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ON THE COVER

Following the success of its locally patented Nip Guard, Brelko has been granted a US patent on its innovation. See story on pg 6.



Nelendhree Moodley.

Will India's population growth drive demand for gold?

China and India are the world's top consumers of gold. India recently overtook China as the world's most populous nation, with numbers surpassing the Chinese population, which was at 1 425 775 850 people in April. According to the United Nations, India's population is set to continue growing for several decades. By contrast, China's population recently reached its peak and has been on a decline during 2022. It is interesting to note that the UN projects the size of the Chinese population will continue to fall and could drop below 1 billion before the end of the century.

Underpinned by a world population of over 8 billion people, minerals and metals will certainly continue to be in demand, but what of gold, for which Indians have a propensity?

India is one of the largest markets for gold with growing affluence further driving demand for the precious metal.

Gold plays an important role in the country's culture, as it is considered a store of value, a symbol of wealth and status, and a fundamental part of many rituals. Even among the country's rural population, there is a deep affinity for gold.

According to the World Gold Council, for Indians, gold is central to personal life events and gifting gold is a deeply ingrained tradition especially as part of marriage rituals, with weddings alone said to generate approximately 50 percent of annual gold demand in India. According to recent estimates, Indian women account for as much as 11% of the world's total gold reserves. That is a whopping 18 000 tons of gold.

With the gold price having already traded over \$2000/oz this year, a growing Indian population bodes well for its continued demand.

In this edition

In our June edition, we cover Akobo Minerals, which recently made the jump from explorer to producer, becoming one of Ethiopia's latest precious metals producers, as it targets first gold and 1 moz producer status (pg 12). In the meanwhile,

West African gold miner, Hummingbird, is aiming to become a +200 000 ozpa producer, and is on track to commence first production from its Kouroussa mine in Guinea by the end of Q2 2023 (pg 16). This new gold production is the pipeline needed to meet soaring demand for the precious metal.

Also in the gold mix is GoldOre's MACH technology, which continues to evolve and has recently been improved for lower energy consumption – even more relevant in our time of extreme power crises (pg 28).

Our cover story, Brelko, considers its people as among its most precious assets, with MD Kenny Padayachee stating that 'it's people above profits'. With a central focus on health and safety, the manufacturer has been promoting employee health initiatives, going so far as to establish its facility as a 'smoke free' zone. The company has also replaced its fleet of diesel-powered fork-lifts with electric pallet jacks, which, says Padayachee, encourages employees on the floor to 'move more'. The conveyor-belt cleaning equipment supplier though, remains at the forefront of innovation and has more recently been on a drive to patent its Nip Guard technology in the US (pg 6).

In our Junior Mining feature, it is interesting to see that despite overwhelming challenges, the junior mining sector has done 'disproportionately' well when compared to the rest of the mining industry, according to Junior and Emerging Miners Desk lead, Grant Mitchell. In 2022, the annual revenue generated by junior producers was R88 bn, while the rest of the sector contributed R1.2 trillion. This amount is a massive jump from the R54 bn contributed in 2018, even with inflation taken into account.

Zest WEG and SEW-EURODRIVE, in the power supply and energy efficiency feature, tout their energy efficient product ranges, with Zest WEG's variable speed drives offering many advantages (pg 32) and SEW-EURODRIVE driving solutions supporting mines' focus on energy efficiency (pg 34). ■

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Kouroussa Gold Mine commissioning begins

Gold miner, Hummingbird Resources, has announced that the Kouroussa Gold Mine processing plant has reached the practical completion stage, and has entered the commissioning phase towards achieving first gold pour this quarter, Q2 2023. The Kouroussa Gold mine in Guinea is a high grade, over 4 grams per tonne (g/t), open pit operation, and is the company's second operating gold asset in West Africa. Dan Betts, CEO of Hummingbird,

commented: "As we begin the commissioning phase to bring Kouroussa online, we remain heavily focused on safety at this busy time. Additionally, operational readiness and the transition to daily operations is a key part of this phase as we look not just to first gold, but to ramping up production to name plate capacity and moving the company to being a +200 000-ounce, multi-asset, multi-jurisdiction gold producer." ■



Hummingbird begins commissioning Kouroussa Gold Mine.

PlatAfrica to bring 2023 'emergence' theme to life

South Africa's annual platinum jewellery design and manufacturing competition, PlatAfrica, has opened for entries from professional and student designers. The theme for this year's edition of PlatAfrica is #Emergence, and calls on designers to create pieces that inspire and resonate with customers, while pointing to the promise of better things to come. Now in its 24th year, and hosted annually by Anglo American Platinum, Metal Concentrators and Platinum Guild International (PGI) India, PlatAfrica aims to increase local beneficiation and position platinum as the jewellery metal of choice for consumers. The competition features three prize categories: professionals, apprentices and students, and the People's Choice award, where the public will have the opportunity to vote for their favourite jewellery piece. ■



PlatAfrica has opened for entries from professional and student designers.

Caledonia commences the direct sale of gold produced from Zimbabwe

AIM-listed Caledonia Mining Corporation has commenced the direct sale of gold produced from the Blanket Mine to a refiner outside Zimbabwe. Since listing on the Victoria Falls Stock Exchange and following completion of the Bilboes

acquisition, Caledonia has been looking into various avenues to achieve the direct export of its gold. Unrefined gold continues to be processed at Fidelity Gold Refinery (FGR), a subsidiary of the Reserve Bank of Zimbabwe, on a toll-

treatment basis. The exportation of the gold is facilitated by FGR as the holder of a gold dealing licence. The refined gold held by FGR is exported to a refinery outside Zimbabwe, the receiving foreign refinery undertakes the final refining process, and the gold is sold on behalf of Caledonia. ■

Reddy takes on chairmanship of SRK

SRK Consulting (South Africa) recently appointed Vis Reddy as its new chairman, following an eight-year term as MD. Reddy has also assumed the role of regional coordinator for Africa, on behalf of SRK Global – as part of the company's strategic expansion into African markets. He explained that his focus will build on the work of previous chairmen in promoting innovation, technology, excellence and collaboration, all of which align with the company's strategic focus areas. "The international SRK network has grown considerably, and it remains important to work as a team to leverage our one-stop-shop capabilities," he said. "We have always strived to be a leader in our field, and to serve clients in a diverse range of skills and offerings as markets evolve." ■



Caledonia commences direct sale of gold to a refiner outside Zimbabwe.

A white Liebherr rough terrain crane is shown in operation on a construction site. The crane's boom is extended high into the air, lifting a large, dark metal bucket. The crane is mounted on a chassis with outriggers, which are extended to the ground for stability. The background features a clear blue sky and a line of trees on a hillside.

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Brelko targets Nip Guard patent in the US

Following the success of its locally patented Nip Guard, an innovative product developed in 2018 and rolled-out to the South African mining industry, Brelko, a Johannesburg based conveyor cleaning equipment supplier to the mining sector, has been granted a US patent on its innovation. *By Nelendhre Moodley.*

The company continues to broaden its horizons by developing technologically advanced products that target zero harm, and is testing the boundaries established by international bodies with its Nip Guard Safety Device.

Underpinning the push for safe products is the global and local drive towards zero harm, which has seen the South African mining industry's annual mining fatality rate reduced from over 200 a few years back to averaging between 50 and 60 deaths.

"This impetus by the mining sector is what drives the development of innovations such as the Nip Guard, which works to reduce operator injuries and thereby helps miners keep a clean bill of health," says Brelko's MD Kenny Padayachee.

The patented Nip Guard safety device has been adopted at most major mines in South Africa including Anglo Platinum, Assmang, Eskom, Exxaro, Kumba, Northam and Tronox and Brelko has added this to its range of local and international patents.

Targeting improved worker safety at conveyor belts, the Nip Guard was designed to prevent unnecessary injuries that are known to happen around pulley nip points and pinch point hazards.

"Brelko applied to the United States Patent and Trademark Office (USPTO) – the federal agency for granting US patents and registering trademarks – for a patent on the locally developed Nip Guard. However, the process of acquiring a patent in the US is lengthy and rigorous and required team effort, including the presence of our research and development team and both local and US lawyers.

"Ahead of being awarded the patent, Brelko was required to pen a white paper explaining the difference between a Nip Guard and a conveyor belt scraper, given the belief that the two products are interchangeable, which is a major misconception," Padayachee explains.

Where conveyor belt scrapers (intended for use in conveyor bulk material handling applications) are installed in direct contact



A Robotic Machine in operation at the Brelko factory.

with the conveyor belt for the removal of residual fines (carry-back) that remain on the conveyor belt, nip guards are primarily intended for use in conveyor bulk material handling applications as fixed guards to prevent worker exposure to conveyor pulley nip points, also known as 'pinch points', 'in-running points', and 'draw-in points'.

"Nip guards offer the most reliable form of continuous protection for dangerous nip points around the head, tail, and drive pulleys," says Padayachee.

"At Brelko, we place people above profits. Our concern around safety does not only extend to our own employees, but to everyone who works with our machinery. We understand we have a responsibility to ensure that those working on our machines are as safe from injury as possible. The Nip Guard is a product that provides safety and efficiency and can increase productivity due to less down time," he explains.

The Brelko Nip Guard has been manufactured according to various mounting standards including SABS, CEMA, Australian and PROK. It requires low maintenance, operates in all conditions and, because of its robust construction, has longevity – all of which contribute to lower expenses and increased productivity.

Brelko drives sustainability

Underpinning the conveyor belt cleaning specialist's focus on localisation, has been its strong desire to become self-sufficient in terms of security of power and water supply.

Currently, South African businesses and citizens alike face unprecedented rates of loadshedding and water-shedding.

According to Padayachee, if businesses are to survive and thrive, they need to become proactive and find alternative solutions for uninterrupted water and power supply.

Having taken the decision to become independent, and thereby ensure the company is able to keep its manufacturing facility operating 24/7, Brelko has invested a total of R21 million in installing over 3.5 megawatts of solar power per day.

Since first installing solar power, a project rolled out in three stages over the past three years and which cost around R15 million,



A Brelko Nip Guard installed at Grootegeluk Coal Mine.

the company recently bumped up its investment by a further R6 million to ensure that it remains totally self-sufficient.

“For any business to succeed, it needs to have sufficient electricity to power up its operations and keep its business running smoothly; enough water to run the operations efficiently and high-level skills sets to deliver cutting edge products in a highly competitive market,” says Padayachee.

The local manufacturer has also been investigating options to free it from its reliance on the local municipality for its water needs and recently began investigating the viability of sinking a borehole at its premises, in Booysens, south of Johannesburg.

“The borehole specialist determined that at the north end of our property, just 15 m from our water mains, is an underground water system. Having established the existence of water, the next step is to test the water for chemicals and minerals, after which we will put in place a filtration system to ensure that the pumped water is pristine. According to the borehole specialist, we will have access to some 1500 litres per hour.”

The construction of the relevant infrastructure to access the borehole will be completed within the next two to three months.

In 2019, Brelko invested heavily to ensure that its facility was able to harvest rainwater, which included the purchase of a 5000-litre filtration tank.

As a key part of its sustainable solutions programme, Brelko purifies around 135 000 litres of rain-harvested water, which it uses for gardening and car washing.

“By having an adequate supply of power and water, Brelko can meet its localisation agenda. We are a truly South African manufacturing hub that understands localisation – we undertake research and development, design our products, create and manufacture our moulds, and construct the products. In essence, we manufacture our entire product line in-house from start to finish – which means that we truly understand what it means to be local manufacturers.”

To manufacture world-class products that are sold across key international destinations, including South America, Europe and the Middle East, Padayachee explains that a highly specialised skills set is required.

“For Brelko to compete head-to-head with globally manufactured products, a highly skilled labour force is non-negotiable – importantly, one that is keen to find solutions to industry’s most pressing challenges by producing locally manufactured equipment using robotics and artificial intelligence (AI). Given this requirement to deliver premium quality products, we have upskilled our staff to be proficient in key areas such as robotics programming.”

The company recently acquired six robotics arms – four of which operate in the belt scraper blade assembly division. The robotic glueing and assembly cell consists of a fully automated glueing station where the scraper blades are precisely located and glued into the scraper blade holders. The glued components then move onto the fully automated scraper blade assembly station, where the final assembly of the belt scraper blades is undertaken by the robotic arms. The other two robotic arms operate in the welding section. The investment in robotics improves efficiencies and productivity and ensures that seamless top-quality products leave the production line.

“For Brelko, producing premium quality products is sacrosanct and means we are constantly enhancing our product line to ensure we remain at the cutting edge of the quality spectrum,” concludes Padayachee. ■



Brelko continues to invest heavily in the latest innovations, including new curing ovens.



Brelko Nip Guard installed at Khumani mine.



A view of the solar room used to power the Brelko factory.



Brelko’s green drive includes the move to electric pallet jacks.

The hydrogen economy outlook

By Afriforesight's Deborah Chikukwa: Head of PGMs and Base Metals, and Kirthi Ramdhanee: Head of Battery Metals

Africa is also expected to gain from growth in this sector, with several countries assessing their potential to produce hydrogen mainly for export. South Africa, Namibia and four other countries formed the African Green Hydrogen Alliance in May 2022 to help the continent become a major producer.

As the world continues moving towards sustainability owing to climate impact concerns, low- and zero-carbon hydrogen is expected to contribute greatly by enabling green transitions in the electricity and heat generation, transport and industrial manufacturing sectors; which account for about 96% of global carbon emissions combined.

Currently, 80% of global hydrogen supply is produced using natural gas and coal feedstocks via a process called steam methane reforming. This method releases toxic carbon monoxide as a by-product, but in conjunction with carbon capture systems, should remain one of the main ways to produce hydrogen because of relatively low costs and the availability of comparatively mature manufacturing technology.

Looking into the future, other methods are expected to increasingly gain traction over time:

'Green hydrogen' is the most promising. It has the lowest carbon footprint since it is produced via electrolysis – separating water molecules into hydrogen and oxygen using electricity – powered by renewable or nuclear sources, or from electricity generated from fossil fuels combined with carbon capture. In 2022, green hydrogen production capacity increased by 44% to 109 ktpa from 2021 levels, but it currently accounts for only about 1% of global supply. Growth of this market depends heavily on government policy and incentives – which have stepped up significantly in the wake of Covid, as governments stimulate economies by ramping up green spending and investment in new technologies.

The EU and Asia (China, South Korea and Japan primarily) are expected to lead this investment drive. Approximately 40 countries have released or are developing hydrogen strategies. At least 680 large-scale hydrogen projects have been announced globally, with about 30% proposed hydrogen investment targeted in Europe.



Afriforesight's Deborah Chikukwa: Head of PGMs and Base Metals.

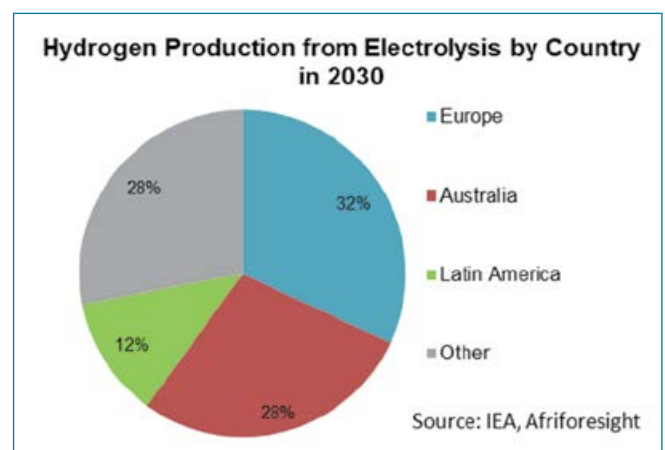
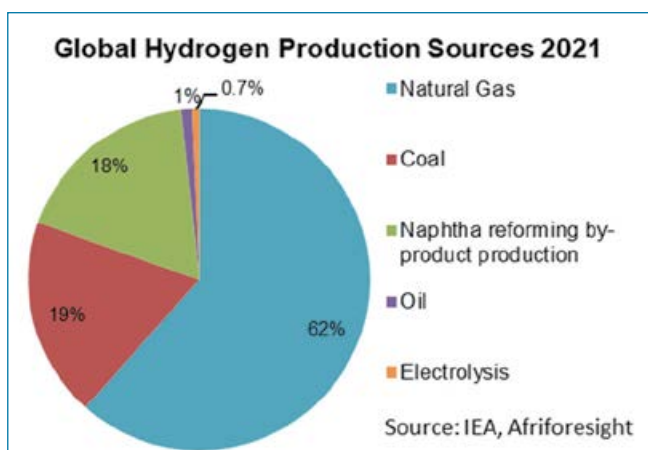


Kirthi Ramdhanee: Head of Battery Metals.

The global capacity to manufacture electrolyzers reached 8 GWpa by end-2022, and capacity is expected to rise to about 60 GW by 2030, led by strong growth from the EU as it seeks to cut dependence on Russian natural gas. While green hydrogen is relatively costly to produce, the method is expected to become competitive against traditional fossil fuel hydrogen from 2030 as technologies mature and renewable energy costs continue falling.

Africa is also expected to gain from growth in this sector, with several countries assessing their potential to produce hydrogen mainly for export. South Africa, Namibia and four other countries formed the African Green Hydrogen Alliance in May 2022 to help the continent become a major producer. The initiative should encourage development of hydrogen production in Africa to compete with other regions, such as Australia and South America, which also aim to produce hydrogen mostly for export. At the South Africa Green Hydrogen Summit in November 2022, President Ramaphosa stated that South Africa had the potential to produce 6-13 mtpa green hydrogen and derivatives by 2050.

While these plans and expectations suggest strong growth in hydrogen supply, the demand for hydrogen is also expected to grow exponentially during the green transition for use in the transport



sector, as well as in stationary fuel cell technology and industrial processes.

Hydrogen fuel cells – which convert hydrogen into electrical energy – should further boost demand for the gas, as this process is naturally quite sustainable as it only emits water. However, to be effectively ‘carbon-free’ the fuel cell would need to use green hydrogen. In terms of practical application, electrolyzers and fuel cells employ similar technologies, being primarily:

- ❑ Alkaline technology (nickel based), which is more mature, carries low costs and currently dominates the market.
- ❑ Proton-exchange membrane (PEM) technology, which is typically platinum-based and whose greatest strength lies in the ability to rapidly adjust output, making it the most viable option in transport applications.
- ❑ Solid oxide technology (ceramic-based), which has the highest efficiency but operates at high temperatures, hindering some applications.

Hydrogen has the potential to transform the transport industry with the use of fuel cell vehicles (FCEVs) which can provide a viable alternative to petrol, diesel and even battery-powered vehicles (BEVs). FCEVs typically use platinum-based technology, which is compact and well suited for this application. FCEVs are expected to gain traction as global carbon emissions regulations tighten, and most governments encourage the adoption of zero-carbon emission vehicles. Typically, FCEVs offer longer driving ranges of about 500 km, greater durability, and refuelling times comparable to conventional vehicles. While these applications have the potential for massive market growth, near term rollouts are likely to continue to be constrained by the relatively high costs of hydrogen and FCEVs, alongside limited refuelling infrastructure.

Hydrogen demand should increase with the rising use of stationary fuel cells, which are best suited for localised, off-grid electricity generation (e.g. powering a remote factory or mine) or emergency generation; and have potential to become an important part of the electricity generation mix. South Korea and California are spearheading development of this market, together accounting for over 90% of installed capacity globally. Although competition from lithium-ion and vanadium flow batteries should dampen demand growth slightly, hydrogen stationary cells remain an attractive option due to scalability and longer energy storage periods, which presents major potential for large-scale renewable-to-hydrogen plants.

Furthermore, hydrogen has the potential to revolutionise some industrial processes and consumer applications, replacing carbon-based energy.

Metallurgical processes such as iron manufacturing can use hydrogen to become carbon-neutral; pilot projects in Sweden and the US are already producing iron for steelmaking through a direct reduction process that uses hydrogen without the use of a blast furnace, and which is then combined with scrap in an electric arc furnace to produce steel. One instance is a plan by BHP and engineering firm Hatch to design a pilot electric smelting furnace capable of producing steel using renewable electricity and hydrogen when combined with direct reduced iron, which has the potential to reduce CO₂ emission intensity by more than 80% compared to blast furnaces.



Hydrogen has the potential to transform the transport industry.

Several countries are implementing plans to blend hydrogen with natural gas to reduce carbon emissions from building heating and various industrial processes (e.g. glass making). European countries are leading this effort, for example a project to boost clean energy for home heating in the mid-sized town of Öhringen, Germany, aims to blend 30% green hydrogen into natural gas networks in 2023 and 100% hydrogen by 2025.

Despite development potential for the global hydrogen economy in the medium- to long-term, logistics constraints, transport costs and storage are expected to pose significant near-term challenges until there is further investment into researching and implementing hydrogen transportation and storage methods.

Effect on Commodity Demand – PGMs

From the South African perspective, development of the hydrogen economy should be highly beneficial as PGMs are integral to the abovementioned processes. Iridium is used as a catalyst for the fuel cell chemical reaction and overall efficiency, while ruthenium oxidises carbon monoxide to remove it from the platinum surface to prevent clogging. But, of all the PGMs, platinum, given its unique chemical and physical properties, should benefit most from fuel cells that use hydrogen to produce electricity, and especially as a component of PEM electrolyzers for carbon-free hydrogen production. In fuel cells, platinum allows the hydrogen and oxygen reaction to occur at an optimal rate while remaining stable enough for the chemical environment, maintaining efficiency overtime.

PEM (Proton Exchange Membrane) technology should become important for global decarbonisation, with its potential to achieve sustainable and reliable power sector transformation. To reach decarbonisation objectives, 90% of electricity generation should come from renewable sources by 2050. The biggest hurdle remains the variable nature of renewable energy, making integration into power networks difficult. This is where PEM technology comes in. Through PEM electrolysis, excess renewables can be converted to green hydrogen which can be stored for later use. The promising nature of platinum-based PEM technology to suit the ‘power-to-hydrogen’ solution should, therefore, make platinum a critical commodity for the green energy transition. Although still small, hydrogen-related demand for PGMs is expected to grow sharply and is projected to account for about 35% of platinum use by 2040. The expectation of strong future demand growth for platinum from development of hydrogen economy should boost investment demand. ■

Silver's strong fundamentals to persist, but downward price pressure will eventually emerge

By Metals Focus (Independent precious metals research consultancy)

2023-to-date has seen a sharp rally in silver prices, along with exceptionally high volatility. From a trough of \$19.90 mid-March, the white metal surged by over 30% to a one-year high of \$26.14 by early May. This was soon followed by heavy profit taking, which has pushed prices back below \$24 at the time of writing.

A return of interest among institutional investors has been the key driver behind silver's recent strength, as increasing financial turmoil has raised gold and silver's safe haven appeal. Even with government intervention, there remains much uncertainty regarding what the ripple effects of the recent banking stress will be on global financial conditions. In addition, the risk that the US government will default on its debt cannot be ruled out entirely. All this has raised market expectations that the Fed will cut interest rates in H2.23. Crucially, this has also undermined the dollar and pushed yields lower, which has cut the cost of carrying precious metals.

Disconnect between silver's fundamentals and investor sentiment

Although 2023-to-date has seen a major recovery in investment inflows, much of this has been fuelled by economic factors. By contrast, even with increasingly favourable supply-demand conditions since 2021, this has not been sufficient to convince professional investors to raise their exposure to the white metal.

Indeed, one of key themes for the silver market for 2022 was that the metal posted what may well have been the largest deficit on record. Underpinning this outcome was a record year for all major areas of



2022 was also a record year for silver bars & coins, jewellery and silverware fabrication. (Source: Philip Gavriel & The World Silver Survey)

silver demand, while global silver supply remained little changed in 2022 year-on-year. That said, institutional investors were either bearish or indifferent towards silver over much of 2022, as faster monetary tightening weighed on sentiment.

With another sizeable deficit expected for 2023, global silver inventories by the end of this year will have fallen by 431 moz from their end-2020 peak. To put this into perspective, it is equivalent to over six months' mine production, and more than half of the inventories held in London vaults offering custodian services, as reported by the LBMA.

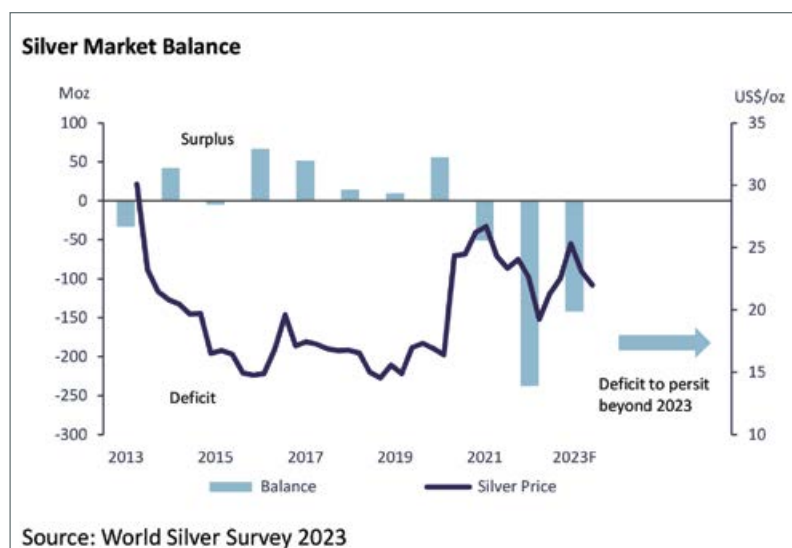
Industrial demand on track for another all-time high in 2023

Making up for almost a half of total silver fabrication (48% over 2010-19), industrial offtake is by far the largest demand component for silver. Despite a challenging economic backdrop, global silver industrial fabrication hit successive all-time highs over 2021-22.

The strength of silver industrial uses reflects several favourable structural factors, which are likely to persist for the foreseeable future. Among these, a shift to green economy applications, in particular the notable growth in photovoltaics (PV), has been a key driver. With countries' efforts to lessen their reliance on fossil fuels and improve energy security, silver should continue to benefit from rising PV installations. That apart, silver applications have also been lifted by electrification within the automotive segment, the rollout of 5G networks and other investments in power generation and distribution.

This builds on cyclical factors, such as overall GDP growth. Some uses, for instance PV, will see further thriving in silver use, but overall it is expected to remain slight. All this explains why we expect industrial demand to achieve a new all-time high in 2023.

A return of interest among institutional investors has been the key driver behind silver's recent strength, as increasing financial turmoil has raised gold and silver's safe haven appeal.



Non-industrial demand to remain historically high

2022 was also a record year for silver bars & coins, jewellery, and silverware fabrication. Although this growth is unlikely to continue in 2023, demand is still expected to remain high for all three sectors.

For jewellery and silverware, India will account for most losses, reflecting a normalisation following an exceptionally strong performance in 2022. For bars and coins, on top of lower interest among Indian investors, sales in the US and Germany are also expected to ease in 2023 (in the former, only modestly), following strong growth over 2020-22. Even with a fall, western retail investment is expected to remain well above pre-Covid levels, particularly in the US.

Total supply fails to keep up with demand gains

A lack of meaningful supply-side gains was another factor contributing to last year's record deficit. During 2018-22, silver supply held at around 1.0Bn oz (except in 2020 when the pandemic led to major mine supply disruptions) as the drop in mine production was broadly matched by growth in recycling. This year supplies from primary and secondary sources are expected to grow, albeit by a modest 2%.

Looking at mine supply, limited organic growth, project delays and disruptions resulted in a 0.6% decline in 2022. Last year's drop was driven by lower by-product output from lead/zinc mines (-3.5%). This was partially offset by higher silver production from gold (+1.0%) and copper (+0.8%) mines. Output from primary silver mines was almost flat (+0.1%). At the country level, Peruvian output fell most, followed by Australia and Bolivia. These losses were partially offset by rising output from Mexico, Argentina and Russia.

Going forward, mine production is projected to return to growth in 2023, rising by 2% to a five-year high. This growth is largely premised on new silver projects coming on-line and ramping up. For example, Juanicipio, a JV between Fresnillo and MAG Silver, is expected to reach full production capacity in H1.23 and be a major driver of growth in Mexico. The continued ramp-up of Kinross' La Coipa and expected commissioning of Gold Fields' Salares Norte towards end-2023 will help push Chilean output higher. Our forecast assumes that Buenaventura's Uchucchacua in Peru will resume operations in Q4. However, full-year output in Peru is expected to be lower, as social unrest disrupts mining operations and grades continue to fall at several major mines. Production is also expected to be lower in Argentina, due to the closure of Pan American Silver's Manantial Espejo, and in China, as a decline in lead/zinc mine output leads to lower silver by-product.

In terms of silver recycling, volumes are expected to increase for the fourth year in 2023, albeit with a



notably smaller rise. In keeping with previous years, this year's growth will be driven by the industrial sector, which largely reflects a rise in the processing of spent ethylene oxide catalysts. Part of these gains, once again, will be offset by an ongoing structural drop in photographic scrap. Led by India jewellery and silverware recycling is also expected to weaken this year.

Price outlook

Looking ahead, silver's short-price term movements rarely take their cue from market fundamentals and instead are largely driven by professional investor activity. The rest of 2023 will be no exception.

Going forward, elevated macroeconomic and geopolitical uncertainties will continue to support inflows into precious metals in the short term. This institutional investment, however, will eventually lose momentum, as we believe the current market consensus that the Fed will be forced to cut rates in H2.23 will be proven wrong. This should see silver (and gold) come under pressure in the latter part of the year as investor liquidations emerge resulting in a much weaker price trend towards year-end. That said, the full year average for 2023 is still forecast to be higher year-on-year. ■

Much of the major recovery in investment inflows have been fuelled by economic factors.
(Source: MKS PAMP & The World Silver Survey)

Going forward, mine production is projected to return to growth in 2023, rising by 2% to a five-year high. This growth is largely premised on new silver projects coming on-line and ramping up.

Mine Production Forecast by Region			
Million ounces	2022	2023F	Y/Y
N America	240.2	263.5	10%
C&S America	230.9	233.6	1%
Asia	159.7	155.7	-2%
CIS	67.6	68.6	1%
Europe	65.8	62.0	-6%
Oceania	41.4	42.7	3%
Africa	16.8	16.0	-5%
Global Total	822.4	842.1	2%

Source: World Silver Survey 2023

Akobo Minerals delivers first gold, targets 1 moz

Gold miner Akobo Minerals recently shifted gears, making the jump to become one of Ethiopia's latest precious metals producers. The new kid on the mining block has its eye firmly set on becoming a million-ounce producer, CEO Jørgen Evjen tells *Modern Mining*. By *Nelendhre Moodley*.



Above: CEO Jørgen Evjen (centre) receives the ESG Explorer and Developer of the Year award.

Centre: Aerial view of the Akobo licence area.



Core drilling sample highlighting the presence of gold.



“This is a defining step in our ambition to develop a million-ounce world class deposit. Importantly, it is the start of income for the company after many years of operational costs as we developed our project,” says Evjen.

The company's flagship asset is the Segele gold deposit, located in southwestern Ethiopia, a prolific area with extensive alluvial gold production. The total mineral resource for the Segele mine is pegged at 69 000 oz, with an estimated 22.7 grams per ton extraction rate of gold.

Speaking of the monumental occasion of delivering first gold, Evjen says that it is a significant marker for investors and employees that the goal set out over a decade ago, has been realised.

Though production is starting slowly, Segele mine will, over the next few months, ramp-up production to generate up to \$50 million of free cash flow over the next two years. The cash generated at Segele will help the company fund ongoing exploration. The project also generates economic activity,

taxes, and royalties for both local communities and the region.

Evjen explains that “Income from our flagship asset will provide an important contribution to the country going forward. It also means a lot for the Ethiopian mining industry – Akobo is the second commercial underground gold mine since Legademi in 1994”. He adds, “We have worked closely with the authorities at federal and regional level to make this happen. Ethiopia has big ambitions for its mining industry, and we are a showcase to prove it can be done. Moreover, the Segele project provides the right directives to attract further international explorers and miners to Ethiopia.”

Path to production

According to Evjen, 2022 was an important year for the explorer as it focused on getting the Segele mine up and running with mining contractor, IW Mining, on-site to break ground for the first time in October.

Akobo Minerals decided early on that it would work with two partners for the underground mining and processing activities. Solo Resources was chosen to handle the process plant design and fabrication, while IW Mining was selected to develop and operate the mine.

The IW Mining team commenced with developments on two smaller entries to the gold ore as well as establishing the main incline shaft. “We started by excavating the incline shaft from which ore from the deeper parts of the ore body will be extracted. Towards the end of the quarter, the mining team took

producer status



delivery of the first set of underground mining equipment. And by the end of the fourth quarter, Solo Resources had completed all but the last details of the process plant design,” he explains.

However, despite the headway Akobo made in progressing mine development, the lengthy delays experienced in getting its key equipment from South Africa, resulted in the company making the decision to establish an ultra-small plant to help it meet its stated first gold production.

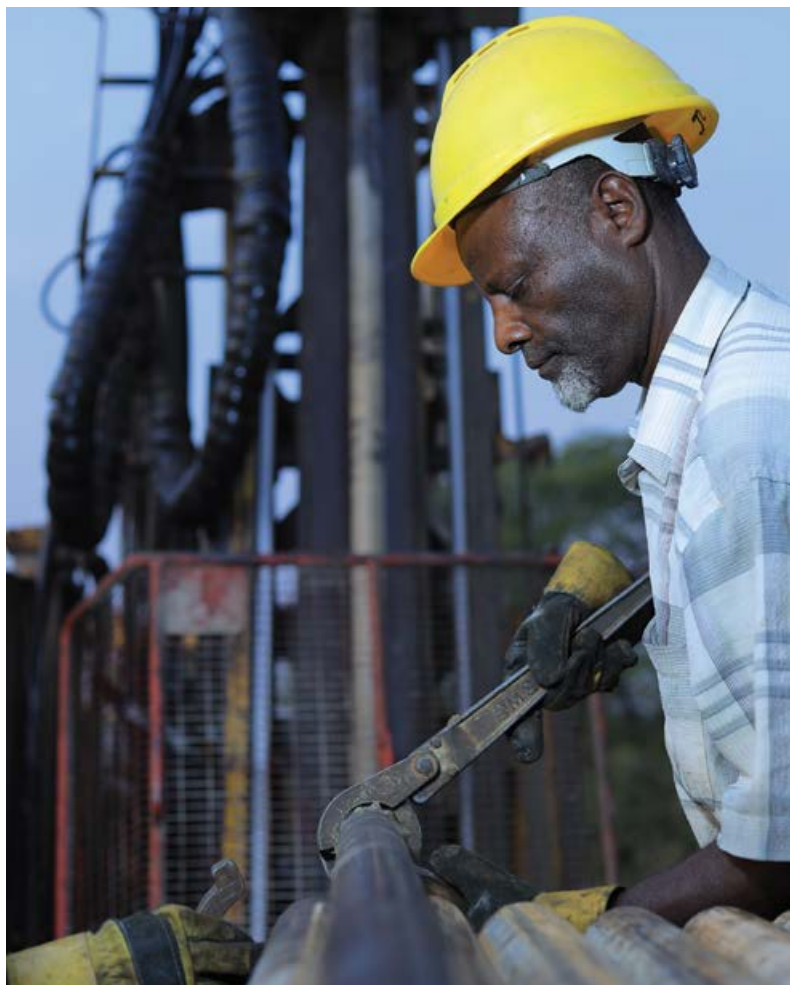
Evjen explains that the ultra-small plant is a stop-gap measure, “given the delays in getting our main processing plant from South Africa, which was held up by logistics issues and electricity shortages”. This subsequently slowed the fabrication process.

“We felt it was important for us to deliver on our promise of processing gold by the stated time and subsequently secured a smaller plant, which can process material at two tons per hour. The upside though is that the plant can be used elsewhere once the main plant is *in situ*,” he explains.

The first, and small amount of gold was produced at the end of March. “This is an exciting achievement that’s been a decade in the making,” he says.

With the pilot project running successfully, Akobo is turning its sights to establishing its larger processing plant.

In recent weeks, there has been significant operational activity— from foundation work and construction to pre-assembly of the plant – all aimed at meeting the demands of a company set to reach full gold production shortly.



“Mining of the incline shaft and winches is well underway,” Evjen says. “During the second quarter of 2023 the rate of incline shaft length will speed up considerably. The IW Mining team is fully manned and equipped for the production rate necessary as we start full production – in the order of 2 000 tons per month at current manning and equipment levels. However, we anticipate that with additional equipment, we could increase the mining extraction rate to over 5 000 tons per month, so a procurement process is underway to evaluate the costs and logistics to more than double capacity.”

Having experienced severe delays associated with the arrival of the main processing plant and

Aggressive exploration initiatives are underway aimed at expanding the resource and life of mine.

Akobo Minerals defined two areas for exploration focus – Segele and Joru.





Mining underway.

equipment from South Africa, Evjen reports that items are finally arriving on-site.

This means that once the plant foundations are complete, which will be in the second quarter, installation of the equipment – including crushing and milling, the gravity concentrator and the elution and smelting elements – will commence.

“The Segele project has an indicated resource of 41 000 oz at 40.6 grams per ton. Our global all-in sustaining costs are in the order of \$243 per ounce; this compares extremely favourably with average global mining costs, which are more than \$1100 per ounce of gold extracted. Conservatively, we are expecting an 81 percent extraction rate at Segele. Once the full processing plant is up and running, the plant will be operating at 10 tons per hour. We have ensured that we will be able to double the capacity of the plant as and when required. The peak production rate of gold is around 4 000 ounces per month with the life of this mine currently estimated at 27 months. Aggressive exploration initiatives are underway, which will significantly expand the resource and life of mine.”

Project funding in the spotlight

Evjen explains that development revenue remains a priority, with the company focused on generating operating income to progress its Segele project to full production.

“The capital expenditure to get the Segele project into production is around \$10 million, which is considerably below the capital requirements of similar projects. At present, revenues are at a nominal level, given that the ultra-small processing plant is only just operational. Once the full plant is operational, income will increase considerably.”

Speaking of Akobo’s funding initiatives, Evjen says that in November last year, Akobo inked a 5 000-ounce gold loan (equivalent to \$8.5 million) with US-based investor, Monetary Metals.

“This funding gave us the financial muscle to progress our mine development and complete payments for the processing plant as well as commence mine operations at Segele.”

Aside from successfully securing a convertible loan of some \$2 million from new and existing investors, which it is using to fund the final phase of its Segele mine; in March this year, Akobo’s board of directors and management together contributed 3.8 million Norwegian Krone (NOK).

“These funds provide the necessary monies to take us to full operation of Segele and first gold extraction and revenues. And, as a listed entity, we could also raise more money through normal share issues for further expansion.”

Having invested over \$10 million to bring the Segele mine into production, the company is now looking forward to finally reaping production rewards.

According to Evjen, Akobo expects to earn some \$50 million in free cash flow from the Segele mine production over the next two years – funds that will go a long way to support and fund continued exploration work.

Progressing exploration

In tandem with the mine development, exploration has continued apace. Akobo Minerals defined two areas for exploration focus – Segele and Joru. Though both are considered exciting prospects for gold, Segele offers a much smaller deposit, but at high gold concentrations, whereas Joru, which covers a larger area, has lower gold content.

“In 2023, we will undertake considerable drilling and exploration work which will help expand our understanding of what resources we have across our license area. In total, we have nine resource targets that are our immediate focus,” says Evjen.

The next six months will be busy ones for Akobo as it continues to expand its exploration efforts, with field and drilling programmes at Joru, Gindibab and Wolleta – all while continuing to maintain a focus on developing the Segele mine to reach steady-state production rate.

Importantly, Akobo recently made a new gold discovery at Segele – a high grade gold mineralisation with coarse visible gold hosted by an ultramafic chlorite schist.

Outlining the discovery, Evjen says, “We have identified several exploration targets that we will take up the value curve, including positive initial findings from this new exploration area, which is located 130 metres to the west of the main Segele mining area. Although the style of mineralisation has been known for several years from hand samples, the discovery of the source is a significant step forward. Trenching in the area has started, and drilling began at the end of January 2023.”

To date, the Segele Hill Top target has tested

five holes of 423 metres in total with first assays expected during the second quarter of 2023.

To the south of the Segele deposit, Akobo has been exploring the Gindibab area, where several new gold-bearing quartz veins have been discovered.

"In March," says Evjen, "We announced the start of core drilling on a new target at Gindibab. The core drilling at the Gingibil quartz vein swarm in the Gindibab area, lies approximately six kilometres southeast of Akobo Minerals' Segele gold mine. From our nine priority gold targets within our license area, this is by far the most encouraging exploration site we have found."

To date, over 1200 soil samples have been collected from Gindibab for assaying. Moreover, over 30 grab samples assayed indicate grades up to 11.3 grams per ton.

"Several hundred additional rock samples are currently waiting to be assayed. During the first half of 2023, we will undertake a mapping and sampling programme to add more drill targets to our programme."

The goal of the near-mine exploration, he explains, is to investigate both the extent and viability of the newly identified mineralisation to the west of the Segele main deposit.

"If possible, the exploration will provide us with enough data to perform 3D modelling of the mineralised envelope. Since the end of the first quarter of 2023, we have installed a second drill rig expressly aimed at doubling our exploration drilling capacity. This will greatly improve the pace of discovery in the Akobo area.

"We are confident we will be able to secure a significant new deposit over the license area that will keep us active for several years to come."

Driving the ESG agenda

With Akobo Minerals focused on delivering sustainable value for its employees and stakeholders, the miner is rolling-out initiatives to improve the lives of host communities.

"We have a number of projects in place, from hiring local workers whenever possible and regenerating the local environment blighted by artisanal mining, to healthcare programmes and building an airstrip to allow faster access into and out of the community," he says.

Working to be a valued corporate citizen, the company has, over the past few months, progressed community education programmes and inked several MOUs with training and academic institutions at Dima Polytechnic, Jimma, Addis Ababa and Oslo Universities.

"We are excited to be contributing to the skills and academic development of Ethiopia's next generation, as well as benefiting from institutional support for our ESG programmes and environmental monitoring. We



Mine development underway.

see these collaborations as an important example of extending shared value. Our relationship with Dima polytechnic, in addition to the planned technical and vocational training, has inspired a pilot project for community management of plastic waste using eco-bricks. Working with the community, we are producing eco-bricks to construct a community training space, initially with plans to reuse plastic water bottles to improve the construction of our local school, currently constructed entirely from corrugated roof sheeting."

He adds that the Sazani Associates' international award-winning education programme, adapted to suit the Gambela region, has been approved by the regional government for roll-out in the project area. This will see local schools benefiting from Akobo's healthy and sustainable schools programme.

"Our 'Green Gold' payment for our ecosystem services and carbon credit scheme, is progressing well, with the establishment of the Akobo Foundation being the last remaining hurdle to the scheme's Gold Standard registration. Furthermore, liaison with the Kebele administration and Dima Polytechnic allows us to provide employment and skills development opportunities for local youths, many of whom were previously engaged in unlicensed activity. Akobo was commended for the 2022 Environment, Sustainability and Governance (ESG) Explorer and Developer of the Year award by Mines and Money."

Looking ahead

The Norway-based company's focus for the next few years will be on ensuring steady state production from the Segele mine and continuing to investigate opportunities in the surrounding areas.

"We might also start mining operations at Gindibil if our initial findings turn out to be correct. The Segele plant can handle ore transported from the Gindibil area in the beginning. We will continue to explore our targets within the existing 183 km² license area. In addition, we will look for new areas in Ethiopia, and at other minerals. We have a full-scale organisation set up in Ethiopia that has the capacity and knowledge to take on more projects," concludes Evjen. ■

Hummingbird Resources aiming to become a +200 000 ozpa producer

AIM listed Hummingbird Resources, a leading multi-asset, multi-jurisdiction gold company operating in West Africa, is at a pivotal juncture for significant growth: the successful implementation of improving the operational performance of Yanfolila, its gold mine in Mali; and the Kouroussa mine in Guinea on track to commence first production by the end of Q2 2023. The combination of these key developments will see the miner on track to become a +200,000 oz per annum gold producer from two mines in two jurisdictions, says CEO Dan Betts.

Hummingbird Resources currently has two core gold projects, the operational Yanfolila Gold Mine in Mali and the soon-to-be-producing Kouroussa Gold Mine in Guinea, which is set to have a transformative impact on the company's production outlook – doubling its output to +200 000 oz per annum. Having delivered, via its joint venture partner Pasofino Gold, a feasibility study in 2022 for the Dugbe gold project in Liberia, the company has a further highly prospective development asset in its portfolio, which benefits from robust economics, underpinned by NI 43-101 compliant reserves of 2.76m oz Au and a post-tax NPV of \$524m with a 5% discount and gold price of \$1 700 per oz.

Off to a flying start at the beginning of the year, Hummingbird Resources delivered a strong Q1 performance with gold production at Yanfolila proving steady at just north of 27 koz, AISC of US\$1 109 per oz – marking an 11% improvement from Q4 2022 – and group EBITDA surged 59% quarter on quarter to \$17.5 million. Hummingbird's average price per ounce of gold sold lifted 9% to \$1 878 during the quarter, reflecting rising gold prices as inflationary pressures push investors towards safe havens and into the arms of the yellow metal. "The best is yet to come" Betts told *Modern Mining*, speaking of

the company's high grade mine at Kouroussa in Guinea being firmly on track for late Q2 kick off.

There are also other reasons to be positive. Hummingbird recently raised \$17.1m with the help of strategic investor, CIG, and an open offer to existing shareholders completing the funding required to ensure Kouroussa commences production by the end of Q2 2023 – elevating the company to a +200 000-ounce per annum gold producer. Further, Betts notes, "This crucial funding injection will also accelerate exploration at the asset where we see material upside potential in extending its life of mine."

Golden Guinea: The importance of Kouroussa

Hummingbird's second asset, the Kouroussa gold mine, located in the prolific Siguiri Basin of Guinea, is a high-grade, low-cost mine, which has a current reserve of 647 000 oz at 4.15 g/t with plenty upside potential to extend life of mine (LOM) with further drilling.

And underestimate Kouroussa at your peril – the game-changing and growth potential of this high-grade mine is immense. Significant exploration



Construction of Kouroussa mine in Guinea.





potential exists at depth beneath two key deposits, Koekoe and Kinkine, with several other high priority targets also identified. The mine is estimated to produce an average of between 120 000 oz – 140 000 oz for the first three years of production, and average 100 000 oz per annum over the initial LOM. Kouroussa is on track and budget for first gold pour at end of Q2 2023 with development works going according to plan. And this is “no mean feat given the current global inflationary pressures and supply chain issues,” as Betts points out.

Construction and development of the Kouroussa mine is progressing rapidly, with over 1 000 contractors working on-site to ensure the project is delivered as guided by Hummingbird. This impressive progress is a testament to the project’s excellent management team, which has successfully met key construction and delivery targets to date.

“We have almost finished the plant at Kouroussa and are currently preparing for commissioning,” says Betts.

The Kouroussa project represents a great leap forward for Hummingbird – its success will not only double gold output in a brand-new West African jurisdiction but also create jobs and provide tangible economic benefits to local communities.

“Community engagement remains a key feature of all our workstreams, with community projects and livelihood initiatives underway. The company expects to expand on these in 2023 including: water supply infrastructure; local community hospital infrastructure improvements and medical supplies; market gardens; and commercial product manufacturing training such as Shea butter and honey cultivation,” explains Betts.

Strategic Partner

Hummingbird recently welcomed African investment company, CIG SA, to the share register as a key strategic investor to strengthen the company’s balance

sheet and improve liquidity. CIG’s \$15 million investment endorses the company’s strategy for growth and marks a clear vote of confidence in the quality of Hummingbird’s asset portfolio, both in West Africa and beyond.

“As we bring the development of our second mine at Kouroussa into production by the end of Q2 this year, we see this investment as the first step of a partnership with the ambition of building a multi asset international gold producer built on strong foundations in West Africa,” says Betts.

Stabilising Yanfolila

Mining can be unpredictable, and Yanfolila is no exception. The first nine months of 2022, like 2021, proved to be a challenging time for Yanfolila as gold production struggled to meet expectations due to poor mining performance and delay in mining the high-grade Komana East deposit, driven primarily by the underperformance of the contracted mining fleet.

However, the last quarter of 2022 saw a significant improvement in operations at Hummingbird’s flagship mine, which produced over 28 000 oz of gold at an All in Sustaining Cost (AISC) of \$1,248 per oz, an impressive end to the year. This performance was due, in part, to the mining of the high-grade Komana East deposit, which will continue to be mined into the second and early third quarters of 2023. Hummingbird’s recent Q1 results, which saw production of over 27 koz, showed the continued stability of operations at Yanfolila, with operational changes made in H2 2022 coming through to the bottom line in terms of more stabilised and predictable performance at the mine.

Due in part to these operational changes, Yanfolila achieved the revised guidance for full year 2023 production of 80 178 oz. With continued effort and innovation, Yanfolila will continue to deliver cash flows and remain an important asset in the

Above: Conveyor belt system and processing plant of Yanfolila mine in Mali.

Left: Processing Plant Infrastructure development of Kouroussa mine.

“Community engagement remains a key feature of all our workstreams, with community projects and livelihood initiatives underway. The company expects to expand on these in 2023,” explains Betts.



A view of the processing plant at Yanfolila mine.

Other community projects include eight poultry farms and ten market gardens that provide additional income support for over 1 000 people. The company also provides training in honey production, shea butter, cashew nut manufacturing, and mechanical traineeships.

Daily and weekly on-site health and safety briefings.



company's portfolio. FY2023 production guidance for Yanfolila has been set at 80 000 – 90 000 oz, with AISC of under \$1 500 per oz.

Komana East Underground is scheduled to come online at the end of Q4 2023 and continue operations until around Q1 2028, although the orebody remains open at depth and along strike, potentially extending the LOM further, subject to exploration drilling results. Various satellite open pit deposits will also be mined to maintain production at Yanfolila.

ESG

Hummingbird is committed to promoting ESG practices across all its operations. At Yanfolila in Mali the company's practices in waste management have led to more than 80% of materials being recycled, and management is continuously improving its process water recirculation performance, achieving a 78% performance rate. In addition, the Hummingbird Tree Initiative at Yanfolila has led to the planting of over 8 000 trees annually. These are procured from the local communities, providing them with additional important income support, with plans in place to start a similar initiative at Kouroussa.

Health and Safety is also a key focus at Yanfolila, having achieved over 11 400 hours of safety training at site and over 2.5m lost time injury-(LTI) free hours at Kouroussa during the construction phase, which remains a core focus for the company in 2023. The company is committed to providing high levels of local and regional employment at its sites, with

around 96% of employees at Yanfolila in Mali being nationals. Yanfolila has installed over 65 large-scale water towers, boreholes, and wells to improve local water infrastructure, which is a huge benefit to local communities. The company's efforts in malaria prevention are also a key focus area, and include annual spraying campaigns to protect over 11 000 people near its Yanfolila mine. Hummingbird provides education support to the local community, paying eleven teacher salaries and school maintenance at schools near Yanfolila.

Other community projects include eight poultry farms and ten market gardens that provide additional income support for over 1 000 people. The company also provides training in honey production, shea butter, cashew nut manufacturing, and mechanical traineeships.

At Kouroussa, the company is implementing various ESG initiatives, including the installation of a 7+ MW solar plant, and implementing energy efficiency programmes such as heat recovery units at the Kouroussa plant to reduce GHG emissions. Contractors and construction employees undergo regular training programmes, including on-site health and safety training. Community health care programmes are being rolled out in 2023 in the communities near Kouroussa with global remote healthcare specialist, Critical Care International, which has permanent doctors on site to support Kouroussa's healthcare team. In total, an impressive 26 community projects and livelihood programmes are scheduled for rollout in 2023.

Hummingbird's work at Kouroussa concentrates on achieving high local and regional employment, particularly as it transitions from the construction to operator phase.

Outlook

At Yanfolila, the focus is on achieving steady production and contributing positive cash flows for the business as a whole. With a good start to the year, the mine is well on track to meet its targets of producing 80 000-90 000 gold ounces in 2023. To achieve these targets, Hummingbird has embedded optimisation improvement strategies, including enhancing mill grade feed, implementing cost reduction and control programmes, and improving community engagement.

In addition, as Kouroussa edges towards its first gold pour, Betts is fired up about the future prospects and the arrival of the company's second asset.

"The mine will more than double our production profile, reduce the Group's cost of production, and diversify risk," he concluded.

Underpinned by a strong commitment to exploration programmes, and adding further sustainable growth to Hummingbird, the company is ideally positioned to maximise returns in a strong gold price environment. It's hard not to be upbeat about that. ■

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Junior mining producers attract investment while exploration juniors do not

Despite the overwhelming challenges that junior and emerging miners face in South Africa, the sector has done ‘disproportionately’ well when compared to the rest of the mining industry, says Junior and Emerging Miners Desk lead, Grant Mitchell.

Over the past two decades mining exploration investment has been on a downward spiral.

“Calculations from our economics team indicate that on the back of the commodities boom, there was an improvement in the income quantum that junior producers contributed to the local mining industry. In fact, in 2022, the annual revenue generated by junior producers was R88bn, while the rest of the sector contributed R1.2 trillion. Even taking inflation into account, this amount is a massive jump from the R54 bn contributed in 2018.”

The top revenue earners for the junior mining sector have been platinum (R19.6 billion), coal (R17.2 billion), gold (R6.3 billion), manganese (R3.4 billion), chrome (R2.3 billion) and diamonds (R1.8 billion) according to Bongani Motsa, a senior economist at the Minerals Council.

According to Stats SA, the mining industry employed 464 615 people in 2022. In line with this

boost in revenue, the junior sector amped up the number of people it directly employed to between 34 846 (7,5%) and 41 815 (9%).

Junior miners target lucrative local opportunities.

According to Mitchell, the history of mining in South Africa follows a two-tiered system, consisting of mining majors, many of whom have transitioned to multinational status and the smaller end of the market, which consists of emerging and junior miners, including companies that are under the umbrella of the Aggregate and Sand Producers Association of Southern Africa (ASPASA). ASPASA currently consists of more than a thousand member companies.

Given that mining majors have deep pockets and thereby extensive budgets, they often overlook smaller projects, which are just the right pickings for small scale and mid-tier producers. And while there remains a vast number of small to medium size projects still up for grabs, new age minerals have become the springboard taking juniors miners to mid-tier miner status.

“As mining majors with massive financial muscle chase after larger more lucrative investments in destinations across the globe, smaller local projects have become money spinners and the life-blood for junior miners. This is more the case with green energy projects, which have become increasingly popular and just up the ally of the junior mining sector.”

The lean and agile sector has been quick to spot opportunities in high demand new green technology and battery metals segments, going after

Last year junior miners generated R88bn in revenue.





commodities including manganese, palladium, platinum, chrome, copper and zinc.

Cadastral system

Following years of waiting patiently for government to adopt a suitable cadastral system, the Department of Mineral Resources and Energy (DMRE) finally issued a Request for Proposal (RFP) for the mining cadastral system in early April of this year.

"This is positive and long-awaited news," says Mitchell.

Over the past two decades mining exploration investment has been on a downward spiral, which has been detrimental to the sector.

"In 2004, South Africa accounted for 5% of global exploration spend but now accounts for just 0,8%. This steady decline in exploration spend over the past 20 years is cause for concern. In other parts of the continent, exploration spend has been increasing, especially in countries such as Democratic Republic of Congo (DRC), Mali, Botswana and Namibia. Even Mozambique, which is relatively poor in terms of attracting dollars, has shown a marked increase in foreign exploration spend."

Barring the unattractive policy environment, excessive red-tape, corruption and challenging infrastructure, the country's inability to implement a proper cadastral system has been a key deterrent to foreign investment.

"Virtually every mining jurisdiction in the world, bar South Africa, has a proper cadastral system. The issuing of the RFP for the mining cadastral system is a step in the right direction. At a recent online RFP briefing, there were a number of potential applicants,

many of whom felt that the terms of reference were 'reasonable'. Importantly, a key criterion for the tender is that applicants must demonstrate that they have, in the past eight years, successfully implemented a cadastral system. This provides some level of confidence that the successful candidate will have experience in implementing a cadastral system," notes Mitchell.

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

Mitchell expects the tender for the cadastral system to be awarded by June, with the system itself taking just over a year to be implemented and become fully functional. "With the South African mining industry on the backfoot, there is a great sense of urgency to get a proper cadastral system up and running as soon as possible."

Challenges stymie growth of junior miners

Social instability, lack of finance and challenges related to power and logistics continue to hamper the mining industry's progress in getting product to

Above: The junior coal sector contributed R17.2 billion in revenue for 2022.

Left: The Minerals Council is working with Eskom and Transnet to find solutions to power and logistics challenges.



A few junior miners have been able to access funding to fast-track project development.

market, with the junior mining sector particularly hard hit by these challenges.

“While mining majors operating across global jurisdictions have access to international capital markets, junior miners remain largely hamstrung. However, some of our junior miners are dual listed, which means that they have access to international capital markets, but a large portion of junior producers are local entities that struggle to access project funding, which means that their growth and development has been stymied,” says Mitchell.

Moreover, policy related challenges and excessive red-tape continue to scare-off investors, “who by their very nature are extremely skittish, preferring to stay away from high-risk areas”.

“Investors are extremely sensitive and jurisdictions with unfriendly policies, such as South Africa, with its litany of problems especially those related to social instability and community uprisings against mines, have seen investors back away even if the intended projects are lucrative and entail commodities that are in demand,” he explains.

To overcome the challenges associated with power, junior miners are forced to invest in renewable energy projects and foot the bill for transporting commodities via road, which comes at a significant cost.

“Transnet’s inefficiencies have compelled junior miners to find alternative routes to get their seaborne product to the export market. In a bid to help the mining sector, the Minerals Council is working closely with Eskom and Transnet to find solutions to issues related to power and logistics. Moreover, with the MPRDA coming up for review, industry and government will need to work closely to ensure the final document is business-friendly and encourages foreign direct investment into South Africa,” says Mitchell.

Further to this, action related to the long-promised



Junior miners in the gold sector contributed R6.3 billion in revenue.

exploration fund mooted by the IDC, needs to take place, he says.

“The Junior and Emerging Miner’s Desk is eagerly awaiting escalation of developments related to the exploration fund – a R500 million fund to be set up by the IDC to underpin much-needed exploration in South Africa. We have been talking about this fund for the past few years and there is certainly a sense of urgency to get the fund up and running as soon as possible.”

On a positive note, though, a few junior miners have been able to access funding to fast-track project development.

Funding can be entirely offshore, examples being Southern Palladium and Theta Gold, or it can be hybrid such as Orion Minerals which has a dual listing in both South Africa and Australia, or funding for mainly smaller projects can be entirely local as in many of the quarry operators who are members of ASPASA.

JEMD initiatives to grow the sector

The Junior Mining Incubator programme, initiated in 2022 in conjunction with the JSE, is tasked with mentoring emerging miners by exposing them to capital markets, providing them with necessary training, advice from industry experts and a platform to present their company to key industry players. It is proving to be extremely useful as evidenced by the response from the latest intakes - Lethabo Exploration and M Exploration.

“The incubator programme is offered to emerging and junior mining companies when they join the Minerals Council. In fact, Lethabo Exploration and M Exploration are currently participating in the incubator programme – which has had an extremely positive impact on their business development,” says Mitchell.

The JEMD is also supporting a review of the Artisanal and Small-Scale Mining Framework (ASM), a policy document released by the DMRE earlier this year.

“It is essential that the Minerals Council has input into the ASM policy framework, which will might later be promulgated into legislation. The policy document has significant implications for how to manage and formalise artisanal and small-scale mining. We

have an interesting artisanal mining project in the Northern Cape, which we are using as a case study. We will extrapolate and incorporate our learnings into a report to the DMRE. In this way, we take a proactive step rather than a reactive stance.”

Additionally, the JEMD and its team of experts are evaluating the legalities related to the ASM policy, an example being the proposal that mining majors make land available to artisanal miners on what has traditionally been their mining right area.

“This is an important topic for discussion, given that it has several implications on mining rights. For example, how do you acquire a mining right for artisanal miners operating on a mining right already held by a mining major? There are questions around who’s responsible for liabilities associated with land rehabilitation and health and the safety of ASM staff, amongst others. The JEMD is busy finalising a research study on these issues and will present a paper on our findings later this year to the DMRE,” says Mitchell.

“For the South African mining industry to grow, we need to get back to basics and ensure there is political and social stability, a working cadastral system that ensures mining and prospecting rights are handled efficiently in a transparent manner, and that we deal effectively with our power and logistics



challenges. Moreover, we need to have a tax incentive system for exploration and policies that attract investment into mining. Importantly, we need to address issues related to community unrest and criminality as these are negatively affecting investment perceptions. Once we sort out the majority of our challenges, the industry will finally be able to capitalise on numerous opportunities,” concludes Mitchell. ■

Platinum has been a top revenue earner for the junior mining sector at R19.6 billion in 2022.

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Kobada Gold project advances down the development path

ASX listed gold development company, Toubani Resources, is looking to bring its flagship Kobada Gold project, which currently has a 3.1-million-ounce mineral resource, into production over the coming years, CEO Phil Russo tells *Modern Mining*.

The exploration and development entity is focusing on becoming Africa's next gold producer. The Kobada project is located 120 km southwest of Bamako, the capital city of Mali, within the Birimian Greenstone belt. The project, believed to be part of a much larger gold system, currently has a 2021 DFS that demonstrates a production rate of 100 000 oz per annum over 10 years.

At a time when the gold price has surpassed the US\$2 000/oz mark with fundamentals for the precious metal looking rosy, the West African gold developer remains upbeat as it takes its project and company up the value curve.

Kobada's path to production

"As an already permitted project, our asset can be bought into production a lot quicker than others. In terms of near-term deliverables, we are currently working on an option analysis study that will inform us on a range of potential execution approaches as we review the most optimal size and mine plan for

Kobada, and take it up the value curve and into production. In the next few weeks, our parallel exploration programme will have received all outstanding assay results from the most recent drilling campaign as we assess the significant exploration potential across the district we are in."

An update to the 2021 DFS is planned once the option analysis study is complete, which Russo says will be a compressed timeline given a detailed DFS has already been completed.

With a clearer understanding of the size of asset, optimal project execution path and potential financing solutions on offer, Russo anticipates a timeline of around 15 months for project construction once the company reaches a final investment decision on the project.

"When we have established a credible path to



Sunset at Kobada camp.





production through our study work and improved market traction, we will begin to turn our attention to the next phases of the project, such as project funding scenarios and continued exploration efforts,” explains Russo.

Options analysis study

“Toubani Resources’ near-term strategy is two pronged – the first is linked to project exploration and optimisation and the second to closing the valuation gap with our peers.”

The company is currently investigating various scenarios to determine the best route to production.

Russo explains that while the current DFS life-of-mine plan contemplates 3 mtpa throughput of oxide ore feed for the first eight years followed by a combination of oxide and fresh run-of-mine, and stockpiled feed from years nine to 16, there exist near-term levers, such as reducing life-of-mine AISC, that will positively impact overall project economics.

According to Russo, trade off studies are underway to quantify the various throughput, capex, grade, and cost scenarios with the goal of optimising these parameters and presenting a robust and attractive development project.

A key component of the options analysis study entails investigating the overall mining schedule as there exists a significant level of >1.0g/t material within the Kobada Main Kobada pit.

Although the overall resource within the Kobada Main pit sits at 0.95g/t, a significant inventory of higher-grade material exists at increased cut-off grades. The Kobada deposit characteristics (high proportion of oxide mineralisation), in combination with extensions of strike across existing and new shear structures, offer appealing development optionality.

“Our study is to validate the most optimal execution approach to getting Kobada into production considering the current market dynamics. We are



currently investigating a range of scalable throughput rates to determine which is the best option for the Kobada project, including establishing whether to develop a plant with a smaller throughput and higher-grade profile and then ramp up to larger throughput or to develop a plant with a large throughput at the onset.”

Targeted drilling

In line with firming and expanding the Kobada resource, Russo explains that historical drilling has,

Above: Field inspection at Kobada East.

Left: Kobada main pit looking north.

Chief geologist, Landoure Maman, with the drill core.





Core shed at Kobada site.

to date, been focused primarily along the Kobada Main deposit. However, the company has more recently initiated drilling outside the Main shear zone – to expand the mineralised strike at Gossa, Kobada North, West and East.

“The aim of the drilling exercise is to test the potential for strike extensions at high value new prospects and to extend known oxide mineralisation. Gosso, Kobada East, Kobada North and Kobada West all show excellent geological potential yet remain largely untested.”

The Kobada project has a large, open pitable Mineral Resource over a 4.5 km strike length, and with over 146 000 m drilled to date. The project has been drilled to an average depth of ~110 m with Kobada Main being open along strike and at depth.

“The oxide depth averages 65 m and can extend beyond 120 m in some areas of the pit, well beyond other oxide deposits in West Africa,” says Russo.

Another favourable attribute, aside from the low LOM stripping ratio of 3.5:1, is the free dig, soft oxide ore that is easy to mine and process.

“The goal of our current programme is to drill and test several high value targets outside the

3.1 moz Kobada Main deposit. Following the success of our initial results in March and April, we are pleased that we have continued to intersect mineralisation and extend the strike at all the targets tested thus far. Our belief is that the potential scale of Kobada is significant, and our extensive drilling programme continues to confirm this theory. Given the success of our campaign, we elected to increase the programme by an additional 3 000 m to a total of

13 750 m. The overall programme is set for completion by the end of April and assays due thereafter.”

Most recent drilling highlights include:

- ❑ Kobada North drilling has confirmed continuity and further extended mineralisation north of the Kobada Main Deposit with mineralisation now intersected over 2 km from previous drilling.
- ❑ Shallow, oxide mineralisation intersected in drilling at the Gosso target delivered results of 1 m at 5.78 g/t, 2 m at 1.44 g/t, 1 m at 3.16 g/t, 3 m at 1.34 g/t, 3 m at 1.17 g/t, and 2 m at 1.15 g/t.
- ❑ Mineralisation at Gosso remains open to the north and south with Toubani’s drilling increasing the strike of known mineralisation to over 2 km.

“Having recently completed RC drilling at the Kobada East target, which delivered high-grade auger results, drilling is now underway at Kobada West, a previously undrilled structure parallel to the Kobada Main Shear. Drill results from Kobada West are anticipated shortly.”

Toubani Resources – an undervalued company

Meanwhile, the ASX-listed entity which took to the bourse in November 2022, believes that recent exploration news coupled with its ongoing optimisation studies, will improve the status of its market cap, which currently sits at A\$19 million.

According to Russo, Toubani is an asset that is “Flying under the radar for no good reason” and, given the limited downside and significant upside of its flagship asset, the company is an extremely good investment opportunity.

“Importantly, gold is a relevant commodity through all cycles and has an eternal place as a global monetary instrument. Currently, gold is trading at around \$2000/oz and, with the Kobada project pegged at an all-in-sustaining-cost (AISC) of under \$1000/oz, the company offers a really good value proposition. From a location perspective, West Africa is a premier gold producing destination and home to several well-established gold mines. Mali has an established mining code and a mature mining industry and workforce,” he says. ■

Operating in Mali

- ❑ Birimian rocks are major sources of gold extending through Ghana, Côte d’Ivoire, Guinea, Mali and Burkina Faso.
- ❑ Mali is the 4th largest gold producer in Africa and continues to increase gold output year-on-year.
- ❑ It is a stable and mining friendly jurisdiction.
- ❑ The country offers political and social support for mining, with stated ambitions of developing mineral resources.
- ❑ The mining industry is one of the largest contributors to the country’s GDP, with gold forming a significant part of Mali’s total export contribution.
- ❑ Mali has a well-established mining industry with a long and successful history of gold production
- ❑ Major international mining companies have been operating in the country for decades, including Barrick Gold, AngloGold Ashanti and Resolute Mining, amongst others.
- ❑ Mali offers transportation links to the capital and logistics routes via other West African ports.

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GoldOre's MD Adrian Singh.

GoldOre's MACH reactor underpins the green agenda

By Adrian Singh, MD of GoldOre

Energy efficiency and decarbonisation remain a key talking point and one can hardly attend any conference in mining and metallurgy without it being a main topic of discussion. It's often a double-edged sword for the mining sector – with the sector itself being a huge consumer of energy, while playing a vital part in the growth of economies, especially in third world countries. Ironically, mining also has a positive role to play in the field of battery and rare earth minerals, which are key for the growing EV industry.

There have been numerous world summits on the subject of decarbonisation and global warming, starting with the Paris Agreement during COP21 (Co-operation of the People) and with COP27, was held in December of 2022, being the most recent.

GoldOre's MACH reactor in operation at a mine in Rustenberg.



Faster extraction kinetics is achieved with the MACH reactor.

There it was agreed to limit the global annual temperature rise to 1.5 °C per year and to achieve a global carbon net-zero position by the year 2050. There is still much to be done, and while there is a huge global drive away from fossil fuels and towards green energy supply, improving efficiency is equally important and top of the agenda for all industries.

GoldOre offers energy efficient solution

Now more than ever, companies need to scrutinise and improve their energy efficiency initiatives and this should filter down to their procurement and supply chain processes. Fortunately, GoldOre has already invested much effort into reducing the power requirement of its patented and proprietary MACH Reactor technology, which it markets primarily into the gold, PGM, base metals and industrial minerals industries, for recovery improvement and environmental remediation.

Economic recovery improvement, as obtained with the MACH, remains of paramount importance to mining operations as they strive to make the best use of available mineral resources and to minimise wastage as far as possible. The MACH is not only able to improve the recovery of difficult to treat ores, but it also reduces reagent consumption, which reduces environmental impact. Philosophically speaking, if economic recovery were maximised in an environmentally friendly manner, there would be no need to retreat tailings dams and use a significant quantity of power all over again. Double handling of material is never efficient. Faster extraction kinetics with the MACH also enable a smaller plant footprint, with the knock-on effect

of electricity savings and reduced environmental impact, ie, doing more with less.

GoldOre's environmental solutions

A little-known application of the MACH is in the field of environmental remediation where it is used to enhance sodium metabisulphite (SMBS)/Air or sulphur dioxide (SO₂)/Air systems where the power of cavitation is harnessed within the venturis of the MACH to improve mass transfer. Cavitation (which is the rapid formation and implosive collapse of voids within a fluid) supports free radical chemistry – also a key mechanism of SMBS/Air systems – so it makes sense that the two technologies would marry well together. The MACH may also be used for arsenic remediation by enhancing the precipitation of scorodite-like compounds, which research has shown to have long-term stability on tailings dams. Last, but not least, there is the field of water treatment where the MACH may be used to treat acid mine drainage, for example. Apart from saving power by bringing efficiency to these systems, the environmental applications of the MACH significantly reduce a mine's overall impact on the environment, paving the way for a more sustainable future.

Research-driven power optimisation

Having established the effectiveness of the MACH to improve both extraction kinetics and recoveries, GoldOre turned its attention to optimising the power consumption of the MACH. This entailed revisiting the initial design criteria and systematically eliminating anything that was a nice-to-have.

It took many years of research to understand the critical components within the MACH and to enhance these whilst simultaneously streamlining the design. Collectively, the design tweaks, together with the adjustment of operating parameters such as pressure and venturi speeds, resulted in a massive reduction in the power requirement of the MACH – by as much as 70 to 80% while maintaining metallurgical performance. By comparison, the MACH draws around 50% less power than rival shear reactors on the market. This is enabled by the cavitation effect in the venturis, which requires a lower back-pressure, and hence also a lower power draw, when compared to competitive systems. The metallurgical benefits of cavitation remain unmatched by rival shear reactor systems.

Careful work was done to maximise the self-aspirating abilities of the MACH in order to lower the pressure requirements of gas that is dosed into the reactor. Whereas existing systems in industry require gas pressures as high as 10 bar in order to operate effectively, the MACH is able to operate at highest efficiency with gas injection pressures as low as 1 bar. Given that much power is required to operate compressors to achieve high gas pressures, the lower gas pressure requirement of the MACH goes a long way to reducing overall power consumption.



The MACH is not a mill

Another interesting phenomenon in minerals processing is particle breakage and liberation improvements, essential for effective mineral extraction, that can be achieved using the MACH, especially in multiple pass systems. This is owing to the energy release during cavitation – the centre of an imploding cavitating bubble can reach 5 500 °C and the water jet that splits the bubble will impact on a particle with a pressure of 1 000 atmospheres. This phenomenon can be put to good use by allowing operations to coarsen mill grinds slightly, to achieve their final grind targets with the MACH at a lower overall energy consumption, whilst preparing the ore for downstream metallurgical processing through pico-bubble generation in the venturis of the MACH. Pico-bubbles enhance both leaching and flotation systems as well as any system where a gas is required to be dissolved into a liquid. As mills tend typically to be the highest power consumers on any metallurgical plant, any power savings on a mill operation will have a significant impact on overall power consumption.

The MACH reactor going through quality control checks.

Technology that outlasts your operation

Moreover, the MACH has been designed for longevity – there are installed reactors in very abrasive environments that have required zero maintenance in over 10 years and are set to outlast the life of the operations in which they are installed. Unlike



A miniature version of the MACH reactor in operation at Mintek.

existing products in the industry that require regular change-out of wear components, if not the entire reactor every couple of months, the MACH is truly a plug-and-play device, requiring little to no attention once correctly installed and commissioned. If one considers the power wastage incurred by rivals for component remanufacture, transport to site for materials and personnel and also plant equipment, such as cranes and forklifts, that would be required to effect the maintenance, then the MACH seems vanilla by comparison.

The materials of manufacture of the MACH are

completely inert with zero environmental impact during operation. At the end of the life of a project, the MACH can be refurbished and re-used with minimal wastage incurred. So, apart from requiring a single manufacture for the life of the project, the MACH can be recycled and repurposed when it is no longer required by the metallurgical operation.

Outlook for 2023

Thus far, 2023 has been a year of diversification and expansion into new territories for GoldOre and the MACH. Interestingly, the MACH has found application in base and battery minerals as well as the industrial minerals sectors, with an accompanying expansion into new geographical areas as well. The outsourcing business model that GoldOre adopts, together with the longevity of the MACH, make it possible for GoldOre to operate globally in the most remote parts of the world, using South Africa as a base. The vast number of MACH reactors that have now been successfully installed around the world have transformed the MACH from an emerging new technology into a tried and tested one that is ripe for the picking and ready to disrupt the mineral processing world – making permanent and positive changes to the metallurgical landscape for years to come and creating a lasting legacy for future generations. ■



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- What actions does the industry need to take to begin the energy transition and move away from coal?
- What is the role of renewable energy in the energy transition?
- What are Eskom's plans for meeting energy demand and its views on coal and alternative energy sources?
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Pieter de Villiers, Gqeberha branch manager for Zest WEG.

VSD technology for energy efficient mining, and more

As South African mines work towards improved efficiency in their energy usage, they are also dealing with the various impacts of load shedding; the use of variable speed drives (VSDs) holds many advantages on both counts, according to Zest WEG Gqeberha branch manager Pieter de Villiers.

The benefits of VSDs in making mining operations more efficient are well known, but there are plenty of other advantages,” says de Villiers, who was previously the VSD Service Manager at Zest WEG. “Many users will be pleasantly surprised by the ways that VSDs can assist in reducing the disruption caused by load shedding.”

He highlights that a core advantage of VSDs is to avoid the high start-up current that an electric motor would normally draw in direct-on-line starting mode. This start-up current is typically six times higher than the motor’s rated current and contributes to an operation’s maximum power demand.

“VSDs reduce a motor’s start-up current to just the current required to drive the load,” he explains. If VSDs were more widely applied across industries and households, he argues, the peak demand on the country’s power system could in fact be considerably reduced – perhaps even making an important impact on load shedding levels.

Power factor

Another important contribution that VSDs make is in improving the power factor of electric motors. Where the current and the voltage in a motor are

not in phase with each other, the phase-shift power factor is not optimal.

“The application of a VSD can improve the system power factor to typically 0,97 – which is quite a drastic improvement and saves on considerable wastage,” he says. “By correcting the power factor, the motor uses less current and thereby contributes directly to efficiency.”

VSDs also help reduce energy wastage in common applications of motors such as pumping. Traditionally, water pumps are expected to run at a constant speed, with the flow being controlled – or throttled – by valves as required. De Villiers points out that the more efficient approach is to control the actual speed of the motor, so it pumps only the volumes required. The direct benefit is reduced energy consumption resulting in a reduction in energy costs.

Load shedding disruption

When it comes to the disruption caused by load shedding, many of the difficulties faced by mines and mineral processing plants relate to the re-starting of systems and workflows when the power supply is resumed. In many cases, there is a sequence that must be followed when machines are re-activated – for operational or safety reasons.

A typical mine plant where WEG motors and VSD solutions can be applied.



“This is where VSDs are very useful, as they can be programmed to automate and control a number of actions in a required order,” he says. He cites a simple example of pumping water through pipelines, from which the water drains out due to gravity during load shedding. Starting the pump dry at full speed could create a vortex that causes cavitation and other damage. The WEG VSD can be set to start the pump at a lower speed to refill the pipeline with water, after which it could resume full pumping duties. He highlights that it is therefore not necessary to install a separate PLC system to accomplish this level of automation.

“This functionality can be extended to more complex applications, such as a mine’s conveyor system,” he explains. “For safety reasons, a siren must first be sounded before the conveyor is allowed to be activated; WEG VSDs can be programmed to do this with the siren connected to one of the drive’s outputs and importantly no extra hardware would be required to achieve this function.”

Load shedding often creates extra work for mines, as an operator must go through several stages to initialise a system. WEG VSDs can be programmed to automate this re-start, taking the load off operators and allowing them to focus on their key duties.

Overcoming dead time

The ‘dead time’ between grid power turning off and the mine’s generator kicking in also creates challenges for operational continuity – and is another area in which VSDs can come to the rescue. If the dead time is too long, then machines can trip out and require a re-start that is often time consuming.

“A common way that the VSD stays live during this dead time is through the stored energy in its capacitors, allowing it to re-accelerate the motor when the generator kicks in,” he says. “It is also possible to set up the drive to utilise the inertia from the load and therefore power from the motor itself – essentially using the motor briefly as a generator to keep the VSD alive.”

As the world moves towards harnessing renewable energy, as many mines are doing, VSDs also have a role in enabling hybrid power systems. When a motor is connected both to solar panels and to the national grid, a VSD can provide the interface that can switch to the optimal power supply, he explains.

“When there is sufficient sunlight, the system will detect the voltage produced from the solar panels and use it instead of grid power, which in turn improves cost savings,” he says. “At night, or even in cloudy conditions, the drive can energise a contactor to connect back to the grid – so this assists not only with load shedding but with overall energy efficiency.”



A range of WEG Variable Speed Drives that can prevent equipment from tripping out during load shedding.



A range of WEG Variable Speed Drives that have built-in PLC capability.



De Villiers notes that the full range of WEG VSDs have built-in PLC capability, and they can be programmed to suit the mine’s requirements. WEG has also developed certain programmes for its VSDs to help users accomplish a variety of common automation and control functions, without having to write or learn how to write this code themselves. ■

The Zest WEG demo trailer displaying a wide range of WEG electric motors and the WEG CFW11 drive that can reduce the operational disruptions caused by load shedding.

feature

Drive solutions that support mines' energy efficiency focus

As mines work towards better energy efficiency, they are looking not just to their own systems but also to their supply partners to support their journey towards a lower carbon future.

Drive technology specialist SEW-EURODRIVE has for many years focused on delivering energy efficiency in its drive solutions – starting at the concept development stage. Indeed, by continuously updating its offerings, the very latest expertise in energy efficiency can be incorporated into drive systems – achieving the optimal balance between economic and ecological interests. These efforts help mines to contain rising energy costs, while supporting their responsible and sustainable approach to the use of resources.

The company has continuously expanded its established DRN modular system of motors in energy efficiency classes IE3 and IE4, and is moving into the IE5 and IE6 classes.

Energy savings

SEW-EURODRIVE's compact product concept uses less aluminium, and cuts down on the use of potting compound – choosing instead to have separate assemblies that simplify repair work. Other aspects of the solution – including regenerative units, energy storage devices, a standby mode, energy saving functions and energy efficient brake management – help customers achieve additional savings.

Further adding to energy savings is the use of simulation software when developing parts that are relevant to heat dissipation. The philosophy adopted by SEW-EURODRIVE when rating energy efficiency is to consider both the motion task as a whole, and the complete drive system.

The company has continuously expanded its established DRN modular system of motors in energy efficiency classes IE3 and IE4, and is moving into the IE5 and IE6 classes. This will involve initially taking the traditional approach of enhancing the efficiency class of the individual components – measuring the



SEW-EURODRIVE's modular system of motors in energy efficiency class IE3.

drive's efficiency exclusively based on rated torque and rated speed.

In terms of international standards, IE4 is viewed as the technological limit for asynchronous motors. At this level, the properties of the motors – especially when they are starting up – pose a challenge when it comes to the strain that is placed on machinery and systems in line operation. For this reason, there are only a few specialist applications where an IE4 asynchronous motor is a suitable solution from the viewpoint of both energy efficiency and drive technology. An IE4 variant has therefore been implemented from within the DRN series, so that a modular solution can be offered for these requirements.

Speed-controlled systems

The real key to making energy savings in the near future lies in the application of frequency inverters. Research by the European Committee of Manufacturers of Electrical Machines and Power Electronics (CEMEP) highlights that potential energy savings of up to 40% can be achieved using speed-controlled systems. Despite the additional losses a frequency inverter introduces, the amount of energy required to complete a motion task can still be reduced by 40%.

There are other benefits to be achieved from frequency inverter-controlled systems, such as being able to control drives dynamically in line with the application, and incorporate the asset digitally. With these sorts of possibilities, the proportion of inverter-controlled motors could rise from 30% today to at least 80% in ten years' time.

Such a trend will lead to a much more energy-efficient – and therefore more sustainable – approach when evaluating the energy consumption of the drive system for a motion task in an application. Rather than evaluating the various individual components of the drive system (inverter, cable, motor and gear unit) based on their rated characteristics, they will be evaluated based on how they work together at specific load points in the application. Doing this will not be a problem, as the method was set out

SEW-EURODRIVE's predictive maintenance option – DriveRadar.





SEW-EURODRIVE uses digitalisation and visualisation during early product development to reduce the environmental impact of countless prototypes and experiments.

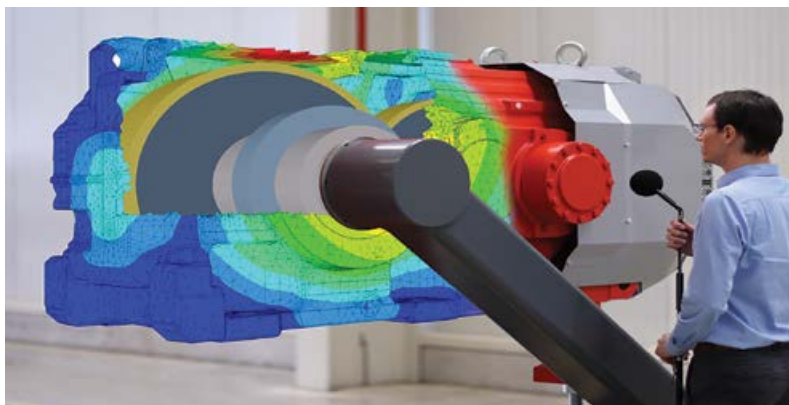
back in 2018 in the IEC61800-9 series of international standards.

Add-ons for modular systems

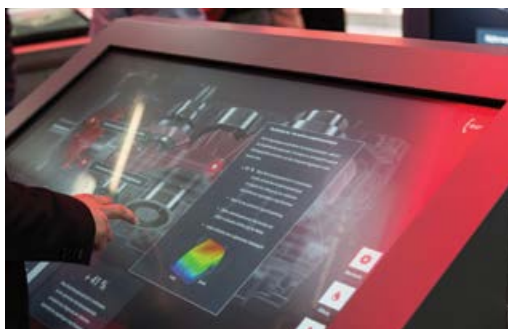
As a second related strategy for its portfolio of motors, SEW-EURODRIVE is therefore focusing on expanding its modular system with add-ons developed specifically for operation with inverters. Several technologies can be employed for this purpose, such as installing magnets in the rotor. This increases the dynamics of the drives and minimises the size, while further improving efficiency of the drives. This integrated permanent magnet (IPM) technology will be used mainly in smaller motors.

Digitalisation and virtualisation are also being employed to boost SEW-EURODRIVE's energy efficient designs. Here, there are increasing opportunities to use virtual simulations and digital models during product development. These tools offer valuable insights into how a product will be used – helping developers to focus their energy saving efforts.

Preliminary simulations can be run during development projects to help deliver important findings at an earlier stage. This means fewer practical



Above: Energy efficiency ratings should consider both the motion task as a whole and the complete drive system, as is the philosophy adopted by SEW-EURODRIVE.



Left: DriveRadar®'s focus on predictive maintenance ensures resources are put to the best possible use.

experiments and specially built models or prototypes are required – which saves time and resources. For instance, a virtual simulation of oil flows helps eliminate the need to carry out experiments in a test centre, while fewer prototypes and experiments means less material is used and less CO₂ emitted.

Integral to SEW-EURODRIVE's closed-loop approach to sustainability is a service concept that is based on using resources as sparingly as possible. It includes a focus on predictive maintenance that ensures resources are put to the best possible use. As part of its Life Cycle Services, the company can also retrofit plants, systems and components to realise substantial energy saving potential. ■

feature



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T3 Projects targets growth, eyes geographical expansion

Launched at the onset of the Covid 19 pandemic, T3 Projects, a spin-off from the now defunct Group Five Projects, is growing by leaps and bounds, posting a 25% revenue increase since its launch in 2019, MD Richard van den Barg tells *Modern Mining*. By Nelendhre Moodley.

“When Group Five entered into business rescue in March 2019, the directors of Group Five Projects considered the Projects division, with its excellent track record of project delivery throughout Africa, to be well worth saving from potential liquidation.”

The Teichmann Group subsequently expressed an interest in acquiring the business and all of its assets, including human capital, plant and equipment and the permanent hubs in Ghana, Burkina Faso and the DRC.

A formal transaction, concluded in mid-July 2019, saw the establishment of T3 Projects. The directors of the company, former Group Five Projects Directors, hold a 30% shareholding.

The T3 Projects business complements the other construction activities within the Teichmann Group, such as roads, civils and earthworks, contract mining and drilling.

According to van den Barg, T3 Projects was awarded its first project, a structural, mechanical, electrical and instrumentation, piping and platework (SMEIPP) contract for the Kenmare Moma Sands wet concentrator plant (WCP)-B relocation project, in Mozambique, in March 2020.

“The contract document was signed in our Boksburg offices on Friday in late March – the same day the country went into the first Stage 5 hard lockdown. Given the travel restrictions, we couldn’t immediately get to site; however, after the first six



weeks, we received our essential services permit. Our suppliers and fabricators were also encouraged to apply for essential worker permits, which meant we were able to purchase the required equipment and transport our staff to site to begin with the site establishment process and place orders for the long-lead items that fell within our contract scope.”

The scope of work on the Kenmare Resources Moma Sands WCP-B relocation project entailed the construction of infrastructure for the concentrator plant that was relocated 23 km away from the existing plant. The Moma Titanium Minerals Mine, located on the north east coast of Mozambique, contains deposits of heavy minerals which include titanium, ilmenite, rutile and zircon. To increase production at the Moma mine on a sustainable basis from 2021 onwards, Kenmare Resources made the strategic decision to relocate WCP B from the existing Namalope mine to a new ore body at Pilivilvi – about 23 km away.

“T3 Projects was contracted to establish infrastructure at the new location. The scope included new feed and reclaim bins, conveyors, HMC stacker, PD pump station, and a new HME workshop.

We were also required to move all the dry mining equipment across to the new site. The project has

Right: Essakane mill upgrade project.

Below: T3 Projects was involved in the Essakane mill upgrade project.





been a huge success and T3 Projects has retained a presence on site since its completion. This project demonstrated our capabilities of “thinking outside the box” and our ability to create tailor-made customer-focused superior solutions in remote locations.”

Since then T3 Projects has executed several large electrical, control and instrumentation (E,C&I) projects, including at Kamoa-Kakula Copper Mine in the DRC; a brownfields relocation of an acid tank farm at Kamoto Copper Company (KCC) (a copper and cobalt mine in the Lualaba Province of the DRC); a mill upgrade project in Burkina Faso; a mine refrigeration project as well a number of smaller shutdown and maintenance projects at the company’s areas of operation.

“We have maintained a permanent presence at Ivanhoe Mines’ Kamoa-Kakula Copper mining complex in the DRC, having participated in Phase 1 and Phase 2 of the prestigious project where we provided E, C&I services and are currently tendering for additional work on the Phase 3 expansion, as well as on the smelter project. We have executed several brownfields projects at KCC, including the shutdown on the acid plant, and are maintaining a presence on site for future work,” says van den Barg.

Further to this, the company was also contracted to undertake structural steel and platework fabrication, and supplied piping for the Lake Kivu methane gas project located in western Rwanda. The lake contains high concentrations of naturally occurring methane gas (CH₄) and carbon dioxide (CO₂). The Lake Kivu project involves the construction of an off-shore gas extraction facility along with onshore gas processing and compression plants.

T3 Projects targets growth

The company, which already has a well-established presence in the DRC, Ghana and Burkina Faso, is eyeing geographic expansion into key mining destinations.

“We are looking at expanding our geographical footprint and are exploring opportunities in new

territories such as Sierra Leone, Senegal, Cote d’Ivoire and Zimbabwe. Our track record of successfully executing projects in remote areas throughout the African continent arising from our 30+ year history of having permanent businesses established in Ghana, DRC and Burkina Faso stands us in good stead for owners, EPCMs and consultants requiring an experienced contractor to construct a new mine, or to upgrade an existing facility,” he says.

According to van den Barg, the strategy for T3 Projects is to grow the business in a sustainable manner, “sticking to what we know best, which is constructing mining infrastructure and mineral processing plants throughout Africa”. Our growth will be organic and carefully managed,” he affirms.

Given the strong demand for commodities, the company is experiencing an uptick in business, with the development of new age minerals such as lithium, tin, rare earths, copper, cobalt and heavy mineral sands offering new opportunities for the specialist construction contractor.

“T3 Projects will remain a lean and nimble company eager to take advantage of African related mining opportunities. We look forward to growing T3 Projects into becoming a project house of choice for mining projects spanning junior, mid-tier and mining project houses,” concludes van den Barg. ■

Above: Lake Kivu methane gas project located in western Rwanda.

Centre: T3 Projects undertook an SMEIPP contract for the Kenmare Moma Sands wet concentrator plant (WCP)-B relocation project.

Left: The company executed an E,C&I for the Kamoa-Kakula Copper Mine.

T3 Projects was involved in the Yaramoko refrigeration plant.





Ross Harvey, director of research and programmes at GGA.

Rand weakness is a blessing and a curse in respect of commodities, though. The sales figures look alright because commodities are priced in US Dollars. So, when the Rand depreciates against the Dollar, the Rand sales figures hide the true picture of the fundamentals.

Imported machinery is already expensive.

Interest rates, untameable fires, and mining production collapse

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

South African mining production is in the doldrums. No surprises there. Figures released by StatsSA in May show that year-on-year production to March 2023 is down by 2.6%. The two most significant negative contributions were diamonds and platinum. Gold and manganese ore production were up, which is phenomenal given the loadshedding circumstances. Mineral sales, though, decreased by 15.1% year-on-year to March 2023. Platinum group metals (PGMs) sales were down by 36.2%, in line with production slowdowns. Gold sales, despite production increases, were down by 20.9%, and coal declined by 23%. As expected, chromium and manganese ore sales were up by 63% and 41% respectively, given that these are critical minerals for the global economic transition towards fewer carbon emissions. Mineral sales are still reasonably high in Rand terms, coming in at R70.9 billion for March 2023 compared to R83.5 billion the year prior.

Rand weakness is a blessing and a curse in respect of commodities, though. The sales figures look alright because commodities are priced in US Dollars. So, when the Rand depreciates against the Dollar, the Rand sales figures hide the true picture of the fundamentals. And Rand depreciation in the current moment is almost entirely attributable to domestic policy blunders.

Neal Froneman, Sibanye-Stillwater (a major global PGM player) CEO, has joined other big-business voices in South Africa lambasting the state: "My view now is that we are practically a failed state." Tracey Davies, director of Just Share, has argued that the term should not be used so loosely, as it grabs headlines but does little to support those of us who get

up every morning trying to make the country work. And, frustrating as things are, we are hardly Somalia. Her caution should be heeded. Nonetheless, the domestic factors driving down the value of the Rand do need to be recognised and analysed:

First, some headline figures: The Economist Intelligence Unit (EIU) forecasts GDP growth for the South African economy at 0.5% for 2023. They are optimistic about the future, but it is hard to understand why. Inflation is persisting at 7.2% at present, far above the midline of 4.5% that the Reserve Bank is trying to target (or at least get us below 6%). EIU projections place inflation at 5.2% for 2023, in line with global downturns in both oil and non-oil commodities. Economists really like to hedge their bets, and the EIU – in standard form – argues the following: "An uptick to 7% [now 7.2%] in February highlights lingering pressures, although we expect the broad downward trend to continue, barring new shocks." But new shocks keep coming. The loadshedding situation is far worse than the state appears willing to let on (a nice way of saying that someone is lying) despite electricity tariffs jumping by 18.6%. Yes, there is slackening aggregate demand, as many South Africans sink into deeper poverty, manufacturing capacity lies idle (causing further jobs and income losses), and the Reserve Bank relentlessly pumps up the interest rates.

Second, Rand depreciation is driven by global market sentiment that is increasingly unfavourable towards South Africa. A Russian ship called Lady R docked (under cover of darkness – and not only because of loadshedding) in Simon's Town naval base in early December 2022, shortly ahead of the ANC elective conference. The president has called for a commission of enquiry into the event, which strongly suggests that no one knows who is in charge. What we do know is that the Military Police oversaw the uploading of goods from Armscor trucks onto the Russian vessel, which had turned off all its identification equipment. Armscor is the procurement arm of the national defence force. It is not unreasonable to expect that arms, which Russia cannot procure because of international sanctions, were uploaded. South Africa has maintained a 'non-aligned' stance by not condemning Putin's invasion of Ukraine in February last year, in addition to holding joint military exercises with Russia and China earlier this year. The diplomatic messages are clear, and at odds with our national interest. The US ambassador to South Africa, Reuben Brigety, has made it clear that our trade deal with the United States (African



Growth and Opportunity Act) is at risk – it is set to expire in 2025, and because it is a US law, the country may simply decide not to renew the agreements therein for South Africa. The American Chamber of Commerce in South Africa has noted that trade in goods between the two countries was worth US\$13.2 billion in 2019. Trade in services was worth \$4.6 billion in the same year. As Brooks Spector quipped: “By contrast, the numbers for Russian investment in South Africa and bilateral trade are close to rounding errors.”

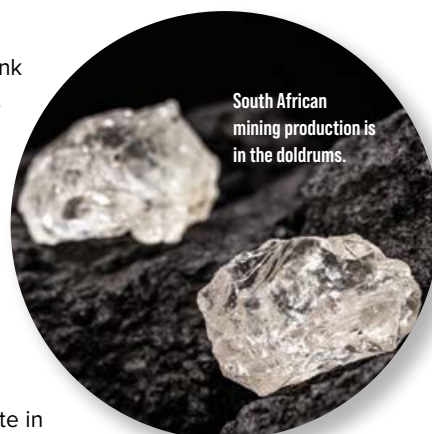
Third, the Reserve Bank keeps trying to put out the fires to the Rand by tightening monetary policy – the Monetary Policy Committee (MPC) is going to keep increasing interest rates until inflation is tamed. But this fire is unlikely to be tamed. Interest rates pour cold water on domestic demand by making savings more attractive while the price of goods and services goes up. But they also buoy the value of the Rand (all else being equal) because Treasury bond yields go up as they become relatively more attractive for global hot money chasing returns. However, when the state does business with Russia against all indications of sensibility, and fails to keep the lights on, there is no amount of interest rate hiking that will break through the clouds of inflation. All it does is squeeze the middle class so hard that many are left with no choice but to immigrate (if they can still afford to do so). Why? Because bond repayments on a R2 million home, which were R14 911 at interest rates of 6.5% (during 2021), are now R20 985 (at an interest of 11.25%) in May 2023. Who can afford an extra R6 000 a month while food price inflation continues to skyrocket at rates far higher than official inflation figures suggest? And who can save in these circumstances?

Because US inflation is still higher than the Fed's target of 2%, they have probably not finished hiking

rates. The South African reserve bank typically follows the Fed, or at least anticipates US rises and hikes the repo rate accordingly. But it is proving a very blunt instrument because its efficacy is thwarted by blunder after domestic blunder. Nonetheless, economists expect that the MPC will up it by another 50 basis points at its next meeting.

All this is fine for the political elite in South Africa living the high life. News just in is that “United Manganese of Kalahari (UMK) is set to become an unbridled cash cow for the ANC, especially its funding front Chancellor House... Chancellor House's indirect 22% share in the 2020 dividends would have amounted to R528 million.” This windfall cleared the company's debt and enabled it to buy out another shareholder. UMK is 49% owned by “an opaque and shifting knot of companies in Cyprus and the Bahamas, which lead back to Russian oligarch Viktor Vekselberg, who has close ties to Russian president Vladimir Putin.” No surprises there, given Lady R shenanigans and every other apparent pandering to Russia.

The EIU expects the Rand only to depreciate to R20.29:1US\$ by the end of 2027 and stabilise at R17.28:1US\$ by the end of 2023. At the time of writing (16 May 2023) it is sitting at R19.074:1US\$. It is the Rand's lowest level in 25 years. If commodity prices continue to decline, as they will in a recessionary global context, South African mining is in real trouble. Imported machinery is already expensive, and declining production volumes will lead to lower sales figures, which will eventually wipe out profitability that is currently a function of temporarily high commodity prices and a favourable exchange rate. ■



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Maptek launches VisionV2X for underground

Maptek™ VisionV2X provides mine personnel with ‘vision’ underground, enabling them to make better decisions for keeping people and equipment safe. Maptek officially launched VisionV2X at Austmine2023 in Adelaide on 10th May. To create a sys-

tem that miners could rely on for proximity detection underground, Maptek turned to proven technology in the automotive industry, the company said. The VisionV2X is already operating hundreds of metres underground at one of the world’s largest underground copper mines. VisionV2X allows miners to see underground and around corners, with metre accuracy to ensure even fully loaded high speed trucks have time to react to each other in all conditions. ‘Our latest product is firmly in touch with the Austmine theme Transforming the future and in line with our industry imperative to bring everyone home at the end of a shift underground,’ said Maptek CEO Eduardo Coloma. ■



Maptek's VisionV2X.

Cat® R2900 XE features efficient design

The first diesel electric underground load-haul-dump (LHD) loader from Caterpillar, the new Cat® R2900 XE LHD, meets the underground mining industry’s needs for bigger

payloads, faster loading and reduced emissions. Built on the platform of Caterpillar’s most popular underground loader, the new LHD features optimised lift arm and component geometry plus load-sensing hydraulics to improve breakout force by 35% over the Cat R2900G. The R2900 XE delivers 52% quicker acceleration and improved machine response over the R2900G. Boasting a higher, 18.5-tonne (20.4-ton) payload for faster load times, the new LHD model offers a 3- to 4-pass match to the Cat AD63 truck for greater efficiency. Combined, these features deliver a 20% increase in productivity for the R2900 XE, the company said. ■



Cat® R2900 XE underground loader launched.

Zest WEG builds special transformers locally for solar farm

A solar power generating facility recently developed by a South African gold mine has made use of Zest WEG’s locally manufactured transformers to serve this specialised application. Factors like harmonics or ‘noise’ in the current flow mean that solar photovoltaic (PV) applications require specialised transformers, explains Rynard Potgieter, Sales Manager for transformers at Zest WEG. At this site, where 40 MW of renewable energy is being generated, the company supplied 10 of its custom-designed transformers of 5 MVA capacity each. The units for the PV project were manufactured at the company’s Wadeville factory. ■



Zest WEG manufactures transformers for the solar industry.

Multotec unveils new MultoComposite integrated liners

Multotec has developed a range of composite integrated mill liners in response to the needs of local and international mining clients. The solution showcases the company’s advanced technical expertise as well as its ability to design MultoComposite integrated liners according to customer’s plant needs, specifications and mill operating parameters, through its high-skilled technical and product development teams. “Many mining operations that operate large steel mills are now looking to switch over to composite rubber liners, such as the MultoComposite integrated liners, which have the same application as traditional steel liners and can thus be used across mines in milling circuits,” says Samuel Hearn, Global Sales Director at Multotec. ■



Multotec launches a range of composite integrated mill liners.

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