country's long and rich mining history has left a legacy of some 6 000 abandoned mines, with many legally classified as 'derelict and ownerless. As such, they will require intervention by the state to address safety, health and environmental legacies.

According to Liefferink, abandoned mines have considerable negative impacts on the health and safety of local communities and on the environment.

Abandoned mines are often associated with open shafts, unstable slopes on dumps and pits,

A view of the tailings piles at Mintails.

(Image courtesy of Mark Olalde)

(Image courtesy of Mark Dlalde)

Shacks built on top of a gold mine tailings pile on the East Rand.

collapsed infrastructure and other hazards, such as contaminated water and soil, chemicals and metals, radioactivity, windblown dust and, in the case of coal mines, spontaneous combustion of coal and coal residue.

In the Jagersfontein tragedy, the cause of the TSF's failure is described as a "structural failure", but reasons for failures can include seismic instability or earthquakes, external erosion, seepage and internal erosion, slope instability, overtopping and structural inadequacies.

Aside from the health and safety risks, these abandoned mines have also given rise to a proliferation of illegal mining and criminal syndicates.

"It must be remembered': says Liefferink, "that tailings dams are living structures and require in-depth understanding and continual management within an appropriate tailings management system. To manage mining facilities responsibly, TSF owners 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 during the life of mine, including closure and post closure.

"If poorly designed, constructed or managed, tailings storage facilities represent a significant risk to local communities and ecosystems, especially in downstream environments. In South Africa most of our facilities are upstream facilities, which are low cost but high risk.

Abandoned and liquidated mines

According to Liefferink, industry currently sits with a number of liquidated mines, including some located within the Witwatersrand gold fields, such as the Mintails Group of Companies (Mintails Gold, Mintails SA, Mintails SA Randfontein Cluster), Shiva Mine, the Blyvooruitzicht Gold Mining Company and Central Rand Gold, Grootvlei Mine.

"These liquidated mines," Liefferink explains, "are often abandoned with no mitigation or management measures implemented such as dust control, storm-water management control, functioning penstocks, piezometers and toe paddocks, erosion control, slope stability control and no access control".

Abandoned mines have considerable negative impacts on the health and safety of local communities and on the environment.

Some mining companies continue to operate without adequate financial provision for repairing damage caused by mining activities.

The foremost challenge is that the Mineral and Petroleum Resources Development Act (MPRDA) places no specific obligation on the courts to ensure that a company applying for liquidation needs to also apply for a closure certificate. If liquidators are legally obliged to apply for a closure certificate it will ensure that surface and groundwater as well as air quality, the soil (property) and vegetation, are fit for current and future use. Furthermore, it would offer assurance of the transfer of the environmental liabilities and the top-up of rehabilitation funds in the case of any shortfall."

Liefferink notes that one of the most serious consequences of liquidation is that the company ceases to exist as a legal person. The environmental obligations specified in the MPRDA are linked to a holder of a mining right, and this, in turn, is defined with reference to a person. If no person legally exists these obligations by extension cannot be enforced.

"There is," she says, "a systemic failure on the part of our Regulators (Department of Water and Sanitation, Department of Mineral Resources and Energy, the National Nuclear Regulator) to regulate liquidated mines."

Tailings dams are living structures and require appropriate tailings management systems.

One of the most common practices for mining companies wanting to avoid their closure commitments is the 'pass the parcel' move. That is, the selling of mines close to closure onto less resourced companies (e.g. De Beers and Reinet selling to Jagersfontein Development) which relieves the former owners of the responsibility and liability of dealing with the problems of closure.

"This 'pass the parcel' approach to the custodianship of the closure plan allows for mines to end up in the hands of the weakest companies which have neither the resources, will nor intention to manage closure responsibly," she says.

Is government succeeding in addressing issues related to abandoned mines?

Despite the findings and recommendations of the Parliamentary Portfolio Committee on Mineral Resources and its 2018 Report to the National Assembly and several recommendations put forth, the FSE notes that some mining companies continue to operate without adequate financial provision for repairing damage caused to the environment by mining activities, if they suddenly close.

Liefferink adds that there is an urgent need for clarity on issues related to business rescue, given the existence of a huge regulatory gap related to the financial provision of the environmental rehabilitation of a mine during the process of business rescue. Moreover, the DMRE needs to be more proactive, especially in identifying the gaps in mining, which have led to the ongoing situation where the polluter does not pay, with the result that it is the state that ends up paying for the costs of environmental rehabilitation.

"The DMRE has failed to implement and effectively carry out the intentions of Parliament to ensure that all mines rehabilitate the damage they cause. For instance, the DMRE allowed Mintails to operate between 2012 and 2018, despite the fact that the Department had not approved the environmental management plans of the mine and had not issued the company with a mining right under the law.

"Moreover, she adds, "neither Shiva Uranium and Mintails Mining SA had saved the money they were supposed, by law, to set aside to pay for environmental rehabilitation. The shortfalls are R36,6-million for Shiva Uranium and R460-million for Mintails. As such, the state inherits these liabilities when the mines are finally liquidated. In essence, the new laws have not proven effective in avoiding the situation where the state and the taxpayer end up paying for the environmental harm caused by mining."

In a bid to mitigate such challenges, the FSE has advised that, going forward, there is urgent need for the DMRE to:

- ❑ Adopt changes to the mining law that were made by Parliament after 2002 to ensure that in mining, as elsewhere, the polluter must pay.
- ❑ Actively ensure that the licensing of mines goes

hand-in-hand with responsibility and accountability.

- ❑ Explore the regulatory gaps resulting from the business rescue process and come up with regulations that will ensure full environmental compliance during the period when a mine is experiencing financial distress.
- ❑ Report to the Committee in Parliament on what it will do (or needs to do) differently in future to ensure that this situation does not continue.
- ❑ Consider the establishment of a trust account where mining companies deposit funds, which the State can access to remedy water and other impacts caused by unrehabilitated, abandoned or derelict mines.
- ❑ Develop a Regional Master Plan aimed at addressing environmental rehabilitation and remediation of derelict and ownerless mines.
- ❑ Report on the progress and anticipated timelines for the finalisation of the draft National Mine Closure Strategy and the draft National Mine Water Management Policy.

How do other governments handle the challenge of abandoned mines?

The issue of abandoned mines is not particular to South Africa and is prevalent across numerous mining jurisdictions. However, in many countries, the state takes responsibility for mines which closed before the passage of legislation requiring formal mine closure.

In the South African case, this date is likely to be the date of the passage of the Mines and Works Act, 27 of 1956. In practice, this has already been agreed to under the Fanie Botha Accord of 1975.

Interestingly, some countries have established a super fund to address problems relating to abandoned mines.

"Another important aspect of many countries' efforts to solve problems related to abandoned mines is the development of demonstration projects, where remediation technologies can be tested and developed and successes can be presented to the broader community. With South Africa being home to so many abandoned mines, the implementation of a similar initiative would go a long way in helping to reduce the impact that abandoned mines have on society," says Liefferink.

Coal mines are associated with spontaneous combustion of coal.

FSE drives the agenda for legislative reform

The FSE's activism continues to play a critical role in contributing towards changes in policies, strategies and regulations, and the establishment of legal precedents.

"Our engagements with industry leaders and government bodies have been sustained for close to two decades," Liefferink explains. "They have contributed to the Parliamentary Portfolio Commission's Report, the directives by the SAHRC, and amendments to our laws (e.g. the retrospective application of the polluter pays principles, the Financial Regulations, which call for financial provisions for latent and residual impacts, and the pumping and treatment of extraneous or polluted water).

"We have been closely involved in providing information and data for national and international research as well as for the publication of scholarly papers and in providing information to international and national news media. The FSE continues to be involved in governmental and academic task teams, steering and advisory committees and research projects," concludes Liefferink. ■

The Council of Geoscience has ranked the derelict and ownerless mines as follows:

Region	Commodities	Pathways	Comments
Witwatersrand (all gold mines from the Free State to Evander)	Gold, uranium	Air, surface water, groundwater	High environmental risks due to uranium
Gold mines related to the greenstone belts of Mpumalanga	Gold, silver, arsenic	Air, surface water, groundwater	High risks due to arsenic
Gold mines related to greenstone belts in Limpopo Province	Gold, antimony	Air, surface water, groundwater	High risks due to the presence of antimony and, in some cases, mercury
All asbestos mines	Asbestos	Air, surface water	
The copper mines in the Springbok Area	Copper, tungsten, molybdenum, bismuth	Surface water, groundwater	Water related risks due to the presence of bismuth
Pegmatites in Northern Namaqualand	Many commodities	Air, surface water, groundwater	Risks are primarily due to radioactive components of bismuth

Ralf Hennecke, managing director of BME.

Omnia's BME reaches globally with feet on the ground

Global economic disruption has in many ways meant a 'back to basics' approach for the mining industry and its supply partners – but this has not prevented Omnia Group company BME from notching up several successes in its innovation and global expansion plans.

For Ralf Hennecke, managing director of BME, the company has progressed on many fronts over the past year. One that stands out is the sterling reception it has received for its latest-generation AXXIS Titanium™ electronic initiation system.

"Seeing this system being trialled by Tier 1 mining companies in markets such as North America and Australia is a real accolade for our ongoing efforts in technology innovation," says Hennecke. "Taking a broader view, though, we also see the industry prioritising its supply chain security in light of Covid-19 and the war in Ukraine."

He reiterates that mining performance is based on continuous and productive operations, which rely on services and products being delivered regularly and on time. Mines want quality offerings and reliable delivery, he argues, which were often taken for granted when mining companies were reaching towards future solutions in mechanisation, automation, and digitalisation.

Supply security

"We have in recent years been inundated with requests from existing and new customers, for supplies outside our current scope, where they may have experienced sourcing difficulties," he says. "The answer has always been, "Yes, we can", and we have. The ability to supply on demand has always been a BME and Omnia strong point."

It has allowed the company to instil confidence in customers within its current footprint, while continuing to expand its reach to new territories and customers.

"On the strength of our established manufacturing facilities and solid supply lines, we have not let down a single customer during these trying times, " he explains. "Mines have placed supply chain risk at the top of their agendas, and with good reason."

Volatile times

He highlights that the sector is dealing with considerable volatility where cost input pricing is often unpredictable. This is an issue BME continues to address in the interests of long term, win-win, relationships with customers.

"As a leading supplier, BME closely manages our own supply chain risk alongside ongoing disruption from electricity load-shedding," he says. "We can do this as our own manufacturing and assembly facilities are able to run independent of grid power – with many operations drawing on renewable energy."

He notes that the company's ability to supply was enhanced by the Omnia Group having the youngest plants in Africa at its Sasolburg site – as well as having considerable production capacity.

On the global stage, BME has made great strides in all the regions in which it is active.

Green focus

Alongside its supply chain focus, the mining sector is still seeing a strong drive towards environmental, social and governance (ESG) objectives – and it expects its supply partners to stay abreast. As part of the Omnia Group, this remains a core focus of BME.

"Our used oil initiative, as one example, continues to gather momentum and expand into new avenues wherever we see the opportunity," says Hennecke. "We provide a valuable service to customers and other oil users by disposing responsibly of their waste oil."

At the same time, the carefully managed and monitored oil collection network gives opportunities to small businesses in the community. BME's transporting and processing protocols are also setting the standard for the broader waste management

Seeing the AXXIS system being trialled by Tier 1 mining companies is a real accolade for BME's ongoing efforts in technology innovation.

industry – which is looking for more transparency and accountability in waste disposal efforts.

This goes hand in hand with the stellar safety record that BME has always maintained and improved. Having already been recognised at the Chemical and Allied Industries Association (CAIA) Awards for its world class safety levels, BME's recorded case rate (RCR) reached a record low of 0,15% in the last financial year.

"We are very proud of our safety record and are aware that this impacts directly on the success and reputation of our mining customers," he says. "We make sure that our safety practices are aligned with our own safety protocols, all relevant regulations and the demands of customers' on-site operations."

New boundaries

On the global stage, BME has made great strides in all the regions in which it is active. The building and mobilising of the company's infrastructure in Canada is proceeding apace – with both a detonator plant and an emulsion plant in progress. These will be complete as planned by end-2022, providing the necessary springboard for BME to become a proactive player in the North American market. An exciting partnership in Indonesia is being developed, while in Australia there is growing interest in products like AXXIS Titanium™.

"AXXIS™ has now also been certified in the United States for cold weather applications, which gives us a further reach into broader global markets – not just North America but regions like South America and Europe," he says. "This is a significant milestone for the system's growing prospects world-wide."

Closer to home, there is considerable buoyancy in the copper segment in southern and central Africa, he notes. The company has always been very busy in Zambia, and this continues to be a rewarding market for BME's operations. With the entry of a new

Above: BME continues to push technological boundaries.

Left: BME's used oil initiative continues to gather momentum and expands into new avenues.

nickel player in the region, there is even more reason to be optimistic.

SADC prospects

"Namibia and Botswana – where we are well established – are doing well too, and there are even mine openings and expansions in Lesotho," he says. "There is often the feeling, though, that mining in Southern African Development Community (SADC) countries could be growing faster."

Current global disruptions and uncertainties are not making the environment easier, but he still feels bullish about the region. South Africa, for instance, is seeing some good progress through expansion projects in the iron ore, zinc, and coal segments.

"With the growing demand for coal, we are even seeing some coal mines re-opening – although it is not clear at this stage whether that is for the short or long term," he says. "It is great to see this level of buoyancy and movement in a mature market like South Africa."

All told, concludes Hennecke, BME is working to keep the basics in place for stability and efficiency in mining – while continuing to push the technological and geographic boundaries to a successful future. ■

AECI Mining Explosives develops alternative booster technology

The storage and transporting of explosives and associated raw materials come with a fair amount of risk. AECI Mining Explosives has addressed this issue through innovation with the development of a ground-breaking alternative booster technology manufactured from non-explosive raw materials.

The manufacture of boosters or primers from Pentaerythritol Tetranitrate (PETN) (or cyclo-trimethylene trinitramine (RDX) and Trinitrotoluene (TNT) is unrivalled in terms of performance and reliability. It remains the preferred method globally as an intermediary part of the detonation train due to its ease of initiation from a detonator and high velocity of detonation (VoD).

AECI Mining Explosives develops innovative booster technology.

The handling of energetic materials and explosive raw materials is, by nature, hazardous and therefore highly regulated in the interest of public safety. This introduces some costly challenges, says Hazel Bomba, product manager at AECI Mining Explosives. As a result, the ability to position booster manufacturing sites in more geographical areas, to ensure product accessibility, is limited.

AECI Mining Explosives alternative booster technology, manufactured from non-explosive raw materials was trialed in the field following extensive laboratory testing. The company enjoyed a successful market introduction of the booster during Q3 2022.

As demand for resources continually surges to sustain global growth, the need for mining activity correspondingly increases. The need for boosters has subsequently increased, says Bomba.

"This alternative technology opens the opportunity for so much more. AECI Mining Explosives has trailed and optimised the booster design to the extent that its PowerBoostTM technology performs to the equivalent expectation as the Pentolite (PETN and TNT) boosters. The use of non-explosive raw materials in booster technology simplifies logistics, has the potential to lower manufacturing costs, and creates the ability to deploy simple mobile modular plants to strategically placed manufacturing hubs," concludes Bomba. ■

UMS returns to its roots with local projects

UMS's recent project awards on local soil demonstrate the company's intent to work closely with the South African mining sector as it responds to a rise in global commodity prices.

Takalani Randima, MD of UMS Shaft Sinking.

Rob Hull, COO of UMS, says that although the company has secured significant international projects over the past few years, it always had its sights set on more local work. "While we serve global mining and minerals processing clients, our origins are in the South African mining sector. We have been involved in many of the major underground developments in South Africa and have a deeply experienced team which has an intimate knowledge of local mines.

"This, together with lessons learnt in the last few years, a drive to incorporate innovation to improve safety and efficiencies, and a strong focus on skills transfer have all contributed to UMS securing a number of local projects, including the prestigious Sedibelo Resources Limited Triple Crown decline shaft project," says Hull.

Sedibelo Resources (SRL) on the Western Limb near the Pilanesberg platinum mine concentrator has engaged UMS for the development of its underground project, which represents a diversification from its current opencast operations.

SRL's platinum assets are situated on both the Western and Eastern Limbs of the Bushveld Complex, which contain around 90% of the world's known reserves of PGMs.

UMS's scope of work includes decline development, raise boring and underground development, to be executed in four legs over a five-year period. Takalani Randima, MD of UMS Shaft Sinking, elaborates on this and says that UMS will be involved in the drilling and blasting of the main conveyor belt and service declines, constructing the anchor support, shotcreting, blasting for workshops, and constructing the ventilation and ore passes. UMS will be raise boring between each leg for an optimal ventilation system.

Randima explains that as the underground ore body in this region is relatively shallow, the decline slope is just 9 degrees, with the reef at a depth of approximately 620 m below surface, allowing for mechanised equipment such as drill rigs, dump trucks and utility vehicles to be used. It will also allow the client to contemplate the use of electric and battery vehicles at the levels development stage.

"Safety is a critical factor in delivering this project," says Randima. "Historically SRL has a top-quartile safety record, and our team is working closely with head office and the client to ensure a number of safety measures are implemented to prevent any harm to persons and machinery.

"Furthermore, UMS is committed to meeting project targets and milestones, which has not always been the case in underground development projects."

Another critical factor to project success is UMS's approach to CSI projects. "We have a thorough CSI plan, coordinated with the client, which will be a key component of how we develop and deliver this project," says Hull. "Besides bringing our technical expertise in mining development, we are prioritising sustainability for the community by offering training and thereby creating a pool of skilled and trained community members for the mines to recruit from."

One of UMS's key training objectives is to ensure that local employees are fully trained in trackless mobile machinery (TMM) as operators, artisans and qualified TMM miners by the time UMS's five-year scope of work is completed. As such, UMS will be contributing to the sustainability of the community by focusing on training artisans and transferring skills in association with other training operators and OEMs. ■

The signing of a safety pledge by the site management team.

Ross Harvey, director of research and programmes at GGA.

Critical minerals demand meets obstinate realities

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

The US federal reserve has likely passed its interest rate hiking cycle peak. In plain language, any future increases in US interest rates are likely to be lower than the last three. US inflation is slowing on the back of higher interest rates, which increases capital borrowing costs. Inflation-stemming is also attributable to other factors such as lower-than-expected global oil prices.

Brent crude futures are currently trading at $85/bbl, whereas the Economist Intelligence Unit estimates that oil will close the year at $102/bbl before dropping to $84/bbl by 2024. With US yields decreasing on the back of slight monetary policy loosening (lower interest rate hikes), the dollar has weakened a little, allowing the rand to make some gains. In the space of three weeks, it has moved from a low of R18.42/$ up to R16.97.

The Johannesburg Securities Exchange has lifted on these numbers, but consumer price inflation has remained sticky upwards. However, the latest producer price inflation figures show a slight decline. But literally as I type, the South African reserve bank's Monetary Policy Committee (MPC) has implemented another 75 basis-point increase to the repo rate (24 November).

In the wake of US dollar weakening, hot money will start flowing back to emerging markets looking for higher yields, which will clearly now be on offer from South Africa. Consequent Rand strengthening may help us to mitigate import-driven inflation, but the risk of the latter seems to be declining, especially with a G7 price cap agreement on Russian crude exports, a very slow Chinese economic recovery, and oil supply expansion within the US. On these grounds alone, the MPC might be well advised to reduce any future hikes to 50 basis points or less.

I argue this case not only because it would provide a slight increase in disposable income for already-squeezed consumers, but also because further rand strengthening would weaken minerals exports and the foreign exchange revenue that brings. However, public sector union strikes for a 10% wage increase are the single biggest counter to the above argument. Public sector wages are about 40% higher than total personal income tax revenue in South Africa, which is an untenable financial situation. Moreover, relying on a weaker rand for greater mineral export revenues is arguably tantamount to shifting deck chairs on the titanic. The mining industry requires significantly more exploration and production expansion investment, especially in minerals that are going to be in increasingly high global demand.

Last year alone, the South African mining industry employed 459 000 people directly and contributed R78 billion in tax revenue, plugging a significant gap in the fiscus due to stagnation in other sectors and resultant tax shortfalls. Chrome and manganese, of which South Africa possesses among the world's largest reserves, should be expanding at a rapid rate, along with Platinum Group Metals (PGMs). Despite temporary backsliding towards fossil fuels in Europe (thanks to Russia's pig-headed and protracted war in Ukraine), the global trajectory still appears to be heading towards a renewable energy tipping point. Chrome and manganese, as well as PMGs, are critical ingredients to various elements of the transition, especially for the construction of wind turbines, electric vehicles and hydrogen fuel cells.

Minerals council data shows that PGM exports for 2021 were valued at R321-billion. Exports constituted 93% of total sales. By way of contrast, chrome exports were only valued at R10.7 billion, although exports are only 49% of total sales. Nonetheless, total sales are still about 15 times less than PGM exports alone. Similarly, manganese exports were worth R34.3-billion, 93% of total sales. Chrome employment in 2021 was down on previous years, but still came in at 18 599. Manganese employment is growing slowly but is only at 13 290. PGMs are still well below the 2012 peak, but employment growth is evident with a total of 171 568 employees. Every job in the mining sector benefits at least five dependents on average (with some estimates suggesting

In 2021, the mining industry employed 459 000 people directly and contributed R78-billion in tax revenue.

the figure is as high as 10). And while mines of the future will employ fewer people, mining remains a potentially catalytic force for other industries to grow. Overall, though, net fixed investment and new mine construction in South Africa has been declining over the past two decades.

Without mining sector growth, South Africa will struggle to keep its head above water. Growth will help to address a range of challenges, but these challenges are the very barriers to further growth. This was the message from Minerals Council CEO Roger Baxter at an Anglo American conference on Sustainable Development Goal (SDG) 16 this week. SDG 16 is particularly important because it is a gateway SDG to achieving a range of other SDGs, not least of which is SDG 8, growth and prosperity. SDG16 is peace, justice and strong institutions. Any economist worth their salt will tell you that institutions are the fundamental cause of long-run growth. As we know all too well, South Africa's key institutions were hollowed out during the Zuma years and it turns out it's enormously difficult to reverse that (just ask Andre De Ruyter). In the vacuums created by that hollowing out, organised crime has proliferated. There is a path dependence to this, a kind of inertia that threatens to overwhelm, if not quickly eliminated. But the state's capacity to deliver accountability and snuff out organised crime is thin.

It is not only that procurement and construction mafias demand a share of any new project, or that local gangs masquerade as community interest groups, it's that organised crime continues to infiltrate entities like Eskom and Transnet. It's clear, then, that the mining industry faces an uphill battle and growth is not likely to be forthcoming until significant progress is made in retarding the current major barriers to investment growth.

However, there are immediate wins on the regulatory front that would at least help private sector players like Anglo make their social investments that much more productive. For instance, the Social and Labour plan (SLP) requirements of the Mineral and Petroleum Resources Development Act are narrow, overly formulaic and almost create the parochial kind of Corporate Social Responsibility (CSR) white elephants that the private sector wants to move away from (schools that end up without running water or teachers, for example). SLP requirements typically do not cohere with the Integrated Development Plans (IDPs) constructed by local municipal authorities that govern in mining host communities. Simple refinements to these SLP requirements would free companies to invest in institutional capacity building that would improve the governance systems of entire regions and help the IDPs to gain real-world traction instead of being pipedreams.

At Good Governance Africa, where I lead the research work, we've just released an intelligence report that visually demonstrates the correlation between local governance performance and political stability. The implication is clear – any investment in improving local government effectiveness will contribute to growing stability required for economic dynamism to flourish. This is not only good for mining productivity, but it would also increase the growth of other businesses. In our challenging and volatile national and global contexts, this is a low-hanging fruit that should immediately be actioned. ■

Organised crime continues to infiltrate entities like Eskom and Transnet.

Without mining sector growth, South Africa will struggle to keep its head above water.

INVESTING IN AFRICAN MINING INDABA

a Hyve event

REGISTER TODAY

6-9 February 2023 | CTICC, Cape Town

Unlock the future of African Mining

Through Investment: Stability, Security, and Supply

Network
Meet thought-leaders, government leaders, c-suite and other influential people in the industry all under one roof.

Learn
Will provide one week of pioneering talks from influential leaders and thought-provoking discussions from across the value chain.

Invest
Guaranteed ROI from targeted roundtables to meeting hubs , with more focus than ever on ensuring your objectives are met.

Get Meetings
Create meaningful connection through unmatched networking programme's and scheduled 1-2-1 meetings and get the most out of your time.

BE SURE TO FOLLOW AND INCLUDE US IN YOUR SOCIAL MEDIA POSTS USING
#MI2023 | @MININGINDABA

Mining – why on-site generation provides a future-proofed, sustainable and reliable alternative

By Vladimir Milovanovic, Vice President, Power Systems, Anglophone Africa Cluster at Schneider Electric

Vladimir Milovanovic: VP Power Systems, Anglophone Africa Cluster at Schneider Electric.

Like its counterparts across the world, the South African mining industry is an electricity super user. Unsurprisingly, it was one of the first industries that had to comply with South Africa's Carbon Tax Act, which is driving mining houses to look at alternatives to reduce OPEX while meeting its regulatory obligations.

That said, it is not only the Carbon Tax Act that is moving the industry towards change; our unreliable grid is seeing mining houses move toward more sophisticated process and control equipment which, in turn, requires high power quality to ensure these systems run optimally and won't fail prematurely or frequently, causing downtime.

Additionally, mines require reliable electricity to remote locations where new operations are designed and constructed. Combined with electricity tariff hikes, one can understand why mining houses are scrambling to find feasible alternatives.

To counter grid instability, as well as availability, many mining operations are relying on internal power sources such as diesel generators to run operations. Also, mines are bringing renewable energy sources, like solar and wind, into the mix to establish a hybrid energy model of sorts.

Whilst the above does provide some form of renewable energy posture, it unfortunately still relies too heavily on fossil fuels, be it generators or grid supply, to meet daily operational demand.

The microgrid – self-containment optimised

To make the most of our country's abundance of natural energy resources, in a sustainable manner, whilst reaping the benefits of quality and reliable energy, mining houses should incorporate the concept of microgrids into their operations.

Microgrids offer mines the following important benefits:

- ❑ They harness modern renewable generation – wind and solar are widely available, becoming more and more cost-effective, and generally safer to operate than traditional sources.
- ❑ Energy storage – comprising battery energy storage systems (BESS) and/or thermal and mechanical methods, storage abilities support a clean energy transition by firming up availability of intermittent power sources and increasing grid flexibility to drive positive outcomes. Moreover, battery storage is becoming increasingly affordable and attainable.
- ❑ Advanced control technologies – such as cloud computing, data analysis and IoT to optimise, autonomously schedule and control energy production and consumption.
- ❑ Microgrids allow for self-contained, on-site energy generation from greener sources that can improve a network's sustainability, reliability, and resilience.
- ❑ Facilitate compliance and ESG.

The digital and energy partnership

Software and analytics need to be used to make the most of microgrids and ultimately mines' sustainability goals:

- ❑ Transparency of consumption – energy's visibility is the starting point for decarbonisation, obtaining insights from across the corporate value chain is vital to measuring and controlling what power resources are used.
- ❑ Analytics and AI can automate the conversion of data-driven insights into real-time decision making.
- ❑ Digital twin technologies enable modelling of the characteristics of the mine (demand/load) to facilitate predictive shifting of flexible operations to when renewable generation is at peak
- ❑ Ecosystem collaboration that leverages the skills and know-how of end-users, technology partners, and integrators.

To forge a future that offers reliable, quality and sustainable energy, mines should include on-site generation such as microgrids into their energy mix, which is realised by a partnership of energy transition and digital transformation. Ultimately, using on-site energy more efficiently, improves mining processes' productivity, reliability, safety, and the expansion of operations. ■

Mines are bringing renewable energy sources, such as solar and wind, into the mix to establish a hybrid energy model of sorts.

VEGA South Africa opens new headquarters in Lanseria

VEGA South Africa – a supplier of level, switching, pressure and nucleonic instrumentation, and a wholly owned subsidiary of VEGA Grieshaber KG – recently opened its new headquarters in Lanseria, Johannesburg.

VEGA South Africa relocated about 20 km north to Lanseria after more than two decades collectively in its Ruimsig home office and consequently its Honeydew head office, which occupied a mere 1 000 m^2. Managing director Frikkie Streicher explains that the steady growth the company experienced over the past six years demanded expansion to complement the long-term vision for local manufacturing and assembly. The current facility and land space allow for expansion as and when the need arises.

VEGA South Africa relocates to new headquarters in Lanseria.

"We can double our staff complement and still be comfortable in our current building," he says. The facility creates a greater scope for providing insightful tailor-made product and industry training. The new building also enables VEGA South Africa to increase its stockholding. "We intend to keep our fast-moving goods stock up so we can fulfil orders within a day or two," says Streicher.

The 6 000 m^2 head office and warehouse is an architectural masterpiece, incorporating a solar system capable of meeting 100% of VEGA South Africa's energy demand during daytime hours, as well as a grey-water harvest system that makes use of VEGA level sensors and controllers. ■

Dry-type transformers go 1,6 km deep in SA gold mine

When dry-type transformer specialist Trafo Power Solutions was asked to supply three units to an underground South African gold mine, it was given a hill to climb in terms of design and logistics.

The mine required the transformers to operate in the usual demanding conditions of dust, moisture and heat, says Trafo Power Solutions managing director David Claassen. However, there were a range of other challenges – not least the weight and height restrictions of a deep mine. While two of the transformers are relatively small – 250 kVA and 630 kVA – the third is a substantial 3150 kVA.

"The transformers are to operate at about 1 km below surface and will have to be transported through an incline shaft and a vertical shaft," says Claassen. "With the larger unit especially, we had to work very closely with our Italian technology partner TMC to reach a design that could be moved within these constraints."

Trafo Power Solutions also designed the enclosures locally, in a manner that would allow them to be transported in manageable components before being re-assembled underground. The enclosure design had to ensure that while dust and moisture were kept out, there was still enough air circulation to cool the unit. The dry-type transformers will be supplying loads for a refrigeration plant.

"Trafo Power Solutions conducted the complete designs, which were then verified and vetted by TMC," he says. "This quality control is central to our approach in ensuring fit-for-purpose solutions."

Trafo Power Solutions supplies three units to an underground South African gold mine.

Delivery of the transformers is expected to take place by the fourth quarter of 2022, with Trafo Power Solutions supervising the installation and commissioning process. ■

Zest WEG delivers mobile switching station to Mozambique

Zest WEG supplied a mobile switching station to Mozambique's national power utility EDM.

Zest WEG, the manufacturer of custom-engineered mobile power solutions, has supplied a mobile switching station to Mozambique's national power utility EDM (Electricidade de Moçambique). The specifications and end-user requirements to be met were provided to Zest WEG by MESAT, a Mozambican engineering company acting on behalf of EDM.

The 33 kV switching station, complete with 36 kV rated switchgear, is housed within a purpose-built enclosure installed on a double-axle trailer and includes all protection requirements to allow for quick connection and safe operation.

"Mozambique is regarded by Zest WEG as a key strategic market and we're therefore delighted to have successfully completed this order," comments Sollie Herbst, senior manager, Energy Systems at Zest WEG.

The switching station was designed and manufactured in South Africa by Zest WEG with the lead engineer on the project being Dumisani Dlamini, energy systems engineer within the Energy Systems division of the company.

Zest WEG is normally able to supply its mobile switching stations within 28 weeks of receiving an order but, in this case, was able to slightly better the time. "The design and fabrication proceeded very smoothly, and we were able to deliver well within the promised timeframe," says Dlamini. ■

Condra acquires iTEK Drives

Condra's MD, Marc Kleiner.

Crane and hoist manufacturer Condra recently acquired iTek Drives, a distributor of the Optidrive range of variable frequency drives (VFDs). The acquisition secures for Condra the supply of a key crane component and reinforces iTek's position as an important sales partner of Invertek Drives, the UK-based manufacturer of the Optidrive product range.

Optidrive VFDs optimise the operation of completed Condra cranes, delivering precisely variable motion during lift, cross-travel and long-travel, and smoothly changing motor speeds to eliminate 'stepping'. The drives also optimise electrical energy usage.

End-users will benefit from expanded technical expertise, including ready access to installation and repair skills delivered by an increased staffing that will soon include Condra technicians currently undergoing training and accreditation in drive programming and repair.

Condra's MD Marc Kleiner thinks that Condra's incorporation of iTek Drives has likely propelled iTek to a position of agency leadership.

"Condra already holds a substantial stock of this product at its Johannesburg factory," he explained, "so combined with iTek's own stock, the acquisition effectively makes it the country's biggest supplier of Invertek drives. Customers will benefit from the increased level of competition in the drive market resulting directly from this increased stockholding. ■

Babcock introduces new Volvo EC550E in southern Africa

Following its global debut at the start of this year, the Volvo EC550E crawler excavator is now available in southern Africa. Ideal for mining, quarrying and large infrastructure projects, the new 55-t class machine delivers up to 35% more productivity and a 22% improvement in fuel efficiency.

The Volvo EC550E crawler excavator is now available in southern Africa.

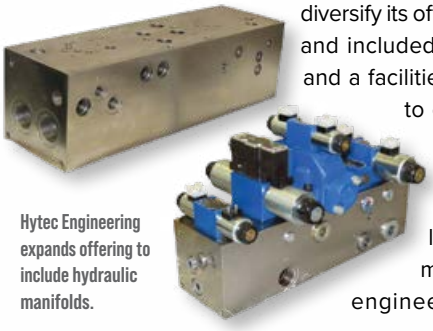
In January this year, Volvo Construction Equipment (Volvo CE) announced the expansion of the distribution of the Volvo EC550E crawler excavator to Tier 3 markets, including Africa and the Middle East. Babcock, the authorised Volvo CE dealer in southern Africa, has brought in its first unit, which has already been delivered to a customer, confirms Lance Mannix, GM sales and equipment at Babcock's Equipment division.

With the EC550E, Volvo CE managed to break the norm by introducing the Independent Metering Valve Technology (IMVT) hydraulic setup, in conjunction with a totally new engine trim on the D13 engine block and electrohydraulic command for the joysticks. As a result, the machine punches well above its weight, offering production more in line with bigger class machines in the 60 - 65 t range, despite the decals stating 55 t.

Boasting remarkable levels of power and productivity, the EC550E can fill a 35-40 t hauler or on-highway truck in just four to six passes – the result is optimum pass-matching and high-levels of production at a low cost per tonne, the company said. ■

Tailored manifold manufacturing from Hytec Engineering

Bosch Rexroth South Africa Group Company, Hytec Engineering, has moved beyond its niche offering of hydraulic cylinder manufacturing, repair, and maintenance to include general engineering work and the manufacture of hydraulic manifolds. The decision to diversify its offering took around six months and included extensive market research and a facilities audit, with the latter used to ensure that the engineering team could meet all clients' expectations.



Hytec Engineering expands offering to include hydraulic manifolds.

Manufactured from locally sourced and certified materials, the manifolds are engineered and manufactured at the company's engineering facility in Spartan, Johannesburg. To ensure that all manifolds are manufactured to exact specifications, two CNC (Computer Numerical Control) vertical milling machines and various specialised tools are used.

"The decision to include hydraulic manifolds in our engineering offering was made as it was a good fit with our existing skillset, facilities and process," explains Hytec Engineering's general manager Andre Lindeque. "Clients seeking these manifolds benefit from their compact design, which simplifies installation and space requirements, as well as limiting any hydraulic pipe installation requirements," he adds.

The company manufactured its first manifold in August this year and subsequently received a large manifold order from fellow Group Company Hytec South Africa's Cape Town office. ■

New high-tech facility for SEW-EURODRIVE

SEW-EURODRIVE South Africa, a specialist in drive and control technologies, moved into its new state-of-the-art 26 000 m² headquarters complex in Aeroton, Johannesburg, earlier this year. The complex more than triples the floor and factory space available at its previous premises.

Built and equipped at a cost of R200-million and modelled on SEW-EURODRIVE's showcase factory in Graben-Neudorf, Germany, the facility – which accommodates around 150 employees – makes extensive use of the latest technologies to effectively network people, processes, services and data.

SEW-EURODRIVE moves into a new high-tech facility.

The investment reflects SEW-EURODRIVE's confidence in the future, of both South Africa and the African continent.

Commenting on the investment, Raymond Obermeyer, managing director of SEW-EURODRIVE South Africa, says: "This is a bold step that demonstrates our commitment to being part of solving South Africa's problems and developing the economies of countries across Africa."

SEW-EURODRIVE currently services, from South Africa, 23 countries throughout the continent. "With the implementation of the African Continental Free Trade Area (AfCFTA) protocol, which came into effect in early 2021, and a push to grow manufacturing on the continent, we are expecting African markets to account for around 50% of our turnover within the next few years," says Obermeyer. ■

Index to advertisers

BRIEF

Botswana Resources Infrastructure Energy Finance Investment Summit

13th & 14th February **2023**

Gaborone, Botswana

www.**invest-botswana**.co

We bring colour into view!

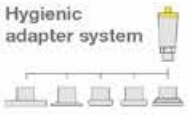
Compact pressure sensors and switches with 360° custom-colour status display

256 colours
Individually selectable:

- Measurement in progress
- Sensor switching
- Process malfunction

Compact design

Hygienic adapter system



IO-Link

Adjustment via smartphone

www.vega.com/vegabar

Looking Forward VEGA