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For people who are serious about mining

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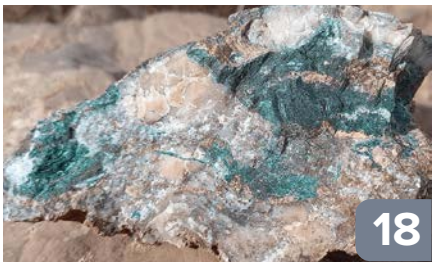

ON THE COVER

In the realm of mining, rapid technological advancements are reshaping the industry's landscape, particularly in the field of blasting, says Ralf Hennecke, MD of mining solutions company BME.

See story on pg 8.

COMMENT

Where is the love?

Nelendhre Moodley.

The Israel/Palestine war is the latest global conflict zone and with it comes yet another set of countries flexing their muscles in a power struggle.

While the world shudders at the savagery of the wars, and millions of families are severely impacted, the arms suppliers are laughing all the way to the bank. This got me thinking about which metals are used extensively in the manufacture of arms and ammunition.

It turns out that lead, steel, titanium, stainless steel, tungsten, brass, copper, zinc, nickel, aluminium, molybdenum and uranium, are amongst the key commodities needed in the manufacture of arms and ammunition, military fleets and rockets.

Metals and minerals underpin our very existence for, when the war is over, countries will need to rebuild and yet again require metals for infrastructure development and the like.

Reinvesting in mining

South Africa's mining industry remains hamstrung by a range of challenges, including power, port and rail and yet, despite recording a drop in profits, the sector is reinvesting in its future operations, says PwC South Africa's *2023 SA Mine: Adapt to thrive* report.

According to the report, miners have opted to dig deep into their pockets and have retained less of their funds in order to fund new capital investments.

For the first six months of 2023, the South African Revenue Service's export data showed that the value of mined material exports amounted to R575 bn, which equates to around 58% of total exports made by South Africa to its trading partners.

However, while new capital investment is good news, investment into exploration projects remains on the backfoot, with Anglo American CEO Duncan Wanblad conceding to delegates, attending the recently held Joburg Indaba, that while South Africa had incredible mineral endowment, it was definitely underexplored, with the mining major itself having not prioritised exploration in South Africa, as it sought more lucrative prospects for its scarce dollars.

Wanblad also bemoaned the fact that exploration in South Africa was not incentivised especially given that exploration projects take a long time before they reach development stage.

On a more positive note, though, gold miner, Harmony Gold advised delegates that it continued to pump funds into its local operations, reinvesting in several operations including its Mponeng mine, located south of Johannesburg.

Meanwhile, since the topic of love is my headline, South Africa's Census 2022 results have shown that South Africa's population increased from 51.7 million in 2011 to more than 62 million in 2022, a growth rate of 1.8% in the intercensal period. Gauteng remained the province with the highest population (15 million), while Northern Cape has the smallest population at 1,3 million. The Western Cape moved from being the 5th largest province in terms of population size in 1996 to being the 3rd largest in 2022.

Good news for the mining sector, as more people mean a greater demand for the minerals and metals needed to sustain growth.

In this edition

Given the strong demand for commodities, our cover story, BME, a supplier to the mining industry, continues to empower mining through innovative blasting techniques. Leveraging its chemical innovations, the company has spearheaded a host of mechanical, electronic and digital advancements that have redefined the blasting landscape for mines (pg 8).

We also feature Stella Vista's Kalia iron ore project – touted as the world's sixth largest undeveloped iron ore deposit, with the miner stepping up project development while also focusing on securing access to rail and port infrastructure (pg 12).

Energy minerals developer, Aterian, with its cache of exploration licences in Rwanda and Morocco, is eyeing massive future growth. The explorer is eager to unlock earning opportunities from its early-stage assets, chairman Charles Bray tells *Modern Mining*.

Our Consulting Engineering feature highlights initiatives by key industry players, including Bara Consulting, which is entering new markets and expanding its service offering, as well as Trafo Power Solutions, SRK Consulting, WEC Projects & Babcock. ■

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Perenti awarded $235 million contract expansion at Motheo

ASX-listed Perenti's surface mining business in Africa, African Mining Services (AMS), has been awarded the contract for open pit mining services at the Sandfire Resources A4 open pit within the larger Motheo Copper Mine in Ghanzi, Botswana. The contract is valued at $235 million over a term of 73 months.

Under the terms of the contract, AMS will deliver all surface mining services associated with development and production activities at the A4 open pit. The A4 open pit is located about 8 km to the west of the Sandfire's existing T3 Open Pit, where AMS has successfully progressed from development into production works. Perenti expects A4 pre-production and development work to commence in September 2023, with pre-strip mining starting in October 2023.

The T3 and A4 open pits are expected to be operated as a larger, integrated mining operation and will therefore leverage the resulting benefits of scale and the operational synergies to optimise the return on capital aligned with the company's financial targets. Primary synergies include the optimisation of existing infrastructure, mining equipment, maintenance facilities and both technical and operational management. Mark Norwell, Managing Director of Perenti, said: "Motheo is a long-life asset in the Kalahari Copper belt, and the expansion of our role here is in keeping with our strategy of disciplined growth within top-tier mining jurisdictions with high quality partners. Sandfire is now one of our largest clients and, over the term of the combined contracts, the T3 and A4 open pits are expected to generate total revenue of over A$1.1 billion, delivering strong returns for Perenti and its shareholders." ■

Perenti awarded the contract for open pit mining services for Motheo Copper Mine in Botswana.

RBPlat rebranded to Impala Bafokeng

To mark RBPlat's delisting from the Johannesburg Stock Exchange, platinum miner, Impala Platinum (Implats) renamed its newest subsidiary Impala Bafokeng and rebranded it with the distinctive Impala logo, by which all Implats Group companies are identified.

Implats Chief Executive Officer, Nico Muller, said: "We are delighted to announce the rebrand to the market. Our rationale for acquiring control of RBPlat, now Impala Bafokeng, was unwavering and the merger advances our commitment to grow and secure the competitiveness and sustainability of the southern African platinum group metals sector, which we believe is in national and regional interests. We are undoubtedly stronger together." ■

Implats' newest subsidiary rebranded to Impala Bafokeng.

Rainbow Rare Earths private placement raises £4.5 million

Rare Earths explorer, Rainbow Rare Earths, has agreed conditionally to issue 30 million new shares in the company at a price of 15p per share, to raise gross proceeds of £4.50 million. The placing proceeds, which total some $5.5 million, replace the US$5 million paid to Bosveld Phosphates (Bosveld) in July 2023, plus associated fees, to secure an immediate 85% ownership in the Group's flagship Phalaborwa rare earths project, with an option to acquire the remaining 15%.

George Bennett, CEO, commented: "This is an exciting time for the Phalaborwa project, following the milestone production of the mixed rare earth sulphate from the front-end pilot plant in South Africa and with the production of separated rare earth oxides from our back-end pilot plant in the US expected in Q4 2023. This will be the final de-risking step in order to demonstrate the commerciality of the unique rare earth process flow sheet that Rainbow has developed with its partner K-Technologies, Inc (K-Tech) to deliver the separated permanent magnet rare earth oxides vitally needed for the green energy transition. It will also open up the opportunity to apply this intellectual property to other phosphogypsum projects globally, starting with the Uberaba project in Brazil." ■

Rainbow Rare Earths raises £4.5 million.

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SCANIA

Mkango subsidiary, Maginito, and CoTec for US joint venture

Resources development company Mkango Resources has announced that CoTec and Maginito have entered into a binding letter agreement in which they have agreed a 50:50 joint venture for a United States roll out of HyProMag's rare earth magnet recycling technology. HyProMag's technology will be sub-licenced to the new Joint Venture company, HyProMag US, on formation.

Julian Treger, CoTec CEO commented: "This is a major step forward for CoTec and Mkango/Maginito and we are looking forward to working with the Mkango and HyProMag teams on this very exciting, proven and much needed technology in the US targeting the long-term supply of low cost, sustainable recycled rare earth magnets."

The US presents a significant opportunity for the HyProMag technology and the technical skills of Mkango and HyProMag combined with CoTec's commercial strength could potentially, in the right jurisdiction at the right time, provide shareholders with a unique and robust value proposition in the rare earth industry. ■

An image of Mkango's 50-100 kg pilot HPMS reactor.

Vedanta appoints Chris Griffith as CEO for Base Metals

Diversified global natural resources company, Vedanta Resources, has appointed Chris Griffith, former CEO of Gold Fields, one of the world's largest gold producers, as the Chief Executive Officer for Base Metals and President of its International Businesses, effective on 2 October 2023. He leads the Group's international zinc business in South Africa and Namibia, its iron ore business in Liberia, and the entire copper portfolio including KCM, Zambia, Fujairah, UAE and Sterlite Copper in India. Before Gold Fields, Chris served as the CEO of two major businesses at global mining major Anglo American – Anglo American Platinum (Amplats) and Kumba Iron Ore.

In his new role as CEO for Base Metals, Griffith's assumes responsibility for steering both the Vedanta Zinc International and Vedanta Copper businesses, including operations at Konkola Copper Mines in Zambia, as well as oversight for the downstream processing businesses of the Company across India and the Middle East. As President International, Griffith will be part of the broader strategic leadership for the company and will provide guidance for Vedanta's operations outside India, including the iron ore business in Liberia. ■

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Empowering mining through innovative blasting techniques

In the realm of mining, rapid technological advancements are reshaping the industry's landscape, particularly in the field of blasting, according to Ralf Hennecke, managing director of mining solutions company BME, a member of the Omnia Group.

BME MD Ralf Hennecke.

"The adoption of emulsion explosives has been a game-changer, enhancing both safety and performance in mine blasting," explained Hennecke. Having pioneered the use of cold emulsions in the local market in the mid-1980s, BME played a pivotal role in introducing emulsion explosives to opencast mines. Over two decades ago, BME took this innovation a step further by supplying emulsions for underground use in South Africa, reinforcing its commitment to pushing the boundaries of mining technology.

Leveraging its chemical innovations, the company has spearheaded a host of mechanical, electronic and digital advancements that have redefined the blasting landscape for mines. This transformation, from traditional packaged explosives to pumpable products, has seamlessly aligned with the developments in mechanised trackless mining and beyond.

Modern detonators have revolutionised blast timing.

Safety

"A key issue, of course, was safety – where emulsions made it much safer to transport and store an inert product that was only activated in the blasthole," he said.

The use of a safe and pumpable product also opened the door to the concept of a vertical emulsion pipeline, direct from surface to the underground workings over 300 m deep. This revolutionary idea was brought to fruition over five years ago in a South African gold mine. In the two decades since emulsions began being used underground, mining efficiencies have been enhanced by a range of other technological developments. These include the tools to initiate underground blasts safely from a surface control room.

Data solutions

"As electronic systems developed, mines could monitor the pre-blast and post-blast process," he said. "Increasing volumes of data improved decision-making and blast quality, with more safety features to support mines' commitments to zero harm."

One such system is the recently updated version of BME's popular Xplolog system for capturing and analysing data on blast holes and decks. Xplolog is a powerful tool for mines to monitor their block progress in real time, providing the necessary data to track trends and continuously improve the quality of blasts. The system also provides mines with a digital audit trail, so that they can track operator performance during the drilling and charging phases, as well as provide hole loading information per truck.

Electronic detonators

Another vital aspect of mining's evolution over this period has been the rapid and large-scale shift towards electronic detonators and away from non-electric versions. Hennecke highlighted that the conversion rate from non-electric to electronic detonators has been particularly pronounced over the past 10-15 years – initially in the opencast arena but more recently in underground mining too.

"The factors behind this trend are all about precision, accuracy and quality blasting – as part of mining's efforts to continuously improve productivity and efficiency," he said.

Digitisation technologies have been a core element of progress on this front, in every aspect of the mining supply chain. In the blasting field, this began early with software-based blast design, evolving to include real-time reporting, data mining and the quest to achieve predictability before every blast.

Non-electric detonators

On the other side of the coin, BME also introduced an improved version of its non-electric detonator product range into the quarrying sector. The Viperdet MS Series boasts quality and reliability, leveraged from automated production lines and a certified supply chain.

Over the years, BME has invested considerably in its innovative production technology, allowing for automated processes that enhance safety, sustainability and efficiency to reliably deliver a world class product. BME's systems harness robotics and artificial intelligence to ensure that it exceeds customer expectations with non-electric detonators. The Viperdet MS Series – which includes downhole, trunkline and dual detonators – is a triple-layered shock tube design, for high tensile strength and prevention of any damage during normal operating conditions.

Corporate landscape

Hennecke noted that the past 20 years have also seen a considerable shake-up in South Africa's mining sector – with the effective unbundling of the large local mining houses and the rise of new, smaller players.

"This aspect of mining's evolution demands a high level of flexibility from the value chain, as supply companies need to establish new relationships to meet new customer requirements," he said. "It also gives suppliers the opportunity to serve more customers, if your systems have the capability and adaptability."

The new version of Xplolog continues to raise the bar in leveraging digital technology.

He highlighted that BME's success has been built among very different customer segments. "While we've developed capacity, product and expertise to service large operations, we are also known for our ability to support small miners," he said. "As the mining industry has diversified by size, BME has responded with more tailored offerings."

This is made possible by developing a better understanding of the specific needs of smaller operations. As more of these mines have begun operating in the same mining region, BME has even been able to further improve and streamline the way its services them – ensuring that its infrastructure is well deployed and shared among smaller mines.

Sustainability

Another important feature of mining's evolution has been the accelerating drive towards more sustainable operations.

"For BME, our contribution to sustainability ranges from safely disposing of used oil in our emulsion product, to our digital solutions that continuously improve the quality of blasting," he said. "With our Blast Alliance technology suite, the blasting cycle is optimised to save energy and boost productivity – for a lower carbon future."

South African mining companies have also increasingly focused on optimising the local socio-economic impact of their operations. To this extent, BME has invested in an enterprise development programme in the vehicle maintenance sector in the mining-heavy Northern Cape province, aimed at further building sustainable economic capacity in the region.

BME's trajectory into the future is illuminated by its advanced technology, the expertise of its teams, and its unwavering dedication to innovation. As BME celebrates almost four decades within Omnia's remarkable 70-year journey, the company looks forward to the next decade with renewed vigour, ready to champion ESG principles and pave the way for innovative mining solutions worldwide. ■

Over the years, BME has invested considerably in its innovative production technology, allowing for automated processes that enhance safety, sustainability and efficiency to reliably deliver a world class product.

Ironveld CEO, Martin Eales.

Tariro Chitapa, Business Development Manager at Ironveld.

Water atomisation of Iron Powder

By Ironveld CEO, Martin Eales and Tariro Chitapa, Business Development Manager

With the increasing need for clean energy solutions and a supply of manufacturing materials, High Purity Iron Powder (HPI) is in demand for its applications in advanced manufacturing, renewable energy solutions and the pharmaceutical industry. With an ever-growing demand for HPI, a sustainable supply chain for the material must be created. Ironveld seeks to be a part of that solution and help facilitate a means of supply so the metal can meet the demands of the global market.

Iron Powder is produced in three different ways, which gives it three different classifications: reduced iron powder, atomised iron powder and electrolytic iron powder. Atomised iron powder is produced through a process called water atomisation. This involves melting iron and directing it into an atomisation chamber, which is equipped with high-pressure water jets or nozzles. These high-pressure water jets strike the molten iron stream, breaking it into small droplets, which are then rapidly cooled as they move through the air and begin to solidify into small particles. After they have solidified, they are then collected and might undergo a screening process to separate particles of different sizes, which is done to ensure that the final powder meets the desired particle size distribution for specific applications.

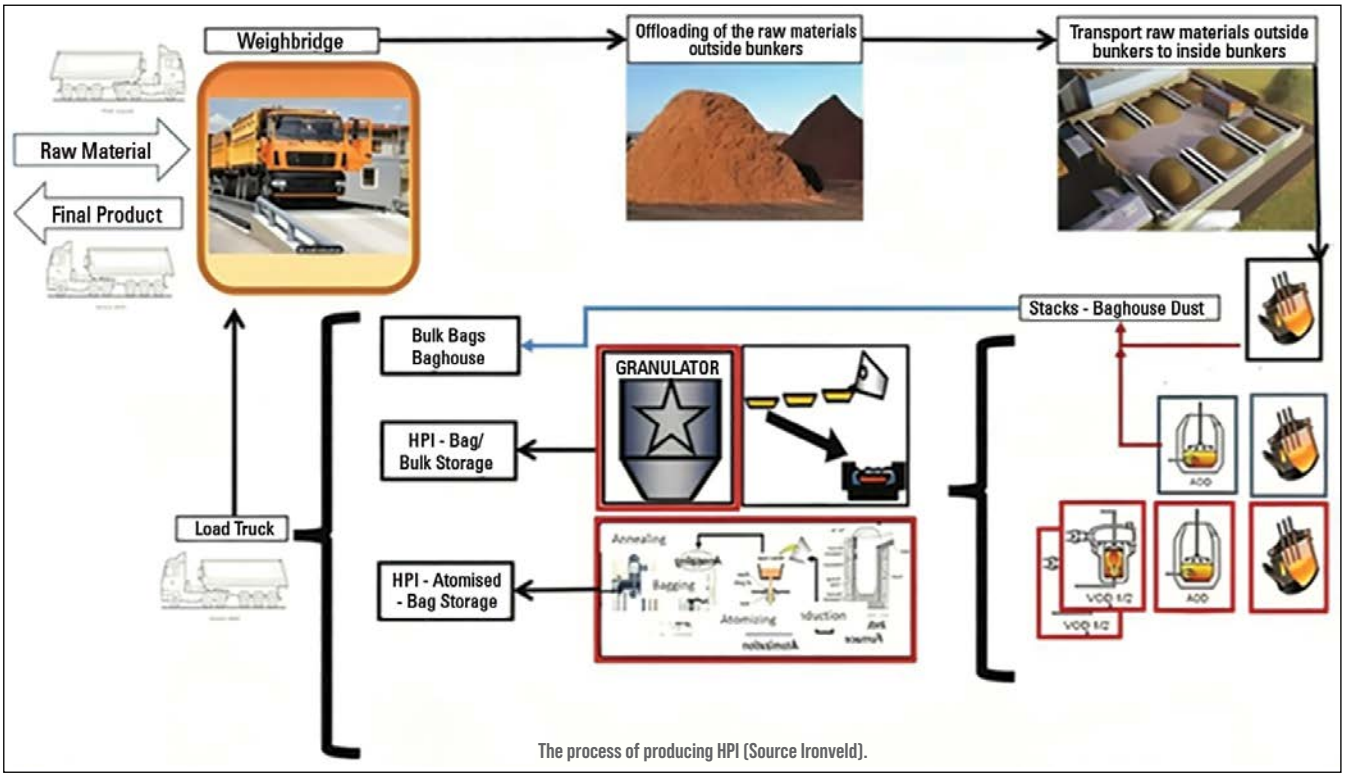
This process is widely used to manufacture metal powders for various industrial applications, including metallurgy, powder metallurgy, and additive manufacturing.

An image of iron powders.

Market Demand

Many industries use water atomised iron powder to produce sintered components, such as gear bearings, bushings and structural parts, often found in industrial machinery, appliances and the automotive sector. As such, HPI is in high demand across the world.

This is most notably seen in South Africa's steel industry. In sectors such as infrastructure, construction and the automotive industry, HPI is a crucial



The process of producing HPI (Source Ironveld).

material and often used for advanced manufacturing and technology applications. Because of this, and Ironveld's location, the company's local production will meet the rising demand for HPI and will reduce reliance on international imports.

The global water atomised iron powder market is expected to grow from $1.02 billion in 2017 to a projected $1.48 billion by 2030, at a CAGR of 4.5%. (Source: DataIntello Water Atomisation Iron Powder Market Report | Global Forecast.)

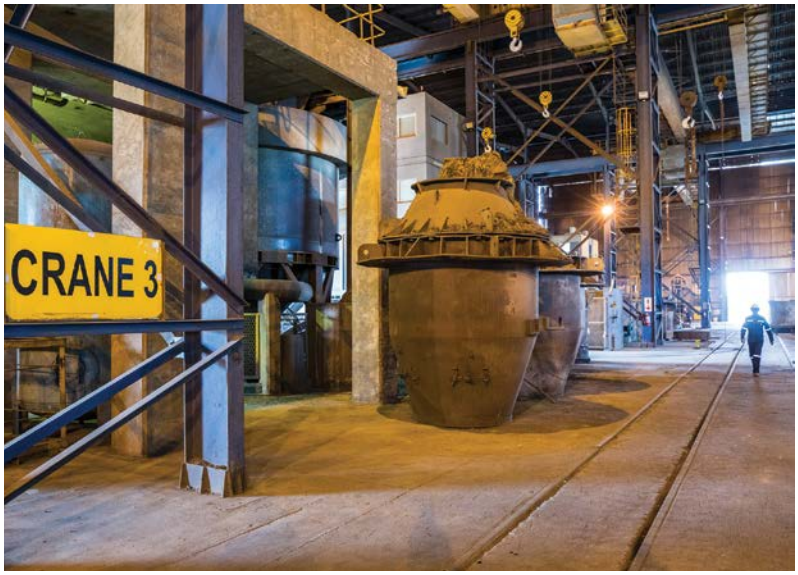
Ironveld feels strongly about its strategy to produce and secure a supply chain of HPI, as the global market shows a lot of promise. With increasing demand from emerging and developed economies, South Africa's strategic location and infrastructure make it competitive in international markets. The shift towards sustainable manufacturing and clean energy solutions further boosts the demand for HPI.

However, specific applications and requirements vary widely within each industry, and the suitability of water atomised iron powder depends on factors like particle size, purity, and physical properties. But it should be mentioned that as technologies and industries continue to evolve, new applications for iron powder may emerge.

Even though many industries use water atomised iron powder, outlined below are some of the key industries that require the metal:

- **Powder Metallurgy:** Water atomised iron powder is a key raw material in powder metallurgy processes. It is used to produce sintered components such as gears, bearings, bushings, and structural parts in industries like automotive, appliances, and industrial machinery.
- **Electronics and Electrical Components:** Iron powder is used in electromagnetic components like magnetic cores, transformers, and inductors for its magnetic properties.
- **Chemical Industry:** Iron powder can be used as a reducing agent in chemical reactions, and it finds applications in various catalytic processes.
- **Aerospace and Defence:** Iron powder can be used in the production of aerospace components, including parts for aircraft and spacecraft.
- **Oil and Gas Industry:** Iron powder can be used in applications such as drilling fluids and as a weighting agent in various oilfield activities.
- **Food and Pharmaceutical Industries:** Iron powder can be used in food fortification and pharmaceutical applications where controlled iron supplementation is required.
- **Renewable Energy:** Due to its chemical reactivity, iron powder can play a role in energy storage systems like iron-air batteries.
- **Environmental Remediation:** Iron powder is used in environmental remediation processes, such as removing contaminants from groundwater through chemical reduction reactions.

An image of magnetite ore.



A view of the inside of the smelter.

Ironveld's participation in the iron powder market

Ironveld acquired its Rustenburg smelter in late 2022 and, following extensive refurbishment, is now producing High Purity Iron, Vanadium slag and Titanium slag from its magnetite ore, which is mined from its mining operations in South Africa's Bushveld Complex.

The mine has a code compliant Resource of over 56 million tonnes of magnetite and fully approved, renewable Mining Rights extending to the 2040s.

At full operational capacity, the Rustenburg smelter will be producing around 20 000 tonnes per annum of High Purity Iron, which Ironveld is planning to upgrade into atomised powders from 2024 onwards – thereby becoming the sole producer of these powders in the southern hemisphere.

As such, Ironveld will be able to meet the growing global demand for atomised iron powder and will assist in creating a sustainable supply chain to the key industries. ■

Kalia – finger on the start button

Touted as the world's sixth largest undeveloped iron ore deposit, the Kalia Iron Ore deposit, which was recently acquired by Millennium Panorama Group Limited (MPGL) subsidiary, Stella Vista, is ready for a revised bankable feasibility study (BFS) ahead of being taken up the value curve and into production.
By *Nelendhre Moodley*.

MD Blair Sergeant.

"We remain highly focused on updating the BFS numbers as a first step, which will provide a credible development plan with associated economics. Simultaneously, we are focusing our efforts on securing access to both rail and port infrastructure, which will underwrite the successful development of the mine," says MD Blair Sergeant.

Located in central Guinea in the Faranah Region, the Kalia project represents one of the world's largest iron ore reserves with an estimated 6.16 billion tonnes of magnetite.

Prior to its acquisition by Stella Vista last year, the mammoth project was owned by AIM-listed Bellzone Mining, which invested over $350 million to upgrade the resource, taking the asset from a 2.4 bt resource to 3.74 bt in 2010 and to over 6 bt in 2011.

In 2012, a revised BFS with incredibly robust numbers – net present value (NPV) of $7 billion, an internal rate of return (IRR) of 53% based on a 45 mpta for a 20-year Life of Mine (LoM) – was issued.

However, given that the BFS, which relied on the development of appropriate rail and port infrastructure, did not occur, in 2013 Bellzone revised its BFS to reflect a lower production rate of a 7 mtpa over a 10-year LOM and trucking as the new mode of material transport to port.

The new estimation also offered a robust IRR of 37% and a NPV of over $1.35 billion.

However, the project was further hampered by the Ebola outbreak between 2014-2016.

Drilling underway at Kalia.

Aerial view of the camp site at Kalia.

"Following two years of the Ebola outbreak, in 2016 Bellzone issued a JORC resource of 79 mt of nickel @ 0.69% and published a pre-feasibility study (PFS) for a ferronickel project producing a NPV of $80 m and an IRR of 27%. At the time, the nickel price was in the order of $10 000/t. Today, nickel is trading at roughly $18,500/t. Despite Bellzone advancing the project to the point where it had proven robust economics, secured all regulatory approvals required to commence mining, raised over $300 m in equity, completed feasibility studies on the required rail and port infrastructure, they ultimately fell victim to a sustained fall in iron ore prices resulting in a difficult capital markets environment," explains Sergeant.

Kalia – Waking a sleeping giant

So how does the mega project fit into MPGL's portfolio?

For MPGL, which also owns approximately half of the even larger Tonkolili Iron Ore Project in Sierra Leone (Tonkolili was once owned by AIM Listed African Minerals), and which had reported Resources of over 11 bt, iron-ore is a well understood commodity with the latest acquisition set to enhance the company's existing portfolio of assets.

"Given the scale and the advanced nature of the project, i.e., a mining licence has been granted, the mining convention has been agreed to and ratified, environmental approvals on-hand, the completion and publication of two BFSs and potential access to port infrastructure, Kalia represents an opportunity worth pursuing," says Sergeant.

In addition, the Kalia iron ore deposit is primarily a magnetite deposit, meaning production from Kalia will be a very high grade (67%+) magnetite concentrate, which is essential feedstock in the low carbon emitting steel production process.

"Magnetite concentrates of 67%+ already receive a premium when compared to the benchmark 62% Fe fines product, and given that it is essential in the production of iron ore pellets, as it is the feedstock for direct reduction iron making (much lower carbon footprint compared to traditional blast furnace), demand is expected to grow significantly. Lastly, the asset also comes with a previously defined, yet under explored, laterite nickel deposit that overlays the iron ore deposit. In 2016, Bellzone published a PFS which defined a JORC Resources of 79 mt @ 0.69% Ni and in addition, processed the material to produce a ferro nickel product."

Moreover, with nickel's growing importance and role in battery chemistry, and the fact that the nickel is at surface, Stella Vista intends to complete

Image showing core sample from Kalia iron ore project.

some additional test work with a view to potentially exploiting the nickel opportunity as a first step in developing the Kalia asset.

Kalia not only holds importance on the global iron ore stage, it also has the potential to have meaningful positive impacts on the local community in Kalia, and the Guinean economy as a whole.

"To provide context, the reported total resources at Kalia of over 5.7 bt of Fe are larger than the total resources reported at Simandou – another renown untapped high-grade iron ore deposit in Guinea. Not all deposit types are identical but, for sheer size, Kalia is, in fact, larger. Added to this, half of the Kalia licence area remains unexplored and it is estimated that the total resource could in fact double," says Sergeant.

Rail infrastructure development set to benefit Kalia

Underpinned by robust economics, the well-advanced world-class Kalia Iron Ore project, which will begin development against a historically high pricing environment, is set to gain from the Government of Guinea's commitment to ensure the development of key rail infrastructure.

"The recent commitment by the Government of Guinea, together with various significant JV partners in Rio Tinto, Baowu Steel, and the Winning Consortium Simandou, to build the rail infrastructure with capacity of 100 mt, from Simandou in the East to the coast just south of Conakry, is an incredibly fortuitous turn of events for our project and the development of the iron ore industry in Guinea generally. In particular, the Kalia project is located roughly halfway between Simandou and the coast, and the proposed rail route is planned to run within roughly 20 km of Kalia. Lastly, the Government of Guinea has always been very clear that the rail line must allow, and be designed for, multi users and third-party access. Our intention therefore is to negotiate and secure access to this rail and, in doing so, unlock the true value represented by the size and quality of the Kalia deposit," states Sergeant.

The above, combined with the Chinese Government's stated objective of reducing its reliance on Australian Iron Ore, bodes extremely well for the much-anticipated development of the West African Iron Ore Industry, starting with Guinea, he adds.

Short-to-medium term plans for Kalia

The first step for the Stella Vista team, says Sergeant, is to update and refresh the BFS of 2013, to reflect any material changes to the underlying development assumptions and to reflect 2023/24 economic and pricing assumptions.

"We are extremely confident that the refreshed BFS will confirm the robust nature of the financial returns on the project. Once we have published the refreshed BFS, our intention is to secure the necessary project finance and commence construction, so that the project will be ready to commence production in line with the completion and availability of rail access."

The total capital expenditure required to develop the project will be determined as part of the BFS process.

"Our intention is for Stella Vista to make an initial public offering (IPO) at the appropriate time. Funding is likely to be a combination of equity and debt, as is usually the case for projects of this nature."

The refreshed BFS will be based on the following initial mine development:

- ❑ 10-year LOM, producing 7 mtpa
- ❑ Initial product will be a 58-60% Fe fines product
- ❑ Mine will be open cut with a very low LoM strip ratio of 0.7:1
- ❑ As the mine approaches end of life, mining will focus on the magnetite resources (5 bt) and beneficiated to produce 67-68% Fe concentrate.
- ❑ Production of the magnetite concentrate will be 10 mtpa or more, and for an LoM of 25yrs++

Iron-ore market fundamentals

Steel is absolutely fundamental to both the developed and developing world.

In addition, the global focus on reducing the carbon footprint of industry, in particular the steel industry, has brought into sharp focus the need for the steel producers to use alternative methods of production. In the first instance, higher grade iron ore is better than lower grade iron ore. More specifically, use of electric arc furnaces and direct reduction iron processes rely on a pelletised feedstock, which itself requires magnetite, not haematite, as the raw material.

In both cases, a high-grade magnetite concentrate is the essential feedstock for EAF and DRI plants which the steel industry requires to reduce its carbon emissions. Given the net zero targets set by Governments across the globe, the expectation is a material increase in demand for magnetite, reflecting the wide-spread adoption of EAF and DRI steel plants throughout the world.

Adding to the attractiveness of the Kalia magnetite concentrate is the intention to source all power requirements for the mining and beneficiation processes from renewable sources, in particular hydro power.

"Based on the previously published BFSs, the project is world class in terms of both scale and potential economics. In particular, the large-scale nature of the deposit has the ability to underwrite a globally significant iron ore mine which, in the form of the BFS, delivered an NPV of over $7 billion @ an IRR of over 50%. These numbers compare to some of the best mining projects in the world," concludes Sergeant. ■

Aerial view of the Grizzly mine.

Strong demand for emeralds underpins investment in Grizzly mine

Grizzly Chairman, Abdoulaye Ndiaye.

Given the robust demand for gemstones, emerald miner, Grizzly Mining, one of the world's largest producers of emeralds, recently acquired the Olympic licence area, which hosts an extension to the ore body adjacent to its current open pit mine. The Olympic licence is set to expand the life of mine by another 20+ years, says Abdoulaye Ndiaye, of Grizzly Mining. By *Nelendhre Moodley*.

Grizzly Mining at the Dubai Auction in August 2023.

Founded by current chair, Abdoulaye Ndiaye, in 1997, Grizzly Mining has been producing high-quality emeralds and beryl for the international gemstone market for over 25 years from its 100% owned flagship Grizzly mine in Lufwunyama region in the Copper-belt province of northern Zambia.

Zambia accounts for 70% of the global supply of emeralds, but also hosts deposits of semiprecious stones including aquamarine, amethyst, tourmaline, quartz, jasper and chalcedony.

Located in the Kafubu Belt, some 50 kms from Kitwe, Northern Zambia, the Grizzly Mine is an open pit operation, currently being mined to a depth of 65 m. The mine produces a combination of high, mid and low-grade emeralds and beryl for the international gemstone market.

Grizzly Mining mines a 1.4 km long open pit, consisting of five (now merged) pits – Chimpundu East and West, Camara, Demar, and Pilala, the original licence, totalling an area of 350 ha.

According to Ndiaye, the emeralds are found in the talc magnetite shist mineralisation (TMS) which

is open W-E along strike and open at depth below the 65 m current open-pit. Future mining is planned to deepen the pit to 155 m to access the next layer of emerald mineralisation.

Meanwhile in line with meeting the growing demand for emeralds, the miner is busy drilling its latest acquisition to determine future expansion potential.

"The plan for the mid-term includes eastward pushbacks and excavation of the lower benches, ramping up to a rate of 1 million tonnes per month and mining to a projected pit bottom of 85 m."

The mine produces 60 million carats a year, with quarterly auctions held both in-country and internationally.

In line with its expansion initiatives, the miner is also building a new washing plant, which will double annual production.

"A new wash plant is under construction – when complete, it will double processing capacity to 50 tph or 800 tonnes per day," explains Ndiaye.

Demand for emeralds

At the latest international emerald auction held in Dubai in August 2023 where the company offered its latest mid-high grade rough emeralds from its flagship Grizzly emerald mine in Zambia, the company generated record sales of $48.63 million.

According to Ndiaye, some of the proceeds from the auction will be reinvested into Zambian operations as part of ongoing production expansion initiatives.

"Grizzly has been championing Zambian emeralds for over 25 years and I am pleased to report another successful emerald auction which has seen new records broken. The market for emeralds remains extremely strong and continues to grow in size each year with Zambian rough accounting for 70% of global supply. We continue to invest in our flagship Grizzly mine in Zambia and this auction will allow us to deliver on our ongoing expansion."

Gemstone market

Emerald deposits are rarer than those of diamonds, owing to the unique chemical make-up circumstances of formation: magmatic pegmatite intrusions through a schist containing trace amounts of chromium and vanadium.

"Importantly, the presence of iron in Zambian emeralds makes them harder, meaning they need fewer enhancements or treatments."

Colombia, Zambia, and Brazil are the major producers of emeralds globally.

Discussing the market fundamentals for emeralds, Ndiaye explains that the market is growing rapidly, in part because, unlike diamonds, emeralds appeal to both men and women – particularly in Asia.

"Historically, emerald production has been dominated by small producers which results in variable and inconsistent supply. This has changed in the last 10-20 years. Groups like Grizzly are able to bring a reliable supply of emeralds via best-in-class commercial operations. Increased supply allows the downstream cutting and polishing market to expand their own operations to meet the demand from end customers."

Mining underway at the Grizzly mine.

90% of the world's rough emeralds are cut and polished in India, the global centre for cutting and polishing. The cutting and polishing houses then sell into the polished gemstone market including to major well known luxury houses such as Graff, LVMH, Bulgari, etc.

Grizzly invests in community development

Grizzly Mining has committed to being a significant driving force in the local communities including, but not limited to, the following:

- Construction and maintenance of 50 km power line and road
- Annual donation of fertiliser and pesticide to six local chiefdoms
- Construction and sponsorship of three high schools and two primary schools, supporting over 900 students annually between the ages of 3 to 19.
- Ongoing sponsored literacy programme and school infrastructure construction
- Support of both local communities and government throughout Covid, providing 1100 oxygen cylinders to local clinics.

Grizzly Mining

- Grizzly Mining is engaged in the processing, grading, marketing and supply of emeralds.
- The company is located in Zambia on the Copperbelt Province and in Lufwanyama District, and was formed in 1997.

Go big or go home – Aterian looks to go massive

Armed with a cache of exploration licenses in Rwanda and Morocco, London-listed green metals explorer, Aterian, is eager to unlock earning opportunities from its early-stage assets, chairman Charles Bray tells *Modern Mining*. By *Nelendhre Moodley*.

Aterian announced discovery of high-grade copper and silver at Azrar Project.

Established in 2011 the exploration and development company, which hopes to ink key earn-in joint venture deals with mining majors for its lithium, copper, tin and tantalum assets, is busy taking its projects up the value curve with plans to commence drilling on key assets by year-end.

According to Bray, Aterian is already in talks with parties interested in some of its assets and remains hopeful of soon entering into joint ventures "that will either result in an earn-in or partial acquisition of some of our assets".

In Morocco, the explorer is focused on copper, silver and base metals, and is advancing a portfolio of 17 projects covering 897 km^2 in the north African region. These commodities, key to the drive towards electrification and renewable energy production, are experiencing growing demand globally.

In Rwanda, the company holds rights to over 3 000 hectares of prospective ground for critical and strategic metals, including tantalum, tin and tungsten. Aterian intends to generate growth through exploration and development of its Rwandan assets, M&A deal flow, licence ownership and partnerships with small-scale producers (artisanal miners) and near-production assets. More recently, the company secured a metal trading licence in Rwanda, which allows it to advance buy-in opportunities.

The Azrar Project in Morocco.

An aerial view of the HCK Main Ridge in Rwanda.

In line with its strategy of near-term cash injection, Aterian recently inked a definitive earn-in investment and joint venture agreement with Rio Tinto Mining and Exploration (RIO) and Kinunga Mining (Kinunga). The agreement is for the exploration and development of lithium and by-products at its HCK Joint Venture project holding the HCK licence in Rwanda.

For the emerging miner, the JV is a key milestone as it is the first step towards enhancing its skills base and sets the platform for cash-injection.

According to Bray, the JV is a transformative deal for Aterian and highlights the company's ability to identify potential world-class deposits in critical minerals such as lithium.

"This is a really exciting venture for Aterian because it allows us to explore an area in Rwanda that has a tremendous amount of potential but, more importantly, as an early-stage exploration company, it allows us to grow our expertise with respect to exploration, while simultaneously expanding our set of capabilities."

He adds: "We have identified 19 separate LCT (lithium-caesium-tantalum) pegmatite zones across the 2 750-hectare project offering the prospective scale necessary to attract such a major partner as Rio Tinto. While we focus on working closely with Rio Tinto and our Rwandan stakeholders to ensure the success of this project, we will also look to replicate the capital efficient exploration and development business model in our other project concessions in Rwanda and Morocco."

Highlights of the deal include:

- ❑ RIO has the option to invest $7.5 million in two stages to earn up to a 75% interest in the Licence to explore for minerals vital for a successful energy transition to renewable energy.
  - Stage 1 exploration expenditures of $3 million over a period of up to two years to earn a 51% interest in the Licence.
  - Stage 2 exploration expenditures of $4.5 million over a follow-on period of up to three years to earn a further 24% interest in the Licence, taking RIO's interest in the Licence to 75%.
- ❑ Cash consideration of $300 000 over the two stages.
  - A 2% capped Net Smelter Return (NSR) granted over the project (capped at $50 million).
  - RIO has the option to add Aterian's two other Rwandan projects, pending licence approval with the authorities.
  - Project located close to good infrastructure, including national highways, power, and water.

Strategy for its multiple assets

A four-pronged strategy underpins the LSE-listed

The Jebilet Project in Morocco.

An image of the Tata project landscape in Morocco.

entity's portfolio of assets in Rwanda and Morocco.

"We are taking a clinical approach to our asset base given that we have some exploration assets that are going to appeal to mining majors. For these assets we plan to undertake preliminary analysis and prepare the ground properly so the mining majors feel comfortable advancing a due diligence on the assets, and ideally, enter into joint ventures with us. Secondly, we have a set of assets that will appeal to miners with operating assets and who are looking to partner on potential assets with high return value. In fact, we are currently in discussions with several companies. Thirdly, we have assets that we would like to develop ourselves and will advance these to the next level of development within the short-to-medium term. Finally, we have assets in our portfolio that we will develop to the point that they are attractive to potential buyers, and which we will sell off to interested parties."

Ore from from the Jebilet project.

Meanwhile, the critical and strategic metals focused company has identified three key projects it would like to develop - the HCK lithium project in Rwanda and two "incredible copper prospects" in Morocco – Tata and AZRAR.

"We believe Rwanda has the potential to become a new lithium destination. The geology of the country, which has historically been mined by artisanal miners, has significant potential. Although the country is littered with LCT pegmatites – lithium and tantalum bearing pegmatites –it is a matter of the type of lithium we discover. Ideally we would like to discover spodumene given that global markets utilise this type of hard rock lithium for their refineries." explains Bray.

He adds that the Moroccan assets have the potential to be phenomenal scale copper projects, each consisting of a strike length of between 20-24 kilometres. "Copper grades range from 0,8% copper up to 1.8% cu. In fact, all three projects are exciting because they have the potential of scale."

Strategy for the next two years

Given its focus on monetising its existing asset-base, Aterian is in the process of launching its trading business in Rwanda and is currently negotiating off-take agreements with several artisanal miners.

"The trading business, Eastinco Ltd, should ensure that the Rwanda business is cash generative and will initially support the Rwandan arm of the business. Over time it should support the rest of our exploration business as we ramp up to the next stage of project developments. Besides that, we would like to realise the potential for royalties from our other assets. With our strategy of monetising our asset base we have, for instance, negotiated a 2% net smelter royalty on the Rio Tinto transaction."

The trading business targets small scale production from multiple artisanal miners in Rwanda.

According to Bray, the partnership with artisanal miners, who are each expected to supply between a ton and two tons of product per month, requires that Aterian offer its expertise to aid miners increase their production, "through helping them improve business efficiencies and, in exchange, secure their supply of product".

"From a business standpoint, artisanal miners have no capital outlay, so we will expend the capital, improve their rates of productivity and thereby their volumes, and what we ask for in return is to secure a portion of that production. Using our vast network, we will trade the product at better prices than the artisanal miners could by themselves. From a product traceability point of view, given that all the artisanal miners we are engaging with are key member producers, there will be full product traceability from the mine to the ultimate buyer."

The company is currently negotiating offtake agreements and establishing pricing points after which it will acquire material (tin and tantalum concentrate) from its JV partners to sell to off-takers.

Further to this, and after having undertaken advanced exploration studies on some of its key assets, the London-based company hopes to ink between two-to-three different joint venture agreements on its larger projects, and "to have another one or two joint ventures in place with smaller mining companies, "while we also identify and progress our flagship asset. All of this will be done in tandem with advancing our trading business.

"We deem that the energy transition that's under underway globally is as fundamentally transformative as the Industrial Revolution, and so we believe that it is critical for suppliers and market participants to provide good data and information about their products and the traceability of those products, but also an understanding of the region in which miners operate. Aterian really wants to understand what it means to source metal and material from different parts of Rwanda and Morocco, and to become a key driver of business in the regions in which we operate," concludes Bray. ■

Aterian looks to improve its skills base

- For Aterian, the challenge remains dovetailing its lofty aspirations with its limited human resources.
- The company, which currently employs some 60 people, is looking to bump up its skills set with the injection of key industry expertise as well as through partnerships with mining majors. "We need to hire at least 10% more highly skilled people. With more inhouse expertise, we will be able to generate more work."

Sovereign Metals announces outcomes for Kasiya Rutile-Graphite Project in Malawi

Australia-based Sovereign Metals has announced the results of the Pre-Feasibility Study for the company's Kasiya Rutile-Graphite Project in Malawi and has confirmed Kasiya as a potentially major critical minerals project with an extremely low CO_2-footprint delivering major volumes of natural rutile and graphite while generating significant economic returns.

A geologist views the ore from the Kasiya Rutile-Graphite Project in Malawi.

PFS highlights

'Market Leader' Position in Two Critical Minerals:

- Positioned to become the world's largest rutile producer at 222 000 t per annum for an initial 25-year life-of-mine (LOM).
- Potentially one of the world's largest natural graphite producers outside of China at 244 000 t per annum.
- Natural rutile facing significant global supply deficit is forecast to further widen considerably in the next five years.
- Natural graphite market moving into deficit as demand rapidly grows in the lithium-ion battery and electric vehicle (EV) sectors.
- Initial Probable Ore Reserves of 538 mt declared, representing conversion of only 30% of the total Mineral Resource of Substantial production rate and mine life upside exists as the PFS modelling was limited to only 25 years.

An aerial view of the Kasiya Rutile-Graphite Project.

Managing Director, Dr Julian Stephens commented: "The release of the Kasiya PFS marks another important step towards unlocking a major source of two critical minerals required to decarbonise global supply chains and to achieve Net-Zero. The project benefits from existing high-quality infrastructure and inherent ESG advantages. Natural rutile has a far lower carbon footprint when compared to other titanium feedstocks used in the pigment industry, and natural graphite is a key component in lithium-ion batteries – crucial to de-carbonising the global economy. The high-quality of work completed and the results of the PFS demonstrate that Kasiya is a globally significant project that has the potential to deliver a valuable long-term source of low-CO_2 products and generate substantial economic returns with a forecast average EBITDA of $415 million per annum for the initial 25 years modelled. The project is well positioned to be a large scale, multi-generational asset with significant opportunity for further upside as only 30% of the current mineral resource (MRE) is utilised in the PFS model. Kasiya's compelling economics demonstrate the potential for industry-leading returns, even against the backdrop of global cost inflation. The company is looking forward to conducting an optimisation review in collaboration with new strategic investor, Rio Tinto and progressing to the Definitive Feasibility Study."

Kasiya, located in central Malawi, is the largest natural rutile deposit and second largest flake graphite deposit in the world.

Sovereign is aiming to develop a low-CO_2 and sustainable operation to supply highly sought-after natural rutile and graphite to global markets.

Kasiya has a geological benefit with both natural graphite and rutile hosted in soft, friable saprolite material at surface that can be mined, beneficiated, and purified with a considerably lower carbon footprint than hard-rock operations or synthetic graphite and synthetic rutile production.

The proposed large-scale operation will process 24 million tonnes of ore per annum to produce

Employees capturing critical data on ore samples.

approximately 245 000 t of natural rutile and 288 000 t of natural graphite per annum once at steady state. The rutile-graphite rich mineralisation will be extracted from surface utilising cost-effective hydro-mining to depths averaging 15 m.

Ore is transported as slurry via a pumping network to a Wet Concentration Plant (WCP) where a low energy requirement, chemical-free process produces a Heavy Mineral Concentrate (HMC).

The HMC is transferred to the dry Mineral Separation Plant (MSP) where premium quality rutile (+95% TiO_2) is produced via electrostatic and magnetic separation.

Graphite rich concentrate is collected from the gravity spirals and processed in a separate graphite flotation plant, producing a high purity, high crystallinity and high value coarse-flake graphite product.

The project has excellent surrounding infrastructure including sealed roads, a high-quality rail line connecting to the deep-water port of Nacala on the Indian Ocean and hydro-sourced grid power. For the duration of the operation, rutile and graphite products will be railed directly from a purpose-built rail dry port at the mine site eastward via the Nacala Logistics Corridor (NLC) to the port of Nacala. Based on the build-out strategy, the operation will commence in the southern section of the Ore Reserve with a 12 mtpa throughput plant, which will be expanded from year six to increase the throughput to 24 mtpa, the company said.

As the southern mineralisation is exhausted, a new plant will be constructed in the north and the second stage WCP moved in order to continue to support 24 mtpa throughput.

Critical raw materials

Both rutile and graphite are critical to the world economy as well as crucial to decarbonisation solutions required to meet 'Net-Zero' and other targets set by policymakers.

Titanium and natural graphite have been classified as critical raw materials by the US and EU due to a combination of their scarcity and China-controlled supply chains.

Current sources of natural rutile are in decline as several operations' reserves are depleting concurrently with declining ore grades. These include Sierra Rutile's (SRL) Mine Area 1 in Sierra Leone and Base Resources' Kwale operations in Kenya.

The company has invested heavily in solar power for the project.

Global rutile supply is projected to decline sharply beyond 2023, following the scheduled closures of Base Resource's Kwale and SRL operations unless mine life extension is approved (Source: TZ Minerals International (TZMI).

There are limited new deposits forecast to come online, and hence supply of natural rutile is likely to remain in structural deficit for the long term, even with Kasiya at full production.

Demand for high quality flake graphite and natural rutile is growing due to global decarbonisation requirements and current and future predicted supply deficits. As per Benchmark Mineral Intelligence, the demand for anodes grew by 46% in 2022 compared to only 14% growth in natural flake graphite supply. ■

Drilling underway at the Kasiya project.

Bara Consulting enters new markets, expands offering

Engineering consultancy firm, Bara Consulting's recent moves are paving the way for growth in international markets. This follows the opening of a new office in Canada (Bara Americas) and strengthening of the UK team. By *Nelendhre Moodley*.

Bara Consulting is a mining, mineral processing and resource evaluation consultancy business servicing junior, mid-tier, and major mining companies, with extensive experience in the completion of project evaluations, techno-economic studies from scoping to feasibility level, due diligence studies, detailed design and optimisation studies as well as operational support for clients worldwide.

Chairman Jim Pooley explains that the company recently appointed Senior Partner and shareholder, Galen White, to the UK arm of the business.

"The recent appointment of Galen White (Partner & Principal Consultant – Geology & Resource Evaluation) further strengthens the growing UK arm of the business. A geologist by background, Galen's principal focus will be to expand the company's geology and mineral resource evaluation service offerings from the UK and strengthen collaboration across our global footprint," says Pooley, who earlier this year stepped aside from the position of MD to focus on new business development – a move that is proving to be invaluable to the company's growth strategy.

Pooley adds, "Galen White is well known in the mining sector having previously held senior management roles with global mining consultancy CSA Global over 15 years. He was a Partner at ERM following the acquisition of CSA Global by ERM in 2018 and brings with him a wealth of technical consulting and project/client management expertise and experience and an extensive network of industry connections. Since his appointment in September, he has hit the ground running, developing new and existing client relationships and growing the geological arm of the business."

Galen White (Partner & Principal Consultant – Geology & Resource Evaluation).

BV 22 at Trinity Metals' Nyakabingo Mine, where Bara Consulting has been engaged in designing the access to resources situated below current infrastructure.

The UK office, which has a large portion of AIM-listed firm clients advancing projects in West Africa and Europe, continues to do extremely well, having experienced its busiest year to date, says Pooley.

Given South Africa's challenging operational environment, which sees mining sector growth stymied by red-tape and a laborious regulatory environment, industry players are eyeing international markets for business opportunities.

"As a company targeting growth, we are looking to invest in mining friendly destinations beyond South Africa, where we can provide the collaborative, value-adding, client-focused and expertise-driven consultant offerings we are known for."

In September, Bara Consulting officially opened its office in Canada, which Pooley says will become the springboard into South America.

The Toronto-based office is ideally located in a key mining jurisdiction with over 40% of the world's public mining companies being listed on the Toronto Stock Exchange (TSX) – "a perfect location that is a hive of activity offering plenty of opportunities" to the newcomers.

"Curtis Clark (MD, Bara Americas and Principal Mining Engineer), heads up the newly formed Canadian office and comes to us with extensive industry experience having held technical, management and advisory roles with several mining companies, service companies and consultancies over 35+ years, and has the requisite

industry connections," says Pooley, explaining that the company has established the new office at an opportune time when demand for commodities, especially energy metals, is strong.

"Canada's mining friendly investment environment also offers the option of a flow through share scheme making it an attractive place for junior miners. In fact, it is much easier to raise capital, advance early-stage mining projects and build a mine in Canada than it is in South Africa, where raising capital for projects is a huge challenge as investors are reticent to invest locally."

Aside from opportunities to tap into the Vancouver market, which is a stone's throw away, a key benefit of being Toronto-based is that Canada lies within the same time zones as the South American market, thereby providing efficiency in developing potential business opportunities for Bara Consulting.

"There are many TSX-listed mining companies that are engaged in mining projects in both North and South America."

The company is also intent on welcoming "more experienced partners" and associates into the fold as it looks to deliver on its objective of bringing new blood into the business and diversifying its shareholder base.

Mining in Africa

MD Etienne de Villiers, who took the helm from Pooley nine months ago, says that business at the South African office has been robust, driven largely by repeat business, with the team "working flat out".

"We are extremely competitive and consistently deliver a high-quality service. So far, 2023 has proved to be a really successful year for Bara Consulting. Over the past few years demand for commodities has remained strong globally, especially for battery metals such as copper, lithium and graphite, and cobalt and nickel, and we have benefitted from the metals bull run," says de Villiers.

As a company working across multiple commodities, energy minerals projects are currently a key generator of work with the company involved in "five copper and several lithium, graphite, gold and silver projects."

BV 33 at Trinity Metals' Rutongo Mine; a new production level being developed using trackless methods. Bara Consulting is assisting Rutongo Mine with life of mine planning services.

"We are busy undertaking design engineering work for a nickel project in Botswana, feasibility studies for Craton Mining's Omitiomire Copper Project, and Shanta Gold, which is progressing its West Kenya gold project. We are also offering our assistance to Trinity Metals in Rwanda and involved with engineering design work for Walkabout Resources' Lindi Jumbo graphite project in Tanzania."

Further to this, Bara Consulting is undertaking several due diligence studies – an indication that the mergers and acquisitions segment of the market is also busy.

"Many companies undertake independent due diligence to verify the value of prospective assets as they consider mergers or acquisitions of mining projects or existing operations, and we are well placed to assist these companies with our experienced geological and engineering resources," concludes de Villiers. ■

Left: Etienne de Villiers (MD) and Edward Baldrey (Principal Engineer) at the Omitiomire Copper Project.

Below: Curtis Clark (MD, Bara Americas and Principal Mining Engineer).

Powering progress: Trafo Power Solutions navigates challenges with collaborative expertise and innovation

David Claassen, Managing Director at Trafo Power Solutions.

Rapid global development necessitates the construction of cutting-edge infrastructure, with the mining sector being pivotal in this progress. The surging demand for raw materials puts mining projects into the limelight. These projects, either greenfield or brownfield, are initiated, developed and concluded each year, presenting unique challenges and demands. A tailor-made approach is essential for the efficient execution of a project in terms of timing and budget.

One effective approach in the mining sector is to engage an Engineering, Procurement, and Construction Management (EPCM) contractor. Choosing the most appropriate option from available alternatives demands extensive experience or a trusted partner with a thorough understanding of your organisation's goals and the complexities of the mining sector. In an interview with *Modern Mining*, David Claassen, Managing Director of Trafo Power Solutions, discusses the prerequisites for working with consulting engineers and project houses.

Founded in 2017, Trafo Power Solutions, a specialist in dry-type transformers, has a rich history of collaborating with EPCM contractors and project companies across South Africa, Africa, Australia, and Canada. Claassen attributes the company's approach and success to his over two decades of experience as an electrical engineer.

He emphasises that a deep understanding of the EPCM and project houses' domain is essential. Trafo Power Solutions' ongoing success is anchored in five core principles: comprehending strategic objectives and complexities; effective communication through collaborative relationships; the capacity and flexibility to adjust to evolving project scopes; access to proven quality technology and products; and, equally important, the ability to deliver on time and within budget.

These three specialised dry-type transformers were supplied to a gold mine.

Trafo Power Solutions recently successfully extended its scope of supply into modular substations – also called E-houses.

Trafo Power Solutions, with its vast experience in the mining sector and particularly in the EPCM domain, acknowledges that a thorough understanding of the client's strategic objectives and the intricacies and challenges of each project are paramount for success. Each project is distinct and the company, therefore, employs a collaborative approach to navigate the complexities and challenges associated with working with EPCM contractors. It adopts an "understanding strategy" mindset for each project.

"Our team is particularly adept at understanding the project process, which enables us to accurately interpret requirements and ensure that Trafo Power Solutions provides the most suitable solution for our customer's needs. We recognise that all projects are different and are highly flexible in navigating any challenges that may arise," adds Claassen.

Drawing on experience from previous projects, the Trafo Power Solutions team collaborates

Modular substations, often referred to as E-houses, are prefabricated or modular structures that house electrical equipment and systems.

effectively and efficiently with EPCM and project teams to identify the most suitable solutions and processes.

This is particularly important as the EPCM contractor is responsible for the detailed engineering, design, and procurement of major equipment for a project. Trafo Power Solutions enhances this process by offering alternative solutions to ensure all aspects of the company's scope of supply are discussed, and potential challenges are identified and mitigated. This proactive and thorough approach not only streamlines procurement but also eliminates duplication and redundancy, guaranteeing optimal results for each project.

"What must also be borne in mind is that when executing projects of this nature, our deliverables are merely one facet. Clear communication regarding all deliverables from service providers and suppliers, including technical interfaces, is critical," Claassen explains. "Different consulting engineers and project houses employ varied communication methodologies, often involving distinct software or cloud-based packages. We believe that the level of flexibility we bring truly sets us apart, and we can use almost all communication methods, enabling us to integrate seamlessly with any project team regardless of the software they employ."

He emphasises the importance of effective communication strategies in nurturing collaborative relationships, benefiting all project stakeholders. "Having above average adaptability not only signifies our commitment to collaboration but also optimises communication and project management processes, driving the success of individual projects."

The company's commitment to building and maintaining strong relationships with all stakeholders is reflected in the meticulous attention to detail applied during all interactions, underpinned by a deep understanding of project requirements. This commitment ensures that the initial solution proposed by Trafo Power Solutions is well-suited to the application, thereby minimising the risks associated with unexpected technical support needs.

Above: The design of dry-type transformers from Trafo Power Solutions allows them to fit easily into any space and deliver the power needed in the mining environment.

Right: The steady uptake of dry-type transformers is driven by the advantages offered.

Furthermore, the Trafo Power Solutions team is dedicated to addressing enquiries from EPCM teams promptly and efficiently, without getting bogged down in bureaucracy. Claassen stresses the company's focus on integrity driving a collaborative approach focused on overcoming challenges together. "The focus of all stakeholders on a project is to see it executed successfully," he says.

This philosophy underscores Trafo Power Solutions' commitment to working collaboratively with all stakeholders on a project to navigate challenges and ultimately achieve success, even if this requires additional time and effort.

Trafo Power Solutions is one of the few local transformer specialists who can design and supply dry-type transformers in enclosures that meet IP65 rating.

Trafo Power Solutions has a strategic partnership with leading Italy-based dry-type transformer manufacturer TMC Transformers, granting the company access to a broad range of high-quality cast resin transformers from 50 kVA to 25 MVA with system voltages up to 52 kV with Class F or Class H insulation systems. Claassen says these transformers are manufactured under stringent quality control conditions at TMC Transformer's ISO-certified facility in Italy. ■

SRK Consulting Associate Partner and Principal Civil Engineer, Justin Walls.

Tailings dam planning takes centre stage in consulting space

As the global mining industry works towards meeting stringent new tailings dam standards, SRK Consulting is highlighting some of the less predictable factors in planning these engineered landforms for the long term – emphasising the important role of consulting engineers in the design and monitoring of these facilities.

Consulting engineers play a critical role throughout the mining lifecycle, from the exploration phase to closure, having a major part in the planning, construction and maintenance of tailings dams.

"The design, construction and maintenance of tailings storage facilities (TSFs) require skills in multi-disciplinary fields, from dam siting to end-of-life planning," noted SRK Consulting Associate Partner and Principal Civil Engineer Justin Walls. "It also requires the review and certification of technical reports dealing with the characteristics of the TSFs, as well as the successful operation of these facilities."

Latest standards

In a recent presentation to the South African Institution of Civil Engineering (SAICE) Environmental Engineering Division (SEED), Walls highlighted that there are a number of "unknown factors" to be considered in the planning and designing of TSFs. In the latest benchmark for TSFs – the Global Industry Standard for Tailings Management (GISTM) – it is clear that mines should assume their TSFs will be permanent landforms.

"Importantly, the GISTM requires that factors like climate change be considered in the design," said Walls. "While there is an emerging consensus on what this means for the next 80-100 years, there is still considerable divergence in what current models tell us may happen to the climate after that."

The GISTM, he pointed out, states that tailings facilities should be designed for mine closure, as "true future engineered landforms" that will be physically and chemically stable for the long term. Indeed, the standard requires that TSF owners ensure that "short term financial or operational priorities do not prevail over better design and operational practices".

Rainfall risk

Much of the concern is focused on the climate change-induced uncertainties in predicting future rainfall patterns, as water management is a key risk area for TSF stability. He said the prospect of higher rainfall levels directly raises the facility's failure risk, either with too much water building up within the

Consulting engineers play a critical role in the planning, construction and maintenance of tailings dams.

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The GISTM requires that factors like climate change be considered in the design of tailings dams.

Water management is a key risk area for TSF stability.

dam structure – making it unstable – or the TSF pond over-topping, with either outcome potentially causing the TSF to fail.

"Even where there is no increase in the total mean annual precipitation, there is still a danger that climate change could bring a higher intensity of rainfall to a region," he explained. "If a downpour delivers a greater rainfall intensity than the drainage structures were designed for, this of course would also raise the risk of failure."

The possibility of less rain is also cause for concern, he said, as this could impact on the vegetation cover of the TSF. This cover is an essential component of the facility's rehabilitation, as it prevents the dangerous erosion of the outer wall – and addresses the hazard of dust and/or surface water pollution.

"If the vegetation cannot survive due to insufficient regular rainfall, then the soil is exposed to wind erosion and to even more damaging water erosion of the soil layer when rains do fall," he said. "Over time, this would expose the tailings materials underneath the soil layer, leading quickly to pollution of local areas and invariably compromising the integrity of the TSF structure itself."

Vegetation also plays a valuable role in evapotranspiration of rainwater falling on the TSF, which limits the volumes of water that percolate into the tailings inside. Without this vegetation, there would be a greater build-up of water in the body of the TSF – potentially raising the phreatic surface and causing instability or contaminating groundwater if no lining of the TSF base is in place.

"Reduced rainfall could also affect mines' post-closure land use plans – especially if these plans focus on agricultural projects such as food production or biofuels," said Walls. "Where these post-mining land uses have been agreed with local stakeholders as part of their social closure process, this adds further complications as the land may no longer sustain the planned use that stakeholders expect."

Among the possible responses to climate change uncertainties, he said that TSF planners could consider incorporating redundancy in their designs; for instance, instead of trying to optimise the size of drainage channels to make them as small as possible, the approach could be more conservative to allow the handling of larger water volumes if necessary.

Auditing and regulation

The Department of Water and Sanitation (DWS) has recently announced that it is updating a database of TSFs in South Africa. As part of this update, TSFs, which are potentially classified as 'Dams with a Safety Risk' will most likely need to be registered accordingly with the DWS. These are TSFs with a height of over five metres, and able to store more than 50 000 cubic metres of water.

"The issue of auditing and regulating dams has been a crucial topic of discussion in the water management sector, particularly in light of recent dam failures and their devastating consequences," he said. "The DWS plays a critical role in overseeing the safety and sustainability of dams so it is essential to have a robust framework in place for auditing and regulating dams to ensure they meet the necessary safety and environmental standards."

However, he noted that one of the challenges in this area is the limited availability of Approved Professional Persons (APPs) – who often work for consulting engineering firms – to carry out the necessary audits and assessments.

"APPs are registered professionals who are authorised to carry out specific tasks, such as dam safety evaluations," he said. "The scarcity of APPs can pose a significant challenge to the DWS's efforts to monitor and regulate dams effectively."

He concluded that consulting engineers will play an important role in providing the APPs required for dam audits and regulatory activities. Moreover, the consulting sector can also contribute to the ongoing need to attract, train and nurture more of these specialised professionals for the future. ■

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WEC Projects to build water treatment plants for Côte D'Ivoire gold mine

South African EPC contractor specialising in water and sewage treatment plants, WEC Projects, has completed a contract for the design and engineering of three water treatment plants for Endeavour's Lafigué Gold Mine situated about 120 kms northeast of Bouake in Côte d'Ivoire.

WEC has designed and built three water treatment plants – one filtration unit for treating water used for processes, dust control, fire suppression and other applications at the mine, and two units for treating potable water to be used by the personnel at the mine and mine camp. The treatment plants will be fed raw water from various boreholes at the mine.

The filter water treatment plant is capable of processing up to 130 m^3/hr of water and comprises two modified shipping containers; a 6 m container which will house the electrical controls and a 12 m container with four filter units, which measure 2.2 m in height and 1.8 m in diameter each, as well as the primary pump system and blower unit.

Raw water is fed into the custom-built inlet flocculation tank where it undergoes chemical coagulation to allow solids to settle. After the flocculation tank, the dosed water will enter a custom clarifier tank whereby lamella media will aid the settling process.

From the clarifier, the water enters the break tank that supplies the filters. The system's blower unit is for air scouring the filters, reducing the need for backwashing. The water passes through the filtration units and is distributed to the client/mine holding tanks. The filtration system uses specialised silica media and activated carbon media for the filtration process to remove solids and organic compounds.

Feed tank to supply softening process (PWTP). This is post-filtration through the sediment and granular activated carbon filters (shown in background – blue vessels).

Filter water treatment plant – clarifier on right and flocculation tank on left. Walkways and handrailing's being checked for fitment before shipment to client.

For potable water, the company designed and built two plants with processing capacities of 10 m^3/h and 5 m^3/h per day respectively and which will be used for drinking water at the mine and the mine camp.

The systems will be installed in 12 m shipping containers and feature sophisticated filtration and treatment processes. Raw water is fed into the plant's filtration section and filtered through activated carbon, which removes organic compounds and improves the taste and odour of the filtered water.

The water is also softened using resin and salts, and is then remineralised. Chlorine hypochlorite and ultraviolet radiation is used for disinfection before the treated water is fed back to the mine and the mine camp.

All three plants include motor control systems, human-machine interfaces and programmable logic controllers to ensure a high level of automation. The only human intervention required is to monitor the processes from the control room and to add

feature

treatment chemicals as required.

Says Ashly Forster, project manager at WEC Projects, “The biggest challenge for WEC was the tight deadline involved. WEC secured the project in November 2022 and completed the plants in April 2023. This required considerable streamlining of the fabrication and assembly processes. We were also challenged by the logistics of securing the various components from suppliers on time, including the electricals and instrumentation which have been affected by the worldwide chip shortage. Some of the components, such as the UV disinfection system, required long lead times.

“As the units are containerised, the transportation and assembly on site will be faster with less on-site time required. WEC personnel will commission the plants once they have been installed on site. WEC will also conduct audits of the plants on a quarterly basis to ensure their operational efficiency and effectiveness. This will allow us to make any necessary adjustments and impact the performance of the plants,” Forster concludes. ■

Above: Potable water treatment plant (PWTP) MCC undergoing testing and checking for HMI control over the PWTP.

Left: Filter water treatment plant main filter feed pump. In background is the blower on the right and the first of four filters.

Thava Govender, CEO of Babcock's engineering business.

How power plant OEMs can help address SA's electricity crisis

As the South African government mulls over ways to improve the performance of Eskom's coal-fired power stations, collaborating with power plant original equipment manufacturers (OEMs) may be the answer to optimising power generation and ultimately putting an end to load shedding. Thava Govender, CEO of Babcock's engineering business, says long-term partnerships with power plant OEMs may be the much-needed solution to addressing the electricity crisis and stabilising the grid.

That the lack of reliable electricity supply is one of the biggest economic constraints in South Africa is no overstatement. To provide context, record levels of load shedding were experienced in 2022, with 207 days of blackouts recorded during the year, compared with 75 days in 2021. This has had a devastating impact on businesses and the economy at large.

As part of government's efforts to solve the electricity crisis and end load shedding, National Treasury proposed a total debt-relief arrangement for Eskom of R254-billion during the 2023 Budget Speech. However, the arrangement came with strict conditions to safeguard public funds. One of the conditions was that Eskom would implement the recommendations of an independent assessment of its operations, which was commissioned by National Treasury.

In February 2023, National Treasury announced that it had appointed the German VGBE Energy Consortium to assess and investigate the operations of Eskom's coal fleet. The outcome of the assessment, which was concluded in July this year, will consider a concession model which could see OEMs playing a central role in turning around and improving the energy availability factor (EAF) and performance of Eskom coal-fired power plants.

Why OEMs?

According to Govender, it is important to note that the root cause of the current electricity crisis in the country is the lack of sustainable maintenance, not insufficient energy capacity, as is mostly purported. While South Africa's coal fleet has a 51% EAF, many plants globally of the same age are operating at a much higher EAF of over 85%. Currently, says Govender, 80% of unavailable power is due to inadequate attention, with only 20% of the power stations on planned maintenance.

Over the years, lack of proactive engagement with OEMs has hampered determination, definition and optimisation of a detailed maintenance scope. The devaluing of OEM support has therefore impacted their ability to effectively support Eskom. One of the reasons for disregarding OEM engineering services is the perception that OEMs are expensive.

The truth of the matter, stresses Govender, is that OEMs are not expensive – they offer a premium service which, of course, calls for a significant initial capital investment, which is in fact outweighed by the substantial return on investment through a much higher EAF over the lifecycle of the power plants. The comprehensive lifecycle support capabilities are made possible by the OEMs' strong skills base, which is a big overhead cost they must carry and have invested in over the years.

To remedy the current power crisis, Govender believes that power plant OEMs have an important role to play. By their nature, OEMs offer end-to-end services – designing, supplying, operating,

Eskom Lethabo coal fired power station.

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Babcock was involved in the construction of the first six units for Matla Power Station.

manufacturing, constructing, commissioning, maintaining and guaranteeing the long-term performance of the critical boilers, turbines and generators, amongst other critical components of the power plants they supply.

One of the sustainable ways of reviving Eskom's coal fleet is through the refurbishment of the power stations – restoring the plants to their near original state. According to Govender, most of the power stations were built decades ago, and were designed for a certain coal quality available at the time.

With coal quality deteriorating over the years, OEMs – leveraging their access to new technologies, local expertise and global best practices – have the ability to upgrade the necessary components such as boilers and turbines to allow the old power stations to operate at peak performance using the new grade of coal available. However, stresses Govender, these changes require time to assess and correct, especially given that there have been some undocumented modifications to the power stations over the years.

"OEMs bring a lot to the table in the quest to finding a lasting solution to the incessant load shedding," says Govender. "They possess a comprehensive understanding, drawings and design performance parameters of the power stations. With their access to developing technologies, they will definitely improve the performance of the coal fleet."

The other key benefit of engaging OEMs is that they offer the necessary spare parts needed to keep these power stations running at peak performance. "At Babcock, for example, we manufacture a fair majority of the parts for our boilers locally. OEM parts guarantee an exact replacement of what was originally included on the boilers, for example. This, in my view, is incredibly important and worth any cost that comes with it."

Babcock's value proposition

As a leading boiler manufacturer, Babcock has a long track record spanning some 130 years in South Africa, with an extensive installed base of over 1 500 boilers during that period. In fact, the company has been involved in the construction and maintenance of some of the flagship coal-fired power stations in the country.

One that quickly comes to mind is Lethabo Power Station, one of the top-performing power stations to date. The company was also involved in the construction of the first six units for Matla Power Station, five units for Hendrina Power Station and five units at Grootvlei Power Station.

Babcock leverages OEM services to maintain and upgrade power stations that were originally built by other OEMs. Its engineering expertise enables it to effectively execute modifications and improvements. Some notable achievements include Kendal Power Station, where the company successfully executed a long-term maintenance contract since commissioning, until 8 December 2021. At Matimba Power Station, the company successfully replaced a main steam system to enhance reliability.

Apart from building and maintaining power stations, the company has also expanded its scope with emissions abatement services. Having already successfully completed a NOx abatement project at a petrochemical plant in the country, where emission levels were reduced by almost 40% lower than the legal requirement, Babcock has successfully been awarded a contract to refurbish electrostatic precipitators at one of Eskom's power stations.

"Another area of competence is mainstream pipework. We have already demonstrated our competence in this area at two Eskom power stations. In fact, we are the only company that has successfully executed a main system replacement from boiler to turbine," says Govender.

Through its supplier development programmes, Babcock can directly empower local small and medium enterprises, micro-enterprises and qualifying small enterprises in the power value chain.

"Through our Education and Training division, we have demonstrated our commitment to developing skills, including those of artisans, mechanics and welders, for our own needs and for the broader economy," says Govender.

Babcock leverages partnerships with leading international technology providers to ensure access and support from the best in the industry. "A lot of know-how resides within our organisation, but we can also tap into the strategic alliances we have with global technology partners such as the Babcock & Wilcox partnership in the United States. This partnership gives us access to the latest advancements which can be retrofitted on local power stations to optimise performance," concludes Govender. ■

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Premature deindustrialisation in southern Africa can partly be solved through mining

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

In 2016, economist Dani Rodrik published a seminal paper called Premature Deindustrialisation. Rodrik identified a phenomenon in which developing countries appeared to be "running out of industrialisation opportunities sooner, and at much lower levels of income, compared to the experience of early industrialisers". Rodrik argued that even in relatively wealthy countries, where manufacturing has continued to grow, lower-skilled workers have been left worse off, with concomitant political implications. He noted that the deindustrialisation trend appeared to be more severe in Latin America and sub-Saharan Africa. Given that it was ultimately the bargain between organised labour and elites that gave rise to modern democracy, the absence of a strong organised labour presence through a weak manufacturing sector in African countries does not bode well for the consolidation of democracies and the governance benefits associated with it.

My colleague, Pranish Desai and I recently set out to answer two questions in relation to the above dynamics: First, are there significant differences in regional "deindustrialisation" trends between different regions in Africa? Second, what accounts for these differences if they exist? The Southern African Development Community (SADC) appears to be particularly afflicted by deindustrialisation. In a paper submitted to *The Africa Governance Papers*, we find that there is good reason to believe that the SADC group of countries is characterised by growing deindustrialisation in both employment and output terms.

Although it is a subject that requires further scholarly inquiry, a related finding that a reliance on oil and mineral rents is negatively correlated with industrial employment and manufacturing output suggests that the Dutch Disease phenomenon may be in effect. Dutch Disease is a two-fold phenomenon in which the natural resource sector attracts physical capital and skills away from other sectors in the economy on one hand, and drives currency volatility on the other, as commodity prices are inherently unstable. Currency value appreciation on the back of demand for commodities can render manufactured products for export uncompetitive. This could be curbing industrialisation prospects in many oil and mineral reliant countries in both SADC and Africa as a whole.

Our core finding has natural implications for the SADC region, particularly with regard to its existing industrialisation strategy, meant to benchmark the region for the period between 2015 and 2063. Current trends indicate that, whether measured in aggregate or average terms, SADC will fail to meet its existing industrial employment and manufacturing output objectives by 2030. Furthermore, even if the region's dominant economy of South Africa succeeds in revitalising its manufacturing base, policymakers responsible for regional industrial strategy coordination will need to consider the reality that South Africa's population is ageing at a faster rate than its SADC peers. In re-evaluating SADC's industrialisation roadmap, these policymakers would also do well to heed existing geopolitical and energy provision realities.

The existing SADC industrialisation strategy is orientated primarily towards structural transformation. It specifically mentions modernisation and closer regional integration and emphasises that the "strategic thrust must shift from reliance on resources

Dr Ross Harvey, director of research and programmes at GGA.

Currency value appreciation on the back of demand for commodities can render manufactured products for export uncompetitive.

Mining will increasingly employ fewer people directly because of technological advances.

and low-cost labour to increased investment and enhanced productivity of both labour and capital". In our view, the emphasis should not necessarily be on reducing reliance on natural resources per se, but rather the careful harnessing of those natural resources to contribute to appropriate industrialisation pathways that do not lock SADC countries into low-value manufacturing. Part of the priority also needs to confront Dutch Disease dynamics. As mentioned above, Dutch Disease is a twofold phenomenon. Any industrialisation strategy needs to address these two dimensions explicitly, and they should work in tandem:

First, given that mining will increasingly employ fewer people directly because of technological advances, the focus of the regional strategy should be to provide skills to the labour force that connect to mining either upstream or side-stream (predominantly in technology, research and development). These skills will likely have relevance in multiple sectors, making the investment productively and allocatively efficient.

The focus of the regional strategy should be to provide skills to the labour force that connect to mining either upstream or side-stream.

Second, a regional sovereign wealth fund (SWF) might be considered, though it would have to be independently governed to avoid corruption and inefficient allocation. The benefit of an SWF is that it can direct investments towards building manufacturing capability that initially feeds off natural resource endowments but becomes increasingly independent thereof in the long run. This would help to alleviate currency volatility too. However, the swiftest way to avoid currency volatility and undue devaluation is for countries in the SADC region to avoid corruption, from state capture to rigging elections.

In addition to addressing Dutch Disease effects, SADC countries need to tap into global value chains that will create efficient manufacturing and service sector opportunities connected to natural resource endowments. However, this has to be fundamentally different to a narrow focus on downstream beneficiation, which remains an underpinning of too many conversations pertaining to industrialisation. The word "beneficiation" is mentioned 17 times in the SADC 2015 strategy alone and is lengthily elaborated on pages 17 and 18. SADC countries are simply not able to directly compete with countries such as China in the realm of producing final manufactured goods such as solar panels. However, there may be opportunities to add value to the required copper locally, for instance, before exporting it as a high-bulk, low-value commodity; this is what the SADC strategy calls "Value Chain Development".

This should only be pursued if it enhances a country's comparative advantage, lest it be subject to the deficiencies of post-colonial early independence import-substitution-industrialisation misadventures that left many African countries highly indebted. It also has to be done with a view to the ecological imperatives of the future. As Gatune and Cloete note in a 2022 paper: "For the regional economy to be truly green, waste-tracking and mapping technologies need to be developed, which is the first step in reorganising mining value chains".

Such opportunities are, nonetheless, connected to energy availability and reliability, which remains a fundamental deficiency across the region. This issue is explicitly addressed in the SADC 2015 industrialisation strategy, which is correct to indicate that "governments should step up the involvement of independent power providers to ease the burden on government investment spending". It is also correct to note that "alternative sources of energy should be exploited with a particular focus on renewables". One of the benefits of a focus on the latter is that some of the critical raw materials required to feed global energy and transport revolutions towards lower carbon emissions are mined in southern Africa (lithium, for instance); these can be processed with relatively low-intensity energy, unlike aluminium smelters. Another benefit of pursuing greener renewable technologies is that they typically avoid extensive sunk capital costs (white elephants), such as those associated with the sub-optimal Medupi and Kusile

coal power stations built in South Africa, which also offload extensive negative environmental and social externalities onto poor communities.

SADC countries therefore also need to be aware of the climate and stranded asset risks associated with pursuing oil and natural gas. Comparable experience from the continent suggests that oil wealth is more likely to create a resource curse than to provide widespread electrification. To the contrary, solar micro-grids, while relatively expensive, avoid the costs of centralised transmission grids and can largely avoid the unproductive rent-seeking typically associated with oil and gas. The implementation of the SADC strategy has to be laser-focused in executing on delivering renewable energy at speed. Otherwise, industrialisation will remain impractical.

In this regard, we find the view expressed by scholars Naudé and Tregenna in a 2023 paper to be highly relevant: "The establishment of the African Continental Free Trade Area is timely, as it would provide for larger market size, could potentially reduce the burden of distance to the coast for landlocked countries, and raise competitiveness against Chinese imports". However, as they rightly warn, such benefits would only be realised if infrastructure improvements are executed to ameliorate the negative consequences of adverse geography. Moreover, continued corruption and chaos at border posts within the region constitute a non-tariff barrier to trade that severely undermines the already-limited comparative advantage that exists within the region.

Finally, SADC countries should take note of cutting-edge research pertaining to industrial policy and how it is changing in light of new geopolitical realities. A paper recently prepared for the *Annual Review of Economics* for instance, notes that the salience of industrial policy has risen greatly as governments have increasingly utilised it to address a variety of problems such as the green transition, supply chain resilience, good job availability and geopolitical competition between China and the United States. The authors argue that the best industrial policy from examples around the world are no longer inward-looking and protectionist, but typically target export promotion. The most successful appear to be those that utilise a broad range of policies that are more effective together than the standard use of subsidies or tariffs (typical of trade policy, for instance).

It is our view that manufacturing comparative advantage will continue to move away from China, and if SADC countries can provide infrastructure, energy and appropriate skills, the benefits of natural resource endowments could still be utilised to both promote industrialisation and, paradoxically, reverse the currently prevalent resource curse dynamics. ■

Natural resource endowments could be used to promote industrialisation.

Oil wealth is more likely to create a resource curse than to provide widespread electrification.

Sensor-based sorting of sulphide ores optimises the process

The accelerating increase in global demand for copper, zinc and lead poses a challenge for mining operations: increasing their efficiency and productivity to meet the demand while ensuring their profitability and sustainability. Sensor-based ore sorting can be an invaluable asset for optimising the process and achieving this goal, as Rasoul Rezai, Global Segment Manager Metals at TOMRA Mining, explains.

Tomra Mining offers technology to sort copper, zinc and lead sulphides.

Sulphide minerals are the source of metals such as copper, zinc and lead, which have a key role to play in our modern lifestyle – with uses ranging from energy supply, electronics and transportation to construction and infrastructure.

The technology to sort copper, zinc and lead sulphides effectively to optimise the process is available from TOMRA Mining. Its industry-leading X-Ray Transmission (XRT) sensor-based sorting technology can effectively detect sulphides in mineralised run-of-mine material, as they carry elements with higher atomic densities than non-mineralised waste rocks. After crushing, the ore, in a size range of +8 mm to 80 mm, is fed into the sorters and the barren and low content rocks are eliminated, resulting in a higher head grade of the mill feed. In addition, the eliminated waste can be replaced in the mill with more upgraded sulphides, increasing the efficiency of the mineral process. ■

Bosch Rexroth Africa welcomes Fairtex as a new Nigerian distributor

Bosch Rexroth Africa welcomes Fairtex as a new Nigerian distributor.

Bosch Rexroth Africa Development, has added a new distributor to its African network. The Fairtex Group (Fairtex) was appointed as a Nigerian distributor of the Group's products and services.

Fairtex is recognised as one of the largest engineering, procurement and construction (EPC) companies in the west African region with most of its work conducted in the oil and gas, water treatment, and power generation industries. Fairtex will be distributing the Group's innovative drive and control technologies throughout the region, including the full range of hydraulic components that can be applied in various applications.

The distribution agreement, which began in 2023, will help serve the Group's aim to expand its footprint on the continent. ■

Xylem has launched a range of different dewatering systems

Water technology provider, Xylem, has launched a range of different dewatering systems in the African market, including the Godwin BD150 Self-Priming Pump, the Flygt Bibo Alpha, the Flygt Pareo and the Godwin HL270M.


Xylem launches a range of different dewatering systems.

The Godwin family of BD self-priming stand-alone pumps serves various dewatering applications across construction, industrial and utility, amongst others. The new Godwin BD150 is portable and configurable and can step up for emergencies or punishing site conditions, the company said. Meanwhile, the Flygt Bibo Alpha submersible drainage pump is able to reduce wear by up to 70% and adapts speed to prevent snoring and dry running. The Flygt Pareo intelligent set of pumps offers increased efficiency, enabling them to solve common issues automatically. Lastly, the Godwin HL270M Dri-Prime Pump's higher head and efficient impeller design handles demanding tasks while requiring less power and maintenance than its peers. ■

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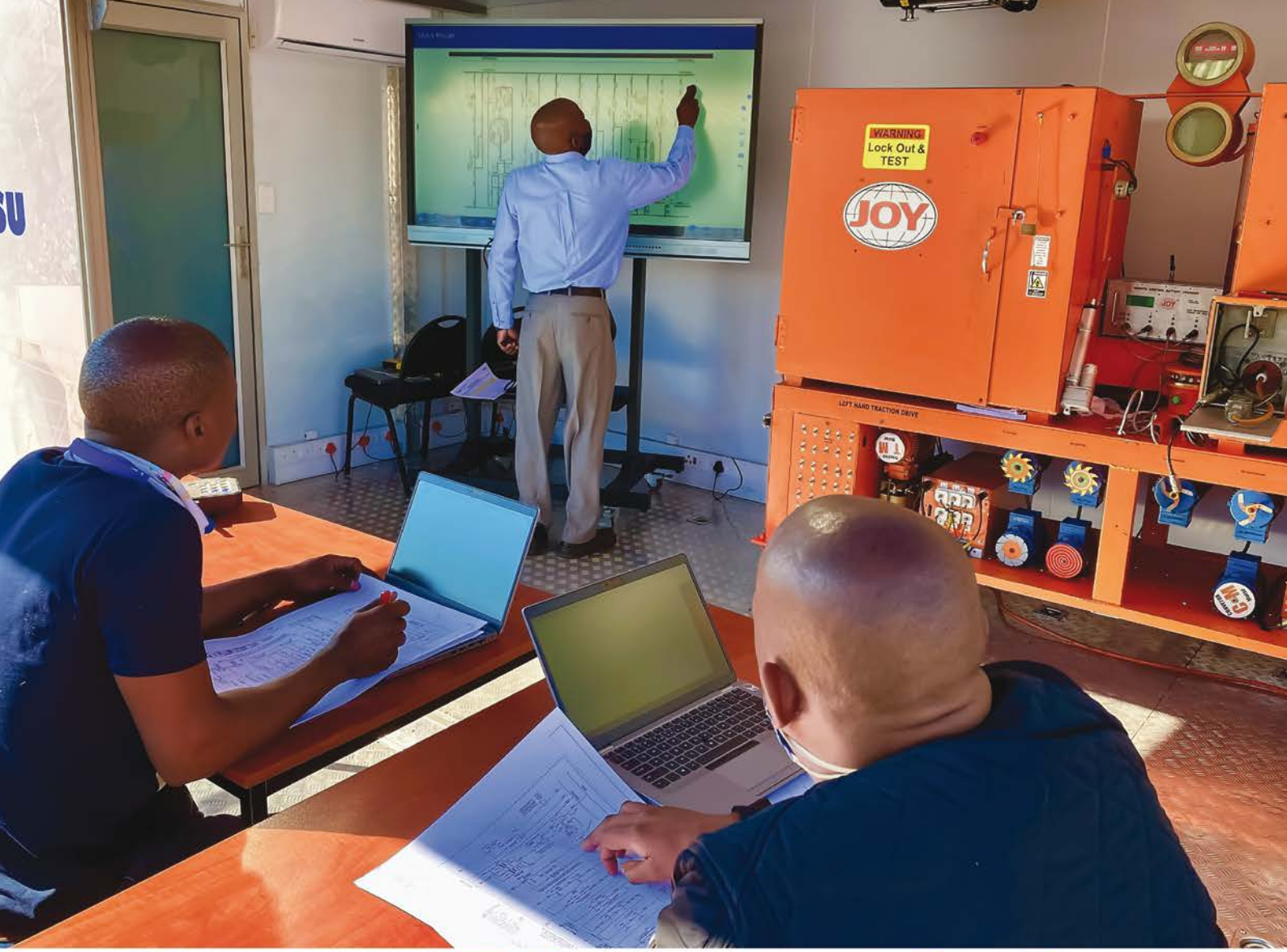

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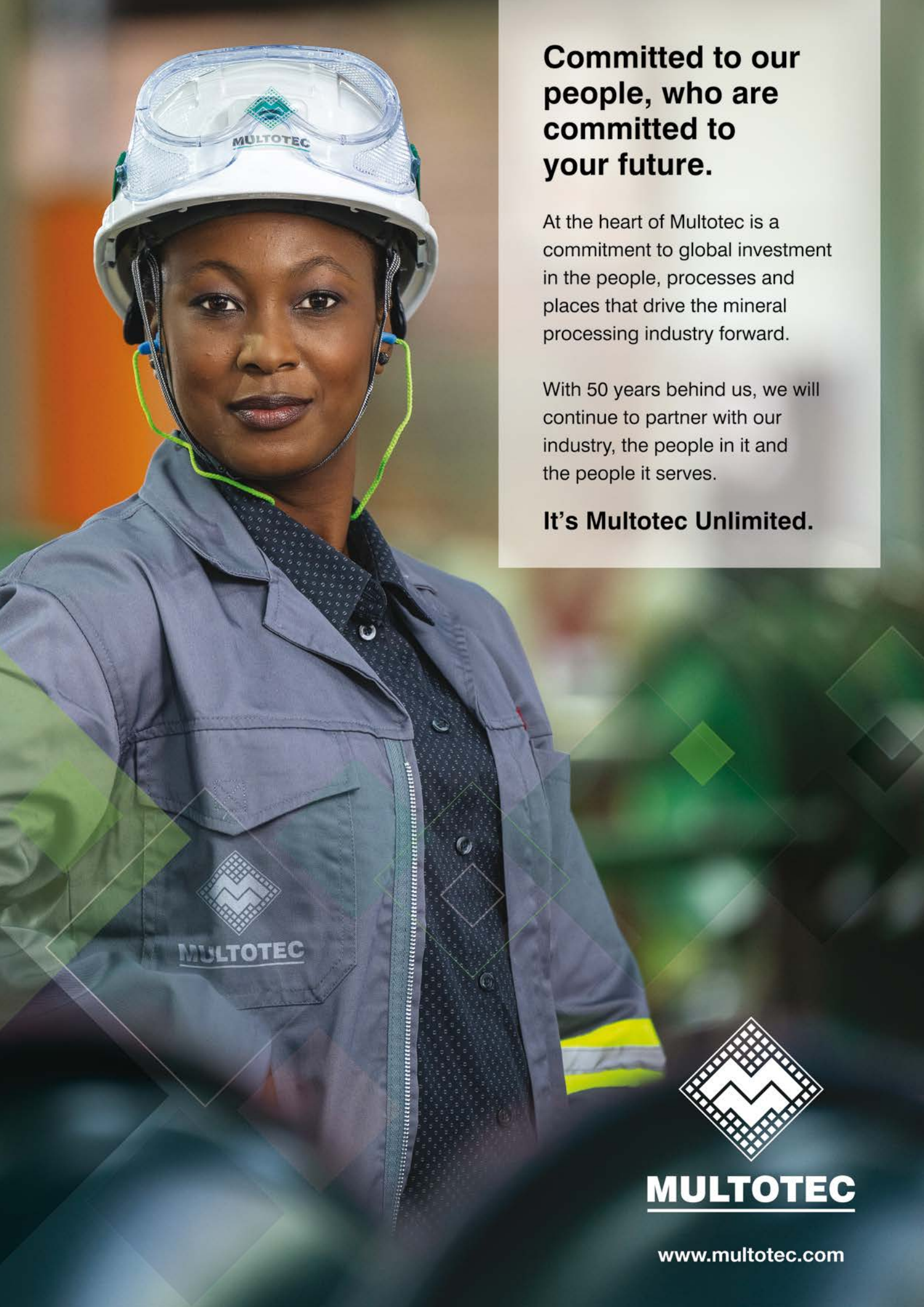

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