MODERN MINING

July 2024 | Vol 20 No 7

CROWN PUBLICATIONS

For people who are serious about mining

IN THIS ISSUE

- Future-proofing mining with AECI's bold strategy
- ZAC's Mngeni shaft begins production
- Will demand for energy metals drive exploration and development?
- Water woes - mining sector extends a helping hand
- Ukwazi talks Sustainable Mining Trifecta

MINING

Comprehensive solutions
for the entire mining industry

WEG is able to offer a range of standard off-the-shelf products as well as end-to-end energy solutions by leveraging innovative best practice engineering and manufacturing capabilities.

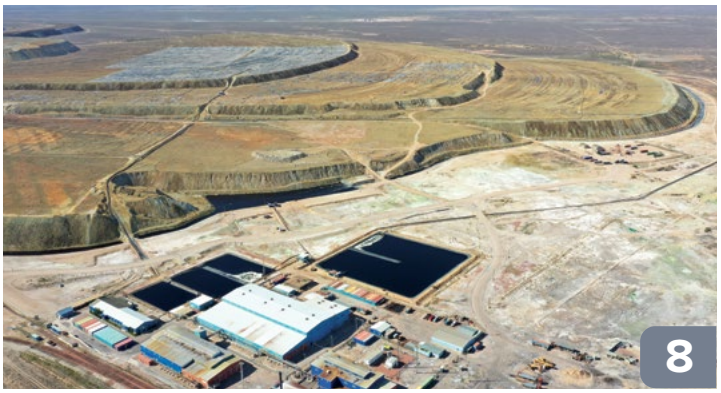
All products are engineered to facilitate a safe and reliable mine and plant with operational stability and the highest possible production levels as an objective. Reduced maintenance, energy efficiency and ease of serviceability assist in lowering the total cost of ownership for the mine.

Level 1 BBBEE | CIDB Grades 9EP & 6EB | ISO 9001:2015 | Sub-Saharan Africa Partner Network

0861 009378 | info_africa@weg.net | www.weg.net

Driving efficiency and sustainability

CONTENTS



ARTICLES

ON THE COVER

AECI Group has unveiled a bold new strategy focused on international expansion, achieving net zero emissions and prioritising mining as a key growth area. **Pg 6.**

COMMENT

On the precipice of a new dawn?

Nelendhre Moodley.

Editor: Nelendhre Moodley
e-mail: mining@crown.co.za
Advertising Manager: Rynette Joubert
e-mail: rynettej@crown.co.za
Design & Layout: Ano Shumba
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 Jan-Mar 2024: 10 696

Now that the die has been cast both, party heavy-weight – the African National Congress – which has wielded power for the past 30 years, and mining industry giant Anglo American, have some tough decisions to make as they carve out a new path for the future.

For the country, coalition talks are underway. Will this signal the unfolding of a new era with team players looking to serve the people or will it be the same old players armed with an unchanged agenda of self-service?

For Anglo American, which recently rebuffed BHP's third takeover proposal, the company is restructuring and exploring options for divesting its steelmaking coal and nickel assets and mulling over the option to sell or spin off its diamond business.

In response to Anglo American's proposed unbundling of its diamond portfolio, De Beers recently unveiled its 'Origins' strategy, which looks to grow value and revitalise desire for natural diamonds. Al Cook, CEO of De Beers Group, said the company was reinventing every part of the business to grow value. "Through delivery of our Origins strategy, De Beers will be streamlined, focused, and a leader in diamond technology, provenance and luxury retail. We will recreate the magic of natural diamonds for modern consumers."

> With no new mines discovered in the past decade, global supply is declining. Consumers in key regions are becoming more affluent and are increasingly differentiating between natural and lab-grown diamonds.

He added that the outlook for natural diamonds remained compelling. "With no new mines discovered in the past decade, global supply is declining. Consumers in key regions are becoming more affluent and are increasingly differentiating between natural and lab-grown diamonds."

The diamond miner's strategic revamp will see the industry stalwart cease the creation of synthetic diamonds earmarked for its Lightbox consumer brand. This is a big blow for consumers looking to purchase the more affordable and environmentally friendly lab-grown diamonds. Going forward, lab grown diamonds will be created primarily for industrial applications rather than the jewellery market.

On a separate note, De Beers' Shining Light Awards programme for the design of diamond jewellery has opened for entries. The awards challenge young designers to re-define luxury, and promise the winners a range of life-changing rewards. De Beers invited entries from Canadian, Botswanan, Namibian and South African young diamond jewellery designers for its 2024 Shining Light Awards programme.

On the topic of precious stones, despite softer market conditions, coloured gemstone producer Gemfields recently sold close to R660m worth of emeralds at the latest auction.

Shift to green

The shift to a green energy system is set to initiate a huge increase in the requirements for energy metals. Until the mid-2010s, the energy sector represented a small part of total demand. However, as this transition gathers pace, green energy technologies are becoming the fastest-growing demand sector for energy metals (pg 8).

Our Green Mining feature showcases client initiatives in this space, including the Federation for a Sustainable Environment, which enlightens us on how the mining sector is helping to alleviate some of our water woes (pg 22). Explosives manufacturer, BME, explains how hydrogen peroxide explosives add to its green mining offerings (pg 26), with specialist mining services provider, Ukwazi talking about The Sustainable Mining Trifecta (pg 28), while financial services group Nedbank highlights sustainable financing for the energy transition (pg 30) and SRK Consulting Engineers discuss How technology will support – and limit – mining's green ambitions (pg 32).

In this edition, we also share insight from Resources for Africa's PGMs Industry Day where Tier One PGM project developers talk about the Risks of opening new PGM mines during depressed markets (pg 18).

Our cover story, AECI, which celebrates its hundred-year anniversary this year, talks Future-proofing mining with its bold strategy. Group CEO Holger Riemensperger unveiled a new strategy focused on international expansion, digitisation, achieving net zero emissions, and prioritising mining as a key growth area (pg 6). ■

Core Resources unveils top 5 tips for critical minerals developers

Backed by more than 20 years' experience, leading metallurgical solutions provider Core Resources has unveiled its learnings to help the growing critical minerals sector.

Core's metallurgical laboratories were established in Queensland in 1982, and for at least the past 20 years they have been designing complex integrated process pilot plants covering a wide range of mineral and hydrometallurgical processes.

Core's Chair Jon Loraine said the team's experience has resulted in significant trials and subsequent break-throughs when it comes to metallurgy for critical minerals projects.

"Obviously the world needs more critical minerals to cater for global population growth and the clean energy transition. However, metallurgical processes are critically different to more conventional base or precious metal projects," Lorraine said.

Here are Core Resources' top five tips for developing critical minerals projects:

1. Get the metallurgy right early on (or the costs could take you by surprise).
2. Understand the product specifications requirements (products of today did not exist 20-50 years ago).
3. Know your markets (pricing power is in the hands of the buyer).
4. There is a need for innovation (we need new ways for purifying and refining, such as Core-IPEX ion exchange technologies).
5. Deal with impurities correctly (do not let minor contaminants become a problem).

Loraine said Core Resources had developed an excellent reputation for identifying process options for complex ores and minerals, and getting an early handle on the potential economics.

Core Resource's metallurgical laboratories were established in Queensland in 1982.

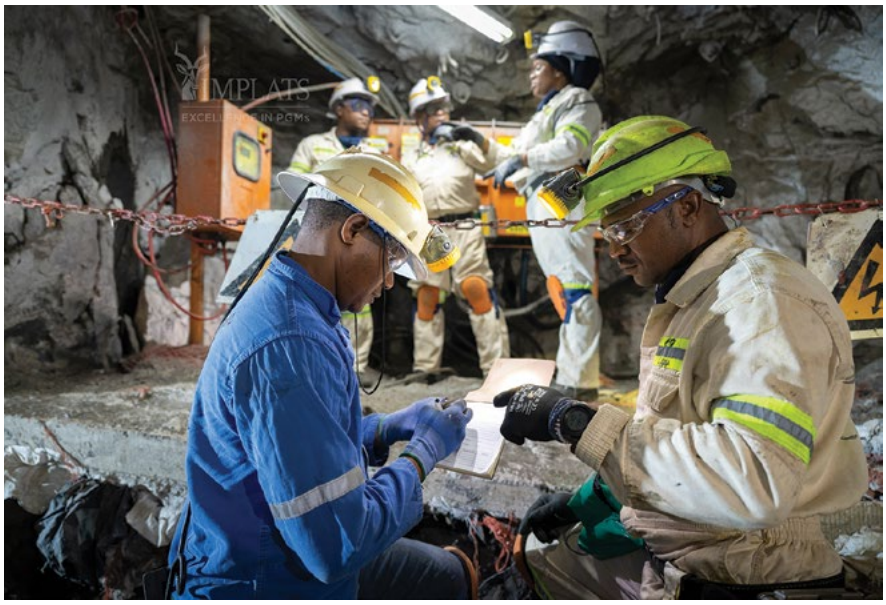
Core Resources is a leading metallurgical solutions provider.

New Multimodal Inland Port Association launched at Transport Forum

A significant milestone was reached in the South African logistics sector with the recent launch of the Multimodal Inland Port Association (MIPA). MIPA addresses a critical need in South Africa's logistics landscape, which is increasingly grappling with rising costs and severe congestion. The association aims to act as the unified voice for inland ports across the nation, focusing on promoting, supporting, and advocating for the increased movement of cargo from road to rail. "Transporting more cargo by rail has become an imperative, considering the growing cost of logistics in South Africa. It is no longer just a nice-to-have," says Warwick Lord, MIPA Chairman. MIPA aims to reform the rail industry through private investment, foster trade activities that meet social objectives, and facilitate the crucial transfer of goods from road to rail. By optimising industrial and logistics activities through efficient multimodalism, logistics costs will be reduced, and efficiency will be improved. Formed by leading entities in the transportation sector, including the Cato Ridge Inland Port, Tambo Springs Development Company, Portfutures, Autoforce, Mac Group, Cape Town Inland Port, the Cape Winelands Airport, the Musina Intermodal Terminal, RailRunner South Africa, and RailRunner Services, the association is committed to collaborating on best practices, particularly in through private sector participation (PSP). It will work closely with government and state-owned enterprises. ■

Warwick Lord, MIPA Chairman.

Implats announces B-BBEE transaction



Implats concludes B-BBEE transaction.

Platinum miner, Impala Platinum Holdings (Implats) has concluded a series of agreements, paving the way to implement a meaningful broad-based black economic empowerment (B-BBEE) transaction at both its Impala Rustenburg and Impala Bafokeng assets. The transaction will result in 13% B-BBEE ownership at both Impala Platinum (Impala), which owns the Impala Rustenburg and Impala Refineries assets, and Impala Bafokeng through its wholly owned subsidiary, Impala Bafokeng Resources (IBR). Equity ownership in Impala and IBR will be via an employee share ownership trust, a community share ownership trust and a strategic empowerment consortium, with ownership of 4%, 4% and 5%, respectively. ■

bpSA agrees to sale of land and assets at SAPREF Precinct

Following successful negotiations, bp Southern Africa (bpSA) and Shell Downstream South Africa (SDSA), have reached an agreement for the sale of their respective 50% ownership assets located at the SAPREF Refinery Precinct to the South African state-owned entity, Central Energy Fund SOC (CEF). The sale includes SDSA and bpSA interests in the SAPREF land and other associated assets, which include tanks, process units, pipelines to and from SAPREF to Island View terminal, and the Single Buoy Mooring for crude imports. Taelo Mojapelo, bpSA Chief Executive Officer said: "We view this agreement as a positive outcome for bpSA, for South Africa's fuel industry and for the country as a whole. SAPREF is an important refinery, the largest in Southern Africa, but continued ownership does not fit with bp's global strategy. Finding a buyer committed to the future of the refinery was an important consideration for us – we believe CEF is well-placed to take SAPREF forward." ■

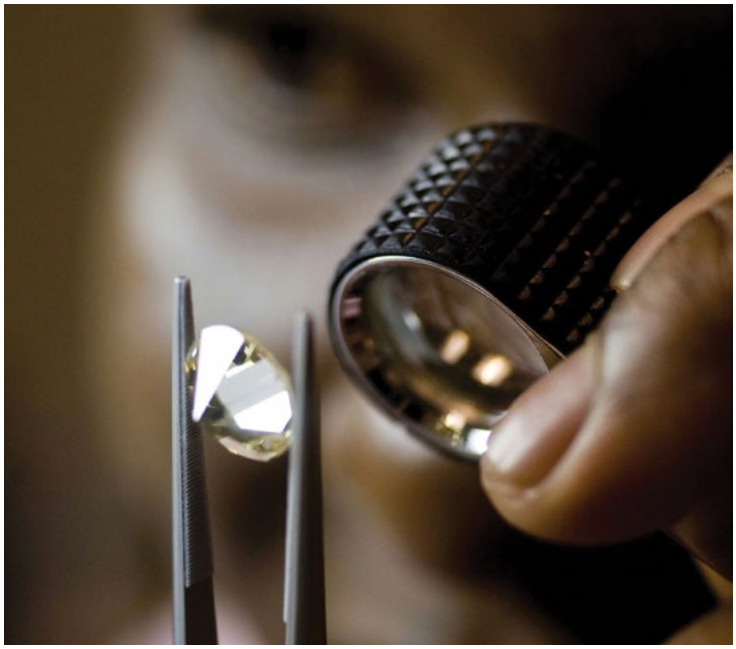
Taelo Mojapelo, bpSA CEO.

Updated Makuutu MRE contains over 126 000 t magnetic rare earth oxides

ASX-listed Ionic Rare Earths has provided an updated Mineral Resource Estimate (MRE) at its 60% owned Makuutu Heavy Rare Earths Project in Uganda. The company is progressing the development at the Makuutu Project through local Ugandan operating entity Rwenzori Rare Metals. The updated Makuutu MRE is estimated at 617 million tonnes at 630ppm Total Rare Earth Oxide (TREO), above a cut-off grade of 200 parts per million (ppm) TREO minus CeO_2 (TREO-CeO_2). This represents an increase of 85 million tonnes (16%) in the total resource with a 2% reduction in overall TREO grade from the previous resource estimate. Importantly, the updated Makuutu MRE has a contained resource of around 126 000 t of magnet REOs and 99 000 tonnes of heavy REOs critical to efforts to establish new sources of strategic raw materials for the energy transition, advanced manufacturing, communications and defence. ■

Makuutu MRE contains over 126 000 t magnetic rare earth oxides.

De Beers Group statement on strategy



De Beers has led the diamond industry for more than a century.

Following the announcement by Anglo American regarding its intention to explore a range of options to separate the De Beers business, De Beers Group remains fully focused on delivering its strategy and creating value in the interests of all its stakeholders, the company said. Al Cook, CEO of De Beers Group, said: “De Beers has led the diamond industry for more than a century. We have unparalleled expertise, outstanding assets across more than 20 countries, a unique sales model and an iconic brand, synonymous with diamonds. I am confident that we will remain the diamond leader for the next century. The announcement from Anglo American opens up new possibilities under new ownership. But some things will not change. We will continue to deliver value for all our stakeholders, including our partners in Botswana, South Africa, Namibia, Canada, Angola and other countries. In particular, we look forward to finalising our transformational agreement with the Government of the Republic of Botswana, which holds a 15% ownership interest in De Beers.” ■

Executing a vision: Future-proofing mining with AECI's bold strategy

As AECI celebrates its 100th anniversary in 2024, Group CEO Holger Riemensperger has unveiled a bold new strategy focused on international expansion, digitisation, achieving net zero emissions, and prioritising mining as a key growth area. "We boast a century of being a registered business and 128 years of operational expertise," Riemensperger says. "Our success stems from our commitment to innovative solutions and the dedication of our workforce. We excel due to our strong customer relationships and our ability to adapt to global changes."

Smart technology for Smart operations.

As it moves from strategising to execution, AECI is poised to solidify its role as a key partner in the mining industry, with a focus on assisting customers to future-proof their mining operations. "Our commitment to excellence and innovation ensures that we will support our clients every step of the way, driving the mining industry towards a more sustainable and technologically advanced future," says Riemensperger.

Future-proofing mining: autonomous innovation

In collaboration with technology partner DetNet®, AECI has developed CyberDetTM I, a ground-breaking wireless detonator that brings advanced technological and safety efficiencies to established blasting techniques. This innovative through-the-earth technology is designed to enhance both surface and underground mining operations, with a future-focused approach that anticipates the growing role of autonomous mining.

One of the major benefits of CyberDetTM I is the elimination of downline wires, commonly used in conventional electronic blasting. By removing these wires from the blasting process, CyberDetTM I allows operators to work in safer environments through significantly reducing the risk of accidents. Additionally, CyberDetTM I allows for seamless integration with their centralised blasting network BlastWeb®, enabling blasting from surface.

Future-proofing mining: sustainable explosives

"In an era where the mining sector faces unprecedented challenges and opportunities, future-proofing mining operations has become essential to ensure long-term sustainability, efficiency, and profitability," says Morne Stiglingh, Vice President - Innovations and Product Management at AECI Mining. "Based on this, AECI excels in developing customised solutions tailored to our customers' specific needs. For instance, our Powergel X2 was developed for use in surface mining applications where hot blast holes, reactive ground, or a combination of both exists. The product is differentiated by the fact that most competitor products available in the market cater for either reactive ground or hot holes, but not both."

Developed and tested by some of the most dedicated and creative minds from AECI's R&D team, its other key benefit includes eliminating the need to use plastic sleeving in reactive holes.

Future-proofing mining: data-driven decision making

AECI's BlastHub represents a leap forward in how the business approaches blasting operations. By leveraging advanced analytics and accurate data, AECI can enhance productivity, optimise ore extraction, and extend the life of mines. BlastHub not only streamlines the blasting process but also empowers engineers to make data-driven decisions that meet and exceed customer expectations.

Accurate records of blasting activities are crucial for future operations. They provide a valuable reference for designing future blasts and ensuring consistency and efficiency. Stiglingh emphasises the importance of this data: "BlastHub is an interface where AECI's site-based experts can upload blast design information. It enables them to interrogate information from different sites for use in future blast designs."

The platform allows engineers to link product consumption with mining conditions, providing a clear picture of product performance. “BlastHub enables us to conduct data mining and refer back to past scenarios when confronted with new challenges,” explains Stiglingh. “We can compare previous actions, assess their efficiency, and make informed decisions to meet customer expectations.”

Future proofing mining: smart delivery systems

AECI’s cutting-edge emulsion vertical drop system (EVDS) and Smart Mobile Manufacturing Units (MMU) are pivotal in this endeavour. As mining operations go deeper, the EVDS ensures the precise delivery of explosives to record-breaking depths of 1000 metres, minimizing waste and maximising blast effectiveness. This innovative delivery system helps mines save on maintenance, fuel, and asset wear of equipment, among other benefits.

Simultaneously, AECI’s Smart MMUs, equipped with advanced sensors and real-time data analytics, provide seamless and efficient on-site manufacturing and delivery of explosives. These smart delivery systems not only streamline operations but also significantly reduce the risk of human error, ensuring safer and more sustainable mining practices. “Our MMUs are equipped with wireless data communication and GPS positioning for precise blast hole targeting, enabling the safe delivery of explosives in hazardous environments,” adds Stiglingh.

Future proofing mining: efficient mineral extraction

AECI’s expertise in custom reagent formulations optimises ore kinetics in flotation, helping to address the need for critical minerals. The AECI collectors are designed to enhance the selectivity and recovery of valuable minerals from complex ores.

At the core of their company’s innovation is advanced tailings treatment. AECI’s Mining Chemicals business offers specialised collectors and frothers that enhance the flotation of PGM, sulphide and industrial minerals tailings. Additionally, AECI’s advanced depressant range turns low-value ores into feasible, valuable resources by selectively inhibiting gangue minerals.

The significance of return water cannot be overstated; AECI’s polyacrylamide range, including anionic and non-ionic polymers, is tailored for various ore types and applications, improving water recovery and reducing environmental impact through efficient tailings management.

“All of AECI’s reagents are engineered to work in harmony, reducing waste, enhancing the beneficiation of valuable minerals, and implementing a strategic focus on preserving the future,” says Stiglingh. “By integrating these innovative solutions, we position ourselves as leaders in sustainable mining practices, ensuring the industry thrives for generations to come”.

AECI’s unwavering commitment to future-proofing the mining industry is evident through its innovative technologies, customised solutions, and relentless focus on sustainability. As the business continues to expand its international growth and push the boundaries of innovation, it remains dedicated to empowering customers with the tools and expertise they need to navigate the evolving challenges of the mining industry.

“At AECI, we are not just preparing for the future; we are actively shaping it, setting new standards and driving the mining sector toward a more sustainable future,” concludes Riemensperger. ■

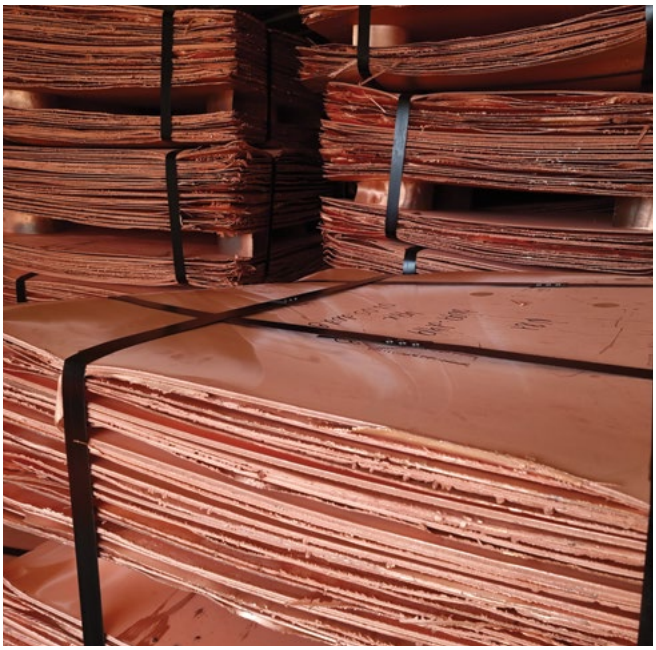
Future proofing Mining in every step of the Value Chain.


Wireless Technology & Innovation.


Delivering explosives to record breaking depths.

Energy metals: Will demand forecasts drive mining exploration and development?

The demand for metals to power the green energy transition is not a novel concept. The well-documented push towards replacing traditional fossil fuel-derived energy sources hinges largely on the capacity for 'energy metals' to satisfy future demand for net-zero-supporting technologies.



Copper is central to global electrification efforts and the green energy transition.

CAML produces copper at its 100% owned, Kounrad project in Kazakhstan.

Whilst there are six core energy metals: copper, cobalt, lithium, nickel, aluminium, and rare earths; there are many more critical minerals that contribute to green technologies. Individually, and collectively, they are crucial to the future generation, storage, and use of electrical energy.

It is, therefore, natural that the shift to a green energy system is set to initiate a huge increase in the requirements for energy metals. This is reflected in the changing demand areas. Until the mid-2010s, for most minerals, the energy sector represented a small part of total demand. However, as this transition gathers pace, green energy technologies are becoming the fastest-growing demand sector for energy metals.

Lithium-ion batteries, the core component in electric cars and current battery-based grid-scale electricity storage solutions, are an optimal paradigm from which to observe this trend. The name 'lithium-ion' perhaps does not afford adequate weight to the importance of cobalt and nickel in this application, with both helping to collectively improve battery performance, longevity, and energy density. All three metals have seen a marked increase in demand. According to the International Energy Agency (IEA), "in 2022, about 60% of lithium, 30% of cobalt and 10% of nickel demand was for EV batteries. Just five years earlier, in 2017, these shares were around 15%, 10% and 2%, respectively."

Rare earth elements are also essential to clean energy efforts. When the blades of a wind turbine rotate, they generate kinetic energy, which is converted into electricity from the interplay between two permanent magnets with reverse polarity. These permanent magnet generators are comprised of rare earth elements, primarily because of the performance capabilities of rare earth magnets, which produce significantly stronger magnetic fields than other magnet types such as ferrite or alnico magnets. Rare earth magnets are also used in EV motors, constituting another area of demand.

One particular energy metal, however, is regarded as central to electrification efforts. According to the IEA, copper is the "cornerstone for all electricity-related technologies". The International Copper Association (ICA) asserts that "one tonne of copper brings functionality to 40 cars, powers 100 000 mobile phones, enables operations in 400 computers and distributes electricity to 30 homes."

Copper has long been considered one of the key industrialisation metals, with electronics, wiring, and white goods all being copper intensive. Globally, people are being lifted out of poverty at a record pace – with rapid urbanisation and an emerging middle class in Asia and the developing world – which

typically heightens copper consumption.

These regional trends were explored in research recently commissioned by the ICA. The research notes that major economic and population growth in India, and the associated urbanisation and growth of the industrial sector, is expected to influence copper use in the country, resulting in a compound annual growth rate (CAGR) for copper demand of 7% to 2040.

Similarly, in the Association of Southeast Asian Nations (ASEAN), copper demand will be driven by population growth, urbanisation, and the region's emerging status as a hub for global manufacturing, with a forecast CAGR of 6 per cent.

Although these demographic and socio-economic shifts underpin strong baseline copper demand, green energy transition efforts are increasingly contributing to its global consumption; copper cable and wire demand serves as a good benchmark for this. According to the ICA, whilst cable and wire demand in traditional applications is only projected to increase by 0.5 percent, it expects to see an 11 % demand growth from EVs and chargers, a 19% growth from grid expansion, and a 7% growth from renewable energy technologies. Overall, copper wire and cable use related to the green energy transition is expected to increase from 0.8Mt to 6.7Mt between 2020 and 2040.

These burgeoning demand areas have spurred an impressive run for the red metal in commodities markets this year. Back in April, the Financial Times asserted that "industrial metals including copper and zinc have outperformed global stocks this year" – a trend that has continued into the summer months.

The growing demand and strong price environment have incentivised base metals producers to seek supplementary exploration, development and production opportunities within the energy metals space.

One such company is Central Asia Metals (CAML), a London listed miner which operates the Kounrad copper project in Kazakhstan and the Sasa zinc and lead mine in North Macedonia. With a cash in bank figure of $57.2 million, as of 31 December 2023, and the backdrop of the global green transition, the company has decided that now is the time to pursue growth opportunities across various stages of mine development.

CAML has initially actualised this with some early-stage exploration and development investments. In 2023, the company formed CAML Exploration, or CAML X, an exploration subsidiary of the company that works with a team of early-stage exploration geologists in Kazakhstan. So far, CAML has reportedly been awarded two exploration licences in the Central Asian nation and anticipates a strong first full exploration season for the new entity.

Buoyed by projections that new mining projects will be required to meet demand, CAML has continued its business development momentum, announcing in March that it intends to make an investment of £3 million in Aberdeen Minerals to acquire a 28.7% shareholding. The junior exploration company based – rather predictably – out of Aberdeen in Scotland, is actively exploring the Arthrath Project in Aberdeenshire. According to CAML, Aberdeen Minerals has already demonstrated the presence of scalable copper-nickel-cobalt mineralisation at Arthrath and is also overseeing several promising targets in the underexplored surrounding district.

CAML is actively reviewing exploration opportunities, as well as larger scale projects, to grow the company's base metals portfolio.

Crucially, CAML has identified an augmented exposure to the base metals market as a prevailing factor in its investment decision making process, citing the importance of these metals in facilitating the green energy transition. This is also the motivation for the company pursuing a larger scale "accretive and potentially transformational" investment opportunity, which it hopes will provide value for shareholders whilst further drawing on its track record of success within the energy metals space, particularly with regards to copper production at Kounrad.

> "The International Copper Association (ICA) asserts that "one tonne of copper brings functionality to 40 cars, powers 100 000 mobile phones, enables operations in 400 computers and distributes electricity to 30 homes."

These investments, whilst sitting at different stages on the Lassonde Curve, all share one similarity – they have been made with the long-term future of the company (and world) in mind. This perhaps highlights the bullishness of companies like CAML on the longevity of demand for energy metals. It's no secret that a transition of this global magnitude can't happen overnight, but, arguably, the first half of this year has indicated that the conditions for a prosperous energy metals sector are starting to propel the world towards a more achievable green pathway. ■

ZAC General Manager Wiets Beukes.

ZAC's Mngeni shaft begins production

Zululand Anthracite Colliery's (ZAC) newest shaft, Mngeni, produced first product in the first week of April, a key achievement for the project located in Emakhalathini, about 100 kilometres from Richards Bay in northern KwaZulu-Natal. The Zululand Anthracite Colliery is South Africa's sole producer and exporter of prime anthracite coal.

ZAC is majority-owned and operated by Menar, a South African-based investment company focused on mineral resources.

The mine operates four shafts: Ngwabe, Outcrop, Deep E, Maye B and now, the Mngeni shaft. Its product is characterised by minimal ash content and low volatility.

The construction phase of the Mngeni project started towards the end of 2022. According to ZAC General Manager, Wiets Beukes, the adit was strategically built to expand operations and help ZAC maintain production levels.

> "The stability of the mine's output means ZAC can continue to contribute to the economy through job opportunities, and initiate procurement opportunities for local businesses.

The company invested R137 million in the establishment of the shaft, including preparation of earthworks, mining of the box cut, erection of major infrastructure and new underground production equipment. The installation of main infrastructure includes potable water supply, dirty water management drains and pollution control dams as well as the installation of electricity supply systems.

"This is a significant milestone for our team, which spent a considerable amount of time and effort to ensure that the project achieved completion. Mngeni will produce between 120 000-150 000 tons run-of mine anthracite annually once it reaches steady state production," Beukes, tells *Modern Mining*.

ZAC's life of mine has been extended to around 2032 while the Mngeni project has a life of mine of around seven years. The shaft incline is about 240 metres long and 34 metres deep, with seam thicknesses from 2.3 m to 2.6 m.

In context of the ZAC reserves, Mngeni is a high seam shaft, with a resource of 1.2 million tons. About 60% of the anthracite mined from the Mgeni shaft is meant for the local market, with 40% earmarked for export. The intention behind the development of Mngeni was to balance the production shafts to offset the high cost of low seam operations.

Discussing the importance of the latest initiative, Beukes says the Mngeni shaft is an important part of Menar's diversification strategy, which involves expanding the company's production capacity on existing operations, like ZAC, and developing new projects from scratch.

"The stability of the mine's output means ZAC can continue to contribute to the economy through job opportunities, and initiate procurement opportunities for local businesses. For instance, two local companies, namely Kulu Mining and Landa Ilanga, played a major role in the construction of the Mngeni shaft."

A bird's eye view of ZAC's processing plant, which is fitted with a filter press.

ZAC Siding: Views from the Zululand Anthracite Colliery siding.

Mngeni Shaft is ZAC's newly developed shaft aimed at supporting production levels.

Landa Ilanga worked on terracing and levelling the roadway to the shaft while Kulu Mining is tasked with working on the box cut, concreting the laydown area and constructing the vent collar for the fan, among other things. Both companies were given a chance to sub-contract some of the work to other suppliers, thus ensuring that more companies benefitted from the opportunities.

"It is through partnerships such as these that ZAC hopes to empower its host communities. ZAC also works closely with local businesses that provide the mine with services such as coal haulage, catering and cleaning," he says.

Community upliftment initiatives

ZAC currently employs about 700 permanent employees with around 500 contractors' employees totalling 1200 ZAC employees and contractors. The mine's continued stability means host communities can benefit from the mine's social initiatives such as clean water projects, procurement opportunities, learnerships and bursaries, amongst other things.

"Projects, such as the installation of toilets at Elomo Primary School and water infrastructure initiatives in the Nongoma communities, underscore our dedication to providing dignified facilities and essential resources," Beukes explains. In line with its current social and labour plan, ZAC has committed to providing 35 internships and 15 learnerships at an estimated cost of over R6 million.

To date, 17 interns have successfully completed their internships and a further 14 people have finished their learnerships. ZAC recently welcomed 11 new interns in various fields, including geology, information technology, and safety. In previous years, the mine also employed candidates who performed exceptionally well.

"Of the 42 learners that took part in the previous SLP, we employed 29 on a permanent basis," says Beukes.

Further to this, ZAC invested in the construction of a Reverse Osmosis Water treatment plant to purify wastewater to a consumable quality level. The purified water will benefit the mine and an estimated 240 households from the surrounding community. The plant will also assist the company in reducing its freshwater consumption.

Commodities outlook for anthracite

Owing to its low volatility and highest calorific values, global anthracite demand is expected to grow going forward. According to a report by Verified Market Research, the global anthracite market size is anticipated to grow by 5.6%, increasing from $ 318.32 million in 2023 to $ 492.24 million by 2031. Key market drivers include industrial production, steel manufacturing and energy demand.

"We expect demand to increase in emerging Asian economies such as China and India, where population growth and consequent infrastructure development are increasing demand for domestic fuel and power generation projects," Wiets Beukes concludes. ■

Anthracite uses

- The principal use of anthracite today is as domestic fuel in either hand-fired stoves or automatic stoker furnaces.
- It is also commonly used in industrialised or specialised applications, such as iron and steel manufacturing.
- The product delivers high energy per its weight and burns cleanly with little soot, making it ideal for this purpose.
- Anthracite is ranked the highest among all coal types due to its high carbon content (86-98%) and high heating value (34.890 kJ/kg). It is preferred over all other types of coal is because it is considered the cleanest.

MS Prakash, Emerson's vice president for the African region.

Safe, smart and sustainable mining

Following the 2024 Mining Indaba, MS Prakash, Emerson's vice president for the African region, highlighted championing safe, smart and sustainable change in the mining sector and the innovations making this possible.

The Emerson stand and team at the 2024 Mining Indaba.

The mining industry across Africa is at an inflection point right now. Global megatrends along the energy transition, energy security and climate change pathways are all driving momentum towards the next phase of investment.

> ...there needs to be improvement in the availability of critical rare earth metals such as lithium, where production needs to increase in the range of 50× to 70× to support industry growth.

"In order to meet the growing demand for renewable energy, as well as the needs of a fast-growing sustainable transportation solution for the electric and hybrid vehicles industry, there needs to be improvement in the availability of critical rare earth metals such as lithium, where production needs to increase in the range of 50× to 70× to support industry growth.

"In addition, several governments around the world, particularly in the United States, European Union and China, have outlined goals to create a secure supply of minerals and raw materials that are critical for economic sustainability and growth. Of course, with more than 40% of global mineral reserves, all roads point towards Africa in terms of Investment," begins Emerson's Vice President for Africa, MS Prakash.

This, he continues obviously translates into growth potential, not only on the mining side, but local processing is also being considered – mostly from an aspirational perspective at this stage. "From an extraction standpoint, the centres of gravity are going to be in Africa, Australia and Latin America. At Emerson we see a lot of opportunity to support mining companies that are looking to extract minerals in a safer, smarter and more sustainable way," he adds.

Traditional mines, he says, are having to go deeper and the ore body grades are dropping. This puts added pressure on operational efficiency. The industry is also under pressure to reduce

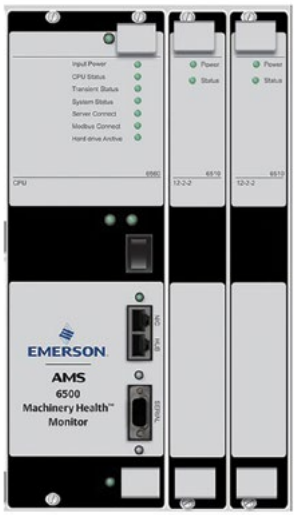
Emerson plays a big part in supporting forward-looking mining customers with innovative technologies to meet their ESG needs.

its contribution to carbon emissions. So safety, sustainability and ESG are being prioritised more than ever before.

Emerson, he continues, plays a big part in supporting forward-looking mining customers with the innovative technologies to meet their own ESG needs as well as to refocus operations towards the world's energy transition. "We have a full suite of technologies, right from sensors and valves all the way through to the control systems and mission critical industrial software that is helping transform mining sites into best-in-class operations. Our automation technology and software are improving safety and reliability, operational efficiency and environmental performance simultaneously," he says.

Improving safety in mining

From a safety perspective, he adds, there are unique challenges that mining customers see Emerson can support them with. Taking the example of tailings, he says, "As mining operations mature, existing tailing infrastructure reaches its design limitation. With mining companies looking to reprocess waste to extract residual value from declining ore grades, the risk of tailing-dam collapse is increased.



Emerson's AMS6500 online condition monitoring solution fetches important condition monitoring and frequency data that can identify developing issues.

"Emerson's Tailings Monitoring system is a fully automated smart system. It consists of wireless sensors to measure water levels and pressures, and it provides real time data back to the control room to notify operators when conditions start to change so they can take timely action. The interconnecting slurry pipelines between dams are included. We monitor pressure and the slurry density for piping anomalies that might help avoid environmental harm due to spillage incidents," he explains.

Further, there are design-driven solutions, such as Emerson's knife-gate valves designed for abrasive slurry service, that increase the time between maintenance downtime for tailing operations.

Another example of a safety solution that is becoming a focus area is worker safety and gas breakthrough in deep mining activity. "Emerson's solution combines smart wireless gas sensors with discrete measurement local alarms that can help to identify dangerous levels of gas concentrations quickly at the mining operation, and help to relay critical information to the control room, thereby ensuring worker and operational safety," MS Prakash explains.

Towards smarter and more efficient mining

One of the most important operational metrics for operators across the mining industry is uptime of critical equipment, which relates directly to profit. Critical assets need the right monitoring and preventive maintenance programmes to maximise availability. "Emerson's online condition monitoring solution (AMS6500) does away with traditional periodic data collection and fetches important condition monitoring and frequency data that can help to identify developing issues during normal operations. This assists operators to deploy a predictive maintenance strategy that complements traditional machinery protection systems," he says.

For other essential assets, Emerson's machinery health analyser (AMS 2140) simplifies field collection

Design-driven solutions, such as Emerson's knife-gate valves for abrasive slurry service, increase the time between maintenance downtime for tailing operations.

of machine vibration and has unique peak detection capabilities that help operators get early indications of machine degradation.

As the complexity and variety of assets and systems across mining sites increases, Emerson's Delta V integrated control and safety systems help integrate operational data across these sources and add context that assists operators to get better visibility of operations and reduce the need for manual data processing. "This capability is further enhanced by our industrial data lake and advanced process control capabilities that are powered by Aspentech," he says.

From a digitalisation standpoint, Emerson believes in initially making small scale investments that result in quick returns. "Then we can scale-up, rather than going for a full site-wide digitalisation, which is typically costly and sometimes difficult to justify based on ROI. But when looking at benchmarks involving smart devices and seeing the efficiency improvements for a single circuit, it becomes easy to replicate that success across multiple critical circuits," Prakash explains.

"In summary, Emerson can offer everything in the mining and metals value chain for any customer seeking to become smarter, safer and more sustainable," he says.

People development

People, says Prakash, are fundamental to the implementation and adoption of technology-based approaches – and talent development is a bedrock of Emerson's offering. "Our primary focus is on upskilling our own people across Africa to support the engineering and lifecycle needs of our customers and to ensure that our technologies are successful on site. Of course, this is supplemented by our comprehensive competency development programmes that are aimed at building technology awareness and expertise with mining operators.

"Talent development in geographies such as Africa can be complex, so we put extra effort into engaging the best-in-class local talent we can find into our organisation, putting graduates from local universities into our own graduate programmes to get experience in the various Emerson technologies. We give new recruits rotational assignments at different sites in Africa: in Dubai, South Africa, Morrocco, Algeria, Nigeria and Egypt and anywhere we think there is a hands-on opportunity to interact with experts in the field. Then we bring them back into their own countries to support local customers. This approach not only develops talent, it also brings us closer to our customers.

"While we can also offer digital remote support, we really prefer somebody from Emerson to be physically available to go onto client sites," he adds. "We believe this is a critical differentiator that helps our customers achieve their operational goals.

"The way we see it, if our customers' businesses grow, so does Emerson's potential to support their growing operations," MS Prakash concludes. ■

Gas Master Plan and the road ahead

Gas has an important role to play in South Africa's energy transition journey, says Prashaen Reddy, a Partner at Kearney. Reddy is an expert on energy matters and his observations come amidst the calls for public comments on a draft Gas Master Plan. The plan was released for comment at the end of April.

Natural gas is playing a pivotal role in the global energy transition.

Reddy says the Southern Africa region has been fortunate with several recent gas finds (Mozambique, South Africa, and Namibia) that allow for the development of indigenous resources to drive industrialisation, social development, and economic growth.

Today, the industry employs at least 70 000 people and contributes between R300 billion and R500 billion a year to South Africa's GDP based on the existing indigenous gas supply.

"In addition, to maintain and grow the industrial base there are few economically and readily available substitutes for gas in the energy-intensive industries, and hence industrialisation may further decline should no gas solution be found in the years ahead," says Reddy.

Gas to power is another critical enabler to stabilising the power sector as we balance our energy mix from being primarily driven by coal to other technologies as outlined in the recent IRP.

"Our research on balancing energy security with sustainability explores how natural gas is playing a pivotal role in the global energy transition. To support the transition to a cleaner energy mix, there is a need for intermittent reliance on cleaner hydrocarbons (such as natural gas) for energy security, until such time as renewable/ nuclear capacity (or other baseload technologies) can be built up and installed," he says.

Notably, natural gas is the cleanest and most emission-friendly fossil fuel that is also suitable for peak generation shaving and baseload provision. It is also a good enabling partner for more variable renewable energy sources due to higher operational flexibility and lower capital costs.

Conversely, natural gas still produces GHG emissions and is limited by inadequate gas infrastructure.

This highlights the need to abate GHG emissions from natural gas production and usage which can be done through carbon capture, utilisation, and storage (CCUS). To address the lack of critical gas infrastructure, significant international and regional financial investments are required.

Financiers will find it difficult to be clear cut on defunding hydrocarbon projects due to the commercial viability, markets, and returns the sector still generates in the medium term. The world will be unable to simply switch off hydrocarbons, which still make up over 80% of the world's energy mix.

Gas has an important role to play in South Africa's energy transition journey.

"Gas will play an important role as a transitionary hydrocarbon, offering security and a reduced environmental impact until renewable and nuclear capacity can be added," concludes Reddy. ■

Transforming mining energy solutions in Africa: Expert support at every stage

The mining sector in Africa operates in an environment fraught with complexities and companies face multidimensional challenges. Between geopolitical instability, fluctuating market demands, and persistent energy challenges, the complexities are many. However, energy remains a crucial lever within the control of mining companies. Reducing reliance on grid-based power and investing in a diversified energy portfolio is not just a strategic necessity, it is a pivotal operational mandate.

Hybrid energy solutions combine the reliability of conventional power sources with the sustainability of renewables.

Aggreko, with over six decades of leadership in power solutions, has consistently provided expert support at every stage of the mine's lifecycle. Leveraging its sector and engineering expertise, and application know-how, Aggreko can solve the most intricate challenges, ensuring that mining companies in Africa have access to optimal energy solutions. Our commitment to flexibility, sustainability, and rapid deployment solidifies our position as a trusted partner for mining companies navigating the energy transition.

Adapting to a dynamic market

Our strength lies in our unparalleled ability to adapt swiftly to market changes. We can deliver the most appropriate and effective solutions tailored to our customers' evolving demands. Whether integrating renewable energy sources or optimising conventional power systems, we ensure our clients access to the latest innovations and technologies. For instance, projects like the Bisha Gold Mine in Eritrea harness a combination of thermal and solar power to remain operationally resilient.

Sustainability as a core commitment

Sustainability is a core focus for mining companies, catalysed by regulatory requirements and a growing commitment to environmental stewardship. The mining sector, contributing nearly 7% of global greenhouse gas (GHG) emissions, holds a crucial role in achieving the United Nations Sustainable Development Goals (SDGs), which mandate significant reductions in GHG emissions.

Aggreko remains dedicated to supporting its customers' sustainability journeys. Simplifying access to deployable, sustainable, and renewable energy, we continuously pioneer new, greener innovations. From lower-emission thermal power generation to hybrid energy platforms, our solutions are customised to help mining companies meet their sustainability objectives. Implementing hybrid power systems at the Syama Gold Mine in Mali exemplifies our commitment to reducing carbon footprints while ensuring operational efficiency.

Flexible financing and tailored solutions

Understanding the unique financial constraints and commercial requirements of each mining operation is crucial. We provide adaptable financing options and commercial agreements, ensuring our solutions are aligned with specific customer needs. This financial flexibility empowers mining companies to invest in resilient and environmentally transformative energy architectures without compromising financial stability. By deploying bespoke energy solutions, mining companies can leverage Aggreko's financing models to drive sustainability and cost efficiency.

Robust engineering capability

We harness advanced technologies and industry expertise to design, deliver, and maintain reliable power and temperature control systems. Our consultative approach involves working closely with our customers to thoroughly understand their specific challenges and objectives. This collaboration enables us to develop customized solutions that optimize performance, ensure sustainability, and drive cost-efficiency. Whether addressing critical power shortages, enhancing operational resilience, or supporting rapid growth, Aggreko is committed to empowering our customers with smart, scalable energy solutions that power progress and achieve success.

A partner in energy transition

Addressing the challenges faced by mining companies today necessitates flexible solutions that reduce costs while ensuring reliability and availability. With the right partner, mining companies can phase their energy transition, reimagining their portfolio while prioritising cost savings and emission reductions. Aggreko supports mines in constructing comprehensive energy portfolios, driving cost efficiency, environmental compliance, and energy reliability without compromise.

Aggreko's deep expertise, innovative solutions, and unwavering commitment to sustainability make us the ideal partner for mining companies in Africa. By navigating the complexities of the energy landscape together, we can achieve a balanced and sustainable energy future, ensuring the long-term viability and resilience of mining operations across the continent. ■

aggreko

A legacy of trust and excellence

For over three decades, Aggreko has been the backbone of mine operations across Africa, delivering reliable power solutions.

Our commitment to the region is unwavering, and we continue to lead the energy transition with our hybrid approach, integrating thermal, batteries, and solar power for a greener future.

From design to maintenance, **we solve complex challenges with sector expertise and engineering insight.**

We are technology-agnostic, ensuring optimal solutions for our customers. We simplify access to sustainable energy, pioneering innovations to achieve sustainability milestones faster.

We not only tailor our solutions to fit customer needs but also adapt financing options and commercial agreements to suit them.

Aggreko – Powering Mines, Energising Africa's Future.

Risks of opening new PGM mines during depressed markets

With platinum group metals (PGM) prices taking a hit, miners developing projects are caught between a rock and a hard place. In fact, owing to subdued PGM demand, a low-price environment and rising costs, the sector is gearing up for a round of retrenchments, which will see between 4000 and 7000 job cuts.

Aerial view of the Platreef project.

So, what are the opportunities and risks associated with opening a new PGM mine at a time when the price environment is unfavourable? This was the question posed at the PGM Day to a panel of PGM miners who are currently developing new multi-million-rand operations.

The discussion, chaired by James Smith, Managing Director of DRA Global, offered Marna Cloete, President of Ivanhoe Mines; Schalk Engelbrecht, Finance Executive at Platinum Group Metals; Thando Mkatshana, Chief Executive, ARM Platinum; and Roger Baxter, Chairman of Southern Palladium, a platform to discuss the issues related to opening a new mine during a tumultuous time for the industry.

The panellists were unanimous that commodities demand is cyclical in nature and that a key consideration when developing any mine is to ensure that, at the onset, it is de-risked as far as possible. This includes keeping costs low (operating at the lowest cost quartile) and taking on a phased approach when bringing large-scale projects on-stream. Throughout the PGM Day, speakers highlighted the need for market development to underpin growth and create demand for the basket of PGM products.

According to Cloete, the IvanPlats Platreef mine development decision was taken in 2011, more than a decade ago.

Ivanhoe Mines indirectly owns 64% of the Platreef project through its subsidiary, Ivanplats. The Platreef palladium/rhodium/nickel/platinum/copper/gold project is located on the Northern limb of the Bushveld Complex in Limpopo. Platreef's 2022 feasibility study confirmed its potential to be the industry's biggest and lowest-cost primary platinum group metals producer.

For the Tier One discovery with a 'great basket of metals', the investment decision – made many years ago – was "based on the massive orebody and the option to establish a mechanised underground mine operating at the bottom of the cash cost quartile".

According to Cloete, the decision to develop a PGM mine was underpinned by the belief that there is a space for every commodity.

"Any decision taken is not based on the spot

Tier 1 deposits

- Tier 1 deposits are large, long life and low-cost operations.

Platreef underground operation.

market of the day, and getting people interested in a project that is ten to fifteen years out, is extremely difficult, which is why we made every effort to de-risk the project by developing it in phases.

"Platreef is by no means a small mine. Phase 1 will go into production next year and produce around 700 000 mtpa, after which we will speedily ramp up to Phase 2, producing more than 500 000 ounces. This will be followed by Phase 3, which will deliver close to a million ounces."

The initial capital costs for Phase 1 are estimated at $488-million, with expansion capital for Phase 2 estimated at $1.5-billion, which may be partially funded by cash flows from Phase 1 and a project financing package.

According to Cloete, the phased approach allows the project developers time to better understand the nuances of the orebody as it is being developed. "As the project is being developed, we get to understand our orebody and the geotechnical engineering required. And, by using the same team and the same technologies we used to build our projects in the DRC, we can deliver the project on time and on budget."

She adds that the company learned a key lesson on the importance of a flat organisational structure. "We are not huge on bureaucracy; we have good governance and our people are empowered to make decisions. Our teams are extremely well versed in their disciplines and our core team liaises with our consultants to ensure that project execution happens the way it should."

Comparing the operating environment in South Africa to that of the DRC, where the Canadian mining company is advancing the expansion of the Kamoa-Kakula Copper Complex and the restart of the historic ultra-high-grade Kipushi zinc-copper-germanium-silver mine, Cloete, says the DRC offers a much less regulated environment for project development than South Africa.

"In the DRC, one has a bit more freedom in how one executes a project. South Africa is difficult in terms of additional legislation related to local procurement and meeting BEE codes, for example, which makes the operating environment much more complex in terms of project execution."

Cloete remains upbeat on the future for PGMs, stating: "I do see a bright future for PGMs, which is why we built the Platreef project. We believe it will be one of the flagship assets that will be in production within the next year."

"In the DRC, one has a bit more freedom in how one executes a project. South Africa is difficult in terms of additional legislation related to local procurement and meeting BEE codes, for example, which makes the operating environment much more complex in terms of project execution."

Capital allocation

Speaking on the topic of optimising capital allocation on African Rainbow Minerals (ARM) platinum's portfolio, Thando Mkatshana, Chief Executive, ARM Platinum, says the discussion factors in "optimising capital in terms of growth, sustainability, and return on investment, amongst others".

ARM Platinum's assets include its Modikwa Platinum Mine, the Two Rivers Platinum Mine and the Bokoni Platinum mine, acquired in 2022.

"First, when considering a project within our

Platreef project.

Southern Palladium's Bengwenyama is a shallow ore body and provides the company with an opportunity for early access.

portfolio, it must be relative to the entire portfolio and secondly, where the project is placed on the cost-curve. Our projects are capitalised to sit on the lower end of the cost curve of the various commodities cycles and the portfolio is expected to be sustainable throughout the cycles."

According to Mkatshana, the current environment calls for discipline when expending cash. ARM's flagship Two Rivers operation is a mechanised mine that sits in a favourable position on the cost curve.

However, he explains that even though the company had accounted for a decline in the market, it "came at a quieter speed than the company anticipated".

Discussing its latest acquisition, the Bokoni Platinum mine – a large open pit mine located in the Limpopo Province acquired two years ago – Mkatshana explains that depressed market conditions called for a phased approach to developing the Bokoni project.

"We started the initial phased approach last year when we commenced developing the project as a 60 000 tonnes per month operation with the aim of doubling that to 120 000 tpm. We believe the project has the potential to ramp up to higher volumes"

Bokoni represents one of the largest platinum reserves in South Africa with an estimated reserve of 75.7 million ounces (2 350 t) of platinum. The mine produces around 55 000 ounces (1 700 kg) of platinum/year.

Despite ARM's aspirations to keep its costs low, its portfolio consists of multiple assets on the higher end of the cost curve with the company working on "taking out" the higher costs to ensure its projects are cash generative.

Aside from financial investments, Mkatshana flags community engagements and investment in skills as being key for any mining company.

As miners advance projects, competition for skills is becoming a major concern, with project developers in the DRC, UAE and Zambia all sourcing from the same skills pool.

Mkatshana explains that aside from having to contend with paying top dollar for highly skilled teams, miners must deal with hyper-inflation and logistical challenges. "What would normally have taken eight months to build now needs to build-in an additional three to four months and a 20% insurance service coverage."

On the concern around scarce skills sets in the mining sector, Schalk Engelbrecht, Finance Executive at Platinum Group Metals, advises that mining houses consider collaborating on their training programmes, as "five years from now, we are going to be competing for and paying a premium for the same skills sets."

He explains that each mine rolls out its own SLP programme, which involves, amongst other things, building a few classrooms and a number of small clinics. Engelbrecht suggests that miners "collaborate to deliver powerful market development, such as a thousand-bed hospital or an entire school which will have a much greater impact for communities."

Platinum Group Metals is developing its Waterberg project, a potential Tier one asset located on the Northern Limb of the Bushveld Complex.

The Waterberg project represents a large-scale platinum group metals resource with an attractive risk profile given its shallow nature. The project facilitates fully mechanised production with the potential to have amongst the lowest operating costs in the PGM sector. The Waterberg project has several highly attractive features, including being shallow and a bulk mineable project with significant scale and growth potential. Sixty three percent of the Waterberg project's reserves and resources are palladium.

Engelbrecht explains that the Waterberg project, a billion-dollar bulk mechanised mining operation, has an ore body that allows it to remain at the bottom of the cost curve, "even at today's prices".

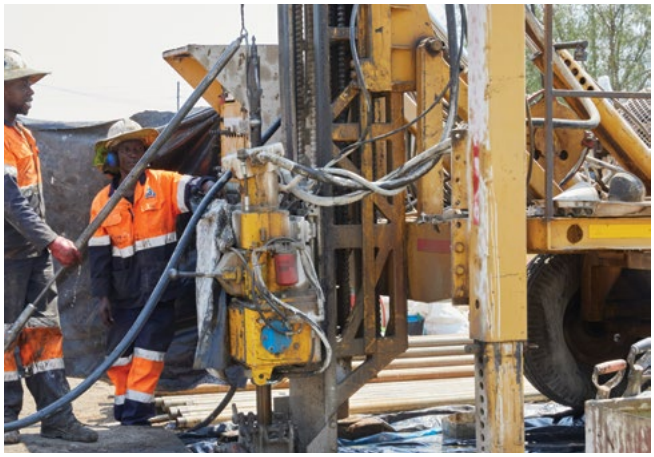
Although the miner had a positive outlook on the PGM metal prices, it faced challenges related to concentrate off-take agreements.

"As it stands, we have a clear idea on what the funding will be and have metal stream arrangements in place for gold, which is one of the minor products. Moreover, we have raised money before for the development of our other mines and have in place strong equity partners. However, what is holding us back is concentrate off-take agreements."

Engelbrecht explains that in the past when miners acquired projects and signalled to the market that PGM concentrate would be available from a specific date onwards, industry would be lining up to sign off-take agreements.

"The old off-take agreement model doesn't work anymore. Since 2019, we have been working on formalising off-take agreements and have had some success and even obtained one or two non-committal, highly conditional

The three key PGM products of platinum, palladium and rhodium are forecast to be in a potential deficit in 2024 and 2025.



Given the sheer size of Bengwenyama, the project will employ roughly 4 000 people.

non-binding indicative term sheets."

Given the poor appetite for off-take agreements, Platinum Group Metals is pursuing the "possibility of building a smelter with a new partner in Saudi Arabia".

"If you consider that the cost of running a smelter includes a 30% to 40% electricity cost and if one develops a smelter in a region where electricity costs are far lower than South Africa, one is immediately able to save between 20 and 30% on the operating cost, making the option to smelter product in Saudi Arabia and transport it back to South Africa a viable consideration. But, first prize is still to secure local off-take," he says.

Adding to the discussion, Roger Baxter, Chairman of Southern Palladium, which has lined up its Bengwenyama project for construction in 2026, said that, barring the "energy, logistics, construction mafia and crime issues, and some regulatory challenges," South Africa has a well-developed mining landscape.

The Bengwenyama project is a Tier One project with a 36-year operating life.

"We have just completed our detailed scoping study and are in the process of producing our pre-feasibility and bankable feasibility studies. Bengwenyama is a project in partnership with the local community – the Bengwenyama community – which owns a 30% equity stake in the project. It is a highly attractive project that has recently gained some attention.

"Once developed, the project will create 4 000 direct jobs and 8 000 indirect jobs and generate potentially R220 and R240 billion in revenue over the 36-year life of mine, which will be good for the country, the community, the tax man and investors."

According to Baxter, "one never builds a company just to manage at the top of the cycle, but also to work through the cycle, which is why being a Tier One project is so important.

"Although we have started engagements with majors on off-take agreements, we are not at the advanced level of talks as Platinum Group Metals. We are also considering every aspect of funding, including local and international interest. We are excited to be developing a project that can be a game changer for the country." ■

Water woes - mining sector extends a helping hand

South Africa's water situation is dire – regions in the country are often without the precious resource for weeks, and sometimes months, at a time when our water quality continues a downward spiral. *Modern Mining* spoke to the Federation for a Sustainable Environment's (FSE), Chief Executive Officer, Mariette Liefferink, about South Africa's current water situation and how the mining sector is investing in infrastructure development to help alleviate some of the country's water woes.

The sewage pollution of the Bloubankspruit within the core of the Cradle of Humankind World Heritage site.

"According to the World Bank Group, South Africa will be unable to reach its SDG6 goals, that is ensuring availability and sustainable management of water and sanitation for all, by 2030. As it stands, a funding gap of R333 billion is anticipated over the next ten years and a projected 17% water deficit by 2030."

South Africa's water crisis is caused by insufficient water infrastructure maintenance and investment, recurrent droughts driven by climatic variation, inequities in access to water and sanitation, deteriorating water quality and a lack of skilled water engineers.

Liefferink explains that following the South African Human Rights Commission's (SAHRC) 2021 Report, which arose from an inquiry into the sewage pollution of the Vaal and the rivers of Tshwane, failing Wastewater Treatment Works (WWTWs) are a problem nationwide, rendering Constitutional rights vulnerable.

"The Commission found that the situation regarding WWTWs and pollution of South Africa's water resources is dire and widespread and, given the breadth of the challenges and their impact on large numbers of people, the SAHRC stated that the situation could lend itself to being declared a national disaster in terms of the Disaster Management Act."

So appalling is our water situation that the Department of Water and Sanitation's National Water and Sanitation Master Plan (2018) reported that between 1999 and 2011 the extent of main rivers in South Africa classified as being in poor ecological condition increased by 500%, with some rivers pushed beyond the point of recovery. It also stated that more than 50% of South Africa's wetlands had been lost and of those that remain, 33% are in a poor ecological condition.

"The DWS' National Eutrophication Management Strategy for South Africa (2022) supports the findings of the National Water and Sanitation Master Plan and reports that South Africa itself has some of the most highly enriched surface waters in the world. It found that eutrophication challenges in South Africa are exacerbated by insufficient wastewater infrastructure and investment; deteriorating ecological infrastructure; recurrent droughts driven by climatic variation and an inescapable need for water resource development; inequities in access to safe sanitation, against the

Hennops River has become one of Gauteng's most polluted rivers.

Sewerage pollution at the Blaauwbank River over Milbank Bridge.

Grey water at the Milbank weir.

backdrop of a growing population; water use regulation that is not consistently and adequately protecting South Africa's water resources against eutrophication; and a lack of skilled water scientists and engineers. The strategy cautioned that poor water quality including eutrophication, is already having significant impacts on economic growth and on the well-being of South Africans."

Similarly, the 2022 Green Drop Report found municipal wastewater collection and treatment infrastructure to be in a worse condition, with 44% of the systems in a critical state and 64% in a poor or critical state.

"This indicates a reluctance by municipal councils to budget for maintenance of wastewater infrastructure. The 2023 Blue Drop Report indicated a similar deterioration in water services in terms of the quality and reliability of water supply. It found that it was not microbiologically safe to drink the water in almost half (46%) of our drinking water systems during 2022, when the Blue Drop audit was done. This resulted in an increased risk of life-threatening water borne diseases such as cholera and chronic diarrhoea."

Government intervention

According to Liefferink, the DWS contributes R12 billion per annum as well as technical advice and management support to poor performing municipalities. However, the challenge for government is that it must repeatedly provide municipalities with grants to repair infrastructure that it had not maintained, which required further funding.

"The Water Service Act makes a distinction between a water service authority (the municipality) and a water service provider. Almost all municipalities are currently both a Waster Service Authority and a Water Service Provider, having approved themselves as sole Water Service Providers. The Water Services Act requires Water Service Authorities and Water Service Providers to be managed and accounted for separately by the municipalities, which is not currently happening. To address these problems, the DWS has proposed reforms to the Water Services Act which include, for example, that the proposed amendment prohibits a person from operating as a water service provider without being granted an operating licence in terms of the Act and that a water service authority

Impact of unlawful development within the natural wetlands of the Blaauwbank River.

may only approve a water service provider if the water service provider is licensed to do so in terms of the Act. Where there is persistent non-compliance, the Minister of Water and Sanitation may rectify the non-compliance at the cost of the water institution and revoke the licence of a water service provider."

By amending section 63 of the Water Services Act government expects to strengthen enforcement through directives and to define the function for which the Water Service Provider is accountable, such as revenue and finance, asset creation, operations and maintenance, human resources, procurement, and customer relationships.

New legislation for mines

Government recently proposed amendments to the National Water Act (NWA), which relate to the prohibition of prospecting and mining in strategic water source areas.

Liefferink explains that in terms of the proposed amendments, all open cast mining and underground mining that has the potential to cause acid rock drainage or acid mine drainage will be prohibited. This is of particular importance to water source areas that are threatened by or vulnerable to mining.

The proposed amendments will impact acid producing mines, such as coal and gold mining, which are categorised as Category A mines – in other words, any mine where sulphide-producing or other acid-generating material occurs in the mineral deposit.

"Since the proposed amendments have a retrospective application, it may result in the Minister of Water and Sanitation reviewing or possibly revoking a water use licence authorisation of a mining company currently operating in a strategic water source area, or prescribing additional terms and conditions. Some ore bodies are in strategic water source areas such as, for example, a proposed underground coal mine within the Enkangala/Drakensberg Strategic Water Source Area. The amendments to the National Water Act envision prohibiting mining in areas that are critical for ensuring water security. However, the mining industry may argue that this proposed prohibition will sterilise a mineral resource."

Water consumption by the mining sector

Based on research by the CSIR, South Africa's mining industry consumes between 2% and 5% of South Africa's available water, which is substantially less than agriculture (61%), domestic/ municipal use (27%) and industry (7%).

According to the National Water and Sanitation Master Plan, agriculture will require 9 700 million m^3 by 2030 while mining and bulk industrial will require 1 017 million m^3. Municipal demand is anticipated to be 5 800 million m^3 per day.

"Since 2020, diversified miner, Sibanye-Stillwater has reported a 4 061 Ml (37%) reduction in potable water withdrawals at its South African operations. The miner endeavours to reduce its reliance on, or extraction from, municipal water systems and aims to use alternative water sources such as groundwater and reclaimed mine process water, to replace purchased water. As part of its water sustainability strategy, Sibanye Stillwater is continuously identifying and reducing the waste of water through advanced initiatives, including improved metering, water balance management, leak detection, and repair initiatives."

Another miner working to reduce its water consumption is gold producer, Gold Fields which, according to the Group's 2020 – 2025 Water Stewardship Strategy, is focused on understanding and securing water resources for its life-of-mine, as well as embedding water planning into operational management and updating water security risk profiles to support sourcing of water while reducing its demand for freshwater.

JSE-listed DRDGOLD's report for the six months, which ended on 31 December 2023, noted that it had a 61.3% decrease in externally sourced potable water and its consumption of potable water during the same period was 536 Ml.

Mining sector extends a helping hand

Given that most municipal wastewater treatment works are dysfunctional, some mining companies, including Sibanye-Stillwater, Gold Fields and Harmony Gold, have been collaborating with government and local municipalities to address some of the associated challenges.

International precious metals mining company, Sibanye-Stillwater is assisting the Mogale City Local Municipality in addressing the challenges with the Percy Stewart WWTWs, with gold miner, Harmony Gold offering the Welkom municipality aid with its WWTWs.

"Dysfunctional WWTWs in Mogale City Local Municipality, Rand West City Local Municipality, Merafong Local Municipality, Matjhabeng and Matlosana discharge raw sewage into water systems, which impact not only the local streams, rivers, dams, and pans, but also surrounding communities and agricultural downstream water users and mining companies' operations and rehabilitation objectives. Mining companies, such as Harmony Gold and Sibanye-Stillwater have identified opportunities to assist local municipalities through their Social and Labour Plans (SLPs) and Corporate Social Investment (CSI) initiatives to provide municipalities with technical advice, skills and capacity. In the case of Harmony Gold, the company has been assisting with refurbishing, operating and maintaining key wastewater

treatment plants in their respective regions."

Liefferink adds that, aside from providing technical advice to the Mogale City Local Municipality, Sibanye-Stillwater also engaged a specialised wastewater contractor to assess the costs associated with refurbishing the primary and secondary process steps of the Percy Stewart WWTWs. Poor management of the WWTW negatively impacts the rivers within the Cradle of Humankind World Heritage Site.

"The undertaking is expected to be cost-effective and enhance the facility's overall compliance. With the need for sustainable solutions, ongoing efforts are directed towards quantifying the cost for the comprehensive refurbishment of the entire facility. This initiative, currently underway, aims to significantly improve the plant's long-term performance. Sibanye-Stillwater, however, cautioned that the success of both engineering approaches (the refurbishment and replacement of failing units) hinges on the dedication of skilled plant operators and a robust maintenance system and sustained compliance in the future."

According to Liefferink, following a visit in July/August 2023 by the UN Special Rapporteur on Toxics and Human Rights', Dr Marcos Orellana, to Sibanye-Stillwater and Gold Fields' South Deep operations, and the West Rand AMD Treatment Plant, he noted that the (Western Basin) AMD Treatment facility "embodied collaboration between the government and a mining corporation" and that the polluted water from tailings were reused in the mining operations, in a closed loop system.

Of the initiative, Dr Orellena said it was an example of a good practice where rehabilitation is being undertaken while mining operations were ongoing and not postponed until mining operations concluded.

Percy Stewart outflow which travels down the ravine into the Blougat Spruit.

Sibanye Stillwater also partnered with the Welkom's Matjhabeng Local Municipality for the refurbishment and interim operations of the Theronia Wastewater Pump Station. The refurbished plant was recently handed back to the municipality.

In January 2023, Harmony Gold refurbished the Witpan WWTWs in Matjhabeng at a cost of R10.7m and refurbished the Stilfontein WWTWs in Matlosana and Oberholzer in Merafong, in August 2023, at a cost of R9.2m and R15.6m respectively.

"South Africa's water situation requires urgent intervention. It would be most beneficial if more businesses follow the examples of companies in the mining sector to collaborate with government and local municipalities and lend a helping hand to alleviate the water challenges the country faces," concludes Liefferink. ■

Polluted canal feeding a fish farm.

Blasts are carefully designed and timed to optimise rock fragmentation.

Ramesh Dhoorgapersadh: BME's General Manager: Global operational excellence and SHERQ.

D. Scott Scovira, BME's Global Manager Blasting Science and Engineering.

Hydrogen peroxide explosives add to BME's green mining offerings

As a pioneer of green mining initiatives, Omnia company BME is further differentiating itself with its future hydrogen peroxide-based emulsion (HPE) offering – which strongly aligns with its mining customers' sustainability goals.

"Our focus on green mining practices throughout our value chain demonstrates our commitment to being a responsible corporate citizen, while supporting our customers' efforts to meet ambitious environmental, social and governance (ESG) targets," said Ramesh Dhoorgapersadh, BME's General Manager: Global operational excellence and SHERQ (safety, health, environment, risk, and quality).

Dhoorgapersadh explained that green mining is a concept rooted in sustainable environmental practises and technologies, in all aspects of BME's business. With the aim of achieving minimal impacts on the environment, he said, the concept is based on five principles.

Green principles

"Firstly, this approach promotes material and energy efficiency, and secondly ensures the availability of mineral resources for future needs," he said. "The other principles are to minimise adverse environmental and social impacts, improve work and organisational practices and, finally, ensure sustainable land use following mine closures."

BME leverages these principles as part of its growth and sustainability strategy, which importantly aligns with the ESG requirements of customers and investors alike. This means delivering products and services that enhance BME's value proposition in all facets of mining, as part of its commitment to green mining practices.

"Such a strategy is built on a concerted and continuous dedication to research and development, allowing BME to drive innovative change and remain at the cutting edge of the blasting sector," he said. "By successfully implementing innovative change, BME can deliver superior performing products while incorporating green mining practices. The amalgamation of resource efficiency, reduction in environmental impacts and overall green solutions provide BME

with a competitive edge in the explosives market."

Sustainability through innovation

Its innovation focus has led to several pioneering green mining achievements over the years, including used-oil emulsions. These emulsion products incorporate used oil as a fuel source, thereby removing from circulation a waste product that has a high potential for environmental harm – and transforming it into a stable emulsion with superior performance. The consumption of used oil as a fuel phase also allows less dependence on the price of fuel.

Another early innovation from BME was its dual salt emulsions; this formulation not only offers superior product performance, it also contributes significantly to meeting ESG goals.

"Our advanced formulation – when combined with used oil – enables the manufacture of finished products at lower temperatures, resulting in reduced energy consumption during the production process," said Dhoorgapersadh. "This energy efficiency in turn translates directly to lower carbon emissions, a growing imperative in mining."

Hydrogen peroxide breakthrough

Among BME's most exciting sustainability initiatives in recent years has been its strategic partnership with Swedish company Hypex Bio Explosives Technology, a specialist in nitrate-free emulsion explosives. Since the 1970s, explosive emulsions have been formulated using ammonium nitrate (AN) as the primary salt, according to Scott Scovira, Global Manager of Blasting Science at BME. Other emulsions sometimes include an alternate salt – calcium nitrate or sodium nitrate – in place of AN.

"The ability of hydrogen peroxide to act as the oxidiser has been known for decades," explained Scovira. "However, all research outside of Hypex Bio has been focused on water gel technology – an old-technology bulk product system – or emulsions requiring 'rocket grade' concentrations of hydrogen peroxide of over 60%."

He highlighted that BME's value proposition for its customers is strongly aligned with environmental goals. The chemistry of HPEs is incapable of creating ammonia and nitrate products like nitrogen oxide (NOx) gas as there are no nitrogen-based components used in the formulation. HPEs are therefore inherently environmentally friendly and safer in terms of post-blast toxic gas formation.

BME's used oil truck collects used oil from customers.

The chemistry of HPEs is incapable of creating ammonia and nitrate products.

Fumes and water contamination

"Many mines have operational restrictions due to NOx gases," he continued. "Globally, in underground applications, cycle time and hence efficiency are impacted due to the time spent waiting for post-blast fumes to dissipate."

Furthermore, in surface operations in many areas, mines are constrained by weather conditions to prevent NOx gas clouds from impacting neighbouring properties and communities. This is a particular concern in developed regions where NOx emissions are carefully monitored and reported; any non-compliance can impact on mine operating permits.

Scovira also pointed to the need to manage ammonia and nitrate in mine water discharge, which can be a challenge since virtually all bulk explosives contain ammonium nitrate.

"The use of other nitrate salts like calcium or sodium nitrate mitigates a large percentage of the ammonia discharge; however these salts have little impact on the nitrates," he said. "Mines in many countries – and those in environmentally sensitive areas – need to remediate their water runoff and discharge to reduce ammonia and nitrates to permissible levels. There are historical cases of increased costs making mines uneconomical and forcing premature closure."

He emphasised that BME's market research has determined that HPE's value proposition for its customers is strong – with no drawbacks that would impact costs negatively. In this sense, hydrogen peroxide technology truly differentiates BME, he asserts, while supporting customers' efforts to raise their ESG performance.

Good stewardship

Dhoorgapersadh summed up by highlighting that green mining is a crucial aspect of modern mining operations aiming to balance the demand for minerals with the need to protect the environment.

"By incorporating sustainable practices into mining operations, BME plays an integral role in the mining industry's efforts to preserve natural ecosystems," he said. "At the same time, we align with the ESG objectives of minimising environmental impact, fostering social responsibility, and ensuring robust governance."

He notes that this approach not only enhances the reputation of mining companies, it also ensures their operations are viable in the long term, meeting the expectations of stakeholders and contributing to a more sustainable future.

"BME is a key enabler to customers in realising this concept," he said. "BME brings to the table immense knowledge and innovative change that unlocks potential for businesses – while ensuring that operations are conducted in a manner that guarantees sustainability and responsible product stewardship." ■

Towards a Greener Future: The Sustainable Mining Trifecta

By Dr Christine Vivier, Ukwazi Sustainable Mining

The mining industry plays a vital role in supplying the raw materials for our modern world, but its environmental impact is a cause for concern. This is especially true as the competition for minerals critical to clean energy production intensifies. Mining companies must now manage and comply with stricter sustainability metrics to remain competitive. Ernst & Young's (EY) annual report "Top 10 Business Risks and Opportunities for Mining and Metals" underscores this point, highlighting Environmental, Social, and Governance (ESG) risks – particularly water stewardship and biodiversity – as urgent priorities linked to climate change.

However, a positive shift towards sustainable mining is gaining momentum. This movement aims to minimise environmental impact while ensuring continued resource extraction. Deloitte's "Tracking the Trends 2022" report echoes this sentiment, emphasising that "Embedding ESG into organisations" is crucial for mining companies to maintain a competitive edge in the coming decade. The path to sustainability encompasses every aspect of a mining operation. Companies can start by focusing on three key areas within the realm of sustainable production: maximising the recovery and yield of valuable resources and utilising intelligent mine planning and design systems for low-waste and low-carbon extraction.

By harnessing the combined power of Life Cycle Assessments (LCA), sustainable mine planning software, and Green Net Present Value (Green NPV), the mining industry can unlock a powerful force for positive change. This trifecta empowers companies to optimise operations and execution, driving sustainable practices throughout the mining lifecycle:

- LCA provides a comprehensive understanding of the environmental impact over the life of mine.
- Mine planning software translates this understanding into actionable strategies through

Sustainable mining for thriving communities.

sustainable design.

- Green NPV ensures these strategies are financially sound and contribute to a sustainable future.

Life Cycle Thinking: Unveiling the Hidden Costs

Think of LCA as a deep dive into a mine's environmental footprint. It analyses the impact across the entire life cycle, from exploration to post-mining reclamation. In the context of mining, mine planning can be considered an aspect of process design, and offers the opportunity to apply eco-design during this phase. Mine planning refers to the process of selecting a particular material for extraction and designating the order and time of extraction to minimise cost or fulfill a specific business target. This process can occur well in advance of operation and can be updated throughout the life of the mine.

Environmental LCA is becoming a valuable tool in mine planning, contributing to a more sustainable mining future. Here's how LCA integrates with the mine planning process:

1. Identifying Environmental Impact Hotspots

LCA helps identify stages in the mining process with the most significant environmental impact, such as energy consumption during extraction, water usage in processing, or waste generation throughout the life cycle. In a practical example, we have examined a major manganese operation in the Northern Cape that has these issues and are looking at combining the mine planning process with open pit rehabilitation, final void use and future land uses.

2. Informing Sustainable Mine Design

LCA results can be used in mine planning software to visualise the environmental impact of different design choices, such as comparing the environmental footprint of open pit mining versus underground mining or assessing the impact of different waste disposal strategies.

3. Optimising the Mining Process

LCA data can optimise the entire mining process from a life cycle perspective by minimising resource depletion, reducing greenhouse gas emissions, and promoting biodiversity preservation. This is critical for planning mines with closure and post closure in mind.

4. Scenario Modelling and Decision-Making

LCA data helps to predict the environmental impact of different mining scenarios, empowering planners to choose the option with the lowest environmental footprint while meeting economic and technical requirements.

Specific examples of LCA application in mine planning include optimising haul truck routes, water management strategies, and waste segregation and disposal planning. Optimisation of machine idle times, traffic blockage, excavation priorities, fleet allocation, unnecessary re-handling, and machine relocation are such opportunities that can improve the life-cycle energy use and reduce greenhouse gas (GHG) emissions. Furthermore, LCA can aid in waste management and rehabilitation planning by evaluating the environmental implications of various disposal methods and post-mining land uses. By considering these factors upfront, mining companies can develop more sustainable strategies for managing waste streams and restoring mined landscapes.

Mine planning software is evolving to incorporate planning with a Green Lens. Advanced software allows for creating detailed 3D models that factor in environmental considerations. This enables planning for minimal waste generation, optimised land use, and effective reclamation strategies.

Green NPV: Balancing Profit with the Planet

The concept of Green NPV involves incorporating environmental costs and benefits into traditional NPV calculations. This approach integrates LCA data and seeks to assign monetary values to environmental impacts, encouraging sustainable investment decisions. By combining LCA and Green NPV, mining companies gain a comprehensive understanding of environmental impact and can translate this knowledge into financial terms for decision-making. Green NPV encourages companies to prioritise projects that are not only profitable but also minimise environmental damage. The approach can lead to long-term financial and environmental sustainability.

Embracing these tools enables mining companies to make informed decisions that balance profitability with environmental responsibility, ultimately contributing to a more sustainable future for the industry and the planet. As LCA and Green NPV become more widely adopted, the mining industry has the potential to evolve into a responsible steward of natural resources, ensuring continued access to materials while safeguarding the environment for future generations.

The Road Ahead

While challenges remain, such as standardising LCA methodologies and effectively assigning monetary values to environmental impacts, this trifecta of tools offers a roadmap for a sustainable mining future. By embracing these advancements, the mining industry can ensure continued resource extraction while minimising its environmental footprint and contributing to a greener future for all. ■

Nivaash Singh, Co-head of Mining and Resources at Nedbank CIB.

Sustainable financing unlocks the energy transition for mining companies

Green loans tied to greenhouse gas reductions and ESG targets can increase access to capital, writes Nivaash Singh, Co-head of Mining and Resources at Nedbank CIB.

Mining companies are leading the charge towards renewable energy, and while load-shedding and rising electricity tariffs form part of the backdrop, the drivers for this change are far more fundamental.

The first is the energy-intensive industry's sizeable carbon footprint: mining accounts for between 4% and 7% of global greenhouse gases (GHGs). This is becoming an existential issue as investors and lenders increase the pressure on mining companies to tackle climate change more proactively. In response, companies are setting ambitious climate targets such as net-zero operational commitments by 2050, and one of the first steps they take is to make the shift towards renewable energy.

The second driver is increasing scrutiny of mining companies' environmental and social impacts beyond greenhouse gas emissions. These include land use, impacts on biodiversity, water use and waste production and, on the social side, factors such as the health and safety of employees and surrounding communities, gender diversity, and human rights.

'Green loans' are often structured to incentivise and support environmentally responsible practices.

Finally, the sustainability focus is being driven by the crucial role that mining plays in the transition to a low-carbon economy. It is the source of lithium, cobalt, copper, aluminium, steel and rare earth elements that are integral to clean-energy technology such as lithium-ion batteries, electric vehicles, wind turbines and solar photovoltaic (PV) panels. As the energy transition accelerates, demand for metals and minerals, particularly those described as 'green', is expected to rise substantially.

Sustainable financing

All three drivers affect mining companies from a financing perspective. They speak to the material environmental, social and governance (ESG) risks that are impacting the industry and can affect companies' access to capital.

The way companies address these drivers is key and can increase their access to capital, not only by appealing to traditional investors seeking to meet their own ESG thresholds but also by pulling in impact investors and development finance institutions with more specific ESG mandates.

This brings us to the concept of sustainable financing, a lever that mining companies can use to adopt sustainable business practices to preserve and grow their operations, as well as mitigate the environmental and social risks of these operations and promote good governance.

'Green loans' are often structured to incentivise and support environmentally responsible practices and may come with more favourable terms and conditions, such as lower interest rates, longer repayment periods and reduced fees, when compared with traditional financing options. These incentives are designed to encourage mining companies to invest in environmentally beneficial projects and facilitate the transition to more sustainable practices.

There are three key types of sustainable finance products that are available to mining companies, starting with use-of-proceeds loans, where the funds raised are deployed in eligible green and social projects or initiatives. For example, the

proceeds of a green loan can be used to procure and install a wind or solar farm to power a mine's operations.

The second option is a sustainability-linked financing structure that incentivises achievement of ambitious, predefined performance targets. These are based on material key performance indicators that are measured on milestone dates. Sustainability-linked structures do not have any limitations in terms of the use of proceeds, and the key performance indicators will be driven by the key ESG risk factors of the particular mining operation, aligned with its sustainability strategy.

Finally, there is transition financing, a type of sustainable finance solution created for hard-to-abate industries such as mining. It is an option to help mining companies attract financing where they would otherwise not typically fit into traditional green or sustainability-linked structures. It is used to support projects and initiatives that will deliver a long-term strategic reduction in GHG emissions.

> "The first is the energy-intensive industry's sizeable carbon footprint: mining accounts for between 4% and 7% of global greenhouse gases (GHGs)."

The Tronox transaction

With its proven track record underpinned by deep sector-specific expertise and experience, Nedbank Corporate and Investment Banking (CIB) has established itself as a leading provider of sustainable financing solutions to the mining and metals industry.

A recent transaction illustrating the impact of sustainable financing involves a R4 billion solar PV installation – one of South Africa's largest solar projects constructed under a corporate power purchase agreement – that recently started supplying electricity to the South African operations of mining company Tronox.

With CIB as the joint lead mandate arranger, two 100-megawatt (MW) solar farms in Lichtenburg, North West, are producing electricity for Tronox operations in KwaZulu-Natal and the Western Cape.

The two solar farms are expected to generate about 580 gigawatt-hours (GWh) of electricity per year, equivalent to the annual consumption of more than 40 000 households. Tronox, a New York Stock Exchange-listed world leader in the mining, production and marketing of inorganic minerals and chemicals, expects the project to reduce its global Scope 1 and Scope 2 carbon emissions by about 13% when compared with its 2019 baseline.

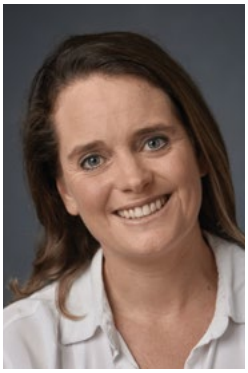
The company's energy-intensive operations – which include mines in Mtunzini on the KZN coast and Brand-se-Baai on the Namaqualand coast, concentration plants, and smelters in Empangeni and Saldanha Bay – are expected to draw 40% of their electricity from the solar PV project.

The projects' total investment is close to R4 billion, with debt financing at about R3 billion. CIB committed roughly R827 million to the debt for these two solar PV projects, handling the associated interest rate hedges. CIB's involvement showcases its leadership in financing renewable energy projects across Africa, reinforcing its position as one of the leading banks in energy finance.

In these deals and many others, mining companies have relied on the experience, mining knowledge and seasoned sustainability credentials of Nedbank CIB. ■

Mining companies are leading the charge towards renewable energy.

Vis Reddy, SRK Consulting chairman and environmental geochemist.



Philippa Burmeister, partner and principal environmental scientist at SRK Consulting.

How technology will support – and limit – mining's green ambitions

Mining has arguably taken the lead among economic sectors in the boldness of its climate change commitments; the focus is now on the pace of technological advancement, and whether this will be fast enough to allow the sector to reach its goals and deadlines.

The voluntary commitments by mining's leading players have set the bar high, promising to reduce greenhouse gas (GHG) emissions to net zero by the year 2050. According to Philippa Burmeister, partner and principal environmental scientist at SRK Consulting, certain technology is rapidly evolving to support mining's green ambitions.

However, she also points out a significant challenge: the need to prove new innovations before they can be reliably implemented. This involves rigorous testing and validation to ensure these technologies are effective and sustainable in real-world mining operations.

"A technological step-change will clearly be required to meet climate change goals, but new technologies may take up to 15 years before they clear the certainty hurdles of a mine's bankable feasibility," said Burmeister. "In other words, any stakeholder, investor or lender who supports a mining project relying on these technologies, must be completely confident that these innovations will deliver as promised at the quoted price and be available at quantities required and hold a reliable warranty."

'Bankable' technologies

The fact is that many of those technologies with the potential to reduce GHG emissions have not been around for 15 years, she pointed out, and many more have yet to even be developed. This creates a challenge for any future mining projects hoping to leverage these capabilities to achieve their emission reduction goals. Funders of these projects will still require considerably more certainty from new equipment and processes before they can be included in a bankable feasibility study.

"The question goes well beyond whether a device or machine actually performs to expectation in each particular application," she explained. "More than that, there needs to be an established 'ecosystem' or value chain around each of the new technologies. This is necessary to ensure they can be readily and economically supported in the field, for instance, and that there are the required skills to conduct this maintenance – and indeed the facilities to produce sufficient quantities of equipment, spares and consumables, and make them available where they are required."

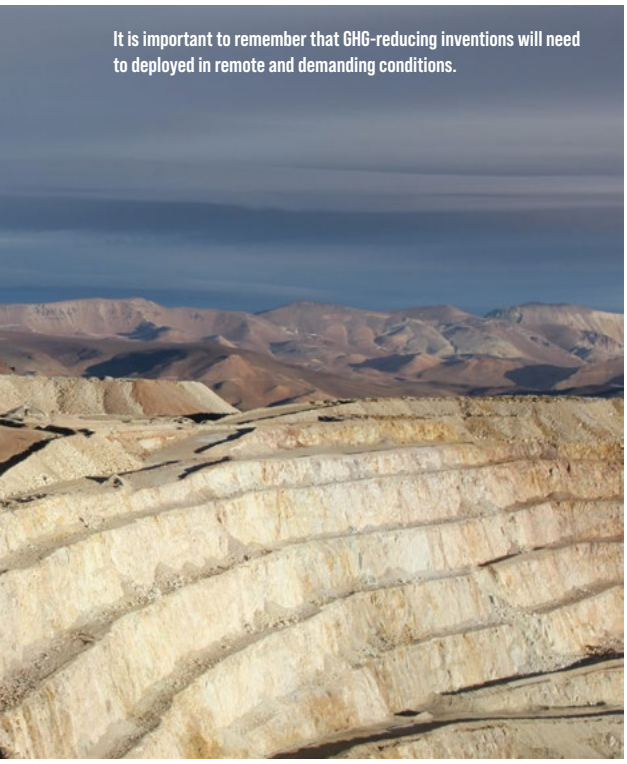
Industry investing in itself

To its credit, the mining sector is not waiting for others to come up with answers. There are plenty of examples of exciting innovations being forged by mining companies themselves, as well as initiatives in collaboration with specialised original equipment manufacturers (OEMs). These efforts are of course limited by available research and development funding, but they are creating a valuable history of steady advancement and technical breakthroughs on which the whole sector and others can piggy-back.

It is also important to remember that the GHG-reducing inventions will need to deployed in remote and demanding conditions. Many of the minerals of the future will be sourced in the expansive rural areas of Africa and other continents, which may not be well served by infrastructure, skills or easy accessibility.

"The outlook, therefore, is that much of the 'mobile combustion' category of an emissions inventory is

The enthusiastic take-up of renewable energy is allowing mines to generate cleaner energy for their operations.



It is important to remember that GHG-reducing inventions will need to deployed in remote and demanding conditions.

going to be difficult to replace in the short term – where opencast mines are especially reliant," she said. "For most of these mines, their surface trucks, shovels, excavators, loaders and related equipment account for most of the carbon footprint."

Renewable opportunities

The other – more positive – side of the coin is the extent to which mines can more easily harness electrical and battery-powered equipment in their operations. Underground mines have already made significant progress in applying these technologies to good effect.

"Not only have underground electric vehicles reduced the environmental hazards of diesel fumes from working areas, but they also generate less heat and reduce the ventilation required – which is itself energy-intensive," explains Burmeister. "The rapid advance of battery technology is further promoting the use of electric vehicles, but mainly in underground operations where the need for long distance haulage is less and alternatives, such as conveyors, are easier to implement."

Underground mines have made significant progress in applying energy efficient technologies to good effect.

She also pointed out that optimised ventilation systems represented a significant area of potential for reducing emissions, where studies show that energy reductions of 30-40% are possible.

When considering the role of electrical mining machinery, the question to be answered in an emissions assessment is of course how the electricity for these machines is generated in the first place. More specifically, is it powered by fossil fuels or renewable sources? Here, there is further cause for optimism, both in South Africa and the rest of the continent.

"The enthusiastic take-up of renewable energy – in general and by the mining sector in particular – is allowing mines to generate cleaner energy for their operations," she said. The steady improvement in solar panel efficiency is just one enabling factor promoting this trend, where wattage output per panel has grown substantially in just a few years.

Many mines in South Africa are investing in their own renewable – mainly solar – power generation, and a number of Africa's mining countries have the benefit of hydroelectric facilities; this bodes well for the impact of mines who can move operations away from fuel combustion to electrically powered alternatives.

Supporting mining's journey

Vis Reddy, SRK Consulting chairman and environmental geochemist, highlighted how the company has responded actively to the global concern over climate change and sustainability.

"Mining companies have nailed their colours to the mast when it comes to their objectives and targets for climate change, and this is clearly guiding their direction in a positive way," said Reddy. "As consulting engineers and scientists, we have integrated these themes into our professional services to these clients – helping chart the way forward in practical ways."

He highlighted the external pressure from various sources, not least from consumers and financial institutions, to move all economic sectors toward a lower-carbon future. SRK not only keeps up to date with the standards and benchmarks arising from these trends, but also participates in related initiatives wherever possible.

"Our involvement in the EU-funded RE-SOURCING initiative is one example," he said, "where we worked on a multi-stakeholder engagement to advance responsible sourcing through global mineral value chains."

SRK has developed leading expertise in a range of sustainability-related fields, infusing its engineering and scientific disciplines with a deep awareness of environmental, social and governance (ESG) issues relevant to the mining sector. This includes developing decarbonisation strategies that place companies on a path to meet their emissions targets. ■

Why laboratory support **is crucial in good waste management**

EnviroServ Waste Management's accredited laboratory analyses waste to reduce risk and minimise its impact on the environment.

Mahmood Patel, EnviroServ's National Laboratory Manager.

Before waste may be disposed of in a landfill, it must be analysed by a South African National Accreditation System (SANAS) approved laboratory to understand its chemical and physical makeup.

In managing its waste, industry must follow the waste hierarchy principles of prevention, followed by reuse, recycling, recovery and finally disposal.

EnviroServ Waste Management's accredited laboratory analyses waste to reduce risk and minimise its impact on the environment. Having competent laboratory staff is an essential part of managing hazardous waste to achieve these objectives.

"The experienced team at our ISO 17025:2017 SANAS accredited centralised laboratory at our Johannesburg head office knows and understands the chemical and physical properties of the waste they are assessing," said Mahmood Patel, EnviroServ's National Laboratory Manager. "Waste classification and the assessment of waste help with the evaluation of appropriate waste management strategies."

Before disposal to landfill, landfill operators must have sufficient information about a particular waste as this informs the landfill class at which the waste may be treated and disposed of.

In 2013, three sets of waste management regulations were promulgated under the National Environmental Management: Waste Act No. 59 of 2008. One of these, the National Norms and Standards for Disposal of Waste to Landfill, lists various prohibitions regarding types of waste that may not be disposed of to landfill. Certain waste types including liquid waste and whole tyres, are prohibited from being landfilled, along with lamps, batteries and hazardous waste with calorific values above their disposal limits.

"In terms of the National Environmental Management: Waste Act 59 of 2008, a person commits an offence if they contravene or fail to comply with regulations," said Patel. A person convicted of an offence is liable to a fine or to imprisonment.

EnviroServ has a policy that no waste handling activity may be started unless a disposal plan for both non-hazardous and hazardous waste has been drawn up. "By applying this principle, we assist our customers in responsible waste management, following all prevailing waste management legislation and avoiding environmental contamination or an undesired reaction when disposed of with other waste types."

Enviroserv offers peace of mind through the provision of containment of hazardous waste, and issues clients with safe disposal certificates.

With close to 45 years of experience in the waste management industry, collaboration with customers is how we drive the circular economy.

We implement agile and innovative waste solutions, proudly ensuring environmental peace of mind through our commitment to industry standards.

www.enviroserv.co.za | 0800 192 783

FIND OUT MORE

ENVIROSERV
WASTE MANAGEMENT
*RAISING THE **WASTE** GAME*

Vibration in motion: resolving downtime in the screening process

By Larry Horrie: Account Manager, Martin Engineering

After fresh water, sand is the most widely consumed natural resource on the planet. The annual world consumption of sand is estimated to be >15 billion tons, with a respective trade volume of 70 billion dollars.

Inland sand is extracted and placed in stockpiles for transport to the processing plant.

Whether extracted from a dry inland quarry or underwater resource, impurities and biological material must be removed, otherwise the sand can contaminate the end process. Removing impurities from the product further saturates it, causing it to enter the processing and drying system as a slurry. Although some end users don't require dried sand, most do, so the water needs to be extracted.

To remove water, the sand is passed through a screening process involving industrial vibrators. The volume and sustained operation of the process can put a lot of strain on the vibrators, so it is not uncommon for them to break down. This is accompanied by downtime and lost production, which makes lead time in being able to replace units and reliability of the vibrators extremely important.

This article walks through the process of one of the largest sand mining operations in the Southern United States and discusses the impact that quality vibration has on the operation.

Clean sand makes strong concrete

The first stop for mined and quarried sand is the sanitisation plant, where the sand is washed of impurities including clay, silt, salts and mica, as well as organic matter which can propagate the growth of bacteria. Along with improving the adhesive quality of the product, the removal of organic impurities and bacteria improves the curing of concrete or mortar, weakening the final product.

For construction purposes, 75-85 percent clean sand is sufficient for cement. Having a larger surface area than sand, clay creates a filmy barrier around sand particles which prevents or reduces the adhesion of cement by increasing the amount of water needed, in turn lessening the strength of concrete or mortar. A high presence of mica can have structural implications due to the smooth surface of the particulate. Because of the corrosive effect on reinforcement, the sand also needs to be tested periodically for coal residues.

Bouncing particles

The processing plant that services the sand mine has three dewatering racks with sloped screens covered with a specially made porous cloth that allows moisture, but none of the fines, to pass through. The racks sit on spring stabilisers to absorb the force output of the two high-powered electric vibrators mounted on top that counter-rotate to create a linear force through the rack's centre of gravity, with enough torque to bounce and move tons of wet material up and down.

Several tons per hour of heavy wet granules are vibrated across the screens, so the water extraction process needs to be fast to meet production demands. It is then dropped on a conveyor to be transported either to the drying kiln or the outdoor storage area.

Breakdowns, downtime and maintenance

The intense demand and stress on the vibrators can be punishing, sometimes causing them to break down. To shut down a single rack translates to a proportional loss in production, so to avoid downtime, operators have the option of recalibrating a single vibrator when backup units are unavailable. In this instance, although production is reduced considerably, the material still passes slowly through the process, releasing considerably less water and putting a tremendous strain on the shaker screen and the single vibrator, reducing their operational life.

Maintenance on the unit is a burden, a possible safety concern and repair can take weeks. Weighing more than half a ton, a crane is used to remove the vibrator and load it for transport. Removal requires several employees, and working around unsupported heavy equipment can be hazardous.

Counter-rotating forces

With two sets of weights mounted on each end of the motor's shaft, as the vibrator shaft rotates, the unbalanced mass of the eccentric weights is used to generate centrifugal force. To produce the proper force in a single vibrator, the two sets of weights can be adjusted so they are a mirror image. When synchronising two vibrators, it is important to ensure the vibrators are counter-rotating and that the weights are properly adjusted to the same value. Once mounted to a piece of equipment, any adjustment made to one unit must also be made to the other.

Although the function and general design are similar to competitor units, what sets the Martin Engineering designs apart is durability, service life and the fact that Martin is the only US manufacturer that offers a three-year guarantee on its continuous-duty, high-output/low-frequency industrial vibrators.

Engineered to stay running for long periods under punishing conditions, the Martin® MM-Series Electric Screen Vibrators use only the highest quality components, such as SKF or FAG bearings with a C4 clearance and Kluber grease. A 10-11 hp (7.5-8.2 kW) motor produces a centrifugal force of 31,000 lbs (14,061 kg). The extended equipment life and reduced maintenance requirements deliver a fast return on investment due to reduced downtime.

Results

The vibrator was delivered and mounted more than a week faster than expected, bringing the operation up and running to full production. The customer replaced the old units as they broke down with Martin Engineering MM-Series vibrators in two of its plants. Having already installed 10 more units since the initial order, operators were impressed with the quality, service, and long life of the equipment.

"The vibrator lasts longer and Martin is more responsive to our needs," a manager close to the project concluded. ■

Mining for Conservation?

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

Botswana's wildlife authority has deemed it fit to sell licences to hunt 400 trophy bull elephants a year.

I had the privilege of growing up in some of the most remote places in southern Africa: mining towns. Essentially, I grew up in the bush. This early exposure to wild landscapes got me thinking about the relationship between rich ore bodies under the ground and the natural environment. The result is that I have two often parallel passions. On the one hand, I long to see the continent's mineral wealth generate broad-based development. On the other, I want our wild landscapes preserved for future generations. Of course, mining is fundamentally unsustainable; the resource being mined is finite. Nature conservation, to the contrary, is fundamentally about long-run sustainability. How do these two worlds connect?

A growing concern is that conservation strategies in southern Africa seem to adopt an extractive attitude towards nature. In other words, because some resources in the natural environment are technically renewable, the thinking is that we can extract a certain number of them each year and still have enough the following year not have to worry about population sustainability. For example, rhino populations grow at a certain rate, all else being equal, given the right circumstances, zero poaching and so forth. To put it technically, many conservation decisions are based on a consumptive view that science can establish a maximum sustainable yield from which a management authority can determine an annual extraction quota. For instance, Botswana's wildlife authority has deemed it fit to sell licences to hunt 400 trophy bull elephants a year. The government has not made the science behind that quota determination public, which is a serious governance issue. The other problem is that such a static view does not consider long run ecological integrity. But the rhetoric rationalising this kind of consumptive use typically argues that the revenue from trophy hunting is required for conservation. This argument is difficult to sustain, especially given that trophy hunting is a dying industry, the quality of 'trophy animals' is rapidly declining, and the economic and ecological opportunity costs of the practice are extensive.

I'm far more partial to moving away from consumptive use models when it comes to nature conservation. We need to find more innovative and sustainable ways of funding contiguous landscapes that avoid the current problems of fragmentation and degradation in certain wilderness areas due to a lack of funding. These innovative funding plans need to include the creation of safe migratory corridors for keystone species like elephants (and apex predators like lions) to move safely between protected areas and be buffered by conservation-friendly agriculture zones. Local communities need to have a sense of ownership of both the wildlife and the agriculture. They should enjoy the dual benefits both from their agricultural produce entering high-end tourism value chains and from self-owned non-consumptive direct tourism options.

What does all of this have to do with mining? Well, mining is extractive and wealth-generating at the same time. While in operation, mining wealth generated in a particular area can, counterintuitively, serve long-run conservation goals. Here's an example. I travelled to Kalumbila, Zambia, in 2018 as part of a research project to examine how copper could serve as a flywheel for Zambian development. Sentinel Mine, owned and run by First Quantum Minerals (FQM), did an extraordinary thing by building a mine and a town that would be sustained well beyond the life of mine – by design! One of the management staff told me that when they arrived on the mining concession, there was an eerie silence. Even the birds had been poached – local community members had smothered the forest with v-traps placed in tree forks. Birds are a bellwether for ecological health, and they were all killed. The mine decided to turn their non-mining concession areas into a nature reserve.

With some sharp environmental foresight, they decided to redivert the river temporarily, with a view to restoring its original course post-mine. Beyond that,

they've already built five-star tourism lodges that will sustain nature conservation after the mine has died. The concession area will then be connected to the nearest national park, which will create one of the largest contiguous conservation areas in Zambia. In the meantime, they've also developed a sawmill worth $2million that produces furniture. Forests are genuinely given to 'sustainable use', unlike slow-growing animals like elephants.

We clearly don't need to take a 'consumptive use' view to generate the wealth required for conservation. Ironically, mining – if done well and with some foresight – can often serve conservation ends by establishing models that do not rely on extracting wildlife for cash. Extract the ore body under the ground and use some of that cash to build contiguous wild landscapes. Once the mine has been depleted, the area can be restored. But it really does require planning informed by a workable vision. There are too few Kalumbilas around and there's no good reason why there shouldn't be more.

Under some circumstances, mining can clearly serve conservation ends. Of course, mining should not occur at all in ecologically sensitive areas like the Okavango Delta in Botswana or the Nyerere National Park (formerly the Selous Game Reserve) in Tanzania. These are both World Heritage Sites and should simply be off limits. However, where possible, mine closure plans should seriously consider how mining might contribute to inclusive and sustainable conservation. ■

Extract the ore body under the ground and use some of that cash to build contiguous wild landscapes.

Sentinel Mine, owned and run by First Quantum Minerals (FQM), in Zambia.

Verder strengthens its dosing pumps range with Spanish acquisition

Verder Group, a global leader in industrial pump solutions, has fortified its dosing pumps range through a strategic acquisition of a majority stake in ITC, a prominent Spanish company renowned for its expertise in developing and manufacturing dosing pumps. This acquisition further strengthens Verder's dosing pump pillar and its ability to support crucial water treatment facilities in Africa. By incorporating ITC's cutting-edge dosing pump technology into its portfolio of innovative

Verder Group acquires majority stake in Spanish company.

dosing pump solutions, Verder Liquids can play a pivotal role in supporting infrastructure upgrades through the provision of high-quality dosing pumps. ■

New branding secures authenticity of Linatex premium rubber

In the quest to distinguish its Linatex® premium rubber from substandard imitations in the market, Weir Minerals has implemented a significant branding enhancement which is set to provide customers with an explicit identifier of the original product. Exclusively manufactured by Weir Minerals for the past 100 years, Linatex® premium rubber has become the benchmark in protecting equipment against erosive damage. Over the years, copycats have tried to imitate Linatex® with substandard red rubber. To secure the authenticity of the brand, all Linatex® premium rubber is now branded with four rows of black Linatex® logos strategically placed along the length of the rubber roll. The introduction of this new branding will enable customers to instantly, visually, verify the authenticity of their rubber products. The presence of the black Linatex® logos will be a guarantee of superior quality and performance. ■

SKF LGGB 2 biodegradable grease earns EU Ecolabel certification

Bearing and seal manufacturing company, SKF, has announced that its renowned LGGB 2 biodegradable grease has been granted EU Ecolabel Certification. “This Certification is proof of SKF’s relentless commitment to reducing our products’ impact on the environment and enables us to contribute to the objectives of a climate neutral, clean, circular economy and a toxic-free environment,” says Eddie Martens, SKF Product Manager - MaPro. “The Certification was achieved following months of rigorous testing and evaluation of our LGGB 2 grease, from environmental impact and sourcing of the product’s packaging material to our manufacturing processes,” explains Martens. ■

Index to advertisers

Unrivalled ‘Rock To Road’ equipment range from Astec Industries

Astec Industries is a renowned manufacturer of heavy equipment used for building infrastructure globally. Our ‘Rock To Road’ portfolio includes high-quality and innovative equipment essential for various stages in the quarrying industry, such as crushing, screening and processing aggregates to obtain the required end product.

Astec supplies more than 100 exceptional products to our growing customer base in the aggregates, construction, infrastructure and mining sectors around the world. In the most demanding quarrying applications, Astec crushers, feeders and screens have earned a reputation for quality, durability and longevity. We design and build equipment that works harder for longer, giving our customers a competitive advantage, enhancing their productivity and profitability, and enabling their success and growth.

While Astec has many decades of experience and expertise, we continuously strive to innovate, improve and leverage new technology to solve our customers’ challenges. We partner with our customers to understand their requirements and we are as committed to their success as they are. Astec’s mission is to deliver the most advanced, productive, resilient, safe and environmentally friendly products and solutions to meet our customers’ needs. This is coupled with training and education, worldwide service and support.

Connection is at the heart of everything we do. Astec equipment builds the infrastructure that physically connects the world, but it is the connections we make with people that truly drive us and fuel our passion to exceed our customers’ expectations. Connect with us today to find out how Astec can help your business thrive. ■

ASTEC

6TH EDITION

Coal & Energy TRANSITION DAY

MEETING ENERGY NEEDS FOR THE FUTURE

23 JULY 2024 | www.coalindaba.com

COUNTRY CLUB JOHANNESBURG, AUCKLAND PARK

Chaired by Bernard Swanepoel, this event will bring together leaders from government, industry, coal producers, alternative energy providers, investors, funders and independent experts, who will discuss key issues such as:

- How is the conversation around the energy transition developing internationally and what are the implications for South Africa?
- What is the global outlook for coal and its role in the future energy landscape?
- What will a diversified and sustainable energy portfolio look like?
- What is the future of coal in Southern Africa?
- How are major coal producers diversifying their portfolios and managing demands to lower carbon emissions?
- What are the latest developments in renewable energy and its contribution to South Africa's energy mix?
- What are investors' perspectives on how to fund the energy transition?
- What is Eskom's perspective on coal and alternative energy sources and the roles they will each play in the future energy mix of South Africa?
- How are the issues around coal transport and logistics being overcome to increase export capacity?
- What are the challenges and opportunities for junior coal miners in 2024 and beyond?
- And much more...

For more information, visit our website, **www.coalindaba.com**

+27 (0) 11 463 7799 // +27 (0) 61 421 9492
registrations@resources4africa.com

IN-PERSON & ONLINE!

Mining Industry Partners: MINERALS COUNCIL SOUTH AFRICA, SERITI

Premium Sponsor: OIM CONSULTING

Contact us about sponsorship opportunities: **sponsorship@resources4africa.com**

The 2024 Coal & Energy Transition Day, for producers, traders, investors and users is brought to you by Resources 4 Africa, the organisers of the Joburg Indaba.

WE CAN HANDLE THE PRESSURE. GUARANTEED.

Invincible Valves is an approved supplier to all major industries within South Africa, we maintain expertise and experience across a broad spectrum of industries and applications with a wide range of products, quality valve products and ancillary equipment

Offering a comprehensive range of local and imported valves and accessories for the mining, petro-chemical, power generation, water, sewerage and general industries, Invincible Valves is well respected for its processes and business practises and are proud to be Africa's largest stockist of Saunders & Insamcor products.

There is only one trusted name in valves – INVINCIBLE VALVES.

+27 11 822 1777 | enquiries@invalve.co.za | invalve.co.za

LEVEL 1 BBBEE

GENERAL INDUSTRY | MINING | PETRO-CHEMICAL | POWER GENERATION | WATER | SEWERAGE

If it's not INVAL®, it's not Invincible