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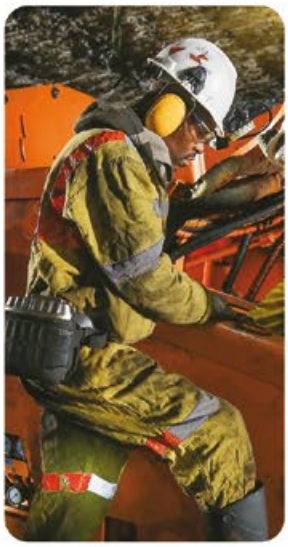

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The game-changing MACH REACTOR has proved its mettle as an innovative technology revolutionising ore extraction in the precious metals sector. See story on page 8.

COMMENT

Despite challenges mining overachieves

Nellie Moodley

Underpinned by robust commodity prices, in 2021 South Africa's mine production value exceeded R1-trillion for the first time, giving the domestic economy a vital injection of higher taxes, wages, and increased employment.

According to Minerals Council South Africa, the boost in value was the result of improved commodity prices, which were 40% higher year-on-year in dollar terms and 20% higher in rand terms.

Despite this good news, however, the Council continues to flag concerns related to rail and port constraints, which it estimates resulted in an opportunity cost of R35-billion for 2021 based on railed tonnages compared to Transnet's targeted tonnages.

If the capacity of the rail network for bulk commodities like iron ore, coal, and chrome is considered, the opportunity loss is R50-billion, a third of which would have flowed into the fiscus, the council said.

While the Department of Minerals Resources (DMRE) is slammed for its snail's pace in transforming the sector, Menar's MD, Vuslat Bayoglu, has argued that, in some instances, the red tape delaying development of new projects is not the fault of this department.

Bayoglu points out that owing to endless appeal processes, the Departments of Environmental Affairs and Water and Sanitation do not issue the necessary licences within the stipulated period, and this delays project development.*

Addressing delegates at the Junior Mining Indaba, and lending credence to Bayoglu's statement, Trevor Blench, chairman of the Steenkampskraal project, said the company had to wait seven years before it was granted a water use licence. Steenkampskraal was granted a mining right in 2010 and applied for a water use licence in 2012, having spent R30m on water supplies, identifying underground aquifers and developing water resources. However, a further delay has arisen in getting Steenkampskraal off the ground as another company has applied for a prospecting right on the mining area granted to Steenkampskraal.

According to Blench, while the DMRE correctly refused the prospecting right, the company, appealed the decision, thereby "contesting the legitimacy of our mining right.

"I implore government to synchronise mining application and approval processes so delays do not occur, as this deters prospective investors from investing in the junior mining sector".

Steenkampskraal is keen to take advantage of favourable rare earths metals demand to attract investment for project development and the current situation creates uncertainly for potential investors.

This year's Junior Mining Indaba, a hybrid event catering to both in-person attendees and online participants, showcased a number of high calibre exploration projects courting the attention of the investment community.

Among the stand-out projects are emerging helium and domestic natural gas producer, Renergen's Virginia project, Osino Resources' Twin Hills discovery in Namibia, and Platinum Group Metals' Waterberg PGM Project located on the Northern Limb of the Bushveld Complex.

Also addressing delegates at the event, was the DA's James Lorimer, Shadow Minister of Environmental Affairs, Forestry and Fisheries, who replaced Minister Gwede Mantashe as keynote speaker.

According to Lorimer, the key to growing the economy is to free it from cumbersome policy and regulation, eradicate corruption, retain only those policies that are essential to the growth of the sector and fast-track the adoption of a new mining cadastre to replace the dysfunctional SAMRAD system.

He reiterated industry's call for the implementation of an off-the shelf proven cadastral system that is already widely used in mining jurisdictions and which can be up and running in six months.

Mining companies have been calling for a modern and transparent online cadastre that will stem corruption in the award of licences and bring about much-needed investment in exploration to the industry.

On the subject of corruption, Gauteng premier David Makhura recently released the provincial integrity management report, which promises to curb corruption within the provincial government. Public servants in Gauteng who have failed or refused lifestyle audits, would lose their jobs, he said. Whether this is to be believed or just a ruse to appease citizens fed-up with high levels of corruption at government level, only time will tell. ■

* The Menar story will appear in the July edition of *Modern Mining*.

Editor: Nellie Moodley
e-mail: mining@crown.co.za
Features Writer: Peter Middleton
e-mail: peterm@crown.co.za
Advertising Manager: Bennie Venter
e-mail: benniev@crown.co.za
Design & Layout: Darryl James

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SOUTH AFRICA OFFICE: +27 11 476-7091

Jim Pooley: +27 82 373 0796 / jim@baraconsulting.co.za

Clive Brown: +27 82 557 5373 / clive@baraconsulting.co.za

www.baraconsulting.co.za

UNITED KINGDOM OFFICE

Andrew Bamber: +44 744 486 4046 / bamber@baraconsulting.co.uk

Pat Willis: +44 781 018 2169 / patw@baraconsulting.co.uk

www.baraconsulting.co.uk

SA's mine production value exceeds R1-trillion

The value of production was just shy of R1.2 trillion in 2021.

South Africa's mineral production achieved record values in 2021, exceeding R1 trillion for the first time, buoyed by strong commodity prices and giving the domestic economy a vital injection of higher taxes, wages, and increased employment.

The Minerals Council South Africa recently launched Facts and Figures 2021, an annual publication that provides in-depth data and insights into the performance of the mining industry. "The Facts and Figures publication shows just how critical mining is for the country, the broader economy, the fiscus, and the labour market," says Minerals Council CEO Roger Baxter.

The value of production was just shy of R1.2 trillion in 2021, and well above the R910-billion achieved in 2020. The boost in value was a result of improved commodity prices, which were 40% higher year-on-year in dollar terms and 20% higher in rand terms. A 12% firming of the rand against the dollar meant mining companies did not reap the full benefit of international commodity prices. The Minerals Council remains concerned about rail and port constraints, which it estimates resulted in an opportunity cost of R35-billion for 2021 based on railed tonnages compared to Transnet's targeted tonnages. If the capacity of the rail network for bulk commodities like iron ore, coal, and chrome is considered, the opportunity loss is R50-billion, a third of which would have flowed into the fiscus. ■

AngloGold Ashanti to list on A2X Markets

Kevin Brady CEO of A2X.

Gold producer AngloGold Ashanti has been approved for a secondary listing on A2X Markets (A2X) with its shares available for trade on A2X from 6 June 2022. AngloGold Ashanti will retain its primary listing on the JSE and its depository share listings on the NYSE, Australia and Ghana exchanges. A2X CEO Kevin Brady said: "AngloGold Ashanti is one of the largest gold mining companies globally, with a diverse spread of shareholders that include the world's largest financial institutions. We look forward to demonstrating the benefits that a listing on A2X brings to both AngloGold Ashanti and its shareholders". A2X Markets (A2X) is a South African stock exchange that plays an integral part in the progression of the South African marketplace. ■

Sibanye-Stillwater hoists first tonnes from its Marikana K4 project

Multinational mining and metals group, Sibanye-Stillwater reached a significant milestone in early May 2022 at its SA PGM Marikana K4 project, when it hoisted the first tonnes since the resumption of the project. The Marikana K4 project at the SA PGM operations is a largely pre-developed and equipped, high return project, which will access both the Merensky and UG2 reefs to produce, on average, around 250,000 4Eoz per annum at steady state over a 50-year life.

Both the main and vertical shafts have been pre-developed and equipped to depths of 1,332 m and 1,078 m below surface respectively. Associated surface infrastructure is in place, with only minor refurbishments required. In addition, the K4 concentrator is already fully operational with a nameplate capacity of around 130,000 tpm of UG2 and Merensky reef. Neal Froneman, CEO, commenting on this milestone, said: "We are investing around R4-billion in the future of Marikana through the development of this world-class project, confirming the ongoing commitment to the sustainability of our company and its stakeholders." ■

Sibanye-Stillwater is investing around R4-billion in Marikana.

FQM approves Kansanshi S3 Expansion and Enterprise Nickel project

TSX-listed First Quantum Minerals recently approved the S3 Expansion at the Kansanshi mine and the Enterprise nickel project. “First Quantum has been working constructively with the Government of Zambia’s New Dawn administration as part of its efforts to reform the mining sector, attract investment and increase Zambia’s copper production. The approval of the projects reflects First Quantum’s increased confidence in the investment climate in Zambia,” said CEO Tristan Pascall. “The S3 Expansion and the Enterprise nickel project are a key part of our brownfield growth strategy. The Kansanshi mine has been a cornerstone asset for First Quantum for 15 years and the S3 Expansion will expand production and extend mine life for another two decades. The low-cost, high-grade Enterprise nickel project is well placed to supply the rapidly growing electric vehicle battery sector.” The company is recommencing detailed engineering works for the S3 Expansion to determine purchase orders for key long-lead items, including the SAG mill, ball mill and in-pit crushing station. A mining contractor will be mobilised for the Enterprise nickel project in order to commence pre-stripping of the pit in June 2022. ■

FQM approves Kansanshi S3 Expansion.

Glencore Ferroalloys launches its Women in Mining structure

Women in Mining Tripartite Forum chairperson, Jacqueline Dibetso.

On 13 May 2022, Glencore Ferroalloys officially launched its Women in Mining (WiM) structure, which is aimed at driving women-related developmental programmes in line with the Department of Mineral Resources and Energy (DMRE) and Minerals Council. The initiative provides the opportunity for women to be further recognised as integral participants in the success of the organisation. CEO of Glencore Ferroalloys, Japie Fullard said the organisation’s key driver is the Home Away From Home culture that resonates with the needs of the female employees, and ensures that female employees find the workplace suitable and desirable to work in. ■

Gold Fields to acquire Yamana Gold

South African gold producer, Gold Fields, and TSX-listed Yamana Gold have entered into a definitive agreement, under which Gold Fields will acquire all of the outstanding common shares of Yamana.

The transaction implies a valuation for Yamana of $6.7-billion. It is anticipated that Gold Fields shareholders and Yamana shareholders will own around 61% and 39% of the Combined Group, respectively.

Yamana is a natural strategic fit for Gold Fields, with its high quality, diversified portfolio of long-life assets located in mining friendly rules-based jurisdictions across the Americas (including its five producing mines and pipeline of development projects and exploration properties), and with a shared focus on health and safety and ESG performance, the company said.

According to Chris Griffith, CEO of Gold Fields, Yamana's high-quality asset base in the Americas and strong development and exploration pipeline will further diversify the geography of the company's portfolio, creating a top-4 global gold major, well positioned to deliver long-term value creation. "Combined, Gold Fields will boast an industry leading portfolio of high-quality, long-life flagship assets that span some of the world's most established gold mining jurisdictions." ■

Gold Fields CEO Chris Griffith.

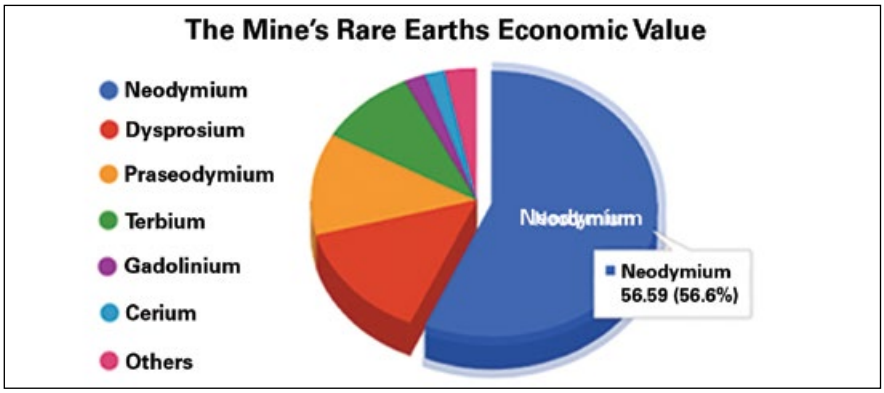
Gold Fields Tarkwa project.

Ma'aden set to open new office in South Africa

Saudi Arabian Mining Company (MA'ADEN) has announced the opening of a new regional office in South Africa. In 2019, Ma'aden strengthened its presence in the African market with the acquisition of Mauritius-based fertilizer distributor, Meridian Group, one of the largest fertilizer distributors in Africa. As a result, Ma'aden has a network of operations across Eastern and Southern Africa, from Malawi to Mozambique, Zimbabwe, and Zambia with 35-65% market share in the four countries. Robert Wilt, CEO of Ma'aden, comments on the new office: "This announcement reinforces our commitment to the African agriculture market, as it is a strategic growth area for our fertilizer business and part of our long-term value creation plan to grow Ma'aden into one of the top miners in the world." ■

Steenkampskraal prepares for AIM and JSE listing

Rare earth mine developer, Steenkampskraal Holdings (SHL) is preparing for a listing on London's AIM and the JSE, and has made three key appointments to proceed with the development of the Steenkampskraal rare earth mine situated in the Western Cape. "SHL has all the regulatory approvals required to commence mining and to produce monazite concentrate. Management is negotiating offtake agreements with numerous prospective customers. SHL plans to raise equity funding through a pre-IPO and IPO on the London AIM market and a secondary listing on JSE," explained Trevor Blench, SHL chairman. SHL appointed Graham Soden as director and mine manager, with Timothy Crombie appointed director and project manager and Megan Korbe as legal advisor. ■



Steenkampskraal targets dual listing.

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Gold Ore's MACH REACTOR worth its

Having been in operation for close to a decade, the game-changing MACH REACTOR has proved its mettle as an innovative technology revolutionising ore extraction in the precious metals sector. The patented technology harnesses the power of cavitation in mining operations to extract minerals in the most efficient way possible, thereby surpassing production targets and increasing profitability for miners in the gold and platinum group metals (PGM) sectors. By *Nelendhre Moodley*.

Right: Gold Ore founder and CEO, Adrian Singh.

According to Gold Ore (Pty) Ltd's founder and CEO, Adrian Singh, demand for the MACH REACTOR is driven by robust demand for precious metals, in particular gold which, flirting between $1800/oz and $2000/oz, is tracking some of its highest prices to date, coupled with strong demand from the PGM sector which is underpinned by demand for clean energy options.

Since its launch nine years ago, the MACH has been delivering improved efficiencies, increased productivity and profitability in some of the most aggressive ore extraction applications.

According to Singh, the MACH REACTOR was "purposefully overdesigned", firstly, to ensure a product lifespan of beyond 10 years with zero-maintenance requirements, and secondly, to ensure that it provided metal recovery benefits beyond expectations, usually between 2% and 8% and in some instances up to 10%, which ultimately translates into millions of rands in additional monthly revenue.

"Lower incremental metal recovery improvement rates with the MACH REACTOR are generally achieved on larger plants that treat extremely high tonnages, as is the case with tailings retreatment plants, which still translates into appreciably higher incremental monthly ounces, with relatively higher incremental recovery improvement rates of between 8 and 10% being realised on more difficult to extract semi-refractory concentrate. Essentially, the more difficult it is to extract gold from the ore, the greater the recovery benefit."

The wholly black-owned South African entity sold its first MACH REACTOR nine years ago to a local PGM producer that was able to unlock extra value from an operation that had hitherto been hamstrung in terms of recovery rates that were possible using conventional technology.

"The first MACH REACTOR Gold Ore ever sold is, to this day, delivering incremental metal recoveries in excess of 5% over conventional technology. When compared to traditional metal extraction technologies, which are known frequently to breakdown in highly abrasive environments, the MACH has stood the test of time and all the units installed across the world remain fail-safe," explains Singh, who adds that the technology was developed with no moving parts and therefore requires no maintenance or servicing.

A key challenge for Gold Ore is convincing certain members of the local mining community, that such a cutting edge, out-of-the-box technology actually exists and that it delivers exceptional results.

However, so confident is Gold Ore about the MACH's capabilities that the company will, on a 2-month free trial basis, install a test unit on precious metals mining projects to showcase the product's exceptional metal recovery benefits. In fact, two 2 500 m^3/h MACH REACTORS (the largest in this segment) are currently being considered for testing at a Zimbabwean platinum operation.

"The optimisation efforts at laboratory level on the Zimbabwean processing plant via other avenues were achieving less than one percent incremental recovery improvements; however, rigorous semi-pilot on site testing with a MACH REACTOR test rig showed potential incremental recovery improvements of close to 8%"

The significant product advantages, in particular

Below: Gold Ore intends introducing the MACH REACTOR to commodities other than precious metals.

weight in gold

the long product lifespan and zero-maintenance requirements, have led to Gold Ore recently being awarded a contract to supply a MACH unit to a global gold major's operation in Tanzania.

Gold Ore has already been vetted as a vendor to the project, with the Tanzanian Ministry also approving the company as a service provider.

"Earlier this year we installed a laboratory test rig on the Tanzanian gold project and, following the phenomenal results achieved, the company placed an order for one of our largest MACH units – a 2 500 m^3/h unit. This is a far cry from traditional products, which are capable of handling only 300 m^3/h of slurry," says Singh.

Aside from the metal recovery benefits that the MACH REACTOR brings to the table, the easy-to-install innovation was recently redesigned to be more energy efficient, aligning with the green agenda of reduced power consumption.

The latest units consume 70% less power than the original product range. For example, a 2 500 m^3/h unit which used to consume as much as 1 MW of power has now been redesigned to consume less than 300 kW of power, thereby ensuring that the MACH is easily absorbed into the overall power requirements of mining projects.

Unfortunately, even though the MACH REACTOR has gained acceptance in international mining jurisdictions, including the US, Canada, Mexico, Turkey, Australia, Kazakhstan and, importantly, the African continent, it is yet to garner significant favour from the local market. One of the key challenges related to tapping into the local sector, explains Singh, is the sector's reticence to explore and adopt innovative world-leading technologies.

"What many miners don't realise is that the MACH REACTOR is installed onto a conventional plant, and requires absolutely no change to the existing plant, which reduces risk. Essentially it is equivalent to adding a turbocharger to a car; while the engine remains the same, the power and efficiency is given a generous boost. Similarly, in the case of metal recovery, the MACH REACTOR is an addition proven to significantly enhance recovery rates, while leaving the conventional back-bone of the plant essentially unchanged," he explains.

Ninety percent of Gold Ore's MACH REACTORS are sold to international precious metals projects.

Looking ahead

To date, Gold Ore has sold more than 40 MACH REACTOR units and its forward strategy is to expand its reach into untapped destinations globally. The technology specialist is also intent on introducing the MACH REACTOR to commodities other than precious metals, and it is already showing promise in the base metals and industrial minerals sectors.

Above: The MACH REACTOR being put through its paces at Mintek.

Right: Gold Ore's smallest cavitation reactor unit being tested at Mintek.

"The company initially targeted the precious metals market purely because it offered the lowest hanging fruit option of higher metal prices but, having also tested the MACH's capabilities on most other commodities that require extraction using flotation and leaching processes – such as industrial minerals and base metals – and having also achieved exceptional results with these minerals, we are looking forward to launching the product to commodity sectors such as fluorspar, phosphate, copper, lead, zinc, cobalt and nickel."

Interestingly, aside from developing the world's largest cavitation-based technology, Gold Ore recently shifted gears and developed the world's smallest cavitation-based test rig that incorporates a fully scaled down MACH REACTOR which requires only a couple of kilograms of sample per test and is proving invaluable for research purposes at universities and for clients that only have a limited quantity of drill core available for testing.

"We recently developed the smallest cavitation reactor unit, which requires literally just a few kilograms of product for the metal recovery testing process. This latest innovation will be invaluable, and a game-changer, to small-scale miners and explorers looking to test the metal recovery potential of small quantities of product, such as drill core samples. This technology will assist junior miners to take early-stage projects quickly up the value curve," he concludes. ■

With increased demand and supply disruptions, coal prices soared to new all-time highs.

Johannes Jordaan.

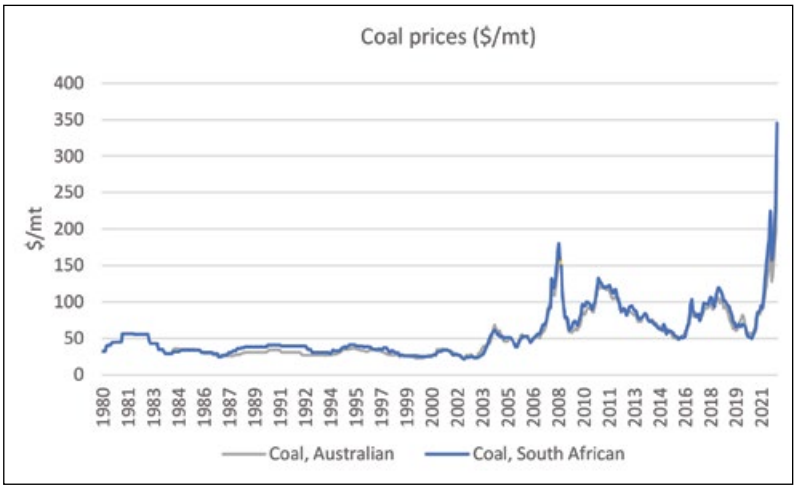
Coal benefits from global market

By Johannes Jordaan - independent economist at Economic Modelling Solutions

The world is in the middle of an energy crisis that started with supply constraints as a result of the Covid-19 pandemic. Increased demand when Covid-19 restrictions were lifted was further exacerbated as a result of unprecedented monetary and fiscal stimulus by central banks and governments to support economies. This resulted in a surge in demand and price increases in most commodities.

The Russian invasion of Ukraine on 24 February caused further market panic and has led to significant disruptions in the production and trade of commodities – especially in those commodities where Russia and Ukraine are significant exporters – as sanctions against Russian exports started piling up.

A commodity that benefitted significantly from the increase in demand, supply disruptions and market panic, is coal; ironically during a time of increasing global pressure and commitment to reduce its use. Coal remains the largest source of electricity generation and the largest single source of CO_2 emissions. Oil prices, and natural gas prices in Europe, that increased almost 600% year-on-year in March, have forced countries like Germany to reactivate coal plants putting further pressure on coal demand.



In 2021 coal production failed to keep pace with demand, and coal shortages in China and India led to power outages and idle factories, putting pressure on prices.

With increased demand and supply disruptions, coal prices soared to new all-time highs, and Australian coal exports reached $435 per ton during March 2022. The price of Australian coal had already increased 284% year-on-year in October 2021 to a monthly average of $225 per ton. But just as prices started to settle down towards the end of 2021, supply disruptions and the war in Ukraine caused new market panic. The price of South African coal exports increased to an average of $200 per ton in October 2021 before pulling back to $128 ton in November 2021, but increased again to a monthly average of close to $300 per tonne during March 2022 after the invasion of Ukrainian. These prices are expected to result in higher electricity

challenges

costs that will further feed into global inflation and costs to consumers.

The global demand for coal is estimated by the International Energy Association (IEA) to have increased to 7 906 million tons (mt) in 2021 (previously estimated at 7 432 mt). This is an increase of 6% from 2020 and 1.3% higher than pre-Covid pandemic demand in 2019. The IEA expects demand for 2022 to increase to 8 025 mt – the highest ever. This figure, however, could be higher as it was estimated before the Russian invasion of Ukraine.

Chinese demand for coal according to the IEA accounted for roughly 52% of global demand in 2021 (4 130 mt), followed by 13.4% from India (1 056 mt) and 6.4% (508 mt) from the United States. The IMF predicts that the Chinese economy will grow by 4.4% in 2022 and that of India by 8.2%.

In 2021, China mined roughly 50% of global coal production (3 925 mt), followed by India (793 mt), Indonesia (576 mt) and Australia (470 mt).

Australia remained the largest coal exporting

Years of underinvestment in new coal mines or infrastructure are also contributing to the supply crunch.

Coal remains the largest source of electricity generation and the largest single source of CO_2 emissions.

Coal benefits from global market challenges

country, exporting 366 mt in 2021 (roughly 29% of global exports) followed by Indonesia, Russia and the United States. Exports from Russia accounted for 15% of total coal exports in 2021 (210.6 mt). Russian coal was exported mainly to China (43 mt), Japan (22 mt), Republic of Korea (20 mt), Netherlands (15 mt) and Ukraine (13.6 mt). The trade sanctions against Russia leave a large gap to fill, although it is unclear at this time how much India and China, particularly, will reduce their coal purchases from Russia.

Heavy rain and flooding disrupted coal production in Indonesia during 2021, and in Australia during the first quarter of 2022. Climate change is expected to intensify and add to price volatility.

Years of underinvestment in new coal mines or infrastructure are also contributing to the supply crunch. Coal exports from South Africa, for example, have declined over recent years because of the difficulties of getting the coal to the Richards Bay Coal Terminal via the rail service. In 2017, South Africa exported 83.5 mt of coal; this declined to 66.3 mt in 2021.

Given the cyclical nature of commodities and the current abnormally high prices, as global supply increases coal prices are expected to normalise gradually from their recent peaks. Consensus forecasts for the coal price are a decrease to an average of $225/ton in 2022 and $150/ton in 2023.

However, there is a large variance in this forecast given the number of factors that could influence prices.

On the demand side, higher prices are expected to reduce demand from consumers while global economic growth is expected to slow as central banks tighten monetary policy in response to global inflation that is increasing at its fastest pace in over 40 years. If central bankers cannot manage a 'soft-landing' for the global economy, this would reduce demand for all commodities including coal and could result in a global recession and a dramatic fall in prices.

The development of the Russian war in Ukraine, and the impact of further sanctions from the European Union especially, on the Russian energy sector, are big unknowns. There is also the possibility that sanctions on Russian exports could remain long after the war as Europe wants to reduce its dependency on Russian oil and gas. This could further support the demand for coal in the short to medium term while the supply of alternative energy sources catches up.

Policies to secure energy independence, especially in China and India, could result in an increase of local coal production in major markets and reduce export opportunities. This could contribute to pressure on prices.

Furthermore, there could be new Covid 19 variants that cause additional disruptions. The impact of the Chinese zero-Covid policy that resulted in new lockdowns in major economic hubs could have an impact on the demand and supply of commodities and products.

Commitments to climate change policies and the adoption of renewable energy are predicted to reduce coal demand in the longer term and the move to renewables could be accelerated if the price of fossil fuels remains high for longer. However, coal is expected to remain the primary source of electricity for some time to come. ■

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Photo: Bennie Venter.

Peter Major, director at Mergence Corporate Solutions.

The party's over for high commodity prices

"The party's over for over-the-top commodity prices, and the descent (gradual descent – we hope) of most commodities prices is imminent," says Peter Major, director at Mergence Corporate Solutions. This news comes just as we are beginning to get comfortable with surging commodity prices and, if his prediction proves to be correct, it is sad news for all of us – miners, suppliers, the industry, and government coffers. By *Nelendhre Moodley*.

According to Major, in just the past two years, mining houses and companies have made tremendous returns from robust commodity prices and have eliminated most of their debt. The surge in prices has been especially good to mines that were highly geared prior to the boom.

However, while these "stupendous commodity prices" have repositioned most mining producers to be in "the best financial shape they have ever been", the tide has turned and commodity prices are on a downward trend.

"This commodities party has been too good for too long," says Major, who explains that commodities such as rhodium and palladium, which were tracking fantastic prices just a few months ago, have fallen fast.

At its highest, rhodium traded at $30 000/oz but has since plummeted to trade at half that price at $15 300/oz.

Palladium has fallen from $3000 oz to $2000 oz, nickel from $50 000 ton to $27 000 ton, and iron ore from $220 ton to $130 ton. Platinum, iridium, aluminum, tin, zinc and others have fallen 20-30% off their peaks this year.

This year three-quarters of the projects presented were gold.

So good were the commodity prices that both the South African government and a few miners took their eyes off the real challenges inherent in our system.

"The sky-high prices compensated for most of our deficiencies, including bad government, damaging policies and regulation, appalling infrastructure – especially from Eskom, Transnet, and the Department of Water Affairs – and the challenges associated with *zama-zamas* and crime," Major says.

Over the years, government has done little to nothing to improve the lot of the mining sector and in fact, according to the Fraser Institute's Annual Survey of Mining Companies 2021, South Africa ranks in the world's ten least attractive mining destinations.

The Fraser Institute's annual survey ranks countries' attractiveness in terms of policy, mineral potential and other metrics based on responses from companies operating and exploring in these mining jurisdictions to come up with a report card that governments can use to assess whether their policies are attracting or driving away investment.

This disappointing ranking serves as a warning that we are headed in the wrong direction when it comes to attracting investment to the country's resources sector, the Minerals Council South Africa said.

But, if Major's forecast is correct, and most commodity prices are in decline, then Africa is the continent miners need to be in, as it has massive deposits, among the best grades in the world and, on the whole, the lowest working costs.

"Our deposits are as good as or better than any other place on the planet; our costs, other than South Africa, are also among the lowest, so if the commodity boom is heading down, then Africa is the place to be. It is also why companies like First Quantum Minerals and Ivanhoe Mines continue to invest billions of dollars into Zambia and the Democratic Republic of Congo.

Investor sentiment

"Investors want projects – you can't make money without projects – and projects need money."

In the past two years, mining companies have made tremendous returns from robust commodity prices.

What stood out most at this year's Indaba were the far fewer investors attending the event than before and, while the reason for this may be the lingering impact of the Covid-19 pandemic which has seen investors reticent to travel, as Major points out, Africa and/or mining, may have lost its appeal to investors.

"This might just be a warning sign that investors are inclined to agree that the commodities party is over. All mining shares are flagging low ratings with the JSE Resource Index and Anglo American both on a 7.5 PE and near 35-year lows with not much more than half their long-term averages. Amplats' PE is under 5.5 and Impala's an abysmal 4.5. No wonder mining execs are pleading with shareholders to be taken private – out of government and other special interest groups' criticising eyes."

The early-stage projects on show at the Mining Indaba and at the 1-2-1 conference were of a much higher quality than on previous occasions and "pretty well capitalised. In other words, they can go the rest of the year with no further investment".

Standout projects include gold exploration company Parallel Mining's advanced gold projects in Ethiopia, Newcore Gold's Enchi Gold Project in Ghana, gold explorer Sarama Resources' early-stage projects in Burkina Faso, AfriTin's tin, tantalum and lithium assets in Namibia and Mako Gold's Napié Project in Côte d'Ivoire.

"Parallel Mining and Newcore Gold's projects are high grade assets containing between 4 g/t and 7 g/t of gold. Interestingly, war-torn Ethiopia with its shallow high-grade deposits should in future rival Ghana as Africa's leading gold producer. However, Ghana's stable environment remains more attractive to potential investors for now."

As a judge reviewing the selection of projects at this year's Mining Indaba, Major explains that of the eight projects presented, seven were gold.

"Two years ago, there were a variety of projects on show. No two projects in a row were the same commodity – gold, lithium, graphite, copper, nickel, iron, platinum and chrome were all represented. This year, two thirds to three-quarters of the projects were gold."

"The sky-high prices compensated for most of our deficiencies, including bad government, damaging policies and regulation, appalling infrastructure – especially from Eskom, Transnet, and the Department of Water Affairs – and the challenges associated with zama-zamas and crime," Major says.

Although Sarama Gold was voted the number one project with AfriTin taking second place, Major explains that most of the projects presented were extremely attractive and made choosing all the more difficult for the adjudicators. ■

Gold drives African economies

Photo: Bennie Venter.

Gold Council's CFO Terry Heymann.

Gold mining remains a key driver of economic opportunity and, according to The World Gold Council's CFO Terry Heymann, its members paid a whopping $38-billion to their host countries over the course of 2020, with $8-billion paid in taxes and royalties, $8-billion to employees and the balance paid to suppliers. By *Nelendhre Moodley*.

"Over the past few years, the WGC has been on a drive to raise awareness of the gold mining sector's contribution to economic activity across the globe. Much of the WGC's work has been to quantify this economic contribution by host countries," explains Heymann.

"Gold is produced in a range of countries across the continent and, in those countries, gold is a really important portion of the economic development."

For Africa, which contributes around 26% to global gold production, the commodity is of great importance not only for its contribution to government coffers and its employment of millions of people, but mining houses play an integral role in socio-economic development of the areas in which the gold mines are found.

Of the 3 478,1 t of gold produced in 2020, Africa accounted for 931 t, with Ghana the leading producer on the continent, contributing 138,7 t, followed by other key producers such as Mali, Burkina Faso, South Africa, Sudan and the Democratic Republic of Congo.

In a world where gold is scarce and hard to find, the outlook for African gold mining remains positive given that the continent remains largely unexplored, offering great opportunity for future gold finds.

This bodes well for Africa because, with the development of new mines, African countries will be able to reap much of the economic benefits, notes Heymann.

"Gold is produced in a range of countries across the continent and, in those countries, gold is a really important portion of the economic development. In fact, speaking at the Mining Indaba conference, were three CEOs from leading gold producing companies with gold mines in Africa including Sébastien de Montessus of Endeavour Mining, one of the largest gold miners in West Africa, who highlighted the company's important role in contributing to the

Gold mining companies are also instrumental in key infrastructure development.

economy of Burkina Faso. Its Houndé, Mana, Karma and Boungou mines are real drivers of socio-economic development in terms of taxes paid, direct and indirect employment, the development of schools and education facilities and, importantly, the role the company played in helping its employees and the communities surrounding the mine during the Covid-19 pandemic," explains Heymann.

Endeavour Mining, a multi-national mining company, is West Africa's largest gold producer and owns and operates gold mines in Côte d'Ivoire, Burkina Faso and Mali.

Mark Bristow, CEO of Barrick Gold, spoke similarly of the efforts and initiatives the gold miner was making around its Kibali gold mine in the northeast of the Democratic Republic of Congo (DRC), an area with very little economic activity other than gold mining.

Bristow spoke at length of the role the Kibali mine is playing in driving economic development and bringing people out of poverty. He also highlighted the broader socio-economic development that comes as a result of responsible mining.

Barrick Gold operates gold mines in the Ivory Coast, DRC, Mali, Tanzania and Zambia.

Clive Johnson, CEO of B2gold, also highlighted some of the efforts the company has played in improving the economy of Mali. In fact, B2Gold contributes as much as 8% to Mali's gross domestic product.

With a move away from employing expats at mines across Africa, more than 95% of people employed at mines are sourced from local communities.

Gold mining companies are also instrumental in key infrastructure development, including building schools, roads, hospitals, and establishing water infrastructure for the communities surrounding the mining operations.

"Africa is blessed with plentiful sunshine and significant sources of water, and gold miners operating in Africa are using this abundance to establish renewable energy projects for their operations," says Heymann.

In a world where gold is scarce and hard to find, the outlook for African gold mining remains positive.

Climate change and gold mining

As companies look to clean energy options, gold miners are

Of the 3 478,1 t of gold produced in 2020, Africa accounted for 931 t.

playing a leading role in energy transition, with a number of miners in Africa already harnessing solar energy to power their operations.

"Africa is blessed with plentiful sunshine and significant sources of water, and gold miners operating in Africa are using this abundance to establish renewable energy projects for their operations," says Heymann.

"A global need for infrastructure to allow people to work from home fed through to demand for gold in electronic applications. That recovery has continued and demand in Q1 2022 was back at pre-Covid levels."

"Endeavour Mining, for instance, has developed one of the largest solar array plants in the world at its Burkina Faso mine, while Barrick Gold has installed a massive hydro power plant in the DRC. In both cases the gold mines created more energy than the mines needed and have fed the additional power to local communities who can, for the first time, be electrified. This is a great example, not only of supporting energy transition by establishing renewable energy sources, but of also providing electricity to parts of a population that didn't have it before. This is what responsible gold mining can do."

Recent developments in gold space

Following the World Gold Council's announcement of the Gold Bar Integrity Programme, which aims to help consumers, investors, and market participants trust that their gold bar is genuine and has been responsibly and sustainably sourced, the WGC is in the process of rolling out the pilot phase of the programme.

The database block-chain is intended to track gold bars along the supply chain from producer through to final product.

London Bullion Market Association and WGC have representatives from the global gold supply chain to launch a pilot phase of the project.

This initial phase will see two distributed ledger companies (aXedras and Peer Ledger) demonstrate how their technology can best deliver a global ecosystem that will create an immutable record of a gold bar's place of origin and chain of custody. This blockchain-backed ledger will register and track bars, capturing the provenance and full transaction history.

"The project is going through a pilot phase at the moment and is receiving participation from miners, refiners, logistical companies that ship gold, and the jewellery industry. It is a start of a really significant shift to bring the gold model into the digital age."

The Gold Bar Integrity Programme supports greater industry alignment to ensure the future growth of the international gold market.

Industrial applications using gold

According to Heymann, technology demand recovered swiftly from the initial damage inflicted by Covid-19 and global lockdowns in 2020.

"A global need for infrastructure to allow people to work from home fed through to demand for gold in electronic applications. That recovery has continued and demand in Q1 2022 was back at pre-Covid levels. There are sectors of growing demand for gold in industrial applications, such as automotives, 5G infrastructure and wearable healthcare tech, but the volumes of gold used in these applications are relatively small," he says.

The challenges related to continued chip shortages, lockdowns in China and an ongoing trend for miniaturisation and substitution, actually cloud the picture for gold usage in industrial and technology applications going forward.

Annual global technology demand has averaged 325 t over the past five years, accounting for around 8% of annual global gold demand.

Expectation for gold demand in jewellery and technology is expected to be flat, to slightly weaker, in 2022. ■


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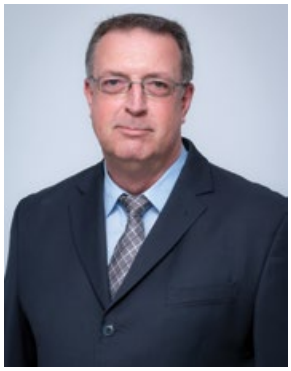
Experience, ESG, innovation drive region's mining

Mining has been an economic mainstay for Southern African economies in recent years, especially during the first disruptive lockdowns of the Covid-19 pandemic; the task now, according to Omnia group company BME, is to build on the momentum that has been created.



MD Ralf Hennecke.

The region's mining activity has shown positive signs as the world economy has rebounded, said BME managing director Ralf Hennecke. Sales in minerals such as copper, cobalt, gold, platinum group metals, iron ore and manganese have all benefited countries like South Africa and Zambia. For Botswana, Namibia and Angola, there are also better prospects for commodities such as diamonds, uranium and coal.

"Although the recent Fraser Institute annual survey ranked many Southern African countries poorly in terms of their mining policies, these industries are showing considerable resilience," says Hennecke. "The region is well endowed with mineral deposits and has the skills and experience to exploit them."

Local knowledge

He highlighted that the region's real value lay in the institutionalised knowledge of the companies that operate here, and their understanding of how to respond constructively to prevailing conditions and emerging trends. Among the recent shifts in policy which will strengthen this foundation is a greater focus on local business participation.

"As a result of our decades of involvement in Southern Africa Development Community (SADC) countries, we have a strong heritage that we are sharing with partners across the region," he says. "Our business networks allow us to meet localisation imperatives and to continue transferring skills."

Better fragmentation of rock – achieved through quality blasting – optimises the energy used in downstream functions.

feature

Through its in-country partnerships, BME also invests in local infrastructure and skills transfer, to build capacity in local supply chains.

Forward through ESG

He notes that BME's efforts on this front also support the shared-value and sustainability commitments of responsible mining companies, which have embraced the principles of empowerment now being legislated in many countries. Much of this commitment is expressed in the industry's well-accepted environmental, social and governance (ESG) policies.

"Our in-country partnerships also imply investment in local infrastructure and skills transfer, in order to build capacity in local supply chains," he explains. "Such capacity is vital for mining companies, especially in fields such as blasting and explosives – where reliable supply is crucial for mining to remain competitive."

For instance, a company like BME, – in aligning with Omnia group policies – prioritises openness, integrity and accountability, he notes. The group's ESG mandate embraces economic, social and environmental relationships through an integrated, sustainable approach that encompasses all stakeholders, including shareholders, customers, employees, suppliers, governments and the communities in which it operates.

Driven by innovation

Mining competitiveness in Southern Africa is also being built on ongoing technological innovation – much of it locally developed. The inexorable progress towards smart mining operations is being accelerated by the application of digital technology. In the blasting sector, says Hennecke, this is well demonstrated through the use of blast planning software, electronic detonators and other digital tools.

The motivation driving this trend not only includes safety, efficiency and productivity, but also the reduction of carbon emissions. Mining companies in the region are, like their global counterparts, acutely aware of environmental regulations and standards, as well as investors' insistence on best practice.

"To meet rising ESG and sustainability standards, mines are constantly fine-tuning the quality of their blasting practice, and improving the productive impact of their blasts," he says. "For example, better fragmentation of rock – achieved through quality blasting – optimises the energy used in downstream functions."

Where power consumption can be saved in energy-intensive activities like loading, hauling, crushing and grinding, mines can cut costs while reducing their carbon footprint. For BME, its emulsion explosives, enhanced by its AXXIS electronic initiation system and Blast Alliance suite of digital solutions, help mines to make this possible.

Learning from data

The digital learning curve is strongly driven by data generation, gathering and analysis. Mines are leveraging real-time information from equipment and processes all over the site for better and quicker decision-making. Hennecke highlights that for this data be intelligible and useful, it must also be integrated into the mine's chosen platforms.

"Suppliers of services, equipment and materials in Southern Africa are fast developing vital expertise in the digital space," he says. "This is enabling mines to track, measure and assess the performance of machines and services – ideally through their own dashboard or interface."

Botswana, Namibia and Angola benefit commodities such as diamonds, uranium and coal.

Data security is therefore growing in importance; mines must be confident that all systems are protected from outside interference by malicious sources, and at the same time complying with evolving local regulations governing data protection in each country.

"The days where data management was considered a niche field for technology specialists are over," he says. "Service

Sales in minerals such as copper, cobalt, gold, iron ore and manganese have benefited countries like South Africa and Zambia.

providers to mines in the region have increasingly ensured that they develop in-house digital expertise that adds increasing value to whichever suite of products or services the company delivers."

Project pipeline

Where Hennecke does have a concern is in the pace of new project development in the region. With potential commodity shortages looming, especially in battery minerals such as cobalt, copper, nickel and platinum group metals, there are simply too few greenfields projects in the pipeline to grasp the demand opportunities, he argues.

"With new mines and large expansions taking up to a decade to progress from planning to production, SADC countries could lose out if they are not more proactive in exploration and development," he says. "Greenfields projects in particular are scarce, and they could add valuably to meeting the future demand-supply gap."

He acknowledges that there might be some uncertainty about which minerals would be most in demand in 10- or 20-years' time, but notes that the mining sector would still be expected to respond quickly. In this context, mineral-rich countries like the Democratic Republic of Congo and Zambia are not currently seeing the necessary levels of investment.

Mining's attractiveness

While mining countries in the region have their own decisions to make about how to attract investment into their mineral sectors, it is encouraging to see the constructive steps being taken by the industry as a whole to improve its position as an investment target. While certain stereotypes about mining linger in the public perception, the sector has embraced complex ESG challenges proactively, he argues.

"The industry is also expecting its service providers and suppliers to align with these priorities," he notes. "This has laid the groundwork for a more constructive relationship with host governments and communities going forward."

For instance, it has taken seriously the impacts of climate change, and is engaging more effectively with local communities and other stakeholders. In many respects, mining is pioneering new levels of best practice, using the technological resources at its disposal.

"Southern Africa's opportunity is to grow its mining sector along this positive trajectory, allowing mining to release economic value and contribute even more to broader economic growth," concludes Hennecke. "By sharing value up and down its value chain within a sustainable operating model, mining holds great potential for stimulating secondary industries and inclusive growth." ■

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Multotec puts down deep roots in Africa

Jaco du Toit, Managing Director, Multotec.

In its nearly 50 years of existence, Kempton Park-headquartered Multotec, which offers one of the most complete ranges of minerals processing equipment on the market, has grown from being a purely South African player into a global group with operations spread across the world. As part of this geographical diversification, the sub-Saharan Africa region has become a vital area of operation for the company.

"We have a saying in Multotec that 'Africa is our oyster' and, over the past two decades, we've extended our reach across the continent quite dramatically, opening fully-fledged Multotec companies in key jurisdictions such as Botswana, Zambia, Mozambique and Ghana," says Jaco du Toit, managing director of Multotec International. "These are complemented by long-standing partnerships in certain countries, such as the DRC, Namibia, Sierra Leone, Guinea, Mauritania and Zimbabwe. These companies are familiar with our product line, provide the Multotec-standard levels of service and also receive full technical support from our regional subsidiaries and head office."

Our commitment to these countries extends beyond the workplace and we pride ourselves on the close relationships we have with the communities in our areas of operation," he states.

While West and North Africa, currently experiencing a commodity cycle gold mining boom, is growing in importance, sub-Saharan Africa remains the single biggest market in Africa for Multotec (after South Africa itself). "We are optimistic about our performance in Botswana, Zambia, the DRC, Zimbabwe and Mozambique and, in response to customer requests, we are looking at strengthening our presence in Angola through the appointment of a local partner," says du Toit.

Discussing Multotec's strategy in Africa, du Toit says the company puts down deep roots in the countries in which it operates. "We don't believe in the 'fly-in/fly-out' approach. We prefer to have a permanent presence in each country where we can be close to our customers. We also do our best to build up local suppliers and subcontractors. Wherever possible, we establish a degree of local fabrication. Our commitment to these countries extends beyond the workplace and we pride ourselves on the close relationships we have with the communities in our areas of operation," he states.

Multotec prides itself on close relationships with the communities in which it operates.

Botswana provides an excellent example of the Multotec philosophy in action. The company has been in the country for many years and, since 2012, has operated a fully-fledged subsidiary with a head office in the town of Letlhakane, in the heart of the Orapa diamond field, and additional site offices at the Jwaneng and Orapa diamond mines.

Multotec Botswana has in excess of 150 employees with 98% being Botswana citizens.

The Botswana company has more than 120 permanent employees as well as over 30 local contractors, 98 % of the workforce being citizens of Botswana. "We don't believe in reliance on expatriates," notes du Toit. "We much prefer to develop local managerial and technical skills and, of course,

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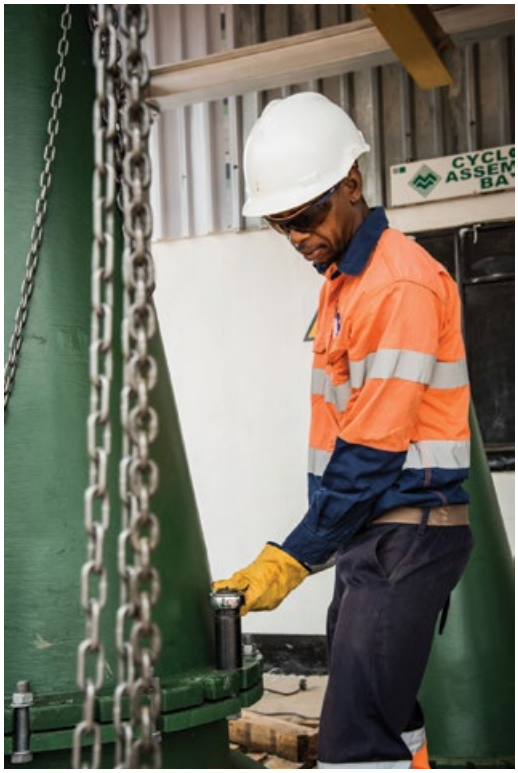

Multotec has fully-fledged companies in Botswana, Zambia, Mozambique and Ghana.

we have the facilities to provide training where necessary. Our training initiatives are targeted at our staff, our customers and the local partners. We're achieving genuine skills transfer."

He adds that Multotec Botswana is able to undertake light steel fabrication and assembly, making for much faster delivery and installation times.

Multotec Botswana offers Multotec's full range of products including screen media solutions, cyclones, magnetic separators, samplers, centrifuges, mill and scrubber linings and wear linings. It has been responsible for some innovative installations in Botswana, including a pulping chute at a diamond mining operation. The pulping chute, a ground-breaking development by Multotec, replaces the traditional rotary scrubber in the ore processing circuit and significantly reduces energy and maintenance costs.

The achievements of Multotec's Botswana company have been mirrored in Mozambique, where Multotec has operated a branch in Tete since 2011. It mainly caters to the coal mines around Tete, the mineral sands operation at Moma in the north-east and graphite operations in the north of the country. Multotec Mozambique recently reinforced its status in the country when it was awarded an additional two-year field service contract by a prominent coal mine in Tete for wear lining services. The project includes the supply and installation of wear-resistant material, preventive and corrective maintenance work on all wear-resistant equipment, and refurbishment of all the classification cyclones on site.

In Zambia, Multotec's subsidiary is located in the mining town of Chingola and is geared to supplying

Multotec's ground-breaking pulping chute at a diamond operation in Botswana.

Multotec provided an innovative hydrocyclone solution for a safe and cost effective tailings storage facility at a large copper mine in Zambia.

Multotec's hammer samplers lauded by the COO of a bauxite mining operation in Guinea.

Multotec's African subsidiaries have fully equipped fabrication workshops.

the copper and cobalt mines of the Copperbelt. Says du Toit: "With its big mining industry, Zambia is an extremely important market for us and we have been active on the Copperbelt for 21 years. Although Chingola will remain our base, we are alive to the fact that the centre of gravity of copper mining in Zambia is shifting from the traditional Copperbelt into North-Western Province. In response to this, we are in the process of establishing a facility in Solwezi which will enhance our services to this area."

Over the years Multotec has completed many notable contracts in Zambia, with one of the more recent ones being an innovative hydrocyclone solution which allowed a large copper mine to develop a safe and cost-effective tailings storage facility (TSF). The gamechangers in this case were Multotec's 250 mm GV hydrocyclones, each specially modified to make them easier to handle and manoeuvre.

"At the end of the day, our success ultimately lies with the quality and performance of the equipment we supply and it is always heartening to receive accolades from our customers," says du Toit. "At the recent Mining Indaba, for example, we were delighted to get feedback from one of our customers who operates a bauxite operation in Guinea in West Africa. We designed, installed and commissioned two of the biggest hammer samplers in the world at the mine and we were complimented by the COO on our project management of the project, and on just how well they are working."

Du Toit says that he and his colleagues who attended the recent Mining Indaba were encouraged by the strong addresses delivered by President Cyril Ramaphosa, who gave a realistic yet upbeat assessment of the prospects for South Africa's mining industry, and Zambia's new President, Hakainde Hichilema, who stated emphatically that Zambia was open for business and that it was the country's goal to increase copper production more than threefold to 3 Mt/a in the medium term.

"It was great to hear such positive messages from these two leaders and it was also heartening to listen to representatives of some of the major mining houses, who generally expressed confidence in the African mining market. Certainly, we at Multotec are very excited by the opportunities we see in Africa and are looking forward to expanding our footprint even further on the continent," he concludes. ■

nuGen: the world's first hydrogen-fuelled

On Friday May 6 at the Mogalakwena PGM mine in Limpopo, South Africa, Anglo American launched nuGen, the world's first 510 t ultra-class load haul mining truck to be fuelled by hydrogen and electrically driven via hydrogen fuel cells. By *Peter Middleton*.

With a payload of 290 t and a drivetrain that can deliver 2.0 MW of power from 800 kW of fuel cells and 1.2 MW of battery storage, the vehicle is the largest hydrogen powered truck ever converted to run on hydrogen.

The nuGen™ vehicle was engineered in-house to enable the entire open cast mining fleet in Anglo American to be converted from diesel to hydrogen. It delivers a zero-emission haulage solution that, on this truck alone, saves 3 000 ℓ of diesel consumption per day at Mogalakwena, displacing 8.0 t of CO_2. If implemented on all of the trucks at an average sized open cast mine, 120 000 t of CO_2 emissions per year can be avoided, and there are over 1 000 such mines worldwide.

For any hydrogen vehicle to be truly zero-emission, however, renewable energy sources must be used to produce 'green' hydrogen. Also required is vehicle refuelling infrastructure, all of which is under development as part Anglo American's FutureSmart Mining™ initiative.

In partnership with Engie, Anglo American has been building a hydrogen production, storage and refuelling complex at Mogalakwena that incorporates the largest electrolyser in Africa. Powered by an onsite solar PV plant, this electrolyser and its surrounding infrastructure use water to produce pressurised hydrogen for refuelling the mine's nuGen trucks.

"The launch of the nuGen truck is truly remarkable and it is a huge milestone on our journey as a country to creating an industry, but also an economy, that is more sustainable, more innovative and resourceful," said South African President Cyril Ramaphosa speaking from Mogalakwena. "It is a smart step for Anglo America, but it is a giant leap for South Africa's hydrogen economy into the future," he noted.

"Today's launch of the world's largest truck powered by green hydrogen – that will be produced, yes, at the mine – also shows us that the energy economy is beckoning us: as a country and as an industry. The hydrogen economy has definitely arrived for South Africa and today we celebrate its arrival," Ramaphosa assured.

In terms of broader national development, he notes that the Department of Science and Innovation,

Anglo American's nuGen truck in motion.

feature

load haul truck

Anglo American and Engie, amongst others, are in partnership to develop a hydrogen valley to capitalise on the country's PGM resources and its renewable energy potential. The aim is to revitalise and decarbonise key industrial sectors along an economic corridor that extends from the mines in Limpopo, down through Johannesburg and onto the KwaZulu-Natal coast, potentially contributing some R57-billion to South African GDP by 2050.

This with a view to making South Africa a real centre-of-excellence for green hydrogen production and export. "Just as finding new mineral deposits leads to new demand in various parts of the country, so will the green hydrogen economy spawn new industries and associated economic activity, leading to the improvement of the lives of our people. This is the beginning of the future that we envisage in the new development plan," notes South African President, Cyril Ramaphosa. ■

nuGen is the world's first hydrogen-fuelled load haul truck.

Alternative energy solutions crucial for future of mining

Mining is a power-intense industry. And because sites are often in remote areas, the potential shortfall of available grid power introduces further complexity into operations. This has resulted in mines relying on fossil-based fuel sources such as diesel or coal, while supplementing these with massive on-site diesel generators. By *Peter Middleton*.

Dinesh Buldoo, director for Power at WSP in Africa.

"To counteract the high cost and environmental impact of these traditional approaches, there is a rising interest in adopting hybrid energy solutions, "says Dinesh Buldoo, director of Power at WSP in Africa.

He says that mining companies across Africa are looking to invest in standalone or micro-grid hybrid power solutions that incorporate some form of alternative energy resource, such as gas or renewable energy options, like solar or wind, to address off-peak demand. "These enable mines to address the risk associated with grid power interruptions or find a workable solution where grid power access is not available. They can also offset the unstable costs and risks associated with their reliance on and access to diesel," says Buldoo.

"At a time when the focus is on ESG (environment, social and governance), using hybrid power solutions can also see mines positively contribute to the carbon reduction of their operations," he adds.

The benefits of adopting renewable energy resources in hybrid power generation solutions are clear. For one, it is a cleaner fuel source. Environmental pollution from solar or wind energy is far lower than technologies that rely on combustion of fossil fuels.

It is also more sustainable. As long as the sun shines and the wind blows, the energy produced can be harnessed to send power across the grid. "Simply put, renewable energy resources are cost effective. With constant developments and advances in the technology, the upfront capital investment to

One of the biggest business opportunities for renewable energy is certainly off-grid mines.

feature

Mines rely on fossil-based fuel sources such as diesel or coal.

build a solar or wind farm is becoming increasingly affordable," argues Dinesh Buldoo.

Renewable power plants can be deployed close to the source of demand through micro-generation. This also means that the renewable power plant will feed the mine with the power supply it needs for its operations and at a locked-in price.

"Mining companies are under immense pressure to address climate risk by reducing greenhouse gases and the impact of their operations on the environment. By adopting alternative power solutions, mining companies will not only be in a better position to secure their supply but, by integrating cleaner alternative energy sources, also support decarbonisation strategies and therein meet the mine's ESG commitments," he notes.

Adoption is still in the early days, but it is gaining traction, Buldoo continues. "In Chile, for instance, BHP, Anglo American and Antofagasta Minerals have all asserted their plans to power their local operations entirely from renewable resources. Brazilian mining company Vale has committed to reach 100% of renewable self-generation by 2025 in Brazil, and 100% of renewable electricity consumption globally by 2030," he says.

Africa still has some way to go before the trend becomes mainstream but, as more multinational operations roll out these solutions as part of their transition plans, it is only a matter of time before mines in Africa start embracing this as well.

Additionally, hydrogen as energy storage and clean hydrogen technologies can help the major electricity systems and domestic sectors to decarbonise. Heavy vehicles powered by hydrogen fuel cells could meet the increasing demand for zero emissions transport, with the advantage of long range, rapid refuelling and moderate costs. Replacing natural gas with hydrogen could, in many cases, decarbonise direct combustion at less cost than can electrification.

"One of the biggest business opportunities for renewable energy is certainly off-grid mines. These hold the potential to reduce pressure on national and regional grids. Where mining sites are in remote locations, renewables offer more cost-efficient solutions to establish independent power plants and micro-grids that can feed the mine with the power supply it needs – as well as potentially supply power to communities and small industries in the surrounding areas.

"Ultimately, mines can ill afford to continue with the energy status quo. They must embrace cleaner, alternative energy sooner rather than later if they are to ensure the longevity of operations within the current pressurised ESG environment," concludes WSP's Dinesh Buldoo. ■

Mines must embrace cleaner, alternative energy sooner rather than later.

David Claassen, managing director of Trafo Power Solutions.

Dry-type transformers make inroads into African mining

While Africa's mines are still predominantly users of oil-coiled transformers, the situation is fast changing, with dry-type transformers making strong inroads into the mining market due to their inherent safety features and the fact that they are virtually maintenance free. In addition, they can easily be transported to the remote sites which so often characterise the African mining scene.

"We're noticing a big uptake of our dry-type transformers by mining customers," says David Claassen, managing director of Johannesburg-based Trafo Power Solutions, which specialises in providing high-quality dry-type transformers in the 50 kVA to 25 MVA range. "Our units offer the same efficiency as their oil-cooled competitors, are very economic to run and are extremely safe, which, of course, is a key requirement on mines. The case for choosing them over the oil-filled alternative is very compelling."

Claassen, who has been in the electrical business for 20 years, founded Trafo Power Solutions in 2017. "I was convinced that there was a huge potential for dry-type transformers in Africa and I established the company with the goal of eventually becoming the leading supplier of these units in the African region," he recalls. "Our growth since then has been typical of what you would expect to see from a start-up company with a great idea, and sales have grown continuously – sometimes almost exponentially – in the five or so years we've been in business."

Trafo Power Solutions sources its transformers from TMC Transformers in Italy, a global leader in the field, and has the exclusive rights to sell and support TMC's products in sub-Saharan Africa (although it sometimes supplies even further afield). "Our partnership with TMC has been vital to our success," Claassen observes. "They're a company noted for innovation and they share our vision of what can be achieved in the African market. They specialise in customised designs and are eager to take on any technical challenge."

While the transformers are fully imported, the enclosures that are often required to house them are produced locally with Trafo Power Solutions handling the designs and specialist suppliers undertaking the fabrication. Units can be standalone or integrated into mini or modular sub-stations, with Trafo Power Solutions supplying the entire package.

Elaborating on the safety features of dry-type transformers, Claassen says that the key point to understand is that they are cooled through natural ventilation in contrast to conventional transformers, which have windings that are immersed in oil. "Oil-cooled transformers generally work well but there is no denying that the oil is a fire and an environmental hazard, and these are important considerations in the mining industry," Claassen observes.

"Fires can arise internally in an oil-type transformer as a result of a fault such as a short circuit and then the oil acts as a fuel, with the result that the fire destroys the transformer – sometimes explosively – and possibly spreads to surrounding infrastructure. A fire can also arise externally and then spread to the transformer, again with dire results. In both cases, noxious

The control panel on this 3.5 MVA dry-type transformer enclosure is critical as it monitors the internal core temperature of the transformer, which is vital for mining environments.

feature

fumes can be emitted from the transformer. None of these scenarios is possible with dry-type transformers, which makes them particularly appropriate for enclosed spaces such as underground mines and for all hazardous areas."

Claassen adds that Trafo Power Solutions' dry-type transformers are categorised as F1 in terms of international fire resistance ratings and are manufactured from materials that are flame retardant and self-extinguishing.

Apart from the fire risk, oil leaks are always a possibility with oil-type transformers, particularly as they age, which means that a bund is often required to contain any spillage. Moreover, the oil has to be checked at regular intervals to ensure it is free of contamination. By contrast, Trafo Power Solution's dry-type transformers normally require just a once-a-year check-up which can be completed in two hours.

A major selling point for Trafo Power Solutions is that its transformers can be customised to meet customers' requirements. "To give an example, we're currently working on a contract to supply a South African underground gold mine with two large transformers," Claassen says. "We've had to design them with space and mass constraints in mind as they will be taken down to the working area in a cage via a vertical shaft. Tight specifications of this type are frequently encountered with underground mines and, in conjunction with TMC, we are always able to provide a solution."

Another advantage of Trafo Power Solutions' dry-type transformers is that they are generally more transportable than their oil-filled counterparts. "This is the result of their rigid construction which allows them to withstand the vibrations of road travel, which in many parts of African can be quite severe due to the poor condition of roads," notes Claassen.

The transportability of Trafo Power Solutions' units was well illustrated several years ago when the company supplied two 3 000 kVA, 400 V/11 kV transformers and two smaller lighting transformers to Alphamin's new Bisie tin mine in the DRC's North Kivu Province, arguably one of the most remote mine sites in Africa. Trafo Power Solutions designed the transformers and associated sub-station to withstand

A 1000 kVA dry-type transformer going through the applied voltage test.

Partial discharge testing being carried out on a 1000 kVA dry-type transformer for a mining project.

Above: Dry-type transformers provide unique advantages over the traditional liquid cooled types, including a smaller footprint and lower maintenance costs.

Below: A 1800 kVA dry-type transformer designed and built to order in an IP23 enclosure.

the long journey by road. The solution provided – which included the design of ventilation and airflow systems to counter the extreme humidity and heat that can be experienced at the site – was manufactured in just 12 weeks and delivered to the mine within the agreed timeframe.

In another successful contract, Trafo Power Solutions supplied four dry-type units to a mine in Sierra Leone. The challenge here was to provide transformers able to move along with mobile process plant over rough terrain. The transformers proved more than capable of handling the tough conditions – so much so, in fact, that the mine followed up with a second order for six more units.

The ability of Trafo Power Solutions' transformers to work under exacting climatic conditions was highlighted recently when it supplied a 3 000 kVA transformer to a gold project in Kyrgyzstan located at an altitude of 4 020 m above sea level on a site where temperatures can go as low as minus 40 deg C.

According to Claassen, the range of conditions in which Trafo Power Solutions' transformers can be deployed is continually widening and he cites the case of recent installation in Mexico in which dry-type units supplied by TMC have been rated at IP68, the very top of the international IP rating scale, which is a measure of resistance to water and solids ingress. "Basically, this means that the transformers can be totally submerged in water without ill effect," he says.

Looking at Trafo Power Solutions' strategy moving ahead, Claassen says that it will be a case of "more of the same" from the company. "We believe in staying close to our customers so that we understand their needs," he says. "This approach has served us well and will remain at the heart of our strategy. We're optimistic about prospects and see particular growth in mining, which is experiencing a strong upturn at the moment. We've built up a significant population of machines on African mines and we're confident that we will continue to expand our market share." ■

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SOOSAN

Actions mining companies should be taking now to reduce their emissions and climate proof their operations

By Tycho Mőncks, MD Boston Consulting Group (BCG) Johannesburg

At African Mining Indaba last month, the focus of many of the panel discussions was on the future and long-term environmental sustainability of mining in South Africa. The industry – a major contributor to GDP, foreign exchange earnings and employment in the country – is facing increased pressure to address its environmental impact and establish a clear strategy to reduce its emissions.

The carbon intensive nature of mining in South Africa, and its vulnerability to climate-related events, creates a unique set of risks for mining companies. However, if these organisations move quickly and collectively, it is possible to manage climate risks by adapting operations, adjusting portfolios, and climate-proofing businesses to take advantage of opportunities present, both in the near- and long-term.

Although mining companies are acting on climate risks and have already significantly advanced their climate responses over the past ~5 years, substantially more needs to be done. Among the actions mining companies can take, there are three priority areas with an immediately positive impact that should be high on the agenda:

1. Reduce energy intensity by using technologies such as energy efficient pumps to improve overall operational efficiency and deliver 'the same with less'; and consider containing Scope 1 emissions through the deployment of alternative fuels, such as hydrogen, to limit diesel usage.
2. Reduce Scope 2 emissions by building renewable energy capacity for self- or co-generation of electricity to limit reliance on utility supply and reduce Scope 2 emissions originating from the prevailing primarily coal-generated grid electricity.

Extensive investment will be needed in exploration for those commodities that will drive the global transition to a low carbon world.

Tycho Mőncks, MD Boston Consulting Group.

3. Address Scope 3 emissions by assisting downstream industries to reduce their carbon footprints, for example, by producing iron ore qualities that minimise CO_2 release in steel making.

In addition, extensive investment will be needed in exploration for those commodities that will drive the global transition to a low carbon world. Demand for commodities such as copper, nickel, cobalt, lithium, silver, and rare earth minerals like praseodymium and neodymium is expected to remain strong in the medium- to long-term, owing to their importance in the manufacture of many green technologies such as solar panels and battery storage solutions. In fact, the energy transition as a whole might be slowed down if mining companies fail to produce these materials at sufficient volumes to meet global demand.

While the above recommendations sound almost straightforward, they ultimately represent a significant transformation of today's mining industry. Individual mining companies, and the industry as a whole, need to take the journey seriously. The chances of success in this endeavour are substantially enhanced if companies take the following actions:

1. Establish a dedicated, active Environmental, Social and Governance (ESG) Programme Management Office (ESG-PMO) to manage emission reduction programmes and all facets of ESG initiatives.
2. Secure the necessary digital and ESG talent, and invest in upskilling current employees to meet future needs.
3. Shape an ecosystem that enables change by partnering with regulators, local communities, and employee organisations.

ESG-PMO: Mining companies should approach their emission reduction programmes with the

mindset of an holistic business transformation, and establishing a PMO will assist with this. The PMO will be best placed to understand baseline emissions, which is key to establishing realistic targets and achievable milestones. Companies will also need to assess a range of possible emission reduction measures. This includes assessing technology options and the feasibility of the various options. Whichever emissions reduction strategy is chosen, it must be implemented with the same rigor and commitment as a traditional holistic business transformation.

Talent: Understanding which reduction levers to use, how to apply them, and in what sequence is no simple task; it requires specialised talent. Setting up dedicated centres of expertise and modernising operations by introducing digital technology to collect and analyse data in a structured manner across all the company's assets can help to assess abatement potential, constraints, and costs. To implement these modernisation initiatives, digital talent will need to be secured. Additionally, ESG initiatives will require securing talent with ESG knowledge and competencies, as well as reskilling existing employees to meet these challenges. In a recent BCG survey, a lack of ESG knowledge and competencies was found to be the key constraint hindering sustainability being embedded in an organisation's corporate strategy. With the high demand for digital and ESG talent across South Africa, mining companies will likely need to set up their own digital accelerators and train the next generation of talent, rather than relying on obtaining the necessary skills from an increasingly tight external market.

Ecosystem: South African mining companies should remember that climate responses will need to be a coordinated response across the industry and with the support of regulators, employees, and local communities. Implementing measures to address climate challenges will require all stakeholders to collaborate diligently and remove any barriers to enable the change needed. By working together, the various stakeholders can shape a greener mining industry in South Africa – and become more competitive on the global stage.

Mining is facing pressure to establish a clear strategy to reduce its emissions.

Climate change poses a significant risk to mining in South Africa, but the challenges are not insurmountable. The steps outlined above will not only improve the long-term environmental sustainability of mining operations, but will also likely lead to significant cost savings and operational efficiencies. Mining is crucial to the South African economy and climate-proofing operations are necessary for the industry to remain competitive globally. Mining companies need to take this transformation seriously. Those that are proactive and take the necessary steps now will set themselves up for success in the future and place themselves at an advantage compared to climate laggards who fail to acknowledge the risk climate change poses to the industry. ■

Condra wins order for Mupani Mine

Crane and hoist manufacturer Condra has won a crane and hoist order for Mupani Mine, one of several Zimplats operations in Zimbabwe. Mupani is undergoing an upgrade to replace production at Rukodzi and Ngwarati mines, and part of Mupfuti Mine. These are projected to deplete over the next six years.

Condra manufactured and supplied cranes for Zimplats Mupani Mine.

The order for the lifting equipment was placed by Australian project management company Worley. It comprises thirteen machines for installation underground: two workshop-duty double-girder electric overhead travelling cranes, a jib crane for ore transfer, and ten short-headroom hoists for miscellaneous functions.

All units have been designed for ease of transportation within the confines of a twokilometre-long underground access route. When manufacture is complete, only the short-headroom hoists will be shipped without being dismantled. The 5-ton jib crane, 10-ton overhead crane and sister 30-ton machine will first be extensively disassembled to enable mine tunnel navigation. Crane girders will be separated from endcarriages and crabs, while the crabs themselves will be shipped minus their hoists.

All three cranes are already being manufactured at Condra's Germiston works.

After delivery, underground installation on gantries supplied by the mine will be executed by Worley's technical teams using chain-blocks attached to rock bolts reinforcing the hanging walls. The company's engineers designed the Mupani overhead cranes to suit reduced installation dimensions aimed at minimising blasting and excavation not directly associated with ore removal. Compacted to fit within the confined operating spaces, the cranes can nevertheless deliver the lifting heights required by the customer. ■

Cameroon exploration progresses with Multotec pilot plant

An exploration project in a remote area of Cameroon has been using a modular pilot plant from Multotec – complete with screen panels, cyclone and spiral – to conduct small-scale testing on its site. Multotec sent a process engineer to the site to assist with commissioning and training of the customer's staff.

The pilot plant was designed and assembled at Multotec's manufacturing facilities in Johannesburg, and shipped to central Africa last year. The containerised plant includes a range of Multotec's own equipment, including screen panels, cyclone rig and spiral rig.

According to Faan Bornman, technology manager: research and development at Multotec's technology division, drill samples from the prospect area are passed over the screen to remove oversized material, with undersize going into a sump to be mixed with water to the correct density. The undersize material reports to the cyclone for desliming – the removal of very fine particles – delivering an underflow with an optimal size range of between 38 microns and 1 mm. This is fed to the spiral rig for concentration, with the spiral delivering a concentrate, middlings and tailings. The process allows the project to assess its economic heavy minerals (EHM) portion, which is concentrated towards the inner section of the spiral.

The equipment in this pilot plant is vital to achieving an accurate assessment of the deposit's viability, but the results also give the customer important insights into how the full-scale plant should be designed if exploration proves results provide positive. ■

Multotec delivers pilot plant to exploration project in Cameroon.

ELB Equipment launches new range of Powerscreen conveyors

Equipment supplier, ELB Equipment recently launched its latest range of Powerscreen mobile conveyors, which offer reduced crushing and screening costs with the use of mobile conveyor loading solutions. The product is suitable across a range of applications and replaces more costly loading equipment. Efficiency, productivity and increased stockpile capacity are just some of the benefits available from ELB Equipment's latest offering of Powerscreen mobile conveyors, the company said.

Wakefield Harding, ELB Equipment national sales manager for mining, says that the range has tracked conveyor mobile machines ranging from 21 to 30 m and from 500 to 1000 tons per hour (tph).

"The tracked radial mobile conveyors range from 20 to 24 m and 500 to 1 000 tph with stockpile capacities of up to 7 500 m^3 at 180 degrees. Furthermore, all the mobile conveyors can be run on automated programmes as an optional extra. The advantage of this range of Powerscreen mobile conveyors is that they prevent degradation and segregation of materials, meaning that they do not separate fines and heavy materials during the stockpiling process and prevent degradation of material as it is stockpiled." ■

ELB Equipment recently launched its latest range of Powerscreen mobile conveyors.

Aggreko celebrates 60 years

Aggreko celebrates 60 years in business.

Aggreko, a provider of mobile modular power, temperature control and energy solutions, celebrates 60 years in business this year. Aggreko Australia Pacific MD George Whyte said the Netherlands-born company – now active in about 80 countries globally – has played an evolutionary role in mine power and temperature control. According to Whyte, digitalisation has been one of the biggest transformers of the mining industry, as it has assisted with emissions reduction and safety improvements. "Digital technology provides the data needed to reduce unpaid down-time on mine sites, for instance, or to discover how solar and batteries behave under cloud cover," he said.

Aggreko's latest technologies include its 1300 kW Ultra-Low Emissions Package – a world-first power generation system, which effectively eliminates up to 99% of all controlled emissions from diesel generator exhaust streams. Emission levels are 90% lower than the next best available technology on the market. Aggreko has a net-zero emissions goal by 2050 and a 2030 target to reduce diesel use in its customer solutions by 50%. ■

Epiroc HRD100 hydraulic rock drill delivers on performance

Epiroc's smart HRD100 Hydraulic Rock Drill, a complete handheld drilling system, consisting of the rock drill, power pack and a selection of pusher legs, has been designed to provide efficient, accurate and safe hydraulic drilling of blow and support holes. The innovative HRD package offers a convenient and cost-effective 'plug and play' solution, requiring only electricity and water to operate, thus eliminating the need for compressed air infrastructure installation and reducing maintenance, the company said.

Epiroc has supplied over 600 Hydraulic Rock Drill sets to customers across South Africa and recently received additional orders from a leading global mining company for use at one of its local operations. ■

Epiroc HRD100 hydraulic achieves faster drill times and increased production.

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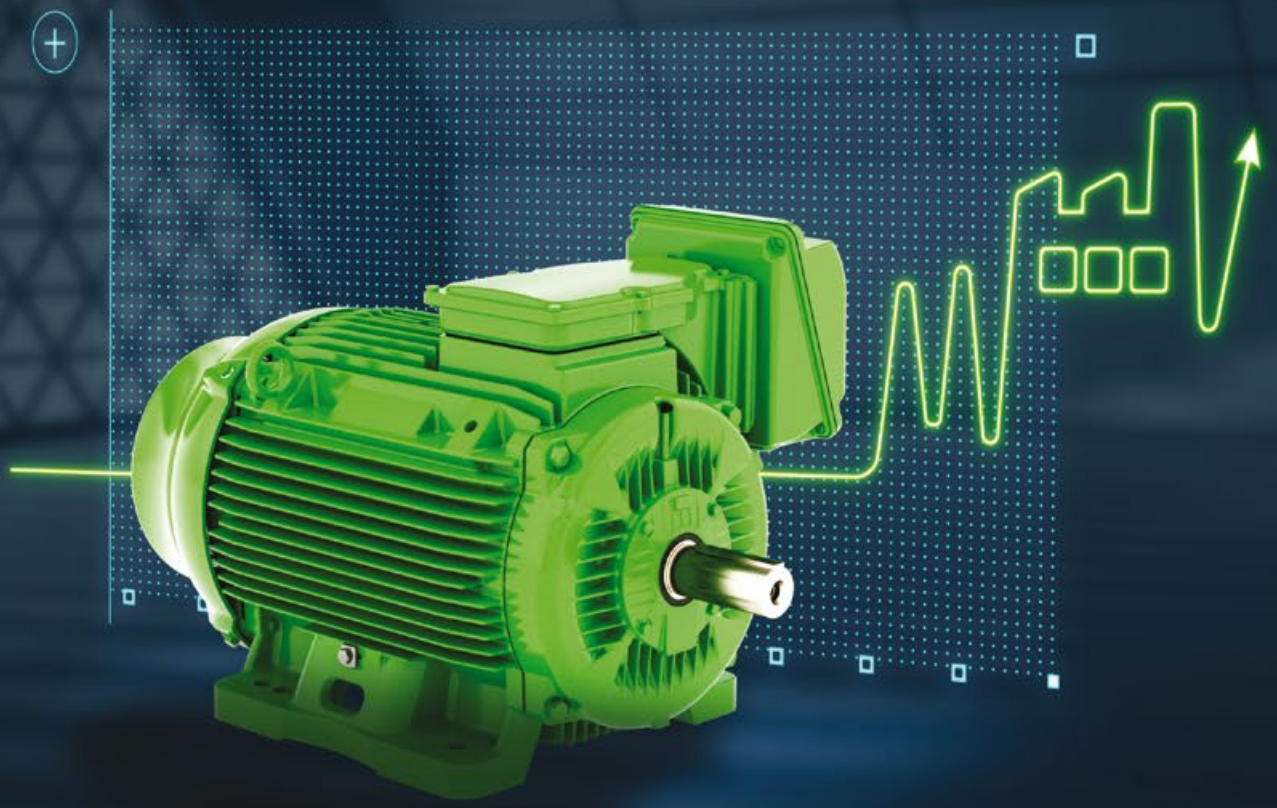

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