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REVIEW AFRICA

MINING REVIEW AFRICA | OCTOBER 2020

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YOUR SAFETY GUARDIAN

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“ We have found the silver lining to the impact COVID-19 has had on our country, ”

Francis Gatare, CEO of the Rwanda Mines, Petroleum and Gas Board

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Underground mine safety has become a top priority agenda item for any mine site management, and while the measures taken to prevent dangerous situations from occurring is essential, so too is the necessity to be prepared for those situations if and when they occur. Through the use of internally developed innovative underground safety technology solutions, MineARC Systems is bringing the mining industry into a new safety era. **P4**

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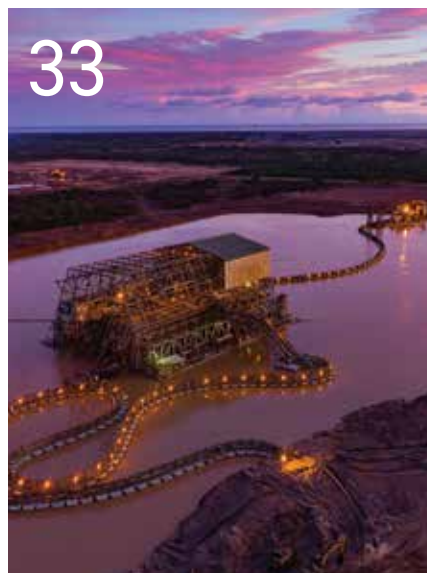
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EDITOR'S COMMENT

Every bad situation

Has an element of good

And so we move into the last quarter of the year – and what a year it has been. I know it's been tough, and you probably feel stretched to your limit having to work and push through the challenges associated with, dare I say it – COVID-19.

But I'm determined to reflect on the positive outcomes that have resulted from operating in a new world – one that will leave a permanent mark on all of us in some way or another.

What have we learnt exactly? That no challenge is unsurmountable for starters. Travel restrictions for example, saw the world, or at the very least the mining industry, learn to operate remotely. We took to *Zoom* and *Teams* with gusto. In fact, we are connecting with clients and colleagues more frequently than ever before.

Of course we must consider safety, which fortunately for the mining sector is already in our veins – so learning to incorporate a few new rules has posed no major challenge. Social distancing, face masks, hand washing – what a cinch.

Technology of course cannot be ignored. While the mining industry has, in some cases, been reluctant to embrace, adopt and accept the role that digitalisation, automation and even artificial intelligence has to play in our lives, this mindset has changed. Suddenly, we've become exposed to the multitude of benefits these

technologies have to offer in making sure the 'show goes on'. This excites me – no doubt wherever you are sitting in the world, technology has also positively touched your life in the last seven months, myself included and I'm truly loving it and feeling completely inspired.

While on the topic of inspiration, one of the articles I have written for this edition is one that will lift your spirits – the relocation of Kenmare Resources' Wet Concentrator B plant for its Moma minerals sands projects in Mozambique. What do you do when you have a depleted ore body, but a new high

grade resource 23 km away in need of just a plant and dredge to tap into? For a large-scale, established miner such as Kenmare, you come up with a plan that saves you time and money.

You don't build a new plant. You don't disassemble and reassemble your plant either. You build a 60 m wide road and implement a novel way to move your plant in its complete entirety between mining areas. What a feat! One that Kenmare has already achieved. This is a story for the mining history books

and I highly suggest taking the time to read this one.

Lastly, before I go, for those of you who don't already know, this edition will be digitally distributed at our *Africa Mining Forum Digital Event* taking place from 16-20 November. It's the meeting place for junior miners and investors, looking to connect – so if you want a slice of that pie, don't miss it. **MRA**



Still connecting with key industry stakeholders, despite lockdown



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MINEARC

Your safety GuardIAN

In recent years, underground mine safety has become a top priority agenda item for any mine site management, and while the measures taken to prevent dangerous situations from occurring is essential, so too is the necessity to be prepared for those situations if and when they occur. Through the use of internally developed innovative underground safety technology solutions, **MineARC Systems** is bringing the mining industry into a new safety era, writes **LAURA CORNISH**.



Technology has become a cornerstone around which new and even existing operations must build their businesses. It has the power to enhance productivity, streamline operations and importantly, save lives.

Established in Perth, Australia, MineARC has since its inception in 1999 been dedicated to setting the

benchmark for emergency safe-refuge systems worldwide; and more recently focused on pioneering new underground safety technologies.

It is this pioneering approach that has seen the company deliver a new safety solution to the mining industry – bringing greater peace of mind to both mine workers and managers and leaving them to focus on their core priority – mining.

“With the introduction of our GuardIAN Intelligence Network suite we offer a comprehensive solution that we believe is unparalleled in the industry,” starts MineARC chief innovation officer Brent Pearce.

“Having noticed the increase in ad hoc safety chamber inspections by on-site personnel, being conducted over and above the typical four-month inspection we offer for our own inspections, we identified the need to bring a technologically advanced system to market that allowed for continuous safety monitoring,” he continues.

Launched in 2015, the GuardIAN Intelligence Network is engineered to provide site-wide integration; allowing real-time monitoring site-wide diagnostics of the underground environment, site assets, and personnel via any PC, tablet or mobile device. It encompasses a range of products that can be implemented singularly or collectively to improve safety standards on-site, including gas monitoring, smart lighting, personnel tracking and refuge chamber monitoring.

A digitally connected node network

MineARC has introduced the concept of a digitally connected network of nodes, all capable of feeding real-time digital monitoring information to a central location dashboard that doesn't require any high-level skills to interpret.

Its GuardIAN Digital Gas Nodes provide an external gas monitoring solution for mine sites; designed specifically to be mounted to rock wall and high traffic areas of the underground mine. Sensor technology within each node monitors gas levels in surrounding areas; designed to facilitate efficiency and safety during re-entry and in an emergency.

As part of the GuardIAN Intelligence Network, the gas monitoring nodes can form an expandable and adaptable web, allowing increased coverage and accuracy of atmospheric data transmitted between MineARC refuge chambers, underground personnel and above-ground control.

The GuardIAN Smart Lighting Nodes provide sites with the ability to remotely communicate safe and unsafe areas of an underground mine site, and most importantly, provide a visual alert when evacuation is necessary. "Think about an airport runway, directing planes to land or highlighting unsafe areas – this is a visually effective method for alerting and guiding underground personnel," Pearce notes.

GuardIAN's Personnel Tracking Nodes have been specifically developed to integrate with the GuardIAN Intelligence Network, allowing sites to remotely monitor the location and well-being of all underground staff. "This extends beyond tagging personnel in and out of zones, and can pinpoint specific distance and location to a refuge chamber," explains Pearce. A small tracking chip located within MineARC's personal devices (such as the SiriUS-LUX cap lamp and Aura-PT handheld gas detector) communicates via wireless

technology with the nearest GuardIAN node, providing location information back to the GuardIAN Network.

And finally, Refuge Chamber Monitoring with GuardIAN is an exciting new development in refuge chamber technology. It enables real-time monitoring; providing confidence that an operation's fleet of refuge chambers are emergency-ready at all times. It is an independent system that continuously monitors all vital refuge operating systems. During standby mode, GuardIAN chamber monitoring checks for component faults and monitors refuge chamber usage or entry to the chamber.

"The incorporation of our GuardIAN network is truly designed to bring underground mine safety into the next century and speaks to the industry's need to invest in the benefits technology has to offer," Pearce highlights.

Naturally, the GuardIAN system relies on a stable underground internet connection – but again, underground telecommunications infrastructure is another important investment that MineARC is seeing a steady uptake in. In support of this, the company also offers the GuardIAN Connect Coaxial Cable – a high speed, fit-for-purpose, linear access layer network, which carries both power and data for the node network to operate. "We do understand the cost to install fibre/LTE networks underground is a significant investment and so we do recommend clients consider this as an alternative in higher risk areas of the mine," Pearce notes.

Africa embracing technology

Importantly, this safety technology has already been embraced by the African

ROBUST AND CUSTOMISABLE

High tech solutions are often considered unreliable but Van Niekerk assures that the company's products and solutions are durable, supported with battery power back-up and can easily be adapted and changed to suit customers' requirements. "Our refuge chambers for example, can be designed to fit certain space requirements, accommodate specific personnel number requirements and can also be provided in a modular configuration that is then assembled underground," he shares.

industry – a true showcase that even in remote regions, technology is playing an important role. "We first rolled out our GuardIAN system to Mopani Copper Mines' underground SOB/Synchloronium mine in Zambia in 2015," says Jason Van Niekerk, sales manager for MineARC Africa. "With the incorporation of our various node solutions, it offers the full GuardIAN benefits."

Consequent to this, MineARC has since installed the GuardIAN safety solution at another 10 mining sites in Africa, including the Kamo-a-Kakula project being developed by Ivanhoe Mines and Zijin Mining, a large-scale PGM mine in Zimbabwe as well as the Bogoso/Prestea gold mine in Ghana, "and enquiries are gaining rapid momentum too," Van Niekerk adds. **MRA**



A NEW PARTNERSHIP SECURED

To fulfil its commitment to be a true emergency response solutions provider, MineARC recently announced its partnership with 60-year old global rescue pack provider DEZEGA. "The fit for both companies – to expand our solutions offering, made sense," Pearce notes.

For now, the focus is providing DEZEGA's self-contained, self-rescuers (SCSRs) into Africa and travelling the journey together as the company will in the short to medium term future launch a new range of positive pressure closed circuit SCBAs with digital monitoring. These SCBAs will be lighter, more ergonomic and more cost-effective than anything else on the market.

Rwanda has an abundance of technology metals – tin, tungsten and tantalite as well as lithium and speciality minerals such as rare earths – all important for the emerging technology boom

Image: www.123rf.com



Rwanda's Francis Gatare:

“Our vision for growth remains unchanged”

Rwanda's mining industry may still be in its infancy years (by comparison with many other jurisdictions in Africa), but under the leadership of **FRANCIS GATARE**, CEO of the **Rwanda Mines, Petroleum and Gas Board (RMB)**, there is great potential for growth. Having implemented the necessary measures to control COVID-19 in the country, the vision to establish a thriving mining sector remains a key priority, he tells **LAURA CORNISH**.

COVID-19 has infiltrated the entire globe, and even small, more remote regions such as Rwanda have not remained untouched. In September, the country reported around 4 400 cases, with a 52% recovery rate.

“Our country took this pandemic extremely seriously and in addition to putting in place the necessary precautions to reduce new cases and control those already infected, we also took the view that understanding the virus was critical,” says Gatare.

Having listened to advice from professionals including the World Health Organisation and Rwanda's ministry of health, the correct safety measures were put in place and the necessary communication shared with the population to educate and inform them – thereby empowering them to take charge in applying their own personal preventative measures. “A behavioural-based change approach has delivered

positive results in controlling this virus,” Gatare affirms.

Unfortunately, Rwanda's mining industry was also impacted by the country's lockdown rules – causing a decrease in production (necessitated by social distancing measures). Since the ease of movement and resumption of economic activity, the sector has been quick to resume activity, albeit at lower volumes – something particularly difficult in a country which has yet to introduce much mechanisation, and therefore, it still relies heavily on labour and man power.

“Fluctuations in mineral prices have further resulted in reduced income and the consequence of being a 100% export orientated country has delayed the turnaround period since starting up again which mining companies rely on,” Gatare outlines.

“Nonetheless, our mining



sector is resilient and thanks to stringent safety measures already in place, they were quick to safeguard themselves against the virus – which has to date meant that we have not reported a single COVID-19 positive case from the sector,” he highlights.

Rwanda’s mining vision still intact

RMB’s vision, although impacted by COVID-19, remains intact and the country is determined to build a strong and profitable mining industry that contributes on a larger scale towards Rwanda’s GDP, while aligning with the Africa Mining Vision (AMV).

The AMV was adopted by heads of state at the February 2009 AU summit following the October 2008 meeting of African ministers responsible for mineral resources development. It is Africa’s own response to tackling the paradox of great mineral wealth existing side-by-side with pervasive poverty.

The AMV advocates thinking outside the “mining box”. It is not just a question of improving mining regimes by making sure that tax revenues from mining are optimised and that the income is well spent – although that is clearly important, but rather it is a question of integrating mining

“

We have not reported a single COVID-19 positive case from the sector,

”
FRANCIS GATARE

into development policies at local, national and regional levels. In other words, how mining can contribute better to local development by making sure workers and communities see real benefits from large-scale industrial mining and that their environment is protected.

It also means making sure that nations are able to negotiate contracts with mining multinationals that generate fair resource rents and stipulate local inputs for operations. And at regional level, it means integrating mining into industrial and trade policy.

“Fortunately, we have found a silver lining to the impact COVID-19 has had on our country,

RWANDA’S COVID-19 REDUCTION MEASURES

- Intensive lockdown measures implemented for one and a half months
- Mandatory use of face masks in public spaces.
- Restriction of movement between 7pm and 5am – aimed at reducing socialising and the over-consumption of alcohol.

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Fortunately, we have found a silver lining to the impact COVID-19 has had on our country, and through lessons learnt, our potential for faster growth, is within our immediate reach,

FRANCIS GATARE



and through lessons learnt, our potential for faster growth is within our immediate reach,” Gatare notes. “We have learnt that we need to increase the equipment mix into our operations so that we are less impacted by diseases and even human error. We have also identified the need for local and regional supply chains that reduce the waiting period for product imports such as explosives and spare parts.

“This needs to be further supported by in-country downstream and beneficiation opportunities and as such we are injecting capital investment into growing this part of the value chain – which we hope to achieve not only within our own country but at a regional level and in collaboration with regional partners.”

In order to the grow the industry, the RMB understands the primary need to encourage investment which it is doing by:

Streamlining the business environment in the country – removing administrative red tape and reducing administrative layers to have a single stop for supporting businesses. The country has furthermore been streamlining administrative and policy legislation for the mining sector.

“We reviewed our Mining Code in 2018 to ensure its globally competitiveness. We understand that miners must get value for their investment while still complying with environmental and fiscal policies in the country,” Gatare points out.

The RMB has recently reviewed its Mining Code again to encourage investment in exploration and encourage downstream processing. Naturally this is extremely important to the junior mining sector which the country is primarily targeting.

Junior investment drawcards

“The junior mining sector is very important to Rwanda and the review of our Mining Code has incorporated changes that pertain particularly to this market segment,” Gatare notes.

Rwanda has granted any junior mining company (both in exploration and development) a 10-year period loss carry over – in other words a decade to write off any losses incurred – necessitated by the fact that this industry segment does not often generate profits in this period. It also offers capital gains tax.

Rwanda may be a small African country but has significant mining potential to offer



“We have also invested in technical institutions to train operators so that junior miners don’t have to source skilled labour from outside of the country and last but not least we have worked in conjunction with our local banking sector to offer an exploration support facility to provide incentives to invest their own cash and work with local financing institutions to get additional financing. This will help investors find Rwanda attractive,” Gatare emphasises.

Staying relevant

The RMB was honoured to host the inaugural *Africa Mining Forum* event in 2019 – which brought companies, government representatives and international financiers together to unpack the mining opportunities in Rwanda. “It was an extremely successful

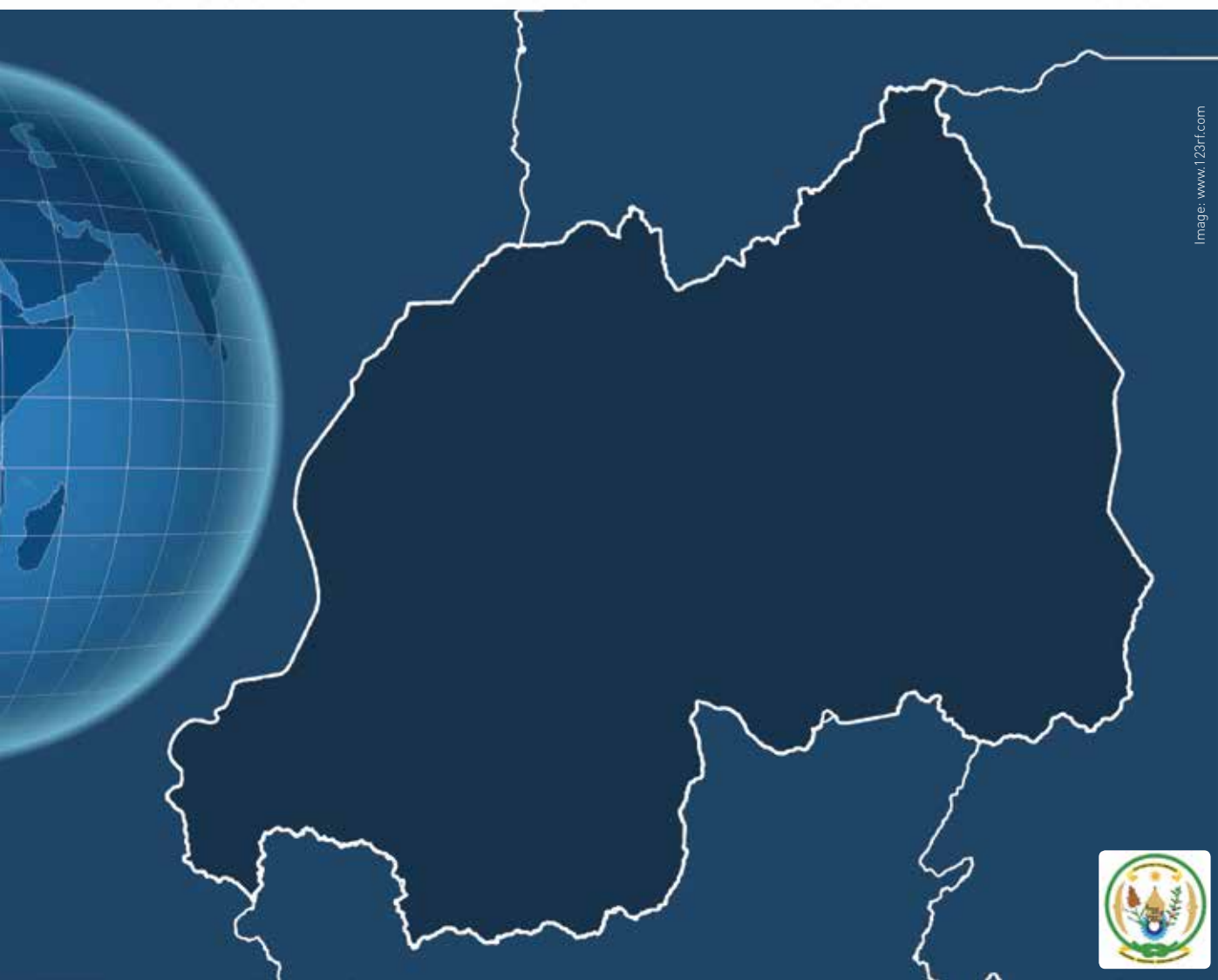


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event and opened our eyes to the potential development we can realise in our country – which starts with collaboration,” the CEO states.

While COVID-19 has prevented the country from hosting its second event, it has been eager to embrace the new digital world to continue leveraging off of opportunities to connect and collaborate.

As such, the Board is co-hosting and sponsoring the 2020 *Africa Mining Forum* digital event taking place from 16 – 20 November. “Adaption is key to the survival of anything – including businesses. Technology gives us that opportunity to adapt but we must use it effectively to benefit from it. Through the digital sphere we also have new opportunities – a chance to connect

with more companies and individuals, at a significantly reduced cost – over the entire year and not just for a few days.”

Gatare is excited and looking forward to the digital event and highlights the three key messages he will be sharing with the audience:

1. COVID-19 continues to be a problem around the world. “I want to encourage our partners to take care of themselves. This virus will end and there are highly-skilled scientists who will find a vaccine.”
2. Until that happens, life must go on and businesses must continue to flourish despite the challenges. “Technology plays an important role in our lives and Rwanda has an abundance of technology metals – tin, tungsten and

tantalite as well as lithium and speciality minerals like rare earths – all important for the emerging technology boom. We want Rwanda to be a source for these materials,” he states.

3. While the pandemic continues, Rwanda has relaxed its travel restrictions. A negative COVID-19 test is the only requirement once in the country. **MRA**



Madagascar

Rebooting the country's mining sector

By Africa Practice Group CEO Marcus Courage & senior consultant Arnaud Liege

The Malagasy government's ambitions to reform mining legislation have been accelerated by the COVID-19 pandemic, following a failed attempt to introduce a new mining code in November 2019.

The drive for reform stems from widespread perceptions nationally that mining projects have failed to deliver expected outcomes or benefits, particularly in terms of government revenues and local content contributions. The combination of outdated tax policies, commodity price fluctuations and governance shortcomings have all contributed to the relatively poor performance of the sector, which has been compounded by the poor public perception of the industry in Madagascar. To redress the balance, extensive consultations were held in 2015, but political instability put paid to these.

Since assuming office in January 2019, President Andry Rajoelina has made reform of the mining sector one of his top priorities, yet his approach has drawn criticism from industry players.

Approval of a new mining code by the government council on 20 November 2019, after no prior

consultation with stakeholders, sent shock waves through the industry. Although the provisions were rejected at a subsequent cabinet meeting on 27 November 2019, the government's approach served to fuel distrust between Rajoelina's administration and mining operators. At the time, there were mounting frustrations within government that big asset operators such as Rio Tinto, which had accumulated significant debts at QIT Madagascar Minerals, were underperforming. Pressure from the World Bank and the Chamber of Mines eventually led the Ministry of Mines to initiate a proper consultation process involving all stakeholders.

The COVID-19 pandemic has now stalled this review process. Although consultations with industry have taken place this year, a revised mining code is unlikely to be presented to parliament this month, as had been planned. The delay will inevitably feed the current climate of regulatory uncertainty.

Meanwhile, the contribution of the mining sector to the economy has now shrunk, with subdued production, mine closures and price volatility all hallmarks of the last six months.

Ambatovy, the country's largest world-class mine, which accounts for 32% of Madagascar's foreign exchange earnings, has been placed on care and maintenance since March, with no indication that operations will resume before 2021. Several promising large-scale projects, including Base Resources' Toliara mineral sands project, remain on hold following a decision by the government to temporarily suspend on-the-ground activities. Meanwhile, new entrants still face significant barriers since the suspension of new mining permits in 2011.

Facing a bleak economic outlook in the near term, the Malagasy government would be wise to see what measures they can introduce to restore investor

confidence and resuscitate and revitalise the mining industry.

Madagascar has good competitive advantage – a resource-rich country endowed with cobalt, nickel, ilmenite and chromium and a wide diversity of precious and semi-precious metals. Promoting investor confidence remains a stated ambition of the country's president, which can only be achieved through laws and regulations conducive to creating transparency and stability.

The cases of Botswana and Chile demonstrate how good governance and skilful management can transform even one of the world's poorest countries.

Madagascar's minerals can be harnessed to revive the nation's ailing economy. The measures required to achieve this are clear, but less clear is the commitment of all stakeholders to this end.

Failure to reboot the country's mineral sector will deny Malagasy the chance to improve their living conditions. The stakes are high. **MBA**

ABOUT THE AUTHORS



Marcus Courage

Courage is the CEO of Africa Practice Group, a strategic advisory firm operating at the apex of industry and government throughout Africa.

During a career spanning more than 20 years Courage has counseled many of the largest mining companies on the continent, helping them to identify opportunity, manage risk and evolve strong leadership positions.

In addition, he has counseled over half a dozen chambers of mines and mines ministries, supporting them to realise policy and regulatory reforms and attract investment.

Arnaud Liege

Liege is a senior consultant at Africa Practice. In this role, he advises clients on political, regulatory and reputational risks to support opportunity identification and strategic investments in sub-Saharan Africa.



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Championing a lower carbon energy economy

South Africa is a member of the global community and an affiliate of the United Nations Framework Convention on Climate Change (UNFCCC). It is also a signatory to the Paris Agreement. This is a demonstration of government's commitment to a low carbon economic development trajectory envisioned by global community.

The government further adopted a "Just Transition" to a low carbon economy as inscribed in the recently adopted Integrated Resource Plan (IRP2019). Recognising that transition to a low-carbon energy economy is inevitable, it is deemed absolutely critical that such a change must be in the form of a Just Transition.

The International Trade Union Confederation defines a Just Transition as that which "...secures the future and livelihoods of workers and their communities in the transition to a low-carbon economy. It is based on social dialogue between workers and their unions, employers, government and communities. A plan for Just Transition provides and guarantees better and decent jobs, social protection, more training opportunities and greater job security for all workers affected by global warming and climate change policies."

South Africa has a coal derived energy economy that was brought about by plentiful indigenous coal resources upon which the national energy infrastructure has primarily been premised on over the last century. Moreover, the coal mining industry is one of the significant creators of employment in the mining industry and a substantial revenue earner that augments that national fiscus. Furthermore, coal-fired power stations produce about 90% of the country's electricity. Resultantly, the importance of the coal sector in South Africa cannot be overstated.

However, the combustion of fossil fuels using current methods, techniques and technologies leads to the emission of carbon dioxide into the atmosphere and consequently the anthropogenic forcing of climate change. In this regard, the South African government has affirmed its international commitment towards climate change mitigation and has made an undertaking to reduce the

nation's carbon dioxide emissions by nearly 50% by 2030.

This will be achieved through multiple interventions that span energy efficiency and the implementation of alternative low-carbon energy sources. With extensive coal reserves and current infrastructure, South Africa will however, still rely heavily on coal-fired energy generation in the medium to long-term as it undertakes a just energy transition journey toward this low-carbon economy.

In this regard, the Carbon Capture, Utilisation and Storage (CCUS) forms part of that Just Transition in the South African context. Notwithstanding that the CCUS is a new initiative in South Africa for the mitigation of carbon dioxide (a greenhouse gas) emissions into the atmosphere. Following international norms, it is expected that CCUS could mitigate more than 20% of South Africa's total carbon dioxide emissions. The purpose of this

technology is to assist South Africa to meet its international obligations pertaining to its greenhouse gas emission limitation target in an effort to ameliorate global climate change.

CCUS can be trifurcated into its main components, namely: Capture of carbon dioxide from the flue gases of such sources as a power station; utilisation of carbon dioxide as a feedstock to produce high value commercial products; and storage whereby the carbon dioxide is safely and permanently stored in deep, stable and safe geological formations.

The capture of carbon dioxide is the first step in the process and is necessary to separate it from the other flue gases, mainly nitrogen. The aim is to produce an approximate 98% concentration of carbon dioxide. Currently, South Africa has the largest carbon dioxide capture plants in the world, about 25 million tonnes per year particularly from the synthetic fuel industry. Such gas provides 'low-hanging fruit' that will lower the cost of utilisation and storage.

The storage of the captured carbon dioxide is considered in a suitable geological formation, usually located 1-2 km deep, albeit that depths of greater than 800 m constitute a minimum requirement to contain pressure and temperature of gas in a super critical state that is near liquid. It has been globally shown that this is a successful mitigation technology.

South Africa's use of carbon dioxide is approximately 200 tonnes per year.

Globally it has been shown that carbon dioxide may also be used as feedstock for, *inter alia*, chemicals, synthetic fuels and fertilisers. This recycling of carbon dioxide can be further de-carbonised by making use of renewable energy. Products can be manufactured when renewable energy is available and stored for future use.

An essential technology

The Council for Geoscience (CGS) is implementing the CCUS project by conducting research that aims to identify apposite geological storage formations that would be appropriate for storing carbon dioxide. This work is funded by the South African government and the World Bank.

CCUS is established as a technology that can mitigate large quantities of carbon dioxide gas. For example, the Sleipner project in Norway was the world's first offshore carbon capture and storage project storing more than 16 million tonnes since 1996.

The International Energy Agency has previously stated that globally the lowest cost of mitigating carbon dioxide emissions into the atmosphere must include CCU. However, since the Paris Agreement (to maintain temperature increase to significantly lower than 2oC), the CCUS initiative is essential.

The South African Bureau of Standards, in conjunction with the International Standards Organisation, is currently developing standards for CCUS in South Africa. The national

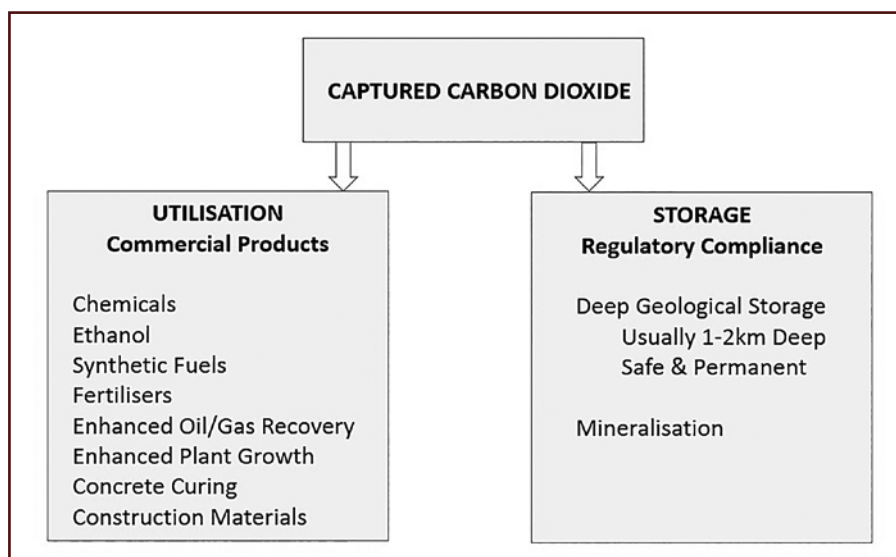
and industry benefits of a complete set of CCUS standards will steer the development and operation of this new industry in South Africa and thereby ensure 1) that newly created jobs comply with health and safety issues; 2) public health and safety during the operation of the plant; 3) quantification and verification of the permanency of carbon dioxide stored in compliance with international reporting requirements; 4) appropriate risk management; 5) that the industry conforms to at least minimum operational norms thereby guiding the industry in the development and roll-out of this new sector; 6) that leakage from the above-ground operations and sub-surface geological storage is minimised.

The technical development of CCUS was initiated by the South African National Energy Development Institute and the Department of Mineral Resources and Energy. During March 2020, the minister of Mineral Resources and Energy approved that programme be transferred to CGS. This move has made more resources available to the programme.

The South African Carbon Capture, Utilisation and Storage Programme participates in international organisations such as the Carbon Sequestration Leadership Forum, International Energy Agency Green House Programme and the Global Carbon Capture and Storage Institute. The consequent high international profile of the South African programme has led to financial and in-kind support for the local programme. Such support has come from South African government and industry, Norway, UK, EU, Carbon Sequestration Leadership Forum, and the Global Carbon Capture and Storage Institute.

More recently the World Bank has made available a grant of \$US 27 million for the pilot storage project in partnership with the South African government's contribution at 65% of the World Bank's pledge.

Following the current Pilot Carbon Dioxide Storage Project, it is scheduled that a fully integrated demonstration project will be underway during 2030. **MRA**



September 2020

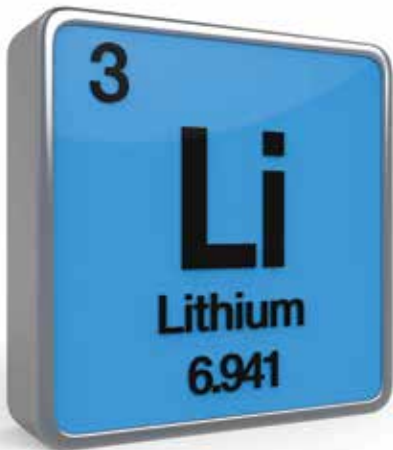
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AVZ Minerals: DRC's lithium front-runner on the cusp of development

AVZ Minerals

will soon reach the turning point at its Manono lithium and tin project in the DRC as it begins development of the country's most significant lithium discovery.



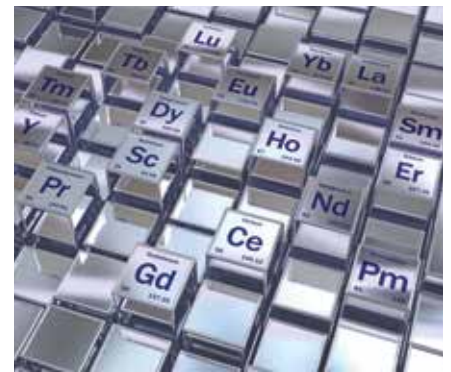
facilitates the adoption of commercial electric vehicles. Its electric vehicle division, Mobile Energy Global, provides discounts on commercial electric vehicles, EV batteries and electricity as well as financing and charging solutions.



Arc Minerals: Making strong headway in Zambia

Arc Minerals is

focused on the discovery and development of its large-scale copper Zamsort and Zaco licences in the Zambian Copperbelt. While director and executive chairman, Nick von Schirnding concurs that it is good to have a diversified portfolio, he believes it is the right strategy for a company like Arc Minerals to focus on a single asset.



BFS and deliver the FEED for Longonjo's power, water and waste services, offices, workshops, camp infrastructure and off-mine facilities including the rail and portside facilities.



Perseus Mining acquires Bagoé gold project

Perseus Mining has targeted June next year for completion

of a definitive feasibility study for the Bagoé gold project, a property 70 km from its Sissingué mine in West Africa's Côte d'Ivoire, which it acquired in September. MRA



Image: 123rf.com



Electric-powered earthmoving trucks: A revolution has begun

Many areas across a mine site offer the potential to improve environmental impact, and with the rapid onset of technology, this now includes electric powered heavy-duty trucks. Ideanomics



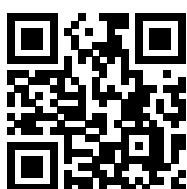
Pensana Rare Earths appoints project management company for Longonjo

Pensana Rare Earths has appointed Paradigm Project Management as the owner's representative for the Longonjo NdPr project in Angola, on behalf of Pensana. Paradigm will co-ordinate the

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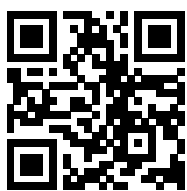
East Africa

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Indiana Resources highlights Tanzania's disdain for miners

"We will now move to lodge our Request for Arbitration. I remain disappointed that we have received no meaningful response from the government of Tanzania to our correspondence on this important issue. The lack of response reflects the disdain that has been shown toward international mining investors since 2017 when the first changes to the Mining Code were made without consultation." – Indiana Resources' executive chairman Bronwyn Barnes.

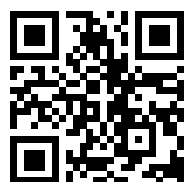


Tanzania sets graphite export regulation

Black Rock Mining has announced that the government of Tanzania has officially published regulations concerning graphite

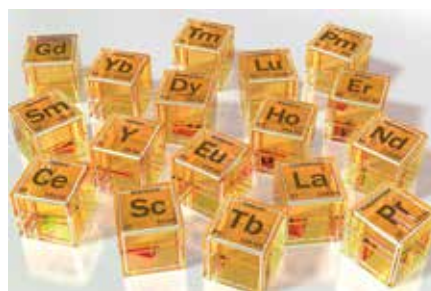


concentrate exports, having issued Government Notice 687 of 2020 "The Mining Regulations, 2020". The updated regulation continues the policy of maintaining a minimum graphite concentration of 65% total graphitic carbon and payment of royalties as conditions of export. The 2020 regulations revoke the Mining Guidelines of 2019.



Peak Resources' SML application for Ngualla complete

The Tanzanian government has advised Peak Resources that its technical due diligence of the Ngualla Rare Earth Project and the SML application undertaken by the Ministry of Minerals Technical Committee is complete. The technical due diligence is an important step in the SML process as it was requested by the Tanzanian government cabinet before it would give their consent to the application.



Base Resources' mammoth mineral sands mine in the making

Base Resources' ability to secure a quality asset, develop and operate it while assisting local government to better understand how best to regulate its mining sector has been proven

countless times over at its Kwale mineral sands operation.

Since operational start-up in 2014, Kwale has delivered on its commitments, despite commodity price movements and typical day-to-day challenges.



Lithium-ion cell capacity to quadruple to 1.3 TWh by 2030

Wood Mackenzie's latest report shows that the global lithium-ion cell manufacturing capacity pipeline could rise fourfold to reach 1.3 TWh in 2030 compared to 2019. The total capacity attributes to 119 battery manufacturing facilities that are operational, under construction or announced by more than 50 vendors. **MRA**



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South African explorers

Capital raising hurdles need to be addressed

The secret, or not so secret, key to ensuring a sustainable mining industry for future generations is exploration. But exploration is a high risk investment in the best regulated mining jurisdictions, making the ability to raise capital for exploration in South Africa an almost impossible task. Could a 'back to basics' approach be the solution to this challenge, **LAURA CORNISH** asks **AmaranthCX** director and owner **PAUL MILLER**.



Canada, Australia and London are well known for their appetite to fund junior miners

Image: 123rf.com

Mining is always capital intensive – the cost to explore, build, operate and sustain mining operations runs into millions and millions of Rands/Dollars/Pounds, etc. Consequently, most junior miners raise capital on a public stock exchange to advance their projects.

Frankly speaking, the global investment appetite for the junior mining sector sits in London, Australia and Canada. These are highly developed and diverse financial services sectors and who, for the large part, are open to investing in early stage explorers and developers, unlike South Africa's public market participants. This is a strange situation considering South Africa's mining sector is mature and boasts one of the largest industries (by GDP contribution and supply volumes) in the world.

"Many stock exchanges were originally established to finance the upfront capital required by new mines and this heritage certainly could be seen on the JSE some 40 years ago when it was trading more than half of the world's total mining capitalisation. It was without doubt the greatest mining stock exchange in the world at the time," states Miller, a business development specialist with a background in financial services, mining finance, minerals exploration, mine development and mining operations.

Today, South Africa's financial world has changed substantially and Miller indicates there is a substantial disconnect between investors and potential mining entrepreneurs – in part a result of the Financial Advisory and Intermediary Services (FAIS) Act – which has put in place barriers between those wishing to raise capital and potential investors. It is now much harder for smaller companies

to reach smaller investors, as the traditional retail stockbroker has been forced by FAIS into becoming a fiduciary financial planner. This is an important, but different role to that traditionally played by retail stockbrokers.

It is simply too expensive in terms of time and effort, under the strictures of FAIS, for financial services players to include new or small companies in retail portfolios or on recommended investment lists.

Also, South Africa's financial savings sector remains highly concentrated with Miller estimating that 90% of funds under management being controlled by just 11 fund management houses, meaning that funds are often simply too big to bother with anything outside the 80 or so largest and most liquid listed companies. .

"In essence, there are no accessible pools of risk capital in South Africa and as a result of the above-mentioned

pointers, the blockage between the capital and exploration funding opportunities will remain.”

So, while South Africa boasts a large number of mines and mining companies – roughly 340 mines operated by in excess of 100 companies, according to Miller’s research and estimates – with only 25 of those companies listed on the JSE. “In Canada and Australia there are 10 times the number of listed mining companies than actual mines - in SA it seems to be the reverse.”

Further fuel to the challenges around junior listings in South Africa is the direct and indirect cost – “which in terms of the JSE listing requirements, makes compliance astronomically expensive. The junior mining market segment should have a more fit-for-purpose regulatory regime,” Miller highlights.

Section 12J investment schemes have also not delivered any results for the junior mining sector in the country. This is ironic considering they were established largely in response to lobbying by the sector. It is Miller’s view that incentives for junior mining, specifically exploration, should serve to not only promote junior mining and thereby the future of mining, but also promote diverse participation in SA’s public markets. The Section 12J incentive failed on both counts.

South Africa is widely regarded as a mature mining country, and perception around finding valuable new deposits is low. “As a country, we have not applied modern geophysical techniques on a regional scale for at least 30 years and if government invested in such initiatives, and made the findings widely available, we could showcase the potential this country still has to offer and generate interest in building a new wave of mines here,” Miller continues.

“Ultimately, it is vital that government put in place both incentives that will get drill rigs turning and create a public market ecosystem which works to mobilise capital for junior mining. As a concluding thought on this, the Canadian flow through shares concept is a fantastic incentive because it does both,” Miller notes.

→ **The funding** requirements for junior miners on the JSE is extremely high



Investment in the rest of Africa

There has been a resurgence of resource nationalism in parts of Africa – which is aimed at capturing a greater portion of financial and economic returns for the host country, but at the same time, reduces the returns to capital providers, thus inevitably serving as an investment deterrent.

“It is not surprising to see the industry struggle in countries including Tanzania and Zambia as a result of significant changes to their regulations, after years of attracting strong investor interest. The Konkola copper mine, a Zambian mining stalwart for example, has been liquidated as a result. The industry also views these changes as a sign of governments reneging on their promises.

“Angola, on the other hand, is in the reverse, and is a country looking to reform its regulations and ownership laws to re-attract investment after hitting an investment low in 2018 – they are an interesting country to watch.

“Naturally, the West African region not only boasts high quality deposits, but countries including Ghana, Burkina Faso and Côte d’Ivoire have deliberately not significantly changed their mining laws in 20 years – they are thus certain, clearly understood and consequently regarded as investment-friendly,”

Miller concludes. **MRA**

“ [South Africa has] not applied modern geophysical techniques on a regional scale for at least 30 years, ”

PAUL MILLER



Image: i23rf.com



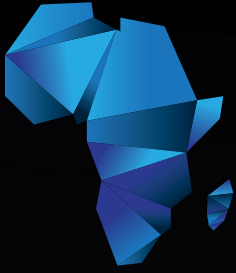
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Finance in the new normal

Sustainability is key

Companies who have been able to weather the COVID-19 storm are in a better position to secure bank financing for their operations. This is according to **SHIRLEY WEBBER**, Coverage Head: Natural Resources and Energy at ABSA CIB. **GERARD PETER** reports.



Image: 123rf.com

The green economy will drive the need for cleaner energy and more sustainable mining

While some mining operations were able to operate with limited capacity during the COVID-19 lockdown periods, there are some that were not able to operate at all. As such, Webber believes that it will take up to six months for mining companies to return to normality and resume full production.

Of course, how quickly a mining company recovers is largely based on the commodity it mines. "If you look at commodities such as gold and platinum, they are ahead of, for example, the diamond sector, which will take a bit longer to recover as this is based on retail consumer demand right now," Webber explains. She adds that South African mines have been able to benefit from the depreciation of the rand during the national shutdown, given the exports and the prevailing US\$/Rand exchange rate.

According to Webber, the shutdown has also had an impact on the liquidity requirements of mining companies and those dependent on a single

commodity have been particularly hard hit. "We therefore expect that the short-term liquidity requirements of these companies would have increased and will most likely remain under pressure in the next few months.

"While commodity prices might have kept their own, we will look at what a company has done with regards to cash flow preservation when the mines were shut down or development of a project has been delayed due to COVID-19."

Webber further states that ABSA's mining clients are taking advantage of liquidity support that they have never utilised before. "We were often asked in the past by credit committees on the necessity of liquidity support lines and our response was always clear because of commodity cycles and that situations can change dramatically," she states. "Now, these liquidity support lines have given companies something to fall back on when they were not allowed to produce. So, as long as we are comfortable with the way companies manage their finances and operations,

we were very willing to make liquidity support available for our mining clients."

Sustainability takes centre stage

When it comes to securing bank finance, Webber explains that factors considered include commodity, management structure and diversification.

Diversification not only relates to commodities but also takes into account if a company has more than one project and/or operates in different regions.

"For example, we look at whether a company is only focused on certain African regions or if it is also looking at expanding beyond Africa."

Webber avers that the COVID-19 pandemic has brought the issue of sustainability to the fore and it will largely influence how banks finance mining activities in the future. "If you look at South Africa, for example, we believe that there will be an energy transition. Granted, we are still heavily reliant on coal but there are a lot of alternative energy sources that are coming into play.

“Currently, we are still supporting our existing client base but we are looking at assisting our clients to move to a cleaner energy mix and also getting them to adhere to environmental policies such as the Equator Principles and the World Bank standards.”

Webber further explains that financial institutions also have to comply with these standards. As such, ABSA has signed up to the United Nations Principles for Responsible Banking. This means that

it cannot put funding in place without having a look at the impact that a mining operation will have on the environment and the communities around the mine.

While banks are willing to help their existing mining client base during these uncertain times, what about new companies that are looking for financial assistance? According to Webber, the door is very much open for smaller mining operators. “We have and we will continue to look at smaller mining operators. A lot

of this depends on where the commodity fits into the bank’s risk profile. Is it a commodity that is going to be part and parcel of sustainability going forward and is part of the cleaner energy mix?

“We have a strategy in terms of where we can and cannot play but ultimately it comes down to management, the type of commodity and the region in which a company operates along with the legislative framework of that particular country,” she concludes. **MRA**



We will be looking at how companies have managed cash flow preservation to get through the coronavirus pandemic. Efficient management is crucial to the sustainability of their operations going forward and this will have an impact on financing of future projects,

SHIRLEY WEBBER



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Diversification

The name of Trident Royalties' game

Although dual-listed diversified mining royalty and streaming company **Trident Royalties** is a newcomer to the mining royalty and streaming space, the company has assembled an experienced team of technical, financial and legal mining professionals and is rapidly assembling a diversified portfolio of assets in resource-friendly jurisdictions around the world. **CHANTELLE KOTZE** speaks to CEO **ADAM DAVIDSON** about the benefits of its diversified approach.

Trident's diversified approach aims to provide investors with exposure to a broader range of mineral and metal commodities – a departure from the predominantly North America-focused and precious metals-focused royalty and streaming companies that have dominated the sector in the last 10 years.

Davidson, who has previously worked with Resource Capital Funds, BMO Capital Markets and Orica Mining, says the company is seeking to build a diversified portfolio over time of royalties on producing or near-term product assets comprising one-third bulk, battery and industrial minerals, one-third base metals and one third precious metals – broadly mirroring the commodity exposure of the global mining sector. The aim of this is to provide an index-fund-like breakdown by commodity, but from a royalty perspective for investors wanting exposure to mining commodities in their

portfolio, Davidson illustrates, noting that this is what Trident saw as missing from the royalties sector.

With the royalty and streaming space dominated by majors and precious metal specialists, Davidson believes that there are several royalty and streaming opportunities currently overlooked by Trident's competitors, specifically smaller, attractive assets in jurisdictions like Australia and Africa – despite being home to world-class natural resources. By focusing on the commodities and jurisdictions that fall outside of the scope of its competitors, the amount of untapped existing royalties and new royalty/stream opportunities, as well as potential package or consolidation deals are abundant, says Davidson, noting that one of the key benefits of operating on the fringe of their competitors is less competition for deals and lower acquisition costs.

Having successfully listed on the AIM market in June with a £16 million IPO, followed soon thereafter by a secondary

listing on the Frankfurt Stock Exchange in August, Trident is establishing 'critical mass' – having completed five deals in the four months since its AIM-listing. This includes the acquisition of two cash generative royalties and six development stage royalties.

The company's initial acquisitions include:

- A 1.5% FOB revenue royalty on part of the Koolyanobbing iron ore deposit and mine in Western Australia operated by ASX-listed Mineral Resources (in production);
- A 1.25% gross revenue royalty over copper production from the Mimbula copper mine in Zambia operated by privately-held Moxico Resources (in production);
- A scaling gold royalty on the Spring Hill gold project in Australia operated by PC Gold;
- A package of four exploration and development stage gold royalties in Western Australia from Talga Resources, including a 1.5% net smelter royalty over tenements within the Talga Talga (operated by TSX-listed Novo Resources), Warrawoona (operated by ASX-listed Caldius Resources) and Mosquito Creek (operated by privately-held Nimble Resources) projects and a 1% net smelter royalty over tenements at the Bullfinch project (operated by SSX-listed Torque Metals); and



↑ Mineral Resources' Koolyanobbing iron ore project in Western Australia



↑ Moxico Resources' Mimbula copper mine in Zambia



↑ Apollo Consolidated's Lake Rebecca gold project in Western Australia

- Most recently, a 1.5% net smelter revenue over production from the Lake Rebecca gold project in Western Australia operated by ASX-listed Apollo Consolidated.

Key to Trident's future is to continue building on its portfolio of royalties and maintaining a healthy pipeline of near-term cash flow royalty opportunities. This will help the company unlock the ability to raise debt against its portfolio, and in so doing will limit its need to raise money (avoiding dilution for its shareholding) to buy additional resources in future. The ultimate goal is for Trident's business model to become self-sustaining and eventually be able to pay dividends while still deploying capital to acquire new royalties – as some of the existing royalties wind down.

To date, Trident has deployed about US\$9 million and has roughly \$15 million in cash on its balance sheet to put to work, says Davidson, in addition to having two paying royalties. With cash on hand, sufficient debt capacity and listed equity available for further deals, as well as a healthy pipeline of potential additional acquisitions, Trident is well on its way to further grow and diversify its portfolio and forecasts having substantive revenues in 2021. **MBA**



One of the key benefits of operating on the fringe of our competitors is less competition for deals and lower acquisition costs,

ADAM DAVIDSON



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ESG and ethical investment

How to manage the risk more effectively

By Simon Barry, lead consultant: risk and standards, The Advisory Group

Mining companies have had a worse than normal 18 months. It began with Vale's tailings dam collapse in Brazil in January 2019 and more recently we have seen Rio Tinto in the spotlight for the destruction of an aboriginal site in Australia in May 2020.

The former CEO of Vale, Fabio Schvartsman, was charged with homicide by Brazilian prosecutors. The CEO of Rio Tinto, Jean-Sébastien Jacques tried to cling on but the pressure became insurmountable for the company and he and two other senior executives have finally departed; this is in spite of the fact that under his leadership shareholder returns and safety were very good.

These two incidents have brought to the fore the increased intensity of the spotlight on mining companies in two areas that hitherto may have seemed to be of relatively minor importance: ethical investment and environmental, social and governance (ESG).

Though these two companies were major entities, junior miners will not be

exempt. As exploration for 'new minerals' to enable cleaner energy needs to increase over the medium term, so will the need for juniors to raise capital to fund both exploration and initial exploitation. They will need both the finance and a social licence to operate – indeed the former may depend upon the latter.

The upshot is that mining companies will be required to show compliance with a broad range of requirements over the full life of a project to a variety of key stakeholders.

A risk-based approach

Failing to raise capital is a fundamental risk to any project's inception. Killing or injuring people is a fundamental risk to its operation.

The old and tried method of project risk management used to start with

a visit to site by either an in-house team, or some consultants, who would produce a multi serial risk register, usually on a spreadsheet. That would then be processed with various remedies noted to remove, mitigate or accept the risk, and duly passed to potential investors or to others such as licencing authorities, who would be the key next step to enabling a project to get started. This process was often based upon a brief snapshot with report backs as requested.

Nowadays there is the capability to have real-time ground truth that covers the full extent of any project and provides reliable information to all those who need to have oversight.

Data from a wide variety of sources can be captured, analysed and processed to give a very accurate



operational picture of what the situation is at any site across the globe – able to be accessed from any location, by phone or laptop. The sources include instruments such as piezometers, air and water quality sensors, satellite observation with thermal imagery and human inputs from on-site observations, CCTV feeds and analysis of local social media through ‘happiness algorithms’. The latter being a study in itself.

Ethical investment

The ICMM’s Global Industry Standard on Tailings Management issued in August 2020 is the latest in a list of such measures that includes the Equator Principles, the UN Principles for Responsible Investment, the World Bank’s International Finance Corporation Policies and Standards, to name some of the most high-profile. The Church of England’s Ethical Investment Advisory Group has now entered this arena and formed part of the process for the production of the ICMM Standard and its 15 principles. In short, the demand for credible proof of compliance with an increasing number of standards is growing.

Mining companies of all sizes that wish to grow through exploration and site development usually need to raise finance; indeed a number of annual reports for 2019 have referred to ‘ethically raised capital’. This is likely to increase as the demand for new minerals needed for the ‘electromobility transition’ to clean energy leads to more activity in these fields, especially across sub-Saharan Africa. The historic ‘spreadsheet approach’ is unlikely to



The future of the community. The lives of the mine and these children are inextricably linked

cut it nowadays. Investors want to see reliable evidence of real compliance with the standards mentioned above, and also real-time oversight with transparency that shows sustained positive results throughout the life of a project. The Reagan dictum of ‘Trust but verify’ will apply, more so because technology enables it to be achieved with relative ease.

Environmental, social and governance

Environmental issues include both the local area, and also what has been done to it. Here the greatest risk is water and mine tailings (read more on tailings management risk in the July 2020 edition of *Mining Review Africa*).

Tailings provide the greatest sustained risk to life and property as recent events have shown. Compliance with ICMM’s 15 principles is likely to become a requirement for many existing mines and for all mines that will be developed

in the future. They mandate effective planning, design and oversight. The oversight will be based on measuring and data and can be designed into the project and by so doing demonstrate a real willingness to comply. The data gathered can be shared with stakeholders to provide credible evidence of good faith and continued compliance through the life of the project. This addresses one of the key challenges in raising investment.

Meanwhile, water management is now available in great detail with specific benefit to a company’s bottom line. Accurate water management can be a carrot rather than a stick as water wasted creates pollution and both waste and pollution waste money. Modern monitoring techniques enable water to be managed as accurately as money.

In addition to this, the social licence to operate from both regional governments and local communities is becoming increasingly important, backed up by



Africa’s ecosystems and environment need care now and into the future

The community's use of the land is key to their culture and future



STAY TUNED FOR MORE

This is the first article in a three-part series that will examine how to more effectively manage some of the foremost risks in the mining sector.

The oversight requirements that have been described do not need a brand new system. If there is already a system in place that is monitoring water and tailings, these additional data inputs can be processed as part of it and would also help broaden the context and ground truth.

In conclusion

The requirement for credible and verifiable data-based situational information across the mining sector is going to increase, whether mandated or just becoming best practice. The driver will be the more obvious elements of risk management such as water and tailings.

However, the comprehensive project risk register will have to include ethical investment and ESG. These can be addressed using the same risk management and mitigation systems that address the former. It then becomes a true value-add. The opportunity is to be seen to be doing it voluntarily as that will always gain approval with those seeking to influence how things are undertaken on the ground. **MRA**

investor action as Rio's latest travails bear witness. The days of a picture of a school and a clinic for the local village, and funding a few of the tribal elders' pet projects, to be able to tick the CSR box are gone. Sibanye-Stillwater's Good Neighbor Agreement (GNA) in Montana is a good example of making necessity a virtue and the advantages of a transparent oversight system (read more on this in the July 2020 edition of *Mining Review Africa* too).

Effective monitoring of a broad range of indicators can provide a comprehensive data set, one that gives a more accurate picture of the continuing commitment to social standards which can be shared with a range of stakeholders in real time. For example, water and air quality can be measured by ground-based sensors, while satellite and other imagery can show how communities are growing, schools and clinics are being used and agriculture is being developed.

Processing the information

Technology provides a toolbox of enablers, and information and data that are not ends in themselves. They also have to be supported by appropriate and validated processes and procedures.

Also key to delivering a successful product is the effective fusion and analysis of information from all sources to achieve the full range of effects, from evidence of compliance, to the avoidance of tailings and water risk and beyond, to more effective operational management through real-time ground truth. There

is a value to be had beyond simply monitoring. The integration of artificial intelligence and robotics can further enhance this capability.

The other side of the coin

Mining companies of all sizes could sometimes be forgiven for developing a persecution complex. In several jurisdictions they come under pressure to take responsibility for events beyond their remit, and are also held to account for situations that can be questionable at best.

If they are doing what they agreed to do on the ESG front, and it has been measured and recorded, they can have a very effective body of evidence in place that could prove hard to refute in an arbitration case, something of a value-add.

ABOUT THE AUTHOR

Simon Barry holds a MSc in Risk Management from the University of Leicester, is a specialist member of the UK Institute of Risk Management and an ISO 9001 lead auditor. He has worked in mining and associated activities across sub-Saharan Africa since 2008, as well as in a number of high-risk locations. With extensive experience in aviation, logistics and management development he is a firm proponent of the team-based integrated approach to problem solving, addressing the hard questions early. Prior to 2004, he spent 32 years in the British Army's Parachute Regiment where he operated in many demanding roles worldwide, within a variety of cultures and environments.



Snapshot

An overview of East Africa's mining sector



No mean feat

When heavily lifter and transportation specialist Mammoet moved Kenmare Resources' Wet Concentrator B plant (part of the Moma minerals sands mine) from Namalope to Pilivili in Mozambique, it was the heaviest piece of mining equipment to be moved in Africa, to date. See more on pg 28



Mining to boost Kenya's coffers

Around 10 000 artisanal and small-scale miners produce and trade approximately USD\$120 million worth in gemstones per year in Kenya. Now, the Kenyan government has proposed to increase the mining sector's contribution to 10% of GDP by 2030. source: pactworld.org

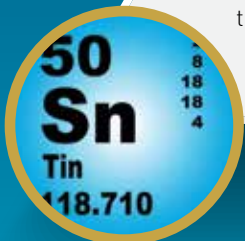


Keeping the lights on

When completed, the Grand Ethiopian Renaissance Dam (GERD) will be a 6.450 MW hydropower project – the largest in Africa, as well as the seventh largest in the world. The project is being funded entirely by the Ethiopian government.

Tech leads the way

A 2019 MIT report ranks tin as the No. 1 metal most impacted by new technology. TechMet subsidiary Tinco is the largest tin and tungsten producer in Rwanda with four producing tin mines and one tungsten mine.



AMF goes digital in 2020

An exciting line-up for this year's *Africa Mining Forum* digital event taking place from 16-20 November has already been confirmed. Book your seat now. More details on pg 44.



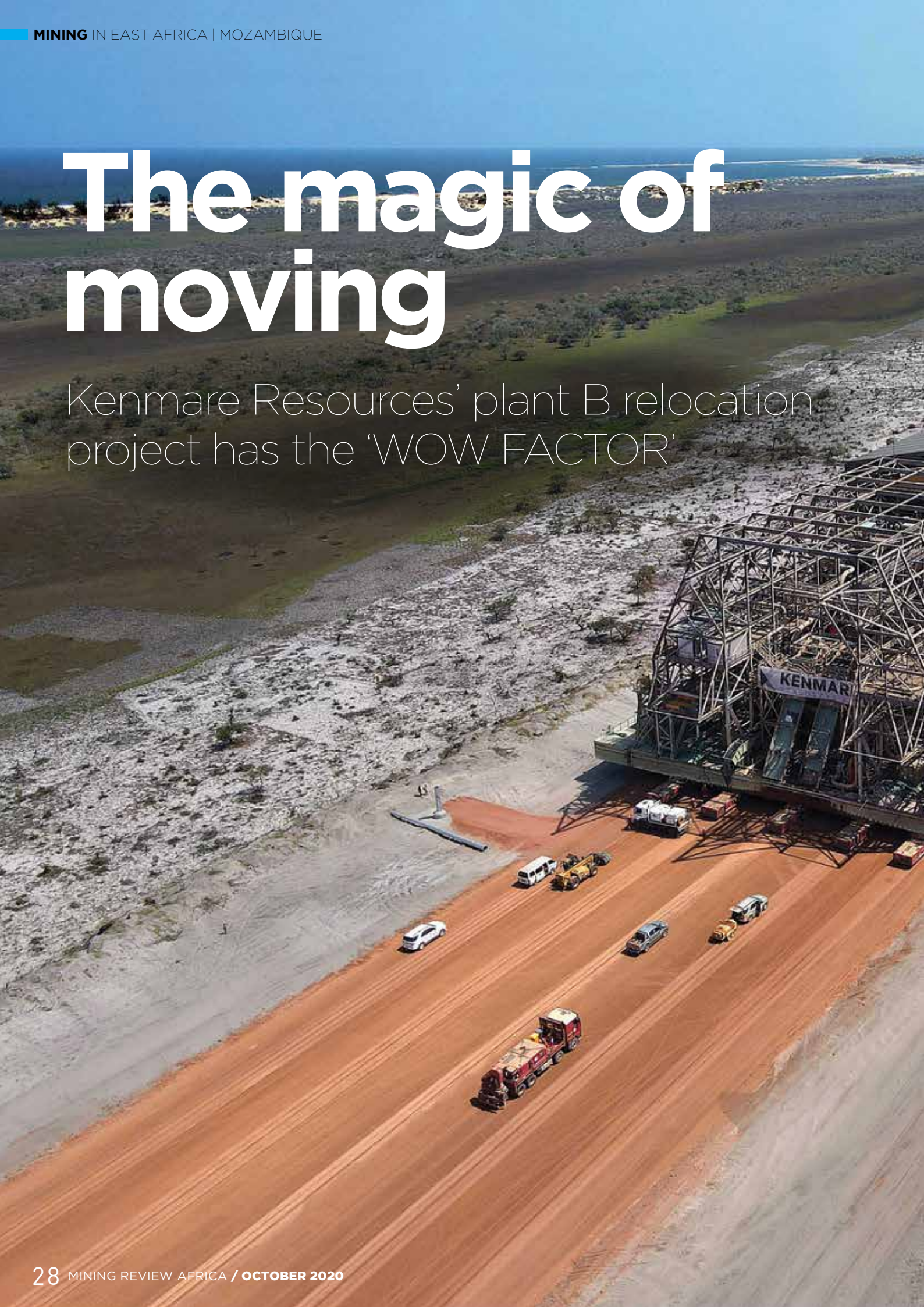
Poised for growth

Did you know that East Africa is poised to have the fastest growth in sub-Saharan Africa? The reasons for growth are attributed to political stability, infrastructure development and investor-friendly government policies.



The magic of moving

Kenmare Resources' plant B relocation project has the 'WOW FACTOR'



IN SHORT

The plant relocation of the scale being executed by Kenmare Resources for its Moma mine is an impressive feat worth acknowledgement in the mining sector.

In spite of the operational challenges associated with COVID-19 lockdown, LSE/ISE-listed

Kenmare Resources is

in the process of executing a large-scale project that is the final step towards increasing production of ilmenite, its primary product, by 35% compared to 2019 at its Moma minerals sands project in Mozambique. The company is on track to complete the relocation of one of its three mining plants, known as Wet Concentrator Plant B (WCP B), by year-end – a massive undertaking that has only been marginally affected by the impacts of the pandemic. **LAURA CORNISH** spoke to MD **MICHAEL CARVILL** about a project that will no doubt go down in the 2020 mining history book.

The past 10 years have had their challenges for Kenmare, with mineral sands prices falling significantly around the middle of the decade, leading to a restructuring of the company.

“Our action plan in 2016 involved the recapitalisation of the company, including a capital raise in order to repay our lenders, and subsequently reduced our debt by two thirds,” Carvill starts.

Fortunately, since 2016, ilmenite prices have more than doubled and Moma’s production levels are higher thanks to a plant capacity expansion at WCP B in 2018 and the development of a third mining plant, WCP C, in 2019. As such, it is benefiting from the stronger price environment.

MOVING FAST FACTS

The move was particularly unusual due to the combination of the weight of the load and the length of the distance travelled:

- weighing the same as 550 double decker buses,
- taller than a seven story building and
- wider than a football pitch.



f
 Moving the full plant by road not only offered the lowest risk profile, but reduces our production offline time significantly, from months or years to weeks,

MICHAEL CARVILL



In the past Kenmare also had to contend with an unstable electricity supply in Mozambique, but this has now also stabilised, allowing the company to focus intensively on operational excellence and building a balanced and diversified team on the ground. Kenmare also continues its commitment to being a responsible corporate citizen, with a progressive land rehabilitation programme in place and 90% of its power requirement sourced from hydropower.

Understanding the project

But this is only the beginning of a new story for Kenmare, as the company in 2019 was granted board approval to execute its largest expansion project yet.

The conclusion of a definitive feasibility study in June 2019 confirmed the technical and economic feasibility of relocating WCP B to a new mining area, Pilivilil – at a capital cost of US\$106 million.

Kenmare engaged Hatch at the onset of the WCP B expansion project. Early studies evaluated the available options to mine the resource, and the best option was to relocate the existing facilities to the new ore zone.

Hatch are experts in modular construction methods and this project has broken all records in the physical size of a single move. Hatch’s construction team worked with Kenmare through the COVID-19 pandemic and have been on-site full-time since February to ensure the project is completed with minimal interruptions to production.

In combination with its two other growth projects in 2018 and 2019, the relocation project targets a 35% increase in ilmenite production (plus by-products) at Moma from 2019 production levels to 1.2 Mtpa on a sustainable basis from 2021 – and the move of WCP B to Pilivilil is the final step in achieving this goal. The increased production is also expected to significantly

Dredge on the move

The dredge approaching its final destination at Pilivilil





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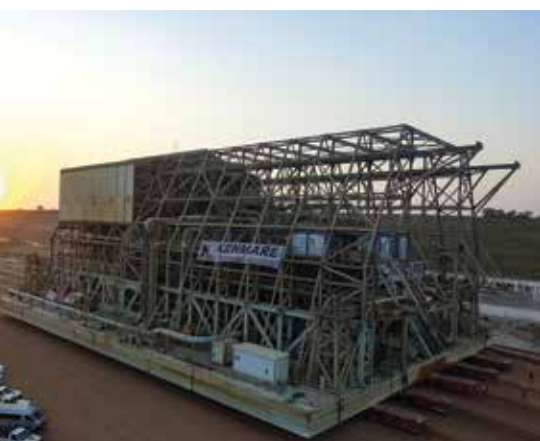




Starter pond at Namalope



Draining the starter pond



↑ The plant prepped and ready to go



lower cash operating costs to between \$125 and \$135/t (in 2020 real terms). Consequently, from 2021, the group expects to be positioned in the first quartile of the industry revenue to cost (or margin) curve, supporting stronger free cash flow generation and providing for increased shareholder returns.

Kenmare's WCP A first began mining the Namalope ore zone in 2007, with WCP B commencing mining at Namalope a few years later in 2013. WCP B completed its mine path at Namalope in August this year, although WCP A and WCP C will continue to mine this ore zone for several more years.

While all ore zones within the Moma portfolio were considered for the relocation of WCP B, Pilivilil was selected due to the favourable combination of higher grades, strong co-product credits and free flowing sand with low slimes, enabling ease of mining and processing, Carvill points out. Additionally, Pilivilil is located 23 km from Namalope and the existing mineral separation plant (MSP), allowing for ease of heavy mineral concentrate transportation by a newly constructed 16 km pipeline.

The Pilivilil ore zone has the highest grades within Moma's portfolio, with mineral reserves of 180 Mt averaging 4.4% total heavy minerals. The life of mine average grade mined by WCP B at Pilivilil is expected to be 4.6% THM and in the first four years of production the average grade mined is expected to be 5.3% THM.

An unusual, but smart approach

"We reviewed many alternative approaches to relocating our plant – including the disassembly/reassembly of the plant, building a new plant or alternate transportation options for the assembled plant by road and/or sea. Moving the full plant by road not only offered the lowest risk profile, but reduces our production offline time significantly, from months or years to weeks," Carvill highlights.

Moving WCP B, which consists of a 1 700 t floating dredge and 7 100t plant, measuring 80 m long, 24 m high and 60 m wide, is no easy feat – and the planning, design and logistics required to transport it some 23 km to Pilivilil is what impresses.

As a start, Kenmare Resources had to invest in the construction of a purpose-built road for the transportation of WCP B and its dredge. This was a nine-month

7 100 t

The weight of the WCP B, excluding its dredge, that was relocated in its entirety over 20 km to its new home

process but has been completed. The 23 km road is a massive 66 m wide – sufficient to transport the plant without compromising its structure in any way.

To move the actual plant, a very specific sequence of events

must take place to complete the relocation project.

First, a starter pond must be constructed adjacent to the existing operation, with supports installed at the base of the pond. The pond is filled with water and the construction of a berm connecting the two ponds established as well. This enables the WCP B and dredge to be floated across into the starter pond and onto the supports, where after the water will be drained. "On 17 September we had executed this portion of the project with complete success," Carvill highlights.

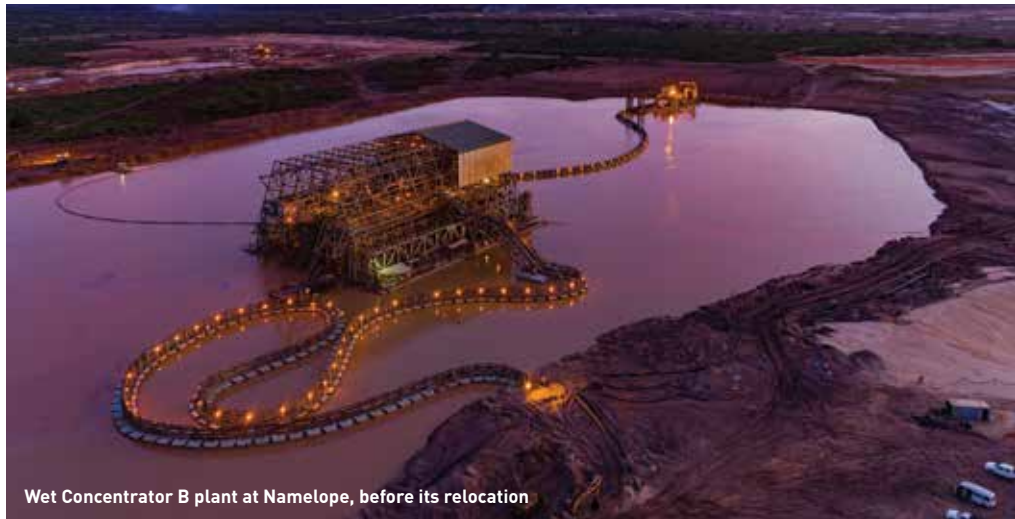
The next steps, some of which have already moved into execution, include a ramp needed to access the now dry starter pond. Heavy lifting and transport specialist contractor Mammoet used five trains of connected self-propelled modular transporters (i.e. lowbed platform vehicles with 290 axles in total) to transport WCP B out of its mining pond and along the road until it reaches Pilivilil, where it will be offloaded onto concrete plinths which recently took place. It will then be floated across a river, thereafter reaching its final destination at the Pilivilil starter which was achieved in late September.

New infrastructure is also required at the new site – including electrical power supply connection and a positive displacement pumping system to pump material back to the MSP.

Production for Moma this year will be down as a result of the move and measures implemented to reduce the contraction of COVID-19 on site. The pandemic has also caused some delays to the relocation project, but only minimal. "Our civil contractor worked throughout the lockdown period but our electrical supply system will be late, but to minimise the impact of this we will start running with diesel electric generators. Our new pumping system will also be late but we will truck material back to the MSP for now to avoid feeling the impact of this as well," Carvill explains.

"Overall, our timeframe to start the project hasn't changed, with commissioning of the plant at its new home planned for the end of this year, with our 1.2 Mtpa nameplate production targeted for 2021," he continues.

Importantly, Kenmare Resources has concluded a modified 40 MW power purchasing agreement with local power utility *Electricidade de*



Wet Concentrator B plant at Namalope, before its relocation

Mozambique. This is an increase in electricity consumption from the ± 32 MW of power used at Namalope – necessitated by the power required for the new pumping station, which Carvill believes will take Moma's total power requirement to about 35 MW.

A project of this magnitude and scale is an impressive feat under any

circumstances, and even more so considering the movement restrictions caused by COVID-19. But with around two years of planning undertaken to lead to the execution of the relocation project, Kenmare Resources has shown resilience and determination to see the project move ahead regardless – and it has, quite literally. **MRA**

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KEFI Gold and Copper

Eyes 2022 gold production

AIM-listed gold and copper explorer and developer **KEFI Gold and Copper** is well on its way to begin development of its 1.7 Moz Tulu Kapi gold project in Ethiopia. KEFI's subsidiary, Tulu Kapi Gold Mines Share Company (TKGM), is a public-private partnership with the Federal and Oromia Regional Governments. TKGM is working hard to stick to its schedule, the next milestone of which is to settle the financing terms with its project consortium in October, followed by the full development, which is expected to start during Q4, 2020 and then to accelerate construction in 2021 for gold production in Q4, 2022, **CHANTELLE KOTZE** writes.

The East African country of Ethiopia has undergone significant transformation in attracting foreign mining investment, having undertaken legislative and tax reforms for its underdeveloped mining sector in recent years to encourage growth and investment to jumpstart its burgeoning mining sector. With an abundance of natural resources in several prolific mining districts that have not yet been significantly exploited, coupled with the mining sector reforms, the country's ability to establish a

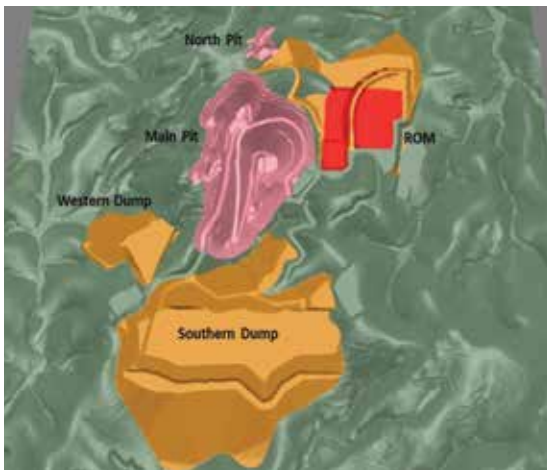
IN SHORT
Despite the global COVID-19 pandemic, the implementation of the Tulu Kapi project development activities was able to continue with duly refined plans and KEFI Gold and Copper's project remains on schedule.

competitive mining sector is no longer a pipedream. With Ethiopia set on unlocking its mining potential, KEFI is serious about contributing to the country's mining sector and, as a first mover within the country, has partnered with the Ethiopian government and leading African development banks as its senior sponsors, to bring to fruition the country's first 21st century industrial-scale mine development. KEFI and the government, through their jointly-owned Ethiopian project company TKGM, have entered into

an agreement (the Tulu Kapi Mining Agreement), which incorporates several foundation documents including development and operating plans, an environmental and social impact assessment and, for the community, the resettlement action plan and development plan. Despite the Ethiopian political turbulence during the democratic transformation of the past few years, and despite the disruptions imposed by COVID-19 during 2020, KEFI, the Governments and the regulatory authorities have been unwavering in their commitment to deliver Tulu Kapi. The parties have been intent on doing so in compliance with the highest international standards including the International Finance Corporation's

Tulu Kapi is located approximately 360 km due west of Ethiopia's capital, Addis Ababa





Performance Standards on Environmental and Social Sustainability and Equator Principles.

KEFI is known within Ethiopia to be contributing broadly to the sector’s modern birth, with an education and training initiative planned around the project and with the company’s senior leadership representing industry on the local board of the Extractive Industries Transparency Initiative and chairing the Ethiopian Progress Association for Mining.

According to KEFI Gold and Copper executive chairperson Harry Anagnostaras-Adams, the merit of the company’s development approach should pay dividends with the imminent mining boom in Ethiopia by, in partnership with Government, setting the highest standards for environmental, social and governance.

Recent entrants into Ethiopia include AIM and TSX-V-listed African mining project and royalty generator Altus Strategies, which holds the Tigray-Afar and Daro copper licences and the Zager gold licence, all of which are located within the Tigray province of northern Ethiopia; TSX-V-listed East Africa Metals, which owns Harvest and Adyabo gold projects, with a combined 915 000 oz indicated and 977 000 oz inferred resource; as well as US-based gold major Newmont, which is also prospecting for gold in Ethiopia.

There are several other companies also actively exploring in the country including Allied Gold (Australia), CRAU Group (Spain), Managem (Morocco), Megado Gold (Australia) Sun Peak Metals Corp (Canada), ZCMC (Armenia) and ETNO Mining.

Having earlier this year updated all capital expenditure, operating and financing requirements as part of the final 2020 Tulu Kapi plan, KEFI-controlled TKGM is now on schedule to allow major site activities to start at Tulu Kapi, upon closing of the full financing package.

Anagnostaras-Adams says that the 2020 Tulu Kapi Plan re-affirmed the project’s gold



The 2020 Tulu Kapi plan re-affirmed the project’s gold production, which will average 140 000 ozpa over an eight-year mine life,

HARRY ANAGNOSTARAS-ADAMS



↖ Planned site layout

↓ 3D rendering of process plant design

production, which will average 140 000 ozpa for eight years, from the bankable open pit, with potential to increase to approximately 190 000 ozpa from the underground development – for which a preliminary economic assessment has been published. Underground development plans will be finalised during construction of the open pit, adds Anagnostaras-Adams, noting that as soon as production settles down within the open pit, possibly within the first year of production, the company could begin development to access the underground deposit.

Finances outlined

The comprehensive project updates and revisions, which informed the final 2020 Tulu Kapi plan, has culminated in a reduced overall funding requirement. Total project funding requirements are now US\$221 million, compared with \$242 million reported in the 2018 annual report.

KEFI/TKGM have mandated two leading African development banks as senior project banks. The project level equity expected to comprise at least 40% of the total funding package, is to be funded by a consortium consisting of KEFI, the Ethiopian Federal and Regional Governments, Ethiopian private sector investors and one or more specialist mining financiers that provide financing facilities under subordinated debt (such as long-planned working capital and stockpile facilities and associated forward sale, offtake arrangements).

Moreover, based on the discussions on the detailed terms as well as the proposals received to date from the financiers and investors, TKGM is seeking to potentially reduce the number of shares it issues by increasing the amount of funds raised by TKGM from the financiers, and by doing so increase its existing shareholders’ ultimate beneficial interest in TKGM. Anagnostaras-Adams explains that if successful, this would have the effect of increasing KEFI’s beneficial interest in





↑ School provided by KEFI near Tulu Kapi



↑ The altitude of the project area is between 1 600 m and 1 765 m above sea level

TKGM above the planned base case level of 45%, to no less than a 60% beneficial interest in the project.

In light of the surge in the gold price this year, which is currently approximately US\$800/oz higher than KEFI's ore reserves assumption of \$1 098/oz and approximately US\$600/oz higher than its base case assumption of \$1 300/oz, the 2020 Tulu Kapi plan has assumed three long-term gold price assumptions, namely \$1 400/oz, \$1 700/oz and US\$2 000/oz, with a new base case assumption of \$1 500/oz.

This gold price could see the development of a slightly larger, longer lasting open pit operation and reinforce that the underground development could be brought on line much sooner. This also means that the combination of the underground mine, which will be located directly underneath Tulu Kapi together with the open pit mine, could see the operation have a potential +12-year mine life. The mine would therefore also be able to produce an overall higher blended gold

grade, from both the higher grade [5-6 g/t of gold] underground deposit and the slightly lower grade [2 g/t of gold] open pit, Anagnostaras-Adams explains. These scenarios will be assessed during construction in consultation with the full financing consortium.

FAST FACT

Tulu Kapi is located within the highly-prospective Arabian-Nubian Shield, which traverses areas within Africa and the Middle East, including Ethiopia and Saudi Arabia where KEFI is advancing its recently announced Hawiah copper and gold discovery.

Project status update

Despite COVID-19, the implementation of the project development activities has continued with duly refined plans, such as Covid-adjusted rostering and including the ordering of long-lead items for off-site infrastructure activities (which are being provided for by the Government).

The commencement of infrastructure development for the connection of roads and power to site is progressing according to schedule, so that it is ready in time for the commencement of on-site activities. A new road has just been built into the new host lands for Tulu Kapi residents to be resettled, while preparation of the new lands and homes is also already underway, in time for the first phase of the community resettlement to be implemented at the end of the year.

An expansion of the accommodation village for construction personnel will commence immediately after, with bulk on-site earthworks to begin in Q2, 2021.

In terms of on-site infrastructure, the process plant front-end engineering design has been completed, following updating pricing from the plant fabricators and the integration of the

recent geotechnical drilling results into the final plant and dam foundation designs.

In addition to the physical development tasks that are underway, KEFI also completed all the independent required for the financiers in order to

conduct their due diligence work.

These studies and report included both technical reports as well as environmental and social study reports. Part of this also included the completion of the tailings dam, water balance and geotechnical studies, which were undertaken on completion of the process plant design.

The Tulu Kapi operation will comprise an open pit mine about 1 km wide to a depth of 400 m. The ore will be sent to a 2 Mtpa carbon-in-leach processing plant followed by a detox circuit to ensure that any waste entering the tailings dam is neutralised to the point that the tailings discharge complies with the International Cyanide Management Code.

In addition to the planned underground mine, an area of over 1 000 km² adjacent to Tulu Kapi has been reserved for exploration by KEFI upon commencement of development, with a view to adding satellite deposits to development and production plans. Over the long term KEFI's vision is to establish Tulu Kapi as the centre of a mining district, with several mines operating. KEFI has also agreed with the Government to jointly institutionalise industry training schemes in the district for the benefit of the region and the sector in general. **MRA**

SHAREHOLDING STRUCTURE NOW AND INTO THE FUTURE

At present, KEFI has a 95% shareholding in Tulu Kapi with the government of Ethiopia holding the remaining 5%. As the government completes its investment in the off-site project infrastructure, its shareholding will increase to over 20%, with KEFI holding the remainder. On completion of the project financing, KEFI will remain the majority shareholder with no less than 60% ownership in the project. This is planned to be set out in October 2020 with the consortium structure settled amongst the various participants.



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Buckreef gold project

Expansion ticks all the right boxes

When **Tanzanian Gold Corporation** published a pre-feasibility study (PFS) for its Buckreef gold project in Tanzania in 2018, executive chairman and director **JIM SINCLAIR** asked technical director **ULRICH RATH** one simple question: “What do we have at Buckreef?” The question set in motion a series of events that has resulted in a doubling of the project’s resources. **GERARD PETER** reports.

IN SHORT

Buckreef has at least 2 Moz of gold reserves with a possible mine life of 10 to 15 years.

The Buckreef project is located in north-central Tanzania and comprises the dormant Buckreef gold mine and four prospects with known mineralisation: Buckreef, Buziba, Tembo and Bingwa.

By all accounts, the 2018 PFS was very attractive, pointing towards a modest sized gold project based on mining and processing about a 1 Moz of gold. According to Rath, under normal circumstances, the company would have progressed towards the final step of a full feasibility study. But, after Sinclair asked him about the project’s potential, the company decided on an ambitious expansion programme comprising three key aspects.

The first saw the company drill 20 000 m on the Buckreef shear zone. The results showed that the shear zone is continuously mineralised along the surface for a distance of 1.2 km. It was also discovered that the gold extends for at least 400 m, possibly

more. “As a result, we built our own resource model,” explains Rath. “This model contains data from 150 000 km of drilling from previous campaigns on the property, including gold assays, mineralisation and geology. We then used that model to update our mineral resources to a measured and indicated resource estimate of 2 Moz.”

In addition, the company published inferred resources of 635 000 oz and what it estimates exists in its exploration targets. These are targets that have not yet been fully defined but Rath believes there is enough evidence to indicate the presence of gold and

these targets could add up to an additional 2 Moz.

Next, Tanzanian Gold undertook extensive additional metallurgical test work. “We sent samples to SGS Lakefield in Ontario, who is our lead advisor on all technical matters. As a result of this metallurgical testing, we concluded that the best economic returns could come from two plants – one plant that treats only the oxide ore and the second plant that treats only the underlying sulphide ore. Initially, the PFS advised one plant that initially treated oxides and then sulphide material. We modified that plan to incorporate two plants,” Rath adds.



↑ The expansion will double the mine’s resources

Production already in progress

Rath further explains that the third phase was to develop a detailed mine plan for the oxides. "We drilled 7 000 m of grade control holes in the zone that our model had identified as having a high-grade oxide ore. We started mining and stripping what we call the oxide pit. We then built stockpiles of ore and built a test pilot mill to treat the oxides, thus enabling us to confirm the flowsheet for a much larger oxide plant. This pilot plant has now produced gold successfully for a number of months."

Following this, the company has secured financing from South African based investor fund, River Fort, to provide the capital to continue expanding its oxide operation. Subsequently, Tanzanian Gold has submitted a plan to the government to build a 40 tph oxide plant with construction planned to start upon government approval later this year and production expected in the second half of 2021.

According to Rath, the plant has sufficient reserves for a six-year life of mine. Recently however, the company has encountered several new exploration zones that could potentially add additional oxide resources.



We concluded that the best economic returns could come from two plants – one plant that treats only the oxide and the second plant that treats only the underlying sulphide,

ULRICH RATH



Paying it forward

In the space of two years, Tanzanian Gold has gone from an exploration company to a gold producer with at least 4 Moz in resources and the possibility of extending Buckreef's mine of life to between 10 and 15 years.

Sinclair puts the success of the project down to the company's culture and its team of highly skilled individuals. "We had to change diametrically. An exploration company is incapable of becoming a significant producer unless it builds on its assets, its capital and most importantly, the expertise of the people involved in pursuing the goal," he states.

Sinclair is no stranger to mining in Tanzania, having begun the development of the Bulyanhulu Mine in 1990. And while there has been a lot of negative sentiment surrounding the country's mining regulations, he believes that the regulations will benefit the country's people and economy. "We have adopted an integrated approach. So, when it comes to the construction, we have selected a few companies that we believe can do this. We are going from an exploration company to meaningful production. What we're trying to do is grow in progressive steps that we can manage," he concludes. **MFA**

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East Africa Metals

Unearthing Ethiopia's gold potential

TSX-listed **East Africa Metals** (EAM) is not only focussed on developing its Ethiopian gold projects as fast as possible in order to take advantage of global gold prices, but is also helping to promote Ethiopia as a lucrative mining destination. **GERARD PETER** finds out more from company president and CEO, **ANDREW LEE SMITH**.

The company has four gold mining licences in East Africa, namely Handeni in Tanzania and Harvest and Adyabo (Mato Bula and Da Tambuk) in Ethiopia. EAM's combined resources are 1 636 Moz of indicated gold and 1 269 Moz of inferred gold.

Currently, the company is focused on developing its Ethiopian licences that comprise combined gold resources of 915 000 oz. indicated and 977 000 oz. inferred. This year, EAM made good headway in developing its Adyabo gold property which includes the Mato Bula gold copper project and Da Tambuk gold project. In February this year, the company announced that a Phase 1 drilling programme had been initiated at

IN SHORT
EAM aims to have all its gold projects in development by 2021.

Adyabo and equipment was being deployed to support the campaign.

Despite the COVID-19 pandemic, EPC work has been ongoing at Mato Bula and Da Tambuk with the assistance of EAM's Chinese partner, Tibet Huayu Mining Company, who is fully funding the capital costs of the operations for the two projects. Tibet Huayu has a 70% interest in EAM's Ethiopian subsidiary, Tigray Resources, while EAM still holds the mineral rights and all exploration obligations for the prospective targets. "We signed the agreement with Tibet Huayu in December last year and work was scheduled to begin early in the year," starts Smith.

"However, after the Chinese New Year the COVID-19 situation changed

everything. Our partners then went back to Beijing with their expat staff but continued to pay their Ethiopian staff and ensured the EPC work continued. As it stands now, the work is almost completed and the intention is move the project forward once the rainy season ends in Ethiopia."

Smith is confident that EAM can commence operations successfully with COVID-19 restrictions in place. "We are hopeful that once business resumes in this new normal that we will actively begin developing Mato Bula and Da Tambuk with the intention of setting up a timeline towards taking them to being production ready."

Ethiopia may not be on the radar for many mining companies. However, it was the country's commitment to transformation and developing its mining sector that attracted Smith to the country. "We were operating in Tanzania in 2009 and we made a major

discovery there. Meanwhile, our Chinese partner, that has an equity stake in the company, had projects in Ethiopia that were not moving forward.

“In January 2010, our partner suggested that we have a look at these projects and Harvest was the first one that we looked at. We discovered that there was a significant geological endowment in the region with literally no exploration having ever been done. The fact that it was part of the same geology that was hosting mines in Eritrea particularly impressed me.”

Putting Ethiopia on the mining map

Another thing that attracted EAM to Ethiopia was the implementation of the country’s transformation programme that was approved by the World Bank in 2010. This resulted in securing US\$75 billion for infrastructure development in this resource rich region. The aim of the programme is to increase mining’s contribution to the country’s GDP from the current 3% to 10% by 2025.

“There is strong intent from the government to focus on the resource sector and 10 years later, it has built highways and roads to the port of Sudan, a regional airport and Africa’s biggest hydropower station at the Grand Ethiopian Renaissance Dam. All of this was happening while we were conducting exploration in the country and this gave us the opportunity to lower the bar with respect to economic hurdles that we could expect with regards to infrastructure development, something that is a major concern in most parts of Africa,” Smith adds.

Naturally, development of EAM’s projects will contribute significantly to the country’s GDP and the socio-economic well-being of its citizens, but the company is doing even more to put Ethiopia on the mining map. To that end,



↑ **Top: Sampling in progress**
Above: The EAM team at the first Ethiopian Mining Conference

“We are looking at developing both projects in parallel... so that we can take advantage of the gold price,”

ANDREW LEE SMITH



EAM was instrumental in organising the first Ethiopian International Mining Conference and Exhibition in 2017, a conference aimed at developing stronger, inclusive and sustainable growth for mining.

The conference provides opportunities to inform stakeholders of Ethiopian reforms to facilitate investment in the mining sector. It helps identify innovative financing solutions applicable to both large and small-scale mining projects and services and improves both the quality and access to data relating to Ethiopia’s geological infrastructure.

With the gold price reaching its highest levels ever, Smith believes that it will help speed up development of its gold projects. “Initially, we had decided, along with our Chinese partners, that the two projects will be developed in series, but we are now looking at developing both projects in parallel in order to bring them online in a shorter timeframe so that we can take advantage of the gold price.

“Our goal is to have all our projects in both Ethiopia and Tanzania in development by 2021. Today, with four permitted development-ready projects in Africa, our future looks bright as we continue working to bring these projects into production within the next 12 to 24 months,” Smith concludes. **MBA**



Kibo Energy

Makes significant headway at its Mozambique power projects

IN SHORT
 Through the development of its three independent power projects, located in Mozambique, Tanzania and Botswana, Kibo Energy aims to use energy as a means to kick-start regional economic development in sub-Saharan Africa.

Multi-asset, Africa-focused energy company **Kibo Energy** has worked meticulously to establish a portfolio of strategically located African energy projects aimed at boosting the economic development potential within the countries that it operates. According to CEO **LOUIS COETZEE**, electricity is one of the key drivers to enable rapid economic development in Africa – a continent that has faced an acute power deficit for far too long. **CHANTELLE KOTZE** reports.



↑ The Benga power project will comprise a 350 MW - 400 MW coal-fired power station with feedstock provided by local coal producers, as well as planned renewable energy projects

While access to energy could enable the fastest economic development in the history of Africa, it is currently the primary impediment to economic growth and development, job creation and investment in Africa, with a staggering 56 days of lost industrial production a year due to power shortages.

The energy picture is no different in Mozambique, where Kibo Energy has made significant progress in the development of its Benga power plant project, in the country's Tete region, and where it entered into a deal with Baobab Resources to supply energy to its steel and vanadium project.

According to statistics from Power Africa – a USAID-funded initiative aimed at increasing the number of people with access to power in Africa through the provision of technical, legal and financial assistance towards the establishment of both off-grid and grid-connected energy

“Power purchase agreement negotiations with both *Electricidade de Moçambique* and Baobab Resources are on schedule for completion by the end of this year and the beginning of Q4, respectively.”

LOUIS COETZEE



solutions – only 30% of the Mozambican population currently has access to electricity.

Despite having an installed generating capacity of 2 827 MW, most of the country's power is exported to neighbouring South Africa. The country's demand for power is steadily increasing by between 6% and 8% per year, with demand at about 20% in the north of the country where most of the mining operations are located, necessitating a power intervention in the country.

Regardless of the country's dire energy situation, Power Africa believes that Mozambique has the largest power generation potential in Southern Africa – at 187 gigawatts – from untapped coal, hydro, gas, wind and solar resources.

Harnessing coal for energy in Mozambique

Kibo Energy is looking to harness the country's untapped thermal coal resources as a power generation feedstock for its Benga power plant project, which has gained significant development momentum. In a joint venture with *Termoeléctrica de Benga S.A*, Benga will comprise a 350 MW - 400 MW coal-fired power station with feedstock provided by local coal producers, as well as planned renewable energy projects.

In addition to the Benga power plant project, Kibo inked a deal in May this year with Baobab Resources to supply approximately 200 MW of energy to its Tete steel and vanadium project in Mozambique – from the proposed Baobab power station project.

Having completed a definitive feasibility study and independent financial model on Benga, which confirmed its economic feasibility, Kibo is in the process of negotiating two independent power purchase agreements with Mozambique state-

owned electricity utility *Electricidade de Moçambique (EDM)* and Baobab Resources, delivering a total of 150 MW to EDM and approximately 200 MW to Baobab. Coetzee says that power purchase agreement negotiations with both EDM and Baobab are on schedule for completion by the end of this year and the beginning of Q4, respectively, which upon completion, will inform the development plan of its power projects in Mozambique.

With the potential of signing at least two independent power purchase agreements of between 350 MW and 400 MW, Coetzee says that the development options currently remain open as to whether the company constructs one power plant to fulfil both supply agreements or two separate plants to service Baobab and EDM independently.

In doing so, Kibo is underway with an integration study to assess the feasibility of a 400 MW combined project for Benga and Baobab, which will assist in assessing and defining the optimal approach in this regard. "Either way both agreements will continue to progress at pace, unencumbered by the other, so that we can realise meaningful value for our shareholders, our power clients and the region at large," says Coetzee.

Kibo Energy is pleased by the Mozambican government's commitment to creating affordable and reliable electricity supplies in the country, having recognised the energy sector as a strategic priority for the development of the country. Highlighting its desire to accelerate social and economic development, the government is encouraging investment in the energy

DID YOU KNOW?
620 million people in Africa are currently living without power. This equates to two in three people in sub-Saharan Africa without access to electricity.



↑ The Benga power plant project is located in Mozambique's Tete Region

sector, either public or private and by nationals or foreigners.

Through EDM, the government is committed to increasing the population's access to electricity and improving the quality of service rendered to consumers by developing infrastructure for electricity generation, transmission and distribution. [MRA](#)

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East Africa

Region ripe with potential

East Africa, including Tanzania, Rwanda and Ethiopia, is home to some of the most in-demand metals and minerals, yet in spite of this many of these regions remain largely unexplored. How do mining companies take advantage of this mineral rich region and is it an attractive investment hotspot?



These questions formed part of a recently held webinar titled *The hottest investment destinations in East Africa*.

Organised by *Mining Review Africa* and *Africa Mining Forum*, the panellists comprised Rocky Smith, former CEO of Peak Resources; Brian Menell, chairman and CEO of TechMet; Andrew Lee Smith; CEO of East Africa Metals; and Marcus Courage, CEO of Africa Practice.

According to an audience poll during the webinar, the region holds plenty of mining promise with Rwanda (37%), Tanzania (27%) and Ethiopia (24%) viewed as the most attractive countries to deliver the biggest return on investment.

Courage, who has operated a consulting business in East Africa for the past 15 years, explained that East Africa experienced the fastest growth of any region on the continent over the last five years. This growth can be attributed to countries having stable governments for a number of years as well as a commitment to infrastructure investment. "For example, transportation, Ethiopia has doubled its roads to 110 000 km and has invested in the Renaissance Dam

hydropower project that will bring energy security to the region as a whole," he added.

Weighing in on the potential that Ethiopia has, Andrew Lee Smith stated that the government's commitment to developing the mining sector played a major role in deciding to start exploration in the country. "We were impressed by the government's position that it wants to see GDP contribution from the mining sector grow to 10%, from the current 3% levels by 2025. So the commitment of the government, the promise of infrastructure and the incredible resource endowments that we saw, allowed us to take on a reduced geological risk."

Tin on top

Addressing the subject of making Tanzania more attractive to foreign miners, Rocky Smith explained that the country's government should interact more with mining companies to attract investment. "The number of foreign companies in Tanzania has reduced over the last five years. For example, at one stage there were at least eight Australian companies in the country, now there are only three.

"Tanzania has really great resources and that's why companies are sticking it out but they need some support from the Tanzanian government to develop a path. This will also help companies work towards getting their licences."



Meanwhile, Menell, who heads up the biggest mining company in Rwanda, added that it was a combination of factors that made the company decide to mine in the country. "Rwanda is very uniquely positioned in the region as a hub for the production of technology metals and ultimately processing that we want to continue to invest in and build. Finally, mining is a tough business. It's long-term, it's capital intensive and it requires an enabling environment. And that enabling environment first and foremost, requires stability and safety and continuity of political leadership. And you have this in Rwanda," he concluded. [MRA](#)

SCAN THE QR CODE TO LISTEN TO THE FULL WEBINAR RECORDING



AFRICA MINING FORUM GOES DIGITAL

The mining industry has gained an exciting new multi-touchpoint partner as *Africa Mining Forum* transforms into a year-round platform, providing engagement and content for 365 days a year, covering all corners of the continent's junior mining activities and opportunities. Although this year's live *Africa Mining Forum* has been postponed to November next year, organiser Clarion Events Africa will host a five-day digital event from 16-20 November 2020. A comprehensive digital line-up has already been confirmed and includes:

- 12 Strategic Spotlights
- Women in Mining Assembly
- Ministerial Forum
- Matchmaking
- Mining Market Place

→ **Expert speaker** line-up includes William Witham, CEO, Australia-Africa Minerals & Energy Group (AAMEG)



In addition to the live event, *Africa Mining Forum* and *Mining Review Africa* have embarked on an interesting new CEOs One-on-One series of in-depth interviews with mining pioneers on the continent and beyond. These are available on the event website and on [miningreview.com](#).

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Booyesendal

Looking True North

Northam Platinum's Booyesendal PGM operation, situated on the eastern limb of the Bushveld Complex, continues to fulfil the true definition of being a new age, new generation mine. This is thanks to the adoption of technology designed to enhance its operational efficiency while most importantly, preserving the environment, writes **LAURA CORNISH**.

Having visited Booyesendal numerous times over the last two years, the mine never ceases to impress. Having instituted various brownfields programmes to maximise the financial value of the operation, it continues to successfully reach its milestones comfortably (although in some cases these have been adjusted due to COVID-19 and lockdown measures).

The expansion programme valued at R5.6 billion will see the Booyesendal complex comprising Booyesendal North and South producing a steady-state run rate of 500 000 4E PGM ozpa.

Part of the expansion programme includes the development of a new mining complex referred to as the Booyesendal South project. (The original operating footprint includes a North UG2 module expanded with its deepening project and North Merensky module).

The Booyesendal South project includes the new Booyesendal Central UG2 mine with seven adits as well as the concentrator plant (part of Everest acquisition) which has now been refurbished and is the plant that will process all of the Booyesendal South ore.

Because the concentrator plant is situated nearly 5 km from the Central

UG2 mine, amongst some of South Africa's most beautifully natural landscape, an innovative approach to deliver a cost-effective transportation system between the two points was required.

Germany-based, materials handling specialist Doppelmayr's RopeCon system was elected as the best solution for Booyesendal South's material transfer needs. It comprises a series of towers, strategically positioned between the mine and plant, connected by ropes and conveyor belt which will run the entire distance above ground.

An enormous feat, the South RopeCon was designed and built,

North RopeCon drive station





Tower 6 construction



Tower 4 construction

and commissioned on schedule in early 2019 and is a huge success for the Northam team (overseen by Northam mining executive Willie Theron, project manager DRA Global's Eddie Badenhorst and of course Doppelmayr).

The distance of the system is 4.7 km, and the lift 530 vertical metres. The towers house six ropes – 2 x 52 mm diameter ropes, 2 x 47 mm diameter ropes and 2 x 37 mm diameter ropes. The combined length of all the ropes is a massive 29 km and will be used to move the ore-carrying conveyor belt. From the loading station situated near the Everest plant, the conveyor belt travels across 12 towers which can accommodate a maximum 1 150 tph tonnage rate.

Success replicated

Part of the R5.6 billion capital investment is an expansion of the Merensky North module to increase production from 25 000 tpm to 50 000 tpm as well as a Merensky Central module of 50 000 tpm.

"The Merensky North mine lies just under 3 km east of the new Central UG2 mine. With sufficient capacity at the Everest concentrator plant – the additional Merensky north and central ore must also make its way to this process plant," Badenhorst notes.

With equally as beautiful landscape in the area – investing in the establishment of a second North RopeCon was an easy decision.

"Although nearly half the length of the South RopeCon, the typography

is very undulating and so considered technically more challenging to design," Badenhorst notes.

"Once completed, the North RopeCon will be 2.7 km in length, run at a speed of 3.6 m/sec and will manage up to 400 tph. The belt width will measure 660 mm and run through seven towers of which the highest (tower 7) will reach 46 m," Badenhorst outlines.

The full length of the north conveyor will run a down-dipping undulation, meaning the energy harnessed during the running process could be used to generate electricity but not of a sufficient amount to warrant the investment necessary to build the infrastructure to utilise it.

Fortunately, thanks to a brand new road that DRA oversaw, the construction





North RopeCon silo under construction

of the towers will be that much easier to navigate and build because they will run parallel to the road itself.

“Having completed the South RopeCon so successfully, this materials handling solution

“The North RopeCon project was originally scheduled to be in full construction towards the start of the year but COVID-19 has caused a six-month delay on its full-scale execution,”

WILLIE THERON

has proven to be not only extremely cost effective when comparing it to traditional truck transportation, it has undisputedly minimised our impact on the environment – an essential aspect of the project considering the operation lies amidst valleys and beautiful natural vegetation,” Theron notes.

Some additional infrastructure is also required for the North and Central Merensky mine feed – which will share the same 4 200 tph silo currently on site at the UG2 South mine. “It is important that we don’t fully blend the UG2 and Merensky ores. After a substantial amount of time investigating and simulating various options to avoid this, we opted to construct a second silo at the Merensky mine boxcut which will function as additional buffer storage,” Badenhorst explains.

When the UG2 south mine goes into a low supply peak, the on-site silo will draw down on the material until it is 90% empty where after the Merensky ore will be fed into the silo. Once transported to the concentrator, this will enable the establishment of UG2 and Merensky split rich ore stockpiles.

Project status update

“The North RopeCon project was originally scheduled to be in full construction towards the start of the year but COVID-19 has caused a six-month delay on its full-scale execution,” Theron confirms.

Nonetheless, the project is back in full swing now that lockdown measures in the country have been mostly reduced. Badenhorst confirms that the project is in fact about two weeks ahead of schedule on the revised timeline.

“Civil works, which kicked off just before lockdown are due for completion in November. Mechanical installations will start in January 2021 and will be commissioned in November or December of the same year. The feed conveyors will be fully installed by June/July next year as well,” Badenhorst outlines.

Full commissioning of the North RopeCon is scheduled to start in December 2021.

NORTH AND SOUTH ROPECONS AT A GLANCE

	South RopeCon	North RopeCon
Distance	4.7 km	2.7 km
Speed of conveyer	4.5 m/sec	3.6 m/sec
Capacity	1 150 tph	400 tph
Number of towers	12	7
Tallest tower	59 m	46 m

Unpacking lessons learnt

Fortunately, the entire Booyendal RopeCon team are able to apply some lessons learnt from the first RopeCon project – a massive advantage considering the terrain for the North conveyor is more complex – “the towers for example have unusual shapes – designed to accommodate the terrain. Because the tower bases sit on different elevations, the conventional plints have also been replaced with specially designed steel piping, a result of the different elevation between the plints making it more complex,” Badenhorst notes.

On the plus side, because the conveyor system is located adjacent to the road, the necessity to lay concrete foundations to lift the towers into place was removed.

With RopeCon South the transfer point was directly below the silo. This created complexity during the construction phase as contractors were dependant on each other with reference to access to construct. With RopeCon North this has been decoupled by installing a short transfer belt from below the silo to the transfer point at the RopeCon. “We trust that this will improve constructability,” Badenhorst concludes. **MRA**

“

Although nearly half the length of the South RopeCon, the typography is very undulating and so considered technically more challenging to design,” ”

**EDDIE
BADENHORST**

South RopeCon



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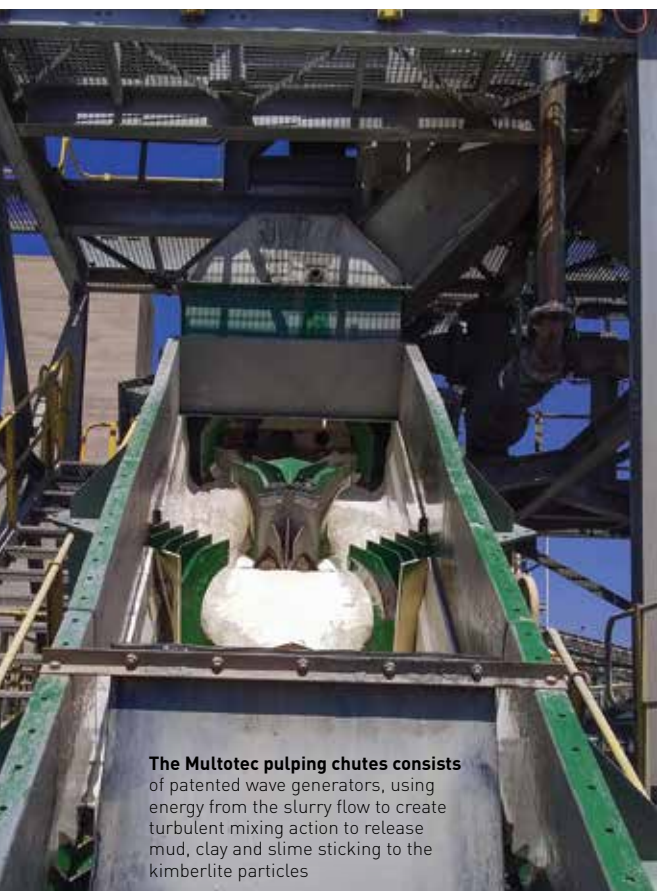
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Innovative pulping chute

Cuts scrubbing costs at Ekapa

A revolutionary new concept in fines scrubbing has been installed by **Ekapa Minerals** at its Combined Treatment Plant (CTP) in Kimberley, processing both virgin underground kimberlite as well as tailings for retreatment, and it is proving itself to be a game-changer.



The Multotec pulping chutes consists of patented wave generators, using energy from the slurry flow to create turbulent mixing action to release mud, clay and slime sticking to the kimberlite particles

The innovation, developed by Multotec Wear Linings, is a pulping chute that scrubs and washes the re-crushed product after it has passed through the High Pressure Grinding Rolls (HPGR) interparticle tertiary crushing circuit. The important advantage here, according to Multotec Wear Linings projects sales manager John Britton, is that it performs the scrubbing action faster and more efficiently than a traditional rotary scrubber would, and at much lower cost.

Multotec commissioned two of these pulping chutes at Ekapa Minerals in late-2019, where they have been operating consistently and in line with expectations. With the use of patented wave generators, the pulping chute uses the gravitational

It is clear that fines scrubbers are significant contributors to a plant's capital, operating and maintenance costs,

JOHN BRITTON



↓ The Multotec pulping chute performs the scrubbing action faster and more efficiently than a traditional rotary scrubber and at much lower cost

energy from the slurry flow to create a constant turbulent mixing action that releases the mud, clay and slime sticking to the kimberlite particles.

According to KEM CEO Jahn Hohne, the pulping chutes are a welcome contribution to the company's cost saving efforts, and a clear demonstration of Multotec's expertise in developing value-adding solutions in the mining sector.

"The dual chute pulping plant is ideally suited to de-conglomerating the HPGR cake product and is exceeding expectations in efficiency and effectiveness at over 600 tph, which is a major relief on the existing overloaded pair of CTP scrubbers. The net result is a meaningful increase of up to 20% throughput capacity of the entire processing plant which substantially improves the economy of scale of CTP, feeding directly to the bottom line," he says.

Britton highlights the efficiency of the system, which is able to aggressively scrub the material in just three to four seconds as it passes through the chute. This represents just a fraction of the usual retention time in a rotary scrubber, which is three to four minutes. He also emphasises the drastic reduction in running cost which the pulping chute achieves.

"From our experience of plant layouts and flow diagrams, it is clear that fines scrubbers are significant contributors to a plant's capital, operating and maintenance costs," he says. "Scrubbers are equipped with large drives with gears and gearboxes to rotate the drum.



They are high consumers of power and require mechanical component maintenance which means higher operating costs.”

Substantial structures and supports are also needed for the scrubber and its drive mechanisms. In designing the pulping chute, Multotec sought a simplified solution, he says. In addition to improving scrubbing efficiency, the objective included reducing the cost of replacing scrubber liners and the downtime that this demanded. The cost of replacing the steel shell of a scrubber – which was constantly subject to stress, wear and fatigue – was another cost to be considered.

The pulping chute, by contrast, is a stationary and much simplified innovation, focused on the scrubbing of fines less than 32 mm in size. Slurry deflectors located at the top end of the scrubbing chute direct at least part of the slurry away from the scrubbing chute floor. This curls into an arched form which flows backwards into the

approaching flow of slurry, creating the turbulent scrubbing effect.

“We custom-design the chutes to suit the application and can increase chute capacity to up to 800 tons per hour,” says Britton. “This is achieved with no moving parts, bearings, hydraulic packs or girth gears; the only power required is to supply material and water to the receiving chute. These actions are also required to feed the scrubber, then gravity takes over and provides the required energy.”

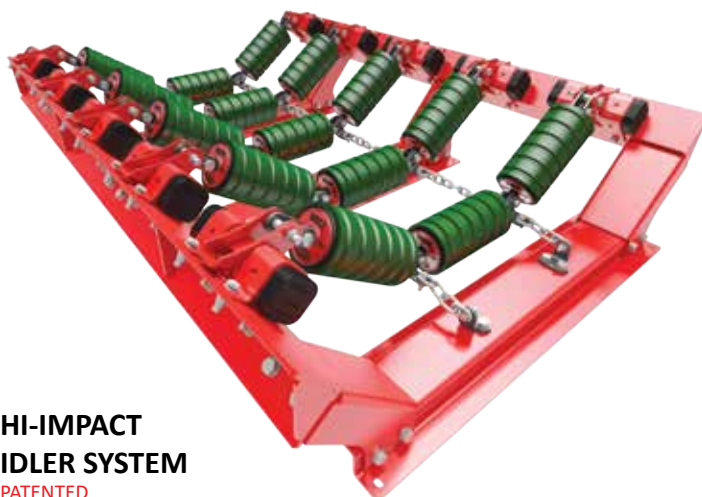
Maintenance is also streamlined by designing the chute in segments. Should one segment be wearing more than others, it can be quickly removed and replaced – putting the chute back into operation while the original segment is refurbished as a spare.

Britton notes that the pulping chute has drawn interest from other diamond producers in southern Africa, Australia and Canada. It can also be applied in commodity sectors such as coal, platinum, chrome, iron ore and mineral sands. **MRA**



The Multotec pulping chute is designed into segments making it quicker to remove and replace segments during maintenance

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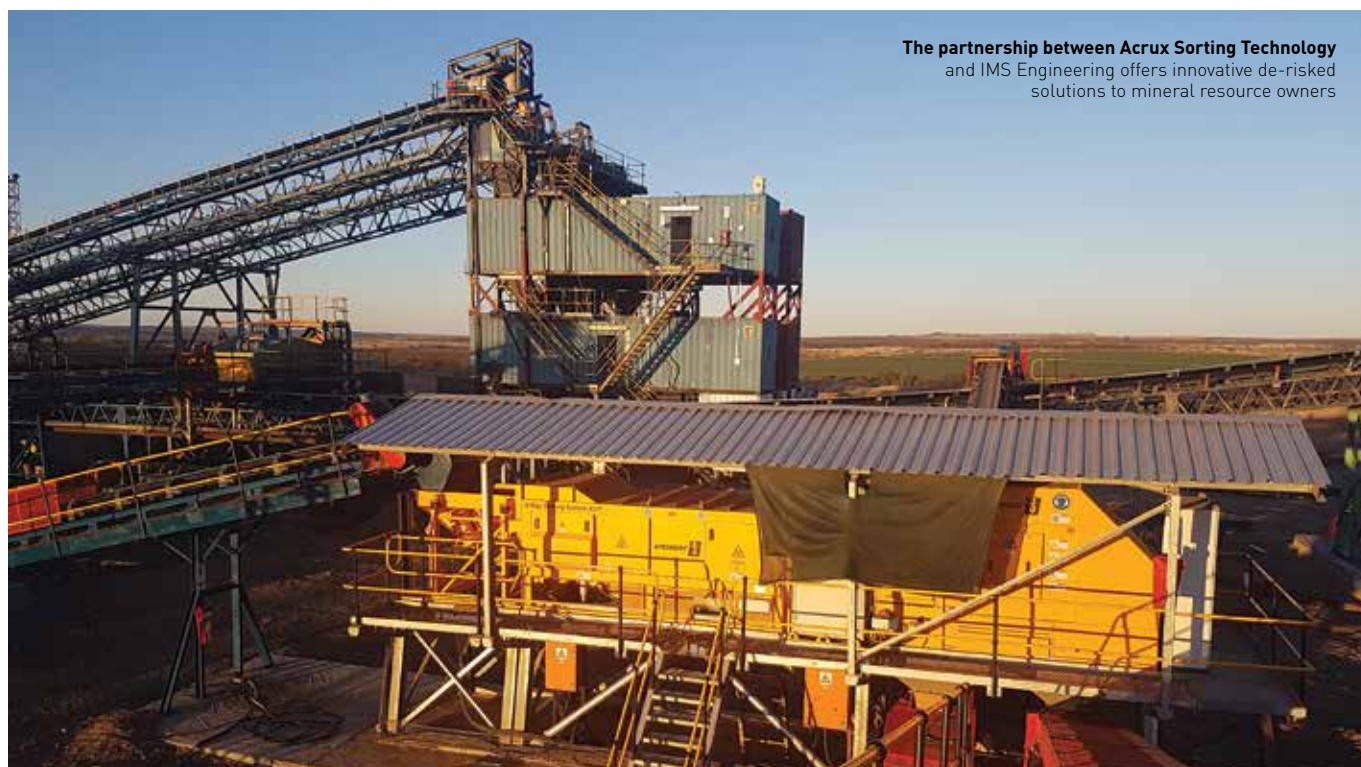
- Install the Belt Tracking System on the troughing side of the belt to centralise a misaligned belt, prevent spillage, decrease downtime, decrease maintenance and extend belt life.



Sensor-based sorting

New partnership accelerates sustainable innovation

Acrux Sorting Technology, a wholly owned subsidiary of commodity trader and resource funding and investment specialist **Acrux Resources**, and **IMS Engineering**, the globally-recognised crushing, screening and sorting equipment manufacturer, have entered into a strategic partnership to provide sensor-based sorting technology to mineral resource owners on a fully funded basis.



The partnership between Acrux Sorting Technology and IMS Engineering offers innovative de-risked solutions to mineral resource owners

The partnership has the objective of creating value for miners by upgrading marginal or uneconomical ore into valuable material that can be fed into an existing processing plant or sold on a concentrated basis at no financial risk to the capital spend.

The uniqueness of the partnership offers innovative de-risked solutions to mineral resource owners, customised to the mineral commodity and operational environment, and provides a unique opportunity to engineer sorting solutions with a heightened focus on adding further value in operations. The 360° solution will unlock opportunities to increase revenue and reduce costs for resource

owners with no need to fund the capital solution.

With the current economic challenges in the mining sector, resource owners have had limited success in accessing this technology due to a lack of capital funding. This partnership will not only provide a solution to the capital funding challenges and improve engineering and operational capacity, but will also add value to resource owners' ESG scorecards, as the technology does not require water, optimises operational costs and efficiency and reduces the need for tailings treatment and overall environmental liability.

"We are excited to partner with IMS Engineering because of their technological, operational, and engineering expertise. We believe that

this partnership will deliver world-class sorting technology equipment and solutions to the sector," says Acrux Sorting Technology's executive director Sean Browne.

"We are focused on providing mineral resource owners with fully funded turn-key solutions that will result in more saleable product and in turn reposition them on the cost curve," he adds.

IMS Engineering MD Paul Bracher believes that by partnering with Acrux Sorting Technology to deliver sustainable transformation to the mining industry, will enable IMS to drive more business impact to its clients through an innovative funding solution and an ESG technology that is centered on the use of sensor-based sorting technologies. **MRA**



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TOMRA's promise to diamond mining operations

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TOMRA's promise to customers is simple – 100% detection in the specified range, irrespective of luminescence profile or coating, and a guaranteed diamond recovery greater than 98%.

Advanced technologies add value at various stages of the process

TOMRA's XRT technology recognises and separates materials based on their specific atomic density. It uses a cutting-edge X-Ray camera with DUOLINE sensor technology to measure spectral absorption information. TOMRA's proprietary high-speed X-Ray processing unit uses the data to produce a detailed 'density image' of the material.

The result is a high level of purity in sorting materials, irrespective of size, the degree of moisture or surface pollution present. TOMRA's XRT high-capacity sorters are incredibly effective in the recovery of free, liberated diamonds at high feed rates up to 300 tph.

TOMRA's NIR sorters recognise and separate kimberlite and waste rock based on their chemical composition. This technology is useful in upgrading lower grade ROM and stockpiles, producing a Kimberlite concentrate for further processing.

Marie-Claude Hallé had first-hand experience of how TOMRA's solutions can add value to diamond mining operations when she held the role as marketing operations manager for leading Canadian diamond exploration and producing company, "You have to really envision that TOMRA has actually

changed the game in terms of rough diamond recovered around the world and allowed producers to access large exceptional quality goods that perhaps in the past would be crushed to pieces."

Customised solutions for kimberlite, lamproite and alluvial applications

With its customised approach, TOMRA can deliver on its promise of guaranteed results both in hard rock kimberlite/lamproite, and alluvial deposits – each of which presents their specific challenges.

In kimberlite, the challenge is to recover 'needle in a haystack' diamonds, which requires controlled crushing of kimberlite ore to avoid damaging or breaking the diamonds. High waste dilution impacts the crushing energy needed and further increases diamond breakage risk. Utilising TOMRA NIR technologies the company is able to remove non-diamond bearing material, not only improving the crushing



profile of the ore, but also increasing the value of each ton of ore processed. TOMRA NIR waste sorting technology can make diluted marginal kimberlite deposits economic.

Additionally, complex, energy and water intensive kimberlite liberation processes, and the cost of transportation for crushing and processing are challenges facing modern diamond miners today. TOMRA's XRT and NIR technologies, which offer extremely high concentration factors, allow the production of hand sortable, ultra-high grade concentrates in as little as two stages compared to up to seven in traditional methods.

The challenge of economically mining low-grade alluvial deposits is due to their typically lower grade and the sporadic nature of the deposits. The high recovery performance of TOMRA's XRT technology enables single-stage or double-stage diamond recovery, offering a drastically lower operating cost and capital investment so that mining marginal deposits becomes economically viable.



Another advantage of TOMRA's XRT solution is that it can operate as a dry process, which dramatically reduces its environmental impact and operational complexity. Besides, it opens the door to new opportunities, making it possible to mine deposits in arid areas where water access is minimal.

TOMRA XRT machines have proved effective in alluvial operations. One such case is that of the Lulo mine in Angola operated by Lucapa Diamond Corporation, where TOMRA XRT technology is used to process material between 18 and 55 mm in size and allows the recovery of diamonds up to

SUSTAINABLE SOLUTIONS FOR PROFITABLE MINING

TOMRA's sensor-based ore sorting solutions deliver proven improvements in recovery and profitability in a wide variety of mining operations, including tin, gold, lithium, diamonds, coal, quartz, chromite, tungsten and phosphate. They maximize efficiency, precision and speed, capturing even the smallest particle sizes with technologies that include Color, Near-Infrared (NIR), X-Ray Transmission (XRT), Electromagnetic and Laser sensors. Energy-efficient, cost-effective, green mining.



1 100 carats – and where it has recovered Angola’s second biggest diamond on record in 2017, a 227-carat stone.

“The recovery of the 227-carat diamond using the new XRT circuit justifies our investment in TOMRA’s large diamond recovery technology, which has more than paid for itself with the recovery of this one stone alone,” comments Stephen Wetherall, Lucapa Diamonds MD at the time of the recovery.

Optimised flow sheet redefined

TOMRA is in the unique position of being able to offer diamond operations a full XRT recovery flow sheet to 2 mm that delivers concentration factors up to 1 million with a much-reduced number of concentration stages.

“TOMRA XRT technology replaces multiple stages of diamond concentration by virtue of its ability to concentrate diamonds to a hand sortable product after only a single step,” explains Geoffrey Madderson, diamond segment manager for TOMRA Sorting Mining. “This concentration factor allows for the removal of multiple recovery steps, drastically reducing both the capital investment and operational costs to recover diamonds.”

TOMRA’s XRT technology can replace traditional methods such as Dense Media Separation (DMS), wet magnetic separation and XRL final recovery with single-stage solutions for +8 mm and double-pass for -8mm +4mm particles. This solution eliminates up to seven

“ We felt, certainly, that the technology that TOMRA offered was the best, ”

EIRA THOMAS



“ TOMRA’s ability to deliver not only a technology that can detect such large diamonds but also an economical process solution for the recovery of ultra-rare, exceptional diamonds, is what sets us apart, ”

GEOFFREY MADDERSON



concentration stages, dramatically reducing the complexity of the supporting plant and infrastructure. This results in significantly lower power and water consumption, which not only reduces costs, but also the environmental impact of the recovery process.

An additional benefit of TOMRA’s solution is that it is a fully automated process, so that there is no manual handling during pre-concentration and recovery, which has positive implications on security and eliminates human error resulting in greater accuracy.

High recovery rate

TOMRA’s sorters not only stand out for their high capacity, they process these large volumes with great efficiency, finding more diamonds than other, traditional separation methods – including coated and low- or non-luminescent diamonds.

The performance of its XRT sorters is independent of the ‘heavies’ content in the feed, and is ideal for processing high-yielding ores unsuitable for DMS.

The result is an exceptionally high recovery rate: “TOMRA guarantees →98% recovery: that is how confident we are in our technology,” states Madderson.

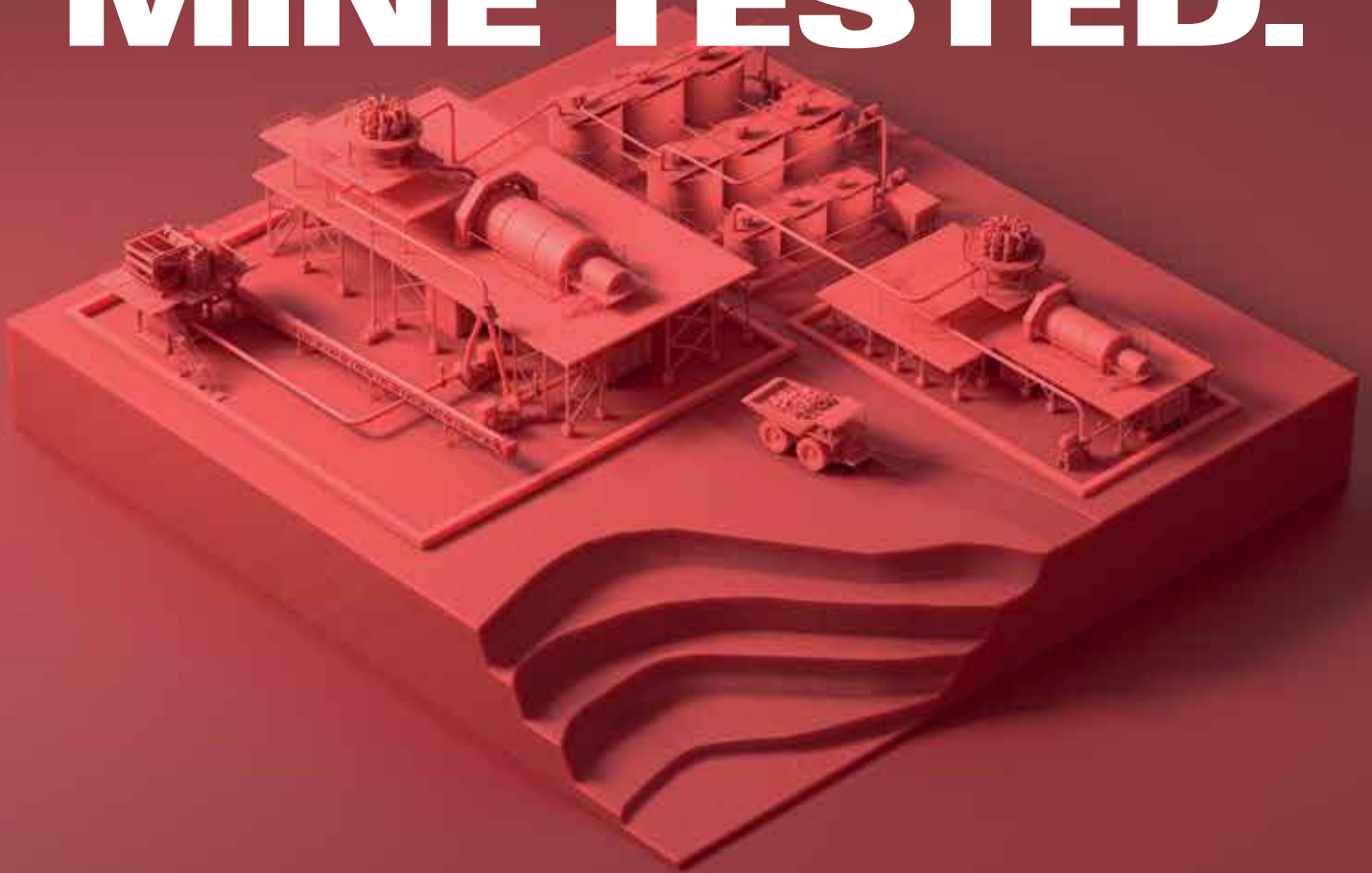
Large diamond recovery

With TOMRA’s sorting solutions, diamond producers can install large diamond recovery systems with a small capital investment and operate with a fraction of operating expenditures per tonne compared to traditional recovery methods such as DMS and XRL. In addition, the economic recovery of ultra-low-frequency exceptional diamonds of +32 mm is now possible.

TOMRA’s XRT technology has exceeded all expectations at Lucara Diamond Corporation’s Karowe mine in Botswana with a string of record-breaking diamond recoveries. TOMRA’s large diamond recovery circuit was installed in 2015 and Eira Thomas, Lucara Diamond CEO is fully satisfied: “We felt, certainly, that the technology that TOMRA offered was the best. But, more importantly, I think it was really around the approach, the attitude of collaboration and willingness to actually work with Lucara as we undertook to solve this problem.”

“TOMRA’s ability to deliver not only a technology that can detect such large diamonds but also an economical process solution for the recovery of ultra-rare, exceptional diamonds, is what sets us apart from our competitors. This is the reason that to date, TOMRA XRT has become synonymous with the recovery of extraordinary diamonds from all around the world,” concludes Madderson. **MRA**

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Ukwazi's extension towards offering a complete project management and consulting engineering service was a natural progression alongside the company's established growth path

Engineering the entire project life cycle

Ukwazi launches project development and delivery offering

Mining specialist **Ukwazi** has expanded its portfolio of mining solutions to include multi-disciplinary engineering services for mine, plant and infrastructure, enabling the company to offer its clients a complete one-stop solution across the full project life cycle, **CHANTELLE KOTZE** writes.

According to Ukwazi's project development and delivery (PDD) leader, Albert Jacobs, the group, which was officially launched to market on 1 September 2020, will focus on providing expert advice at every project stage – from concept through to execution – drawing on cutting-edge systems, design methodologies and controls.

These approaches, in conjunction with a range of integrated software solutions, allow for the establishment and growth of a single source of truth for access by multiple project contributors. Consequently, knowledge developed during a project can be transferred to the operational team to a much greater extent.

Jacobs says that an increasing skills development challenges and escalating operating pressures have prompted the mining industry to seek out service providers that could provide hands-on guidance throughout the project life cycle, no matter the stage of the project.

Even though the PDD group was only officially launched recently, the core team has been working hard since the beginning of the year to develop efficient workflows and lean

project systems; allowing for close co-operation with clients.

The demand for this arose quite some time ago, says Jacobs, with clients seeking innovative engineering and project management services in addition to the more traditional mining services already offered by Ukwazi. This need intensified in the last few years, with clients seeking a more complete project delivery solution from a single service provider and many tenders/proposals including a larger portion of multi-disciplinary engineering services or requesting overall responsibility for project management and controls of diverse project participants.

Based on the industry's growing need, the extension towards offering a complete project management and consulting engineering service was therefore a natural progression alongside the company's established growth path, explains Jacobs.

Jacobs, who is an experienced professional engineer and project manager and the former owner of engineering consulting firm ATEC PMC, approached Ukwazi MD Jaco Lothringen after observing the increasing demand for broader engineering services by the mining industry, proposing the

establishment of a division within Ukwazi that could fulfil this need rather than continuing to provide a sub-consultant services to the company. This was agreed to and ATEC PMC's systems and resources were then used to seed the PDD division to establish this capability in-house for Ukwazi.

Through the PDD division, Ukwazi now has a skilled multi-disciplinary engineering team that has proven to effectively deliver a range of innovative design, procurement and construction management services for traditional or bespoke contracting models and implementation strategies. Selecting and applying appropriate approaches when designing for surface and underground mining or processing plants, in both Greenfields and Brownfields environments, ensures that client and project objectives are met taking into consideration budget and time constraints, whilst always ensuring the technical integrity of the solution.

"We design and engineer the preferred technical solution first, ensuring that it is executable, and then integrate tested project management systems and processes to guide implementation – all while keeping the bigger picture in mind," explains Jacobs. Best-practice specialist

tools, software and dashboards, including smart 3D design for advanced building information modelling (BIM), are then used to plan the work, manage project challenges, costs, quality and progress against baselines. Thus, helping to control project outcomes through the integrated coordination of all key disciplines. This unique approach will ensure that all project requirements and client objectives are regularly met or exceeded.

The ability to integrate the multi-disciplinary design concept with mining engineering earlier on in a project, allows Ukwazi to jointly develop a bespoke solution for a client that makes better technical and economic sense, ensuring that a well-rounded, more complete and seamless solution can be implemented.

Because the current environment requires instantaneous adaptability in response to changes in the project environment, external pressures or new insights gained during the course of a project, Ukwazi combines the best aspects of traditional or waterfall project management methodologies (Project Management Body of Knowledge or PMBoK) with aspects of current Agile project management thinking. This allows teams the flexibility to quickly identify and respond to opportunities for improving value, while adhering to client approved overall timelines and cost parameters.

As such, Ukwazi's PDD clients will have access to the full range of technical and management capabilities within the PDD division, including project management, project controls, engineering design and bespoke solution services.

This includes capabilities ranging from reality capturing and conversion into intelligent 3D models, expert analysis through design software used for optimising engineering, developing risk mitigation strategies during design and cloud-based information management with integration into third-party solutions. In addition, data-driven decision-making is prioritised throughout all project phases by making shared information visible, via practices such as earned value management cost and schedule performance dashboard reporting and forecasting.

In addition to its existing service offering to the resource sector, the company now also provides a complete PDD offering and has the technical expertise and track-record to partner with clients from design through to execution, operation and closure, ensuring success across the entire mining value chain through a single integrated team, says Jacobs. All projects can now be managed transparently (even remotely), leveraging advanced tools and ensuring the efficient measurement and reporting of changes in scope, cost, schedule and progress for better ongoing decision making and control.

Ukwazi now offers a complete PDD offering and has the technical expertise and track record to partner with clients from design through to execution, operation and closure,

ALBERT JACOBS

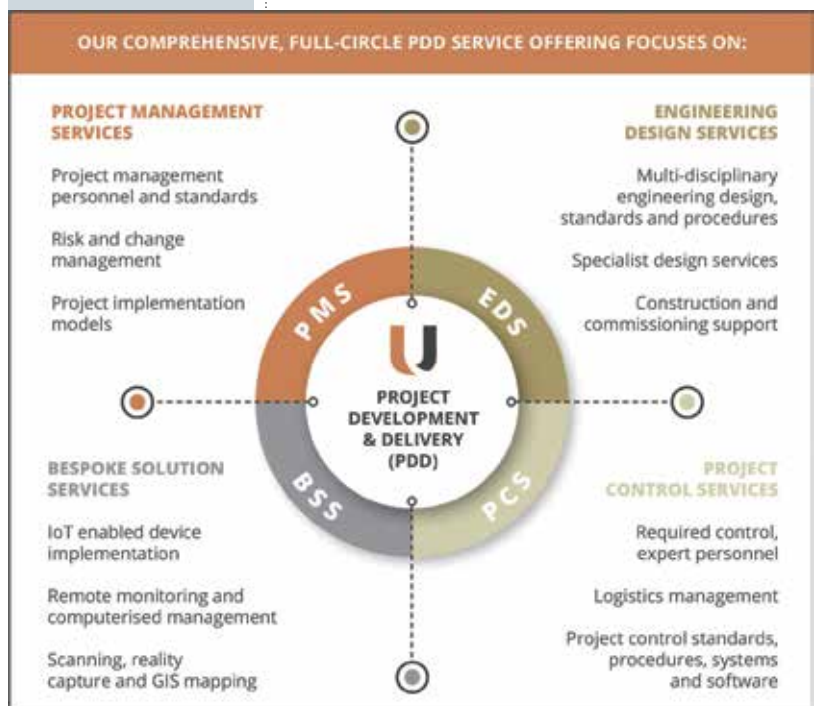


As the mining industry continues to grapple with the skills shortage, both now and as technology continues to change the way we work, Ukwazi believes that the PDD division can assist with skills development through partnering with both the client teams and the communities in which they operate. Ukwazi is actively investigating potential opportunities to partner with local companies and help them establish themselves so that they can continue to support the operation on an ongoing basis once the construction and commissioning is completed.

Having successfully launched its PDD offering Ukwazi will focus on enhancing its project management and control standing within the mining industry over the next 12 months. It will do so by successfully completing the large projects that it is embarking on and demonstrate its capability.

The company will also focus on growing its network of skilled people to expand its specialist offering to more commodities and expand its footprint managing multiple large projects, as well as further its local partnerships to improve capacity building interventions in various locations.

In light of the COVID-19 pandemic and the resource sector's response to this new operating environment, Ukwazi has already adopted fully cloud-based information management and project control systems to allow remote working and the sharing of information in this new environment where physical travel and interaction may still be restricted for the foreseeable future, Jacobs highlights. **MRA**



↑ Ukwazi's multi-disciplinary engineering team has proven that it can effectively deliver a range of innovative design, procurement and construction management services across the entire mining value chain



Business continuity

The driving force for VBKOM

Way before the outbreak of the COVID-19 pandemic, mining consulting firm **VBKOM** was already looking at ways to improve its service offering. As a result, the company has adopted a number of new technologies, as well as restructured itself into more focused, discreet business units. **GERARD PETER** finds out more from director **EDUAN PIETERSE**.

As part of ensuring that it can service its clients efficiently the company has placed a strong emphasis on business continuity using the latest technology. "We have always been very adamant with our consultants that all data is backed up. Prior to COVID-19, we switched over to a cloud-based solution which allows for greater collaboration within the team. This has helped tremendously during the pandemic as we would have struggled if we were using the traditional way of accessing

a server while working remotely," Pieterse adds.

The company is also ensuring business continuity for its clients. A case in point is when VBKOM developed a COVID-19 business continuity programme (BCP) for a tier one company's exploration division. Developed in partnership with the client, the BCP outlines procedures to prevent damage, maintain productivity and ensure that personnel and assets are protected whilst allowing for the continuation of operations. It focused on three core areas, namely risk

management, incidence response and recovery.

The risk management plan is centred on preventing COVID-19 infection and addresses travel, screening and de-densification arrangements. The incident response plan focuses on preventing further infection and transmissions and includes quarantine/isolation measures as well as scenario planning for essential and non-essential personnel. Finally, the recovery plan describes actions and timelines to achieve operational readiness after shutdown.



One size doesn't fit all

From a technical perspective, the challenges that mining companies face are similar. However, Pieterse explains that you cannot take the cookie cutter approach. Each project and client is unique and their governance requirements are different. "We work with a range of clients, from junior mining companies right up to blue chip listed companies who put a strong focus on governance. From our side, we try to streamline our processes to make it cost-effective and ensure that we can deliver as fast as possible."

"Certain mines and ore bodies can be very tricky and you can't approach these projects in the traditional way. You need to spend time navigating the various complexities with the client and guide them," he adds.

It is for this reason that Pieterse avers that technology is playing an ever increasing role in mining operations. "We have been fortunate enough to land a string of projects in the automation space, specifically autonomous mining and hauling. All our clients are faced with a number of challenges such as input costs continuously rising and needing more predictability in their operations, so automation is the way to go."

He further adds that COVID-19 has highlighted that technology can actually ride out some of



We are not doing ourselves a favour by being difficult labourers,

EDUAN PIETERSE



the storms that affect human beings. "You still need people to manage the technology but we are definitely on a track towards automation."

Strengthening the case for automation

Pieterse concurs that the African mining sector does have challenges when it comes to implementing technology such as automation but he believes that it is easier to implement technology than to start a mining operation in the traditional way. "Previously, you had to create an entire town, building houses and putting in infrastructure so that the workers can operate the mine. Now, while you cannot completely eliminate the human element when it comes to mining, you can significantly reduce the human capital component by implementing technology.

"What's more, if you look at labour costs and labour uncertainty as a result of strikes, this has hampered the mining sector in the past. We are not doing ourselves a favour by being difficult labourers and this has strengthened the case for automation."

Already, the company is dealing with an expansion of a mine in the Northern Cape where the new expansion will be fully automated. This was a strict prerequisite where the client stated that the project can only go ahead if it is autonomous and it was approved on that basis.

"Also, mining fleets have to be replaced so if you want to replace a haul truck that costs millions of rands and use the same infrastructure for the next five years, then you need to give careful consideration if you want that truck to be manned, automated or a combination of the two," Pieterse adds.

"We believe that more companies will start looking at a hybrid solution starting with a small autonomous fleet and then slowly progressing towards having a larger automated fleet. We see it happening already and the success of the early adopters of technology will see the rest catching up," he concludes. **MRA**

CREATING OPPORTUNITIES

In September, VBKOM was granted BBBEE level 1 certification. In addition, the company has embarked on several youth employment initiatives to address the rising number of youth unemployment in the country. VBKOM has embarked on a partnership with the YES programme (Youth Employment Services) that cultivates innovative thinking to upskill the youth for easier integration in the job market.

Bara Consulting has a healthy mix of both development and operational projects

Gearing up for growth

Mining consultancy set for successful 2021

Despite the effects of the COVID-19 on the mining industry's bottom line due to temporary mine closures, supply chain disruptions and reduced workforces, mining engineering consultancy **Bara Consulting** has weathered the pandemic storm to come out stronger, more resilient and ready to adapt to the changing needs and realities of the mining sector in the new normal. **CHANTELLE KOTZE** writes.

While any prediction on the future for the global mining industry remains a guess, as the impact of the pandemic cannot yet fully be measured, "one thing is for certain – the post-COVID-19 world will look a little different to what we have become accustomed to," says MD and founding partner Jim Pooley.

Despite initial disruptions within the African mining industry and the resulting uncertainty around the impact or duration of the pandemic causing mining companies to shelve exploration and expansion plans, the industry has bounced back relatively quickly in the past few months as infection rates are brought under control and restrictions are gradually lifted.

In its eight years of business, Bara Consulting has consistently grown the company year-on-year. Despite experiencing a setback in its growth during 2018, the company resumed its upward growth trajectory in 2019 and 2020.

"Despite experiencing a contraction in March, Bara Consulting resumed normal operations in April as several of its desktop-based projects were able to continue unabated," notes Pooley. Defying the pandemic situation, Bara was awarded new work in mid-April – a trend that has continued since. On the back of this, the company is in a very strong position and is confident of its growth in 2021 having begun the current financial year with a stronger than usual order book, as shelved projects are restarted and as new work continues to be awarded.

According to Bara Consulting principal mining engineer Clive Brown, the company's healthy mix of both project development and operational projects, allowed it to mitigate some of the risk it would likely have faced had it only been working on operational projects, whose main focus was to conserve cash in the face of the pandemic, while the more risk-averse project development companies were able to maintain their development momentum.

With the gradual lifting of lockdown restrictions, Bara Consulting has restarted work at one of its two major operation projects in South Africa.

"If we are able to maintain our current trajectory within the African mining sector, we foresee a busy next 12 months," says Pooley, who is cautiously optimistic about the medium term, based on its order book.

Brown echoes these sentiments noting that decreased global mineral stocks could potentially see a period of high demand to rebuild these stocks as quickly as possible.

Moreover, during the COVID-19 pandemic, Bara Consulting was appointed to conduct several due diligence and review studies for companies looking to transact or invest in projects in Africa. "This may be the first green shoots evidence that the mining industry is recovering," says Pooley, noting that this is just one more reason to be cautiously optimistic about the company's future growth. **MRA**

Image: 123rf.com



CERTAINTY - A NON- NEGOTIABLE IN THE AFRICAN MINING SECTOR

The East African country of Tanzania had for many years won the favour of mining

companies and investors alike with supportive legislation aimed at driving the development of the country's mining sector, which boasts critical new-age metals such as graphite, minerals sands, rare earths as well as gold, coal and bauxite. The country faced a rapid decline in its investor attractiveness in 2017 when the government of Tanzania passed a number of sweeping changes to the Mining Act of 2010, which made the operating environment for mining companies more restrictive, denting investor sentiment in the country.

According to Brown, who has worked in Tanzania for many years, under both the previous and current regulatory systems, says the unpredictability in the operating environment in Tanzania has had far-reaching consequences for mining companies active in the country. While the changes have a stronger impact on the more marginal developments in the country, some of the more economically robust developments have managed to progressed despite the onerous changes to the country's legislation.

One such robust project has been ASX-listed energy metals producer Walkabout Resources' Lindi Jumbo graphite project. Bara Consulting has worked on the project since 2016, when it was first appointed to the role of lead engineer, responsible for completing a scoping level mine development plan for the project, based on its successful maiden mineral resource estimate.

In 2017, Bara was appointed lead consultant to upgrade the mine development plan to feasibility study level. The company was subsequently requested to remain a part of the project in a project management role as the Lindi Jumbo moved towards the early-start programme. Bara concluded its work with Walkabout Resources in July this year.

What remains a concern to Bara Consulting is the four key regulatory changes enacted in February 2019, all relating to the country's local content regulations, preventing non-Tanzanian service providers from doing business in the country.



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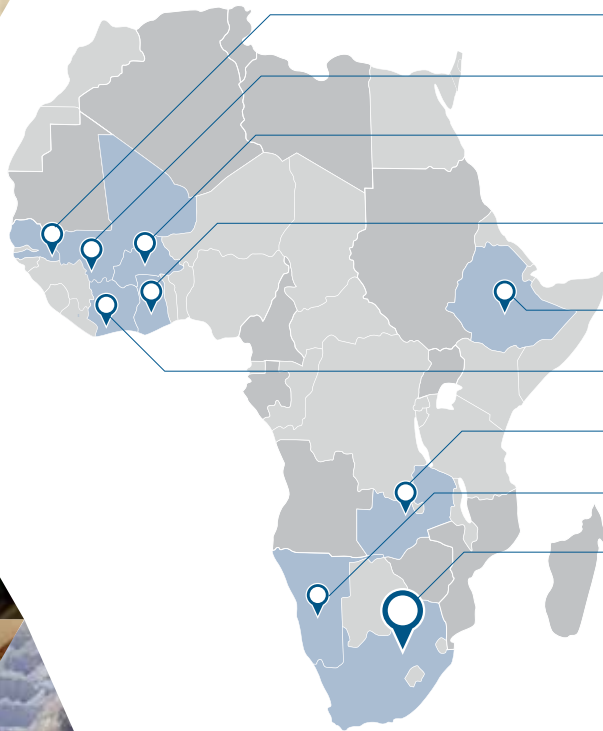
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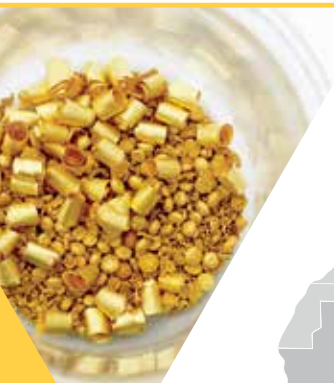
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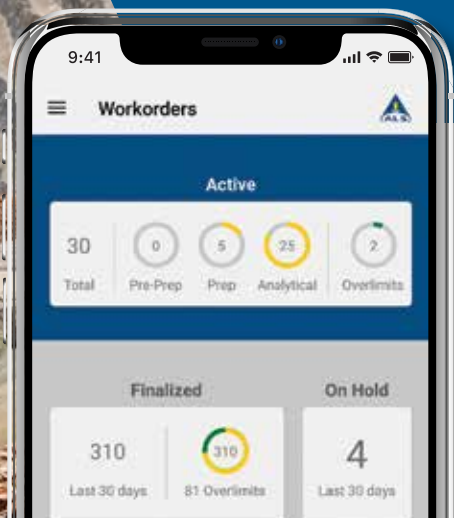
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