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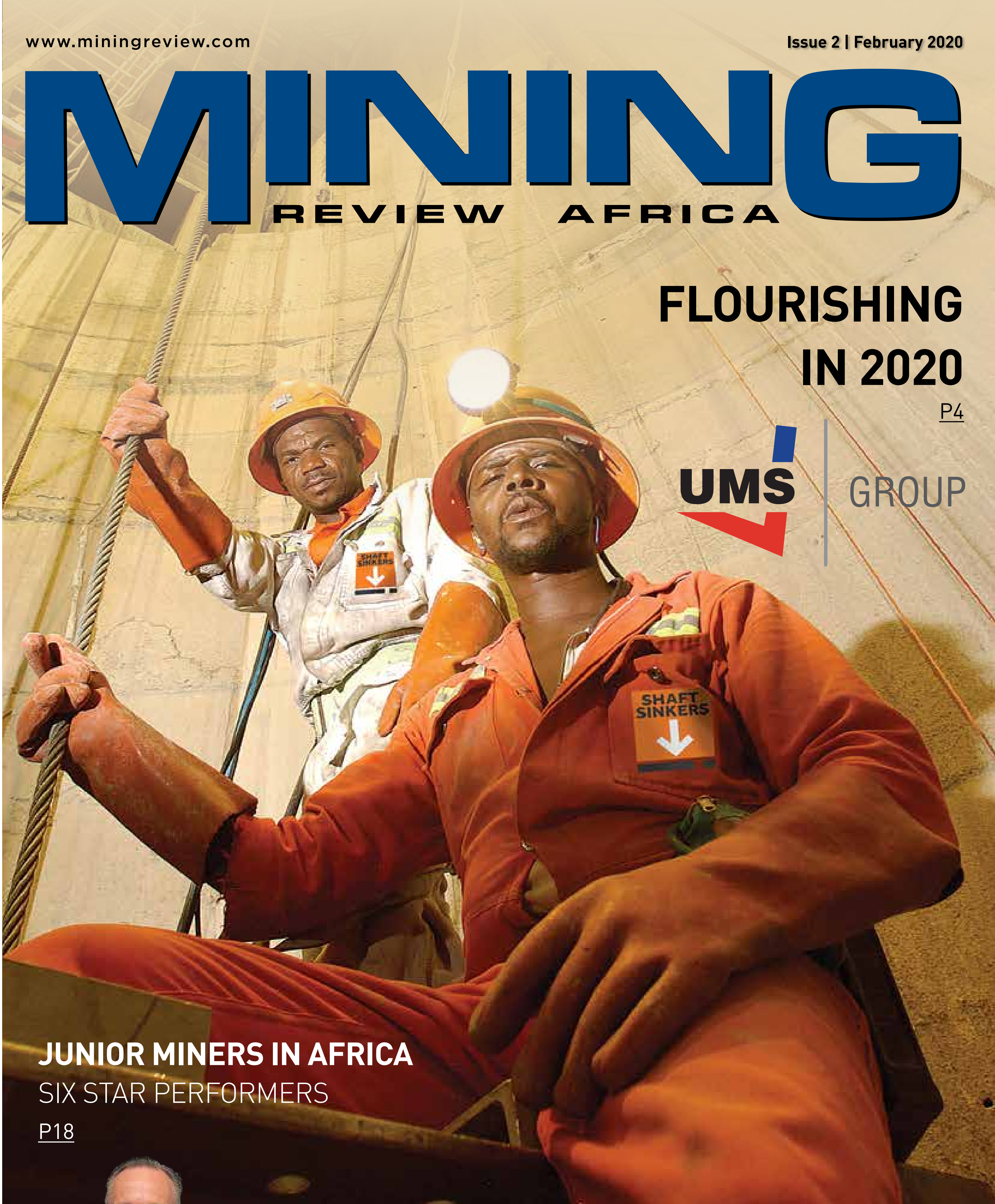

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FRONT COVER

2020 Looks set to be United Mining Services Group's strongest year since its establishment in 2015. This is thanks to the tireless efforts of the company's wholly owned businesses – Shaft Sinkers, METS Mining and METS Process.

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EDITOR'S COMMENT

IN THE SPOTLIGHT

INDUSTRY INNOVATOR

IN-COUNTRY FOCUS

JUNIOR MINERS IN AFRICA

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CLARION EVENTS

Dedicated
To the juniors

With a new decade comes a new approach to doing things and the February edition of *Mining Review Africa* represents this very concept.

In light of our distribution at PDAC in Toronto, Canada, my team has dedicated this entire issue to the junior mining sector. We take a look at a few miners that fall within this category and how they are upholding the name and reputation of everything a junior stands for.

Beyond this we have delved into all the major influences affecting how a junior operates and potentially develops and/or explores their piece of ground. Having explored (excuse the pun) the most prominent elements that such companies must consider, I've realised the following:

> Despite the added pressure of being a junior, they can still be found in abundance across Africa,

The life of a junior miner today is vastly different from that of one just five or 10 years ago. The greatest challenge back then was determining if the asset you had found/acquired was economically feasible, particularly if your spot was in a very remote location. Commodity prices of course always count – today and back then.

These undoubtedly remain priority agenda items, but that is only the beginning. Juniors must now battle it out to secure finance in a market which no longer considers mining a definite return on investment. Beyond this, a junior must secure a social licence to operate – perhaps always something to consider but this has now become important enough to halt a project in its track.

In a nutshell, a social licence to operate means uplifting local economies through employment and training to ensure long-term livelihoods. It also more recently means considering the environment, not just in the way you mine your pit but also in the process you opt for to reduce water consumption, CO_2 footprints, etc. Of course, you must also win favour with the government, most of which (in Africa) are becoming more informed about how they want their resources to be developed for the benefit of their own countries. Combine all these factors [repetition] and you realise just how tough juniors have it.

But… fear not – despite the added pressure of being a junior, they can still be found in abundance across Africa, determined to build that new mine successfully and in a fully compliant manner. Let's also not forget that they do represent the future of mining so I'm happy to acknowledge their hard work and efforts in sustaining the industry in the long-term. May you all prosper in a year that holds potential promise.

Looking forward to seeing many of you in snowy Canada in March. MRA

↑ Editor Laura Cornish

Shaft Sinkers and METS

UMS Group's businesses to flourish in 2020

2020 looks set to be United Mining Services Group's (**UMS Group's**) strongest year since its establishment in 2015. This is thanks to the tireless efforts of the company's wholly owned businesses – **Shaft Sinkers, METS Mining** and **METS Process**. The Group has secured baseload project work that will sustainably take it through the next two to three years, UMS Group CEO **DIGBY GLOVER** tells **LAURA CORNISH**.

Under the leadership and guidance of Glover, supported by UMS Group COO Murray Macnab, the company's current work profile has grown considerably. "2019 was a tight year for the business but we will be rewarded in 2020 for the hard work and efforts we injected into the business over this time," Glover starts.

The CEO joined UMS Group early in 2019 to implement and execute a strategy to consolidate the business and position it to grow on the back of significant expertise and experience which the Shaft Sinkers and METS companies have to offer.

"We have since then further supplemented the business with additional skills in shaft sinking, project management, risk management as well as multi-disciplinary design and engineering. We have also, through strengthening our internal systems, better positioned ourselves to focus on securing new work – which we've been particularly successful in achieving in

the shaft sinking and refurbishment areas," Glover notes.

"This, however, is just the start of what is a multi-year strategy to see this business flourish. It is important that we continue to focus on the Groups' key strengths, while exploring opportunities to grow our offerings in allied markets. We also still have some work to do to improve the company's financial strength as well as to fully align with localisation requirements in the markets in which we operate."

This focus and approach as mentioned has already delivered success for the company and is indicative that the plans put in place are working. "We have had strong support from our international shareholders over the past 12 months which is testimony to the optimism and confidence they have in seeing us prosper," Glover states.

Positioned to deliver excellence across the value chain

The Group prides itself on its ingenuity in solving mining and mineral processing challenges.

Through the extensive skill sets and intellectual property housed within METS and Shaft Sinkers, the company offers an experienced, one-stop-shop of mining and minerals processing services from a firm that has the capabilities to build new mines and processing plants, from concept through to commissioning and operation, under one roof.

The companies' full service offering includes:

- Concept to feasibility studies (METS Mining and METS Process)
- Engineering and project management (METS Mining and METS Process)
- Capital infrastructure projects for new and existing mine projects (Shaft Sinkers)
- Shaft sinking
- Inspections, including shaft auditing, optimisation studies, refurbishment and rehabilitation, optimisation design and execution (METS Mining and Shaft Sinkers)
- Contract mining (Shaft Sinkers)
- New mine designs and developments, including shaft sinking systems, material handling and hoisting systems, structural and civil engineering (METS Mining) ▶

"2019 was tough for the business but we will be rewarded in 2020 for the hard work and efforts we injected into the business over the last year,"

DIGBY GLOVER

EXPANDING SKILLS IN 2020

UMS Group has employed people with various additional skills into the business, all well recognised in the industry for their expertise.

Pieter Louw	PhD; MSc (Eng)	Group Executive: Project Services	Over 35 years mining industry experience
Andrew Green	BSc (Mech Eng); Pr Eng	Principle Mechanical Engineer	Over 18 years of experience in the mining and minerals processing sector
Sean Lavery	MSc (Construction Project Management)	Manager: Project Controls	Over 13 years industry experience
Chris du Toit	National Diploma, Safety and Management Registered Pr. CHSA	Group Manager: Risk	Over 25 years industry experience

- Minerals processing and infrastructure design and execution packages (METS Process)
- Consulting services, including third party reviews and owner engineering team assistance (METS Mining)

2020 a year of execution

Both Shaft Sinkers and METS have moved into 2020 with the commitment to deliver on the work secured in 2019 – effectively and with efficiency.

"The work we have in hand is sufficient for at least the next 24 months to grow the business, which includes sinking a new utility shaft in New Mexico in the United States," says Glover.

Sinking will be undertaken in a joint venture with a local business and will commence in June this year. Once completed in 2022, the final shaft will measure 8 m in diameter and extend to 693 m below the surface. This is a good demonstration of the company's expanding international footprint, both in Africa and further afield.

Closer to home, METS Mining has secured the design work for a new large project in Botswana. Work has already started in a neighbouring country, and will continue for most of the year. The intention is to progress into procurement and construction in the next few months.

In South Africa METS Mining is further performing two shaft refurbishment jobs in the Northern Cape and Mpumalanga. The last few years have seen many older mines suffer financial strain as a result of weak commodity prices, and increased running and labour costs – combined with declining ore grades.

The ongoing challenge from UMS Group's perspective is not to neglect investing in and further optimising its technologies and business practices, as these give the company an edge whilst growing its order book. Safety and optimising production performance in particular are key priorities.

METS Process is equally busy and is currently conducting two detailed engineering scopes of work for two southern African gold process plants – both of which are expected to move into execution phase this year.

"We have positioned ourselves as a highly skilled business with expertise ranging across the entire value chain. Our purpose is to serve the needs of the mining industry – from concept to closure. We believe this positions us as a niche service provider," Glover concludes. MRA

Footnote: All images show different shaft sinking projects that Shaft Sinkers and METS companies have executed


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Gold price drivers

All roads lead to West Africa

By Dean Cunningham, Director at Micofin

The price of gold is influenced by a combination[1] of supply, demand and investor sentiment. That seems simple enough, yet the ways in which these factors work together is sometimes counterintuitive.

Correlation with inflation

Two economists, Claude B. Erb, of the National Bureau of Economic Research, and Campbell Harvey, a professor at Duke University's Fuqua School of Business, have studied the price of gold in relation to inflation. They conclude that when inflation rises, gold is not necessarily significantly impacted. So, if inflation is not the driver, fear of inflation must be, combined with the associated impacts on currencies and economic activity.

Supply

Unlike oil or coffee, the gold consumed today is largely above ground. Though there are some industrial uses for gold, this hasn't increased demand as much as jewellery or investment.

Central banks

In times when foreign exchange reserves are large and the economy is growing, a central bank will look to reduce its gold holdings; unlike bonds or even money markets, gold generates limited return. One exception is China which has been a net buyer of gold for some time, likely due to the extent that it is regarded as a source of diversification from the dollar.

Portfolio considerations

Gold has been seen as an insurance policy over short time horizons. This often does well but its inclusion should be viewed alongside risk, return and correlation features of the wider portfolio to achieve optimal diversification.

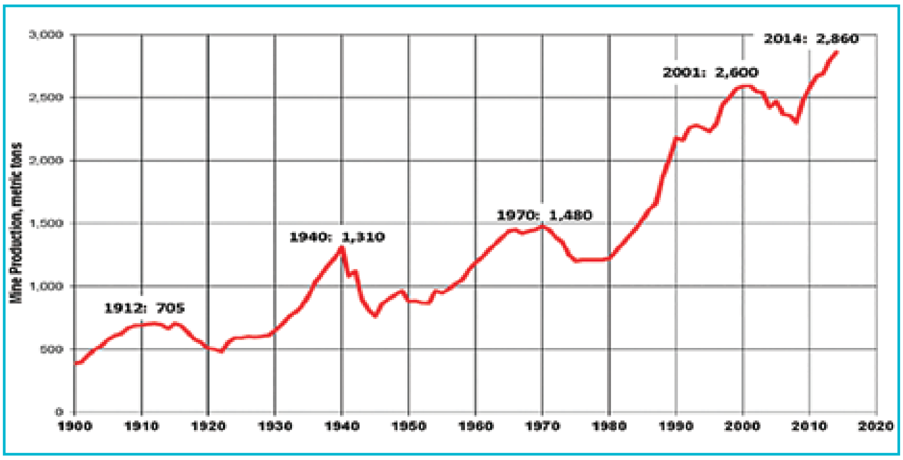


Figure 1: Historical gold production

Retaining value

Many authors, like Erb and Harvey, have concluded that the purchasing power of gold has stayed fairly constant and largely unrelated to market prices. We see it as tangible, movable and acceptable around the world as a currency. Many investors in gold are looking for diversification away from the dollar and are prepared to fund gold mines upfront and get paid in gold.

Global economic conditions

If you're looking at gold prices, it's probably a good idea to look at how well the economies of certain countries (particularly China, the UK and US) are doing. As economic conditions worsen, the price will (usually) rise.

- Technically[2] – The gold price has been showing bullish signals and has recently broken out, with some commentators looking as high as US$2 000/oz and even $5 000/oz.
- Trade Wars – Key players with divergent views, opinions and ideologies have been disrupting years of global trade. What looks like a move away from


Image: 123rf.com

integrated global trade and towards increasingly segmented markets could be a key contributor to a rising gold price.

The US-China trade war has been blamed for a lack of growth. Manufacturing has been hit hard, with orders dropping and prices rising on the back of increasing tariffs imposed by the two countries. Talks have stalled repeatedly and the IMF believes this has already cost the global economy billions. A move by investors to safe-haven assets like gold is possible.

Gold forecast for 2020

After an impressive nine months, gold has already increased from $1 270/oz in July 2019 to $1 574/oz in January 2020. At this stage, short-term volatility in the gold price seems to be driven by geopolitical and economic circumstances, but this can change significantly and rapidly.

We expect long-term, strong demand. With the World Gold Council reporting that demand in mid-2019 was up 8% year-on-year we expect 2020 to be an interesting year for the metal.

Many of the drivers behind gold's recent rally are still ongoing. Most have no resolution in sight and the unpredictable way in which they end will likely have a significant impact on the gold price outlook.

In the words of:

- Commerzbank: "We see the ongoing steep rise in the gold price as an expression of high-risk aversion among market participants. Gold is quite clearly still in demand as a safe haven in the current market environment."
- Neils Christensen for Kitco News: "We are entering another leg of the bull market where there is greater investor acceptance of stocks as attractive assets but at the same time, they acknowledge the higher risks," ...I think it is natural that at this point in the bull market, investors become interested in gold."
- Holmes and US Global Investors see gold at $5 000/oz and $10 000/oz, respectively. Based unprecedented money printing will continue, with ultra-loose monetary policy undertaken by central banks to flood the economy with money.
- In the short- to medium-term, gold remains a key component for diversification within any portfolio; buy on any pull-back and continue to monitor market risk and sentiment. ▶

Where to go

The focus is West Africa, now producing over 330 tpa of gold (Figure 3). With some 220 exploration or near-term producers and operators, investors have an ideal environment in which to invest.

There has been a significant increase in investment in existing and new gold mines of late. So says Barry Beylefeld from Azmet Technology and Projects, a multi-disciplined engineering design and project management company with a strong eye on gold in Africa. "We have seen a significant rise in demand for technical skills and services to improve existing operations by considering new technologies, optimising certain unit operations, and recommissioning mothballed companies based on the current higher gold prices in the region," he says.

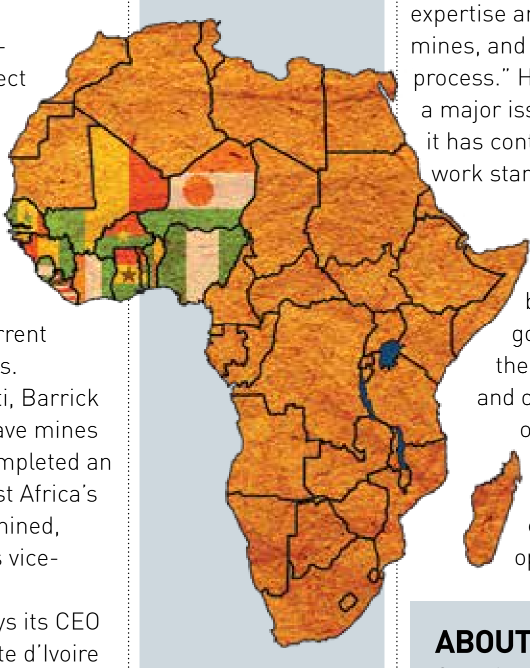
Key players include AngloGold Ashanti, Barrick Gold and Newmont Goldcorp, who all have mines in the region; and Newmont recently completed an expansion project in Ghana. Most of West Africa's gold deposits have yet to be found and mined, according to Oumar Toguyeni, IAMgold's vice-president for the region.

Endeavor has an ambitious target, says its CEO Linda Rottenberg, whose focus is on Côte d'Ivoire and Burkina Faso, although the company's new Kamala project in Mali will also be key in getting it above the 900 000 ozpa production level and Tabakoto is also an important mine. Further, which sheds some positive light on African gold plays in general, royalties in Endeavor's targets are on a par with or above those in Canada and Australia without the infrastructure benefits seen in more developed jurisdictions. However, attacks in Burkina Faso and the deaths at one of Hummingbird Resources' sites in Mali show parts of the region still have a way to go.

West Africa (2018)	
Country	Tonnes
Ghana	131
Mali	61
Burkina Faso	59
Côte d'Ivoire	41
Guinea	27
Senegal	18
Total	337

Figure 2: Key players having an impact on the gold price outlook

Figure 3: West African gold production 2018



"In the short to medium term, gold remains a key component for diversification for any portfolio,"

DEAN CUNNINGHAM

Exploration and recommissioning are becoming key plays in West Africa with several smaller companies now exploring for gold in West Africa, aiming to either develop their own mines or making that initial discovery, firming it up and then on selling to the mid-tier or major miners. Cora Gold CEO Jon Forster says: "It's one of the world's great gold provinces."

Barrick's CEO Mark Bristow said his company was not getting bang for its buck in Côte d'Ivoire. "Issues that should be addressed immediately are the increasingly serious problem of illegal gold mining, the granting of permits to companies that lack exploration capacity and expertise and a history of delivering world class mines, and the acceleration of the permitting process." He also raised energy infrastructure as a major issue in the country. Barrick Gold says it has contributed $1 billion to the country since work started on Tongon.

Certainly, from data available there is a significant gold play in West Africa, some of the small print still needs to be played out, but overall, investors and gold mining houses alike cannot wait in the wings and need to acquire now, explore and operate in the region. Big players in my opinion are the short-term plays with structures, influence and networks to deal with some of the negativity currently underplay in the region. The opportunities are abundant. MRA

ABOUT THE AUTHOR

Over the past years Dean Cunningham has been the orchestrator of a number of local and international transactions in the mining, downstream and energy and utilities sectors – coupled with Micofin and its strategic partners' (Wood, Practara, NEXUS Intertrade and Africa House) objectives to take skills, technology and capital to Africa, with a firm understanding of doing the work and creating jobs here at home. Project destinations include the Middle East (Phase 1 completed) and the production of dololime and magnesium metal, supplying construction materials in Mozambique, the formation of a logistics company to move both own and third-party products and the treatment of waste material into high value saleable materials for the battery sector.

[1] Jesse Emspak: What Moves the Gold Prices? https://www.investopedia.com/articles/active-trading/031915/what-moves-gold-prices.asp

[2] https://www.bullionbypost.co.uk/info/gold-price-forecast-2020/

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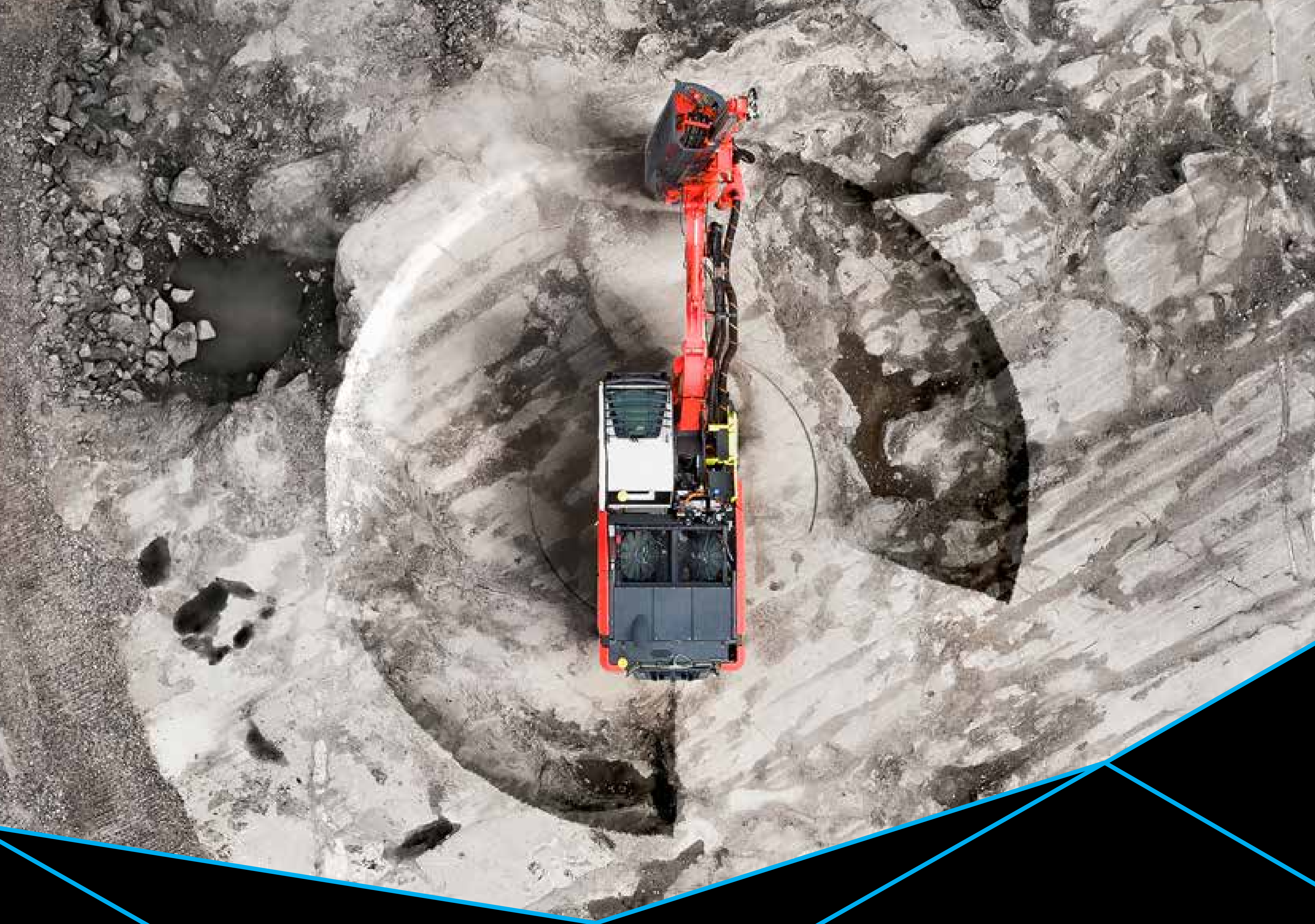


Diamond exploration

New technology holds promise to revive the sector

Established in early 2018, **Subterrane** has been pioneering geophysical interpretation to attain new levels of understanding of the Earth's structure, and transforming conventional understanding of plate tectonics to apply to the exploration of the planet's natural resources.

On site at Thorny River

The company's flagship product, Sigmoid Tectonics, has evolved from previous published work employing a variety of geophysical methods from satellite, airborne, marine and ground acquisition of gravity and magnetics.

Andrew Long, founder and director of Subterrane, says: "The principle key to applying Sigmoid Tectonics lies at the basis of the interpretation of geophysical anomalies. Comprehending what geophysical anomalies imply in a profoundly different way can help us unify other theories such as Einstein's treatment of gravity."

Subterrane introduced this concept at a presentation at the Geological Society of London in May 2018 in a discussion: 'Regional to basin scale influence of strike slip tectonism on the evolution of the western Caribbean Margin implications for petroleum play systems in Patuca and Mosquitia'.

This was part of a petroleum exploration project working on the Caribbean Margin in Central America.

Prospectivity

Subterrane started working with AIM/BSE-listed diamond junior Botswana Diamonds in early 2019 on its Thorny River project in the Limpopo Belt of South Africa. Over a period of some months all the previous exploration data that had been acquired was reviewed and reprocessed. This included an array of proprietary ground surveys employing magnetics, gravity and electromagnetic surveys, plus the regional and national surveys available from the Council of Geoscience in South Africa, as well as the important 'hard' data (core log).

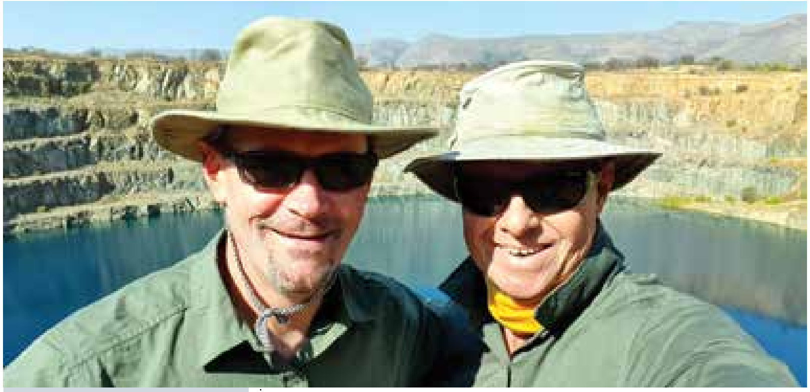
Subterrane already had a good idea of the structural evolution of the Kaapvaal craton through its proprietary application of Sigmoid tectonics. "We can understand the present day structure of the Earth's crust through different treatment to that conventionally understood by plate tectonics. By interpreting the longer wavelength structure through regional gravity, magnetics, elctromagnetics and seismic tomographic models it is possible to understand how the Earth's crust has been deformed over time, and how it will continue to deform in the future.

"The applications of understanding this are far reaching, including the construction and engineering industries, resource extraction, and hazard mitigation in relation to predicting earthquake activity," says Long. Subterrane has constructed an evolving global synthesised structural model of

the Earth's structure from the core to the upper crust. "The idea is to eventually develop software applications for real world practical use in a variety of industry sectors; however we will need to acquire more sophisticated geophysical measurements at the satellite level to fill in areas of sparse measurement coverage."

In July 2019 Subterrane signed a commercial agreement with Botswana Diamonds to find kimberlite pipes similar to the famous Marsfontein mine. There are a number of known fissures on the acreage, and attention had been focussed on these with ground geophysical acquisition and drilling.

In October a site visit by Subterrane was conducted to ground truth along fissure-strike targets, carrying out conventional geological field work and take structural measurements from the available exposure. "The initial prognosis looked good, with dolerite outcropping on strike with their associated indicative geophysical anomalies".



Andrew Long (left) with MD of Botswana Diamonds James Campbell on site at Thorny River

Subterrane in 2019 reviewed all the Thorny River exploration data

Following a review of the structural measurements, further understanding of the pipe system was gained. Subterrane conducted final ground work in January 2020 in order to constrain the target locations. "The pipes we are looking for have little surface expression, and the typical structure of these small kimberlite intrusions have a small areal extent (less than 40 m typical diameter of the indicated sub-crop), and are associated with the older, early Jurassic (180Ma) dolerite magmatism, which was precursory to the later kimberlitic emplacement.

"With Subterrane's understanding of the extensional tectonics around Africa's cratonic shields' since the early Jurassic breakup of Gondwana, we can reconstruct the kimberlite trail across the [Mokopane] region,"

ANDREW LONG

Traditional depth estimation via magnetic anomalies indicates the top of the targets will be intersected in a range between 20 m and 40–50 m depths in some localities. "With Subterrane's understanding of the extensional tectonics around Africa's cratonic shields since the early Jurassic breakup of Gondwana, we can reconstruct the kimberlite trail across the region," says Long.

The cratonic region represents what Subterrane describes as an extremely low entropy geological setting that has not undergone significant extension over geological time. An example of a high entropy setting would be a coastal setting where sedimentary processes are fast evolving given the influence of the Earth's tides, aeolian processes and extensional tectonics on the margins of active oceanic spreading ridges.

It appears there were at least three phases of Jurassic kimberlite emplacement, with the curious en echelon configuration of the Thorny River fissures indicating different paths of fissure emplacement, and an evolution of the pipes over time. The field work revealed that one of these phases indicated a north-south emplacement trend.

By revisiting the airborne magnetics it is believed there is one very large pipe situated between the two main fissure strikes on the property. "We will look closely at the outcrop in more detail to further our understanding of the evolution of the kimberlite emplacement and make further detailed measurements of structure so we can target the drill bit more precisely over the geophysical anomalies of interest."

Subterrane is working with Botswana Diamonds on a direct fee basis and associated royalties based on any diamond production from successful targets. "This is a common trend in today's mining industry as junior miners team up with larger players," says Long.

The company hopes its proprietary processes will find success on the project and will open the way to establishing a renaissance in natural diamond exploration in a timely manner, as the supply of natural diamonds to the market anticipates shortage in the near future. MRA

Tanzania's mining sector reform

The good, the bad and the ugly

In July 2017, the Tanzanian government passed a number of sweeping changes to the Mining Act of 2010 – the legal and regulatory framework that regulates the country's natural resources. Supporting regulations were also enacted in 2018 and later amended in 2019. The changes enacted to regulations by the government of President John Magufuli have made the operating environment for mining companies more restrictive, denting investor sentiment in the country, **CHANTELLE KOTZE** writes.

The bad

The three new laws that were enacted in 2017, which significantly increased government control over the mining sector in Tanzania, include:

- The Natural Wealth and Resources (Permanent Sovereignty) Act, 2017;
- The Natural Wealth and Resources (Review and Renegotiation of Unconscionable Terms) Act, 2017; and
- The Written Laws (Miscellaneous Amendments) Act, 2017.

These new laws provide the national assembly with sweeping powers to review and instruct renegotiation of previous arrangements or agreements concluded by the government.

They also stipulate new requirements for state participation in all mining companies, including at least a 16% free-carried interest, which may be increased up to 50% to match the value of historical tax benefits granted to mining companies. It also increases royalty rates – for gemstones and diamonds from 5% to 6%, for metallic minerals such as copper, gold, silver and platinum group minerals from 4% to 6%.

Moreover, the new laws have stripped foreign companies of the right to seek international arbitration in the event of a domestic legal dispute.

Furthermore, these regulatory changes (as well as further ones enacted in 2018 and then amended in 2019) have led to significant policy uncertainty in the country, which will hamper new investments and disrupt existing ones.

The ugly

According to Diego Oliva-Velez, commodities analyst at Fitch Solutions, the most evident example of regulatory uncertainty is the dispute that came to the fore in January 2020 between three mining companies and the government of Tanzania over repossessed retention licences issued prior to 2018. On 10 January 2018, the government published the Mining (Mineral Rights) Regulations, 2018 which under Regulation 21 cancelled all retention licences issued prior to that date, which would cease to have any legal effect.

As such, the retention licences granted to TSXV-listed battery metals exploration and development company Montero Mining (Wigu Hill rare earth element project), ASX-listed resources company Indiana Resources (Ntaka Hill nickel sulphide project) and TSXV-listed junior gold explorer Winshear Gold Corp. (SMP gold project) prior to 2018 have now been revoked by the Tanzanian government. In response, these companies have initiated international arbitration procedures, Oliva-Velez notes.

In the short-term, the Tanzanian general election is expected to increase the country's policy uncertainty over the coming months, likely stalling new investment decisions until after the vote takes place in October 2020. Fitch Solutions' Sub-Saharan Africa Country Risk team foresees risks of social unrest in the run up to the elections, especially if any further shift towards authoritarian behaviour takes place on behalf of the government, with opposition activists likely to draw more attention to the issue at such a time.

In the long-term, Oliva-Velez notes that the Tanzanian mining sector has significant potential as the country contains significant high-grade gold deposits that are yet to be exploited.

Furthermore, a sustained recovery in global gold prices over the next few years should provide companies with an incentive to expand their operations or to launch new mining projects in the country. Nevertheless, in order for this potential to be unlocked, Oliva-Velez advises that the country's investment environment be significantly improved.

The good

The most recent amendments to Tanzania's mining sector include four key regulatory changes enacted in February 2019, all relating to the country's Local Content Regulations. The Local Content Regulations follow the amendments of the Mining Act, 2010 through the Written Laws (Miscellaneous Amendments) Act, 2017, which introduced the local content requirements.

Local content regulations now require that at least 20% of a mining company operating in Tanzania must be owned by Tanzanian citizens, down from 51% previously (as stipulated by the Mining Local Content Regulations introduced in 2018).

> "The Tanzanian mining sector has significant potential as the country contains significant high-grade gold deposits that are yet to be exploited,"
>
> **DIEGO OLIVA-VELEZ**

Other requirements for an entity to qualify as an indigenous Tanzanian company remain the same (the company must be incorporated in Tanzania, and Tanzanian citizens must hold at least 80% of the company's executive and senior management positions and 100% of its non-managerial and other positions).

With regards to the provision of financial services, a contractor, subcontractor, licensee or other allied entity is still required to retain only the services of a Tanzanian financial institution or organisation.

Further alterations to the Local Content Regulations have reduced the stringent financial services requirements for mining companies operating in the country.

While the original Local Content Regulations stipulated that mining companies or other companies involved in the sector could only open a bank account with an "indigenous" Tanzanian bank: in other words, with a bank that was majority owned by Tanzanians. Under the amended regulations the word "indigenous" has been removed and stakeholders can now maintain bank accounts with Tanzanian banks that have a minimum of 20% Tanzanian shareholding.

Moreover, stakeholders in the Tanzanian mining industry must submit local content plans to the Mining Commission, which decides or approves the plans as per the recommendations of the Local Content Committee.

The amended regulations have extended the timeframes (to 60 days, compared with 25 previously) by which the Mining Commission and Local Content Committee acknowledge receipt of, review and communicate decisions on local content plans.

In summary

On the whole, the changes enacted over 2019 have been positive as they have made the country's local content requirements less stringent, thus making it easier for foreign mining investors to operate in the country.

Despite the recent positive alterations to local content requirements, changes enacted to regulations in recent years have made the operating environment in the mining industry more restrictive with investor confidence in the country's mining sector expected to remain bleak for the time being. MRA

Orion Minerals' Prieska copper-zinc project

Rediscovered. Reimagined. Redeveloped

IN SHORT
Having acquired Prieska in 2015, Orion Minerals, a junior miner with major ambitions, has worked tirelessly to build a strong case for the redevelopment of this world-class Brownfield base metals mine.

Poised to produce 189 000 t of copper and 580 000 t of zinc from a 30.49 Mt resource (grading at 1.2% copper and 3.7% zinc), ASX/JSE-listed base metals developer **Orion Minerals**' Prieska copper-zinc project is underway with a study to optimise these already impressive figures, with the aim of breaking ground at the project in Q3, 2020. **CHANTELLE KOTZE** spoke to CEO **ERROL SMART** about the Brownfield redevelopment project.

Orion Minerals can best be described as a junior miner that is picking up where a major left off. The historical Prieska project, which was successfully operated for 20 years by the once major mining company, Anglovaal, produced over 430 000 t of copper and more than 1 Mt of zinc from 46 Mt of milled ore during its lifetime, until its closure in 1991 – resulting from falling copper and zinc prices, which rendered the operation uneconomic at the time.

After a worldwide search to find an advanced stage copper-zinc or copper-nickel exploration asset with a style of mineralisation that was amenable to bulk, mechanised and modern mining, Orion set its sights on the historical Prieska mine, which ticked all of these boxes.

Ranked as the 26th largest volcanogenic massive sulphide (VMS) deposit globally, Prieska is also the world's largest, single lens VMS copper-zinc deposit. While already highly attractive based on this global ranking alone, Smart explains that VMS deposits have an additional attraction in that they occur in clusters – with research confirming that the sum of the smaller orebodies almost always add up to the single largest ore body.

↑ Errol Smart

"What piqued my interest in Prieska was that based on the mine's history and what we know about VMS deposits, as well as the fact that the area around the historical mine is unmined, at the time we concluded that there should be a minimum of another 46 Mt

Orion Mineral's Prieska project is currently being fast-tracked into production

As a result, the required new infrastructure is limited to rock-and-materials winders, underground rock handling facilities, an ore processing plant and related surface infrastructure, all of which will be modern, efficient and purpose built for the new mine.

Existing infrastructure also includes a water pipeline from the Orange River, tarred roads, national grid power supply and a 1.7 km-long air strip. The operating rail siding of Groveput, located 50 km from the project site, en route to the town of Prieska, provides rail access to the main Kimberley – De Aar railway line and from there the ports.

The mine is currently flooded to a depth of 330 m below surface, and it will require 14 months of pumping to dewater it (or shorter depending on the results of the optimisation work). Despite this, Smart is confident that once Orion breaks ground on the project by late Q3 at Prieska, it will take 28 months to reach production, 33 months to break even and one-year from then to reach full production. However, these timelines are expected to change following the release of the optimised BFS study. ▶

of ore within the Prieska cluster. This has now increased to a target of another 80 Mt," Smart theorises.

Having acquired the asset in 2015, and on the back of investment by mining-focused, private equity group Tembo Capital – one of Orion's largest shareholders – the company undertook an 18 month, 86 000 m drilling campaign. Some of the first few holes delivered some of the highest-grade intersections drilled at Prieska, some of which were drilled at the furthest known extension, which indicated that the ore body remains open at depth.

As it was completely sealed up, Orion reopened the shaft and upon inspection, was pleasantly surprised that the 1 100 m-deep and 8.8 m-wide concrete-lined hoisting shaft and concrete headgear remained intact. The mine's strong rock conditions, cool rock temperatures and up to 35 m wide ore body, had stood the test of time and looked virtually untouched, says Smart.

The historical Prieska copper mine operated from 1971 to 1991

Ready for redevelopment

2019 was a significant year for Orion and was the year in which the company completed its first global mineral resource estimate in January, and then only six months later – in June – delivered a BFS, and was granted a mining right for Prieska in September.

The BFS is based on a modern 2.4 Mtpa underground and open pit mining operation, with a 10-year "foundation phase" mining 20.8 Mt and delivering 189 000 t of copper and 580 000 t of zinc in concentrate. It also revealed strong economics including undiscounted free cash-flows of A$1.1 billion pre-tax, a pre tax project NPV of A$574 million and a peak funding requirement of $378 million.

The project is now rapidly gaining momentum and the positive results from the ongoing value engineering and optimisation study work, which has continued since the completion of the BFS, is now being incorporated into the BFS financial analysis and project development plans. This will culminate in the release of an updated BFS in Q1 this year with the expectation of reduced pre-production capital and thus reduced financing requirements.

Results of these optimisation studies have the potential to reduce pre-production capital, significantly extend the planned mine life and further improve project economics and reduce the financing requirement.

FAST FACT

Orion has a 33 000 km^2 landholding within the Areachap belt on which the company has 22 identified VMS occurrences and 14 identified nickel-copper deposits and in 2016 made a new VMS discovery at Ayoba, 53 km south-west of Prieska

Exploration drilling at Prieska

Orion is poised to produce 189 000 t of copper and 580 000 t of zinc from a 30.49 Mt resource

There are three key studies, which are now at an advanced stage and are being incorporated into the optimised and updated BFS. These include:

1. Water treatment trials investigating supplementary means of dealing with the 8.5 million cubic meters of water to be pumped from the underground workings, so that the dewatering timeline and costs can be reduced. A technical assessment and pilot trials have been completed with detailed engineering design and capital costing underway.
2. Value engineering of the ore processing plant designs and layouts to reduce both capital and operating costs. By instead using SAG milling, as opposed to primary, secondary and tertiary crushing (as well as conveying infrastructure), Orion expects to reduce its capital cost quite dramatically, by about A$15 million, while also reducing its operating costs.
3. Mine-to-market enterprise optimisation of the foundation phase mining plan, in order to optimise the mine plan, scheduling and operating parameters to realise maximum financial returns from Prieska over its 10-year mine life.

Currently in the financing phase, Orion is also progressing negotiations with various parties to secure the total funding requirements for the development of the Prieska project – expectation of 60% of which will be debt funding and 40% will be equity funding.

Written expressions of interest have now been received from seven banks to provide senior secured project debt financing. In addition, several proposals for provision of mezzanine debt and equity investment at asset level have also been received, from parties interested in securing future product offtake.

Several expressions of interest have also been received from potential strategic investors, who are interested in partnering via significant equity participation in Orion's mine operating subsidiary companies.

Establishing a modern mechanised mining operation

Orion is developing Prieska at a critical juncture in the global mining industry's history – where the industry is moving away from conventional, labour intensive mining to a more modern and mechanised way of mining.

Not only will the base metal junior be establishing a Brownfield modern, mechanised mining operation in the footprint of the historical operation (without disturbing any additional land), but it will also ensure that Prieska is a fully-mechanised and automated mining operation that employs digital information systems and long-hole stoping.

Prieska will look vastly different to the historical operation, from a labour point of view, and will only require an underground workforce of 150 people, versus the nearly 3 000 people sent underground on a daily basis at the former operation. "If we want to prevent health and safety incidents in the mining industry, we have to change the way we mine," says Smart, adding that Prieska aims to be an efficient, sustainable, mechanised and modern mining operation. It is this that makes Prieska viable. MRA

DID YOU KNOW?

There are 11 approved Independent Power Producer renewable energy sites within 20 km from Prieska with the potential for direct delivery of renewable energy to site

Prieska copper mine decline

WHAT THEY ALSO SAID

What sets Orion apart from its base metals peers will be the purity of its concentrates. Unlike impure concentrates whose headline prices are directly affected by the deleterious elements, or penalty element charges, Orion's copper and zinc concentrates, which don't contain any deleterious elements, are expected to fetch premium prices compared to market prices. The increasingly stringent focus on reducing the environmental impact of mining and beneficiation has meant that countries don't want to import impure concentrates because of the impure emission that countries will have to pay to beneficiate the concentrates.

Prospects for Prospect Plentiful

Lithium prices are recovering from the negative perception of a slower consumer uptake for electric vehicles which has inadvertently slowed down the development of new lithium projects – particularly amongst the junior mining industry. This situation, however, has not affected ASX-listed **Prospect Resources**. The company confirmed in January this year that its Zimbabwe-based Arcadia lithium project boasts mineralisation that will enable it to tap into the traditional high price glass-ceramic market, which is suffering a supply deficit, MD **SAM HOSACK** tells **LAURA CORNISH**.

2019 was a defining year for Prospect Resources. The conclusion of an updated definitive feasibility study (DFS) and review of its mineralogy has positioned the company at the forefront of its lithium junior peers. This has been echoed by Australia-based small and mid-tier listed equity analysis business Pitt Street Research, which highlights robust economics for Arcadia and of equal importance, the strong support it is receiving from the Zimbabwe government.

Consequently, Prospect Resources has made significant progress in securing offtake agreements for its product and will likely secure the US$162 million needed to build Arcadia this year.

IN SHORT

Prospect Resources is uniquely positioned to benefit from the increasing supply deficit of petalite for the glass-ceramic industry, while preparing to supply spodumene into the battery metals market as well.

Unique mineralogy

The Arcadia ore body comprises hard rock spodumene – required for the EV market – as well as ultra-low iron petalite, currently in a supply deficit. Having spent the last year evaluating the opportunities for this niche product,

Prospect revealed it has passed two qualification processes with two of the world's largest glass-ceramic manufacturers, both based in Europe.

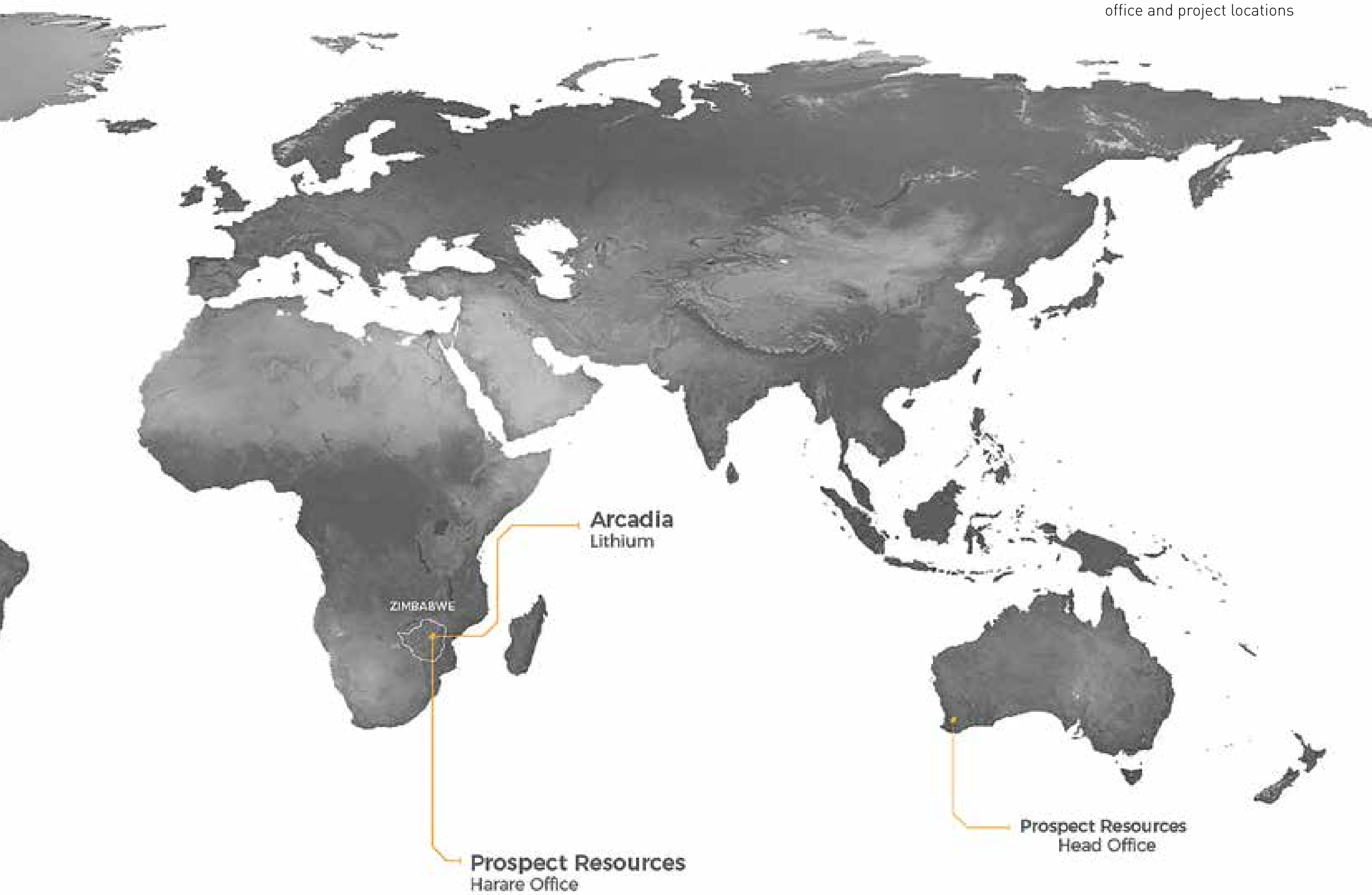
As such, the company anticipates being one of only two mines in the world capable of producing ultra-low iron petalite and expects to be the largest player in this "natural oligopoly" – none of which are based in Australia.

To pass the final step in the product qualification process, Arcadia's ultra-low iron petalite product needs a full test in a production kiln which will be undertaken in 2020, once the pilot plant is constructed and larger volume of product becomes available.

"The results of these tests have enabled us to commence discussions with an additional industry leading glass ceramic player based in Europe with a view of entering into a Memorandum of Understanding (MoU) where both parties seek to develop a commercial relationship," Hosack says. This is over and above engagements with other glass and ceramics customers across Europe, Asia and Africa who collectively consume over 130 000 tpa equivalent of ultra-low iron petalite.

"This bodes well for the business and has seen investment interest increase. The European glass-ceramics market trades at a premium. It also comprises sophisticated, mature customers and this equates to a non-volatile, stable market requiring consistent and steady supply which absolutely suits Prospect as the largest low-cost producer of ultra-low iron petalite," Hosack continues.

Prospect Resources' office and project locations



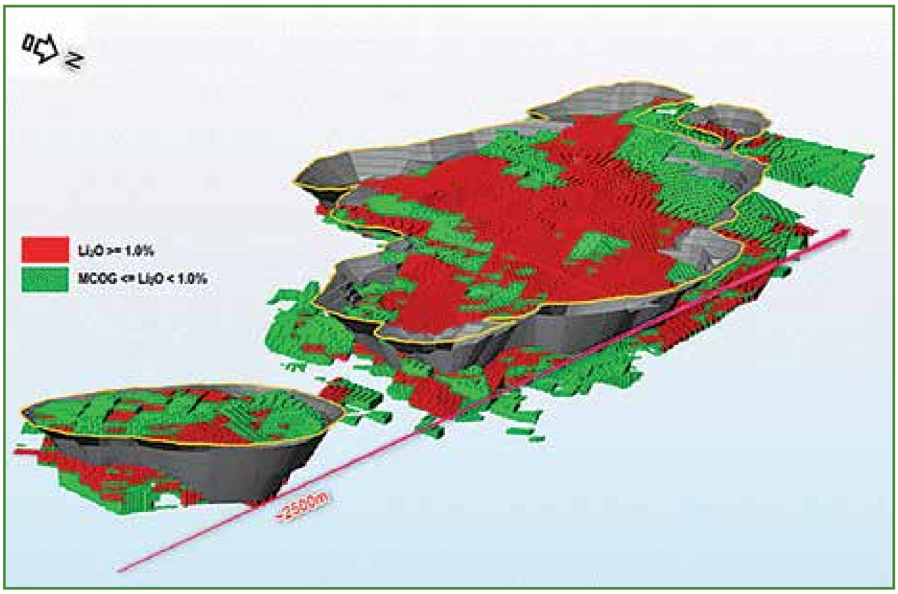
The company will look to initially supply 100 000 tpa of petalite material (of which about 500 000 tpa equivalent is consumed at present) into this industry and thanks to a 15.5-year mine lifespan (up from 12 years in the original DFS), will be considered a reliable and steady mining partner to the industry.

Prospect has consequently updated its mine plan, better balancing production of low iron petalite and spodumene, in turn reducing Arcadia's payback period to a short one and a half years, while boosting its overall project economics:

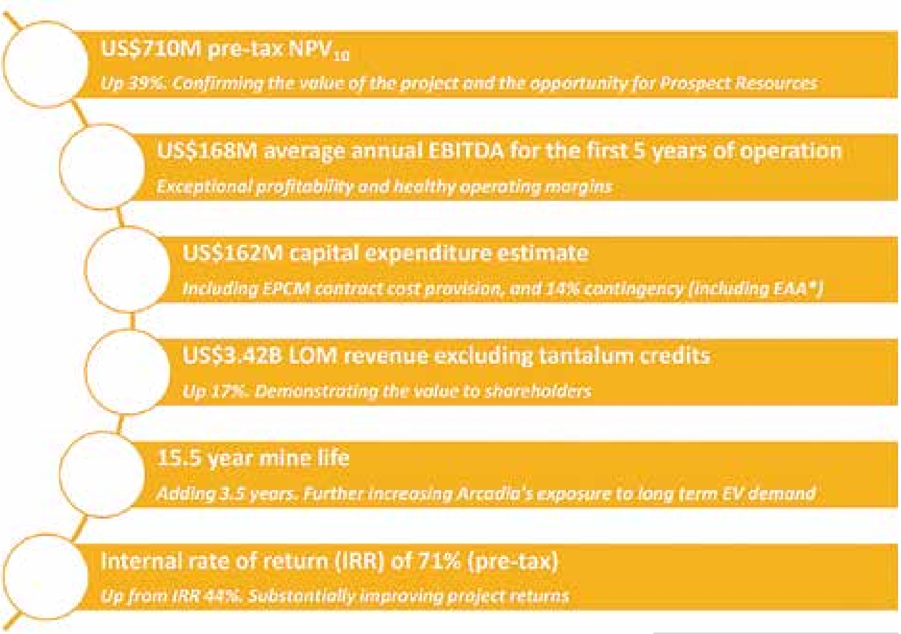
"We consider ourselves fortunate to have an ore body that also contains spodumene and so will look to tap into the EV market as it picks up in the medium future," Hosack notes.

In fact, the company has already signed an MoU with Uranium One Group to conduct a 90-day due diligence which may see it invest in the business and secure at least 51% of its future lithium production. Having commenced with the due diligence in mid-December last year, Prospect could secure an offtake agreement before the end of 2020's first quarter.

"It is clear that in the space of a year Prospect has executed the necessary work to secure a strong position moving forward that is now underpinned with technical and market confidence, which will facilitate discussions for securing the finance we need to build this project," Hosack highlights. ▶



Arcadia lithium project resource 3D model



Prospect Resources' December 2019 DFS results

Zimbabwe not a prohibiting factor

While the nature of doing business in Zimbabwe is considered difficult, this is not unique to the country or the continent for that matter. Developing a project simply requires pro-active regulatory compliance and, for those who are fortunate, productive support from the government.

Prospect has this in abundance – having been awarded special economic zone (SEZ) status for Arcadia in February 2019. The licence is valid for 10 years, with the ability to renew and extend it prior to expiry.

SEZ status at Arcadia provides Prospect with an extensive list of benefits that includes tax relief and exemptions and the ability to hold and operate foreign currency accounts; as well as exemptions and reductions of costs and trade barriers associated with the import of raw materials and capital goods through to the exportation of the concentrates.

"Let's also not forget that Zimbabwe offers numerous other benefits for mine developers, specifically access to skills and infrastructure. Arcadia specifically is adjacent to the capital city Harare – making access to the project quick and easy," Hosack indicates.

Securing finance and project build timeframes

In December last year, Prospect appointed Pan-African multilateral financial institution African Export-Import Bank (Afreximbank) to arrange and manage the primary syndication of a $143 million project finance debt facility. Afreximbank is proposing to fund and hold $75 million of the facility.

The parties have also agreed to a non-binding indicative debt facility term sheet. The appointment of Afreximbank as mandated lead arranger is a critical milestone in the financing of the Arcadia lithium project in Zimbabwe. The parties will now undertake further detailed due diligence and negotiate the final facility agreements.

Execution of the facility agreements will be subject to Afreximbank's further due diligence and credit approvals and drawdown will be subject to satisfaction of various conditions precedent to be included in the agreements.

The bank was established in October 1993 by African governments, African private and institutional investors, and non-African investors. It now comprises some 50 African member state countries.

"With our Zimbabwe based financial partner in place we are confident of progressing Arcadia to financial close in 2020 after which we will make our final investment decision. With an 18-month build timeframe we expect to move into production late in 2021 or early 2022 – the perfect time we believe to also benefit from the battery metals demand upswing," Hosack outlines.

> "Arcadia is not a typical hard rock deposit; we have diversified product streams that service two distinct markets and this will position us as a leader in the lithium field,"
>
> **SAM HOSACK**

Understanding Arcadia

Arcadia is the seventh largest hard rock deposit in the world and represents the fastest moving lithium project in Africa. It is fully permitted.

Due to the shallowness of the ore body, open pit mining is the most convenient and economical extraction method. The pit design takes cognisance of the local resource geometry to optimise the location of the ramps with respect to pit entry location, pit base access and utilisation of the pit floor for access to the final benches. ▶

Zimbabwe President Emmerson Mnangagwa and Prospective Resources' chairman Hugh Warner at the Arcadia lithium mine ground-breaking ceremony

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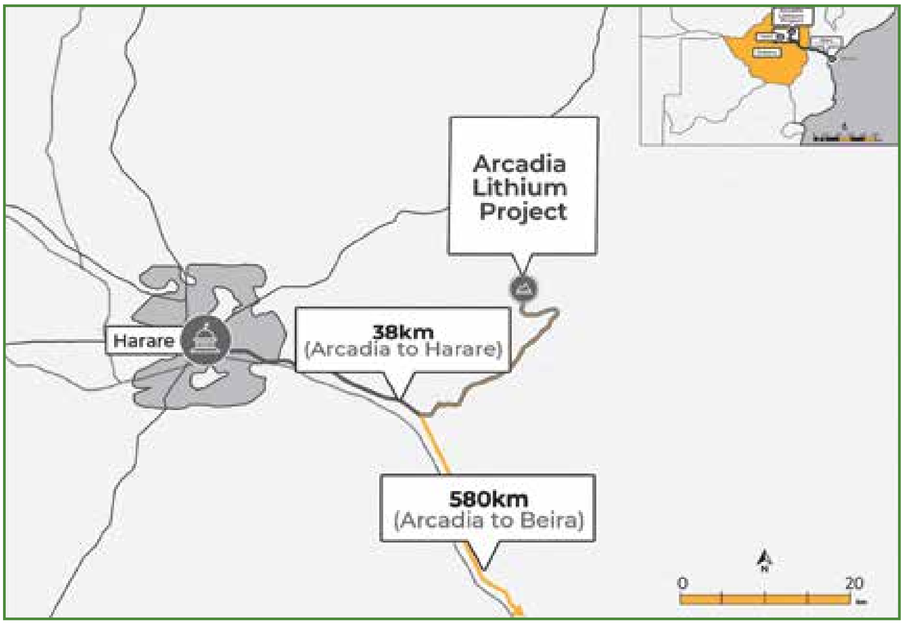


Arcadia project location

The mine schedule was prepared based on the following criteria:

- The process plant has six-month ramp-up period prior to a steady-state throughput rate of 200 000 tpm;
- Low grade ore is to be fed into the processes in the first month of commissioning, with high grade ore (+1.0% Li_2O) thereafter. The remaining mined low-grade ore is to be stockpiled and fed to the process plant when high-grade ore reserves are exhausted or blended with very high-grade ore to produce a relatively constant production profile over life of mine.

DID YOU KNOW?
Between 2025 and 2028, its expected 75% of all lithium will be produced from hard rock deposits

The Arcadia ore is hard, brittle and abrasive and three-stage crushing incorporating high pressure grinding roll crushing (HPGR) has been selected to achieve the sub-3 mm crush size required to achieve adequate liberation of petalite for primary recovery by DMS. A split DMS concept (coarse and fines) with rougher and cleaner stages has been adopted. The target grade for petalite products is 4% Li_2O; with 80% petalite from the DMS meeting technical grade specification.

The spodumene grain size is finer than the petalite at sub-millimetre size, and together with the presence of spodumene-quartz intergrowth in the MP, resulted in limited recovery of spodumene by DMS. Consequently, all ore post gravity recovery will report to the flotation circuit where spodumene is effectively recovered at a grind size P100 of 212 µm. The target grade for spodumene concentrate is 6% Li2O.

Tantalite will be recovered as rough concentrate by the application of spirals and wet high intensity magnetics separation (WHIMS) to reject streams from the DMS and flotation circuits. The rough tantalite will be upgraded to a saleable product containing approximately 25% Ta_2O_5 using conventional wet shaking tables.

Prospect's ambitions

The company wants to be a dominant player in Zimbabwe. "We understand lithium in this country and this gives us a strong advantage. We are ready to go and are mobilised to move this project into construction quickly. With fewer risks and limited uncertainties we are now stronger and more investment attractive than we have ever been and the pathway to both funding and development to first revenue is clear," Hosack enthuses.

"Arcadia is not a typical hard rock deposit; we have diversified product streams and market opportunities and this will position us as a leader in the lithium field," he concludes. MRA

BIGGER MINING MOVEMENT IN-COUNTRY

Prospect is not the only mining company putting Zimbabwe back on the map. Both PGM miner Tharisa and diamond miner Alrosa are making significant investments in the country

Members of the Prospect Resources Zimbabwe team

Asante Gold's Kubi

Back in the spotlight

In 2018, junior explorer **Asante Gold Corporation** was ready to call it a day at its Kubi gold project in Ghana. However, following an upturn in the gold market, high induced polarization (IP) survey results and the possibility of using a new and more cost-effective mining technique, there is renewed interest in the project. CEO **DOUGLAS MACQUARRIE** tells **GERARD PETER** why Kubi holds great promise for the company.

IN SHORT
The plan is to re-develop Kubi as a potential near-term green mining ~25 000 to 45 000 ozpa gold producer

Asante Gold holds the rights to purchase a 100% interest in the Kubi Mining Lease – a 20-year renewable mining lease issued in 2008. The Kubi Main deposit was initially explored by BHP in the 1980s; in the 1990s by Nevsun Resources; and from 2006 through to 2013 by PMI Gold Corporation (MacQuarrie was the CEO of PMI until April 2011).

"Over US$30 million in exploration has occurred at Kubi to date. Nevsun leased the near surface oxide resource to Ashanti (later AngloGold Ashanti) in 1998, and through 2005, 500 000 t of ore with an average grade of 3.65 g/t gold, producing 59 000 oz of gold, was mined from two small open pits," states MacQuarrie. "Ore was trucked from Kubi, a distance of 25 km to Anglo's oxide processing facility at Obuasi. The pits were then backfilled to daylight and reclaimed."

A change of fortune

However, while there were promising signs to get Kubi going again, market conditions were not in the company's favour. "It's been a tough six or seven years for junior gold explorers with weak gold prices," explains MacQuarrie. "In the junior business, the trend is your friend and with the trend going down, it meant we were not getting money.

"Also, in Canada we saw the demise of broker dealers that normally could provide $500,000 finance to juniors to further their exploration. And the major banks will not finance you unless you have a bankable feasibility. Essentially, the rug got pulled out of the industry and we have been on survival mode." As such, Asante was looking to joint venture or sell Kubi in 2018.

MacQuarrie has 40 years' mineral exploration experience, including 27 years in West Africa. He has been responsible for the discovery, acquisition and development of many significant gold deposits both in Canada and in Ghana. So, when the gold price started its upswing last year, he decided to take another look at Kubi.

"There was an area just to the east of the Kubi pits and I realised that there were a couple of interesting drill intersections in a rock that was previously not targeted. I did a reinterpretation of the airborne magnetics and identified a fold structure that looked very promising. "

"We have our own internal geophysics crew and IP equipment. We realised that things were slow and we don't have a lot of money, so I said, let's go and do some exploring. As a result, we identified six IP key targets with the nearest just 150 m east of our resource," MacQuarrie states.

Mining disruptor

The current NI 43-101 mineral resource at Kubi shows a measured resource of 0.66 Mt at 5.30 g/t gold for 112 000 oz; an indicated resource of 0.66 Mt at 5.65 g/t gold for 121 000 oz; and an inferred resource of 0.67 Mt at 5.31 g/t gold for 115 000 oz. MacQuarrie believes Kubi, like most deep seated Ghana gold deposits, has considerable expansion potential down dip.

In January this year, Asante Gold announced that anomalous high IP survey results had been noted vertically above a previous drill intersection that graded 3.0 m of 4.5 g/t gold. This new IP anomaly is located just 150 m to the east of the Kubi Main gold resource and has a significant strike and inferred +360m dip potential.

In another exciting development, MacQuarrie notes, Asante Gold is looking into a new mining technique, Sustainable Mining by Drilling (SMD), at Kubi. SMD is a two-stage drilling method that enables direct mining of near vertical narrow deposits.

The technology is being developed and commercialised by Anaconda Mining, in collaboration with Memorial University of Newfoundland, and utilises technology proven in other industries. This concept is a complete surface mining option with a drilling rig as a main surface piece of equipment used in conjunction with several field proven down hole technologies. The mining process would be divided into two campaigns: drilling the pilot holes and accurately mapping the vein, then enlarging the pilot holes to predetermined sizes to recover the ore.

According to Anaconda, SMD technology is a "disruptor" in that it reduces the cost to extract ore by 50% over conventional underground

Asante drilling rig at Kubi

Workers in trench keyhole

> In the junior business, the trend is your friend and with the trend going down, it meant we were not getting money,
>
> **DOUGLAS MACQUARRIE**

narrow mining techniques; it places the operator in a safe location on the surface; it can access areas not open to conventional mining; reduces the environmental footprint; and bypasses the crushing and grinding circuits by moving the +-2mm drill cuttings in a slurry direct to the mill.

"The new SMD mining technique slashes the mining costs, development time and capital required to take near surface gold deposits to production. Cash flow from a gravity plant commences immediately that the drill starts turning," adds MacQuarrie.

MacQuarrie states that the plan is to re-develop Kubi as a potential near-term green mining ~25 000 to 45 000 ozpa gold producer. However, he cautions: "As a geophysicist, I can say that while the geophysics might be interesting, it does not mean that every target will eventually become a mine. If it did, I would be Midas. As such, I am hoping that at least two or three of these targets that we have identified will have some gold," he concludes. MRA


Pilot plant at Jangamo

IN SHORT
Savannah Resources is focused on progressing the pre-feasibility study at Mutamba towards completion. Once finished, it will increase its current shareholding in the project from 20% to 35% and to a potential 51% upon completion of the feasibility study.

Mutamba heavy mineral sands project

Strategically important for Mozambique and South Africa

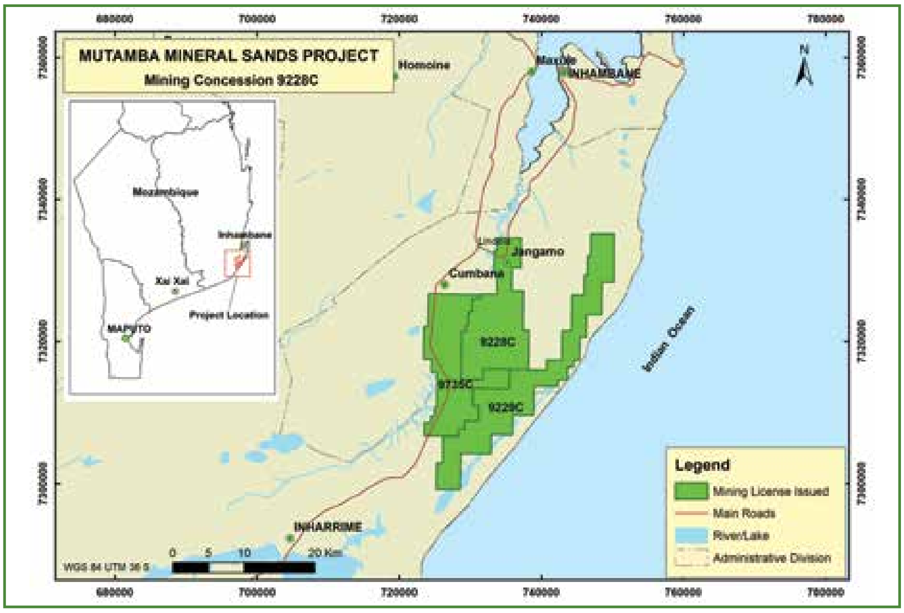
The Mutamba heavy mineral sands project, which AIM-listed diversified resources group **Savannah Resources** is developing in joint venture with mining major Rio Tinto, is a strategic undeveloped mineral sands deposit in Mozambique. While still in the early stages of development, the project is poised to become a globally strategic project capable of delivering future titanium feedstock on the back of strong global demand and tight supply following a decline in global mineral sands output and the subsequent decline in titanium dioxide slag production. **CHANTELLE KOTZE** spoke to CEO **DAVID ARCHER**.

The development of the Mutamba project is not only of economic importance to Mozambique, but is equally important to the economy of South Africa where the heavy mineral sands will be beneficiated into titanium feedstock by Rio Tinto at its 74%-owned Richards Bay Minerals heavy mineral sands extraction and refining facility.

What started out as a small exploration venture in 2013 in a world-class heavy mineral sands region in Mozambique, grew considerably in scale when Savannah Resources and Rio Tinto (who was also exploring in the region at the time) signed an agreement in 2016 to combine Savannah Resources' Jangamo project with Rio Tinto's adjacent Mutamba project.

As part of the agreement, Rio Tinto has the exclusive right to purchase 100% of the mineral sands production from Mutamba for its life of mine while Savannah Resources, the operator of the project, may earn up to 51% interest in the combined project on completion of the feasibility study.

Having been granted mining licences over three core, contiguous concessions between December 2019 and January 2020 at Mutamba, Savannah Resources can now actively focus on the development of the project, on which a pre-feasibility study is currently under way.



Map of the Mutamba project area

The 398.81 km^2 project area covered by the three mining concessions, namely Jangamo Matilda, Jangamo Rio and Dongane, contains an indicated and inferred mineral resource of 4.4 Bt, grading at 3.9% total heavy minerals. Containing ilmenite, rutile and zircon, it constitutes one of the largest remaining mineral sands deposits in the world that is yet to be developed, says Archer.

Based on the prospectivity of the area and the significant resource potential ▶

The 20 tph pilot plant is used to produce bulk samples of concentrate for metallurgical and product test work

defined to date, Savannah Resources is confident that Mutamba could sustain a significant mining operation, while also providing much needed continuity of supply of titanium minerals to Richards Bay Minerals over the project's 30-year mine life – until at least the middle part of this century, Archer adds.

The pre-feasibility study, which will build on the results of the 2017 scoping study and further define the commercial potential of Mutamba, is currently being recrafted. The pre-feasibility study will re-evaluate the production targets, entail further metallurgical test work (which will entail recommissioning of the 20 tph pilot plant at Jangamo), and also entail preparation for some of the early work programmes in the run-up to mine development.

"While there was a reduction in the pace of activity on the pre-feasibility study during 2019 while awaiting the approval of the mining licences, we will vastly increase the scale of activity this year while accelerating the pre-feasibility activities to reach conclusion as soon as possible, moving straight into the definitive feasibility study in 2021," says Archer.

Savannah Resources is looking to mine about 450 Mt of the 4.4 Bt mineral resource over its 30-year mine life. This equates to mining 15 Mtpa of material to produce about 500 000 tpa of ilmenite and 120 000 tpa of non-magnetic zircon and rutile concentrate. These production figures, Archer says, are slightly lower than those of mineral sands producer Kenmare Resources, which operates the Moma mineral sands mine to the north of Mutamba.

The orebody, which occurs at surface and has virtually no overburden waste, has a low strip ratio and lends itself well to dry mining, explains Archer, noting that this is unlike other mineral sands mining operations that make use of more expensive dredge mining. As a result, Savannah Resources expects Mutamba to be a more robust project with a lower capital expenditure, more flexibility and more redundancy.

The company will use a two stage processing method comprising gravity separation followed by a mineral separation plant that will separate the principle, saleable ilmenite product from the non-magnetic zircon and rutile. The ilmenite will then be shipped via the Port of Inhambane (approximately 20 km by road from site) to the Port of Richards Bay in South Africa.

One of the great features of the mine is that while it is located in Africa, it is close to existing infrastructure, says Archer. Nearby infrastructure includes a tarred highway which runs through the project area, an international airport as well as a port facility in the town of Inhambane, and reliable grid power already installed and available in close proximity to the concessions. This is expected to reduce the overall capex required for the mine development – estimated at US$200 million in the scoping study.

With production targeted for 2023, Savannah Resources has also identified further material identified on the tenements, which could add to the mine life. In addition to this, the company routinely evaluates other opportunities from time to time in the regions in which it operates – currently a gold opportunity in Mozambique. MRA

FAST FACT

The bulk of titanium feedstock, about 90%, is consumed by the pigment industry, where it is used in the manufacture of paints, paper, plastic, ceramics and cosmetics

"The Mutamba heavy mineral sands project constitutes one of the largest remaining mineral sands deposits in the world that is yet to be developed,"

DAVID ARCHER

DIVERSITY IS THE OBJECTIVE

Diversity is key to multi-commodity development company Savannah Resources' strategy in that it aims to sequentially develop a pipeline of diversified cash generative and profitable mining operations to ensure robustness and resiliency against any movement in commodity prices. In addition to Mutamba in Mozambique, the company owns the Mina do Barroso lithium project in northern Portugal – Western Europe's largest new spodumene lithium discovery, which is the most mature asset in the company's portfolio, with production targeted in mid 2020. Savannah Resources also has rights to two blocks covering 1 004 km² in the copper-rich Semail Ophiolite Belt in Oman, a region proven to host clusters of moderate to high-grade copper deposits with gold credits and metallurgically simple ores.

Katoro Gold's Haneti

Teeming with potential

While **Katoro Gold's** Haneti project is still in the early stages of development, the company believes that there is significant margin for growth. Moreover, as executive chairman **LOUIS COETZEE** tells **GERARD PETER**, Haneti heralds a new direction for the company as it seeks to diversify its portfolio.

IN SHORT
The principle target zone is an 80 km long ultramafic belt with grades from surface sampling of up to 13.6% nickel and 2.33 g/t combined platinum and palladium.

Soil sampling team in action at Haneti

Katoro Gold acquired Haneti from coal and energy focused company Kibo Mining in June 2018 as part of the overall acquisition of Kibo's subsidiary, Kibo Nickel. Katoro has a 75% interest in Haneti. Development of Haneti is being advanced in tandem with its joint venture partner, Power Metal Resources, which has the remaining 25% interest in the project.

Located in central Tanzania, Haneti covers an area of about 5 000 km² and forms a near contiguous block. The project has significant mineral discovery potential due to this favourable geological setting and this has been demonstrated by the results of historical exploration carried out over the area by previous operators. Haneti is a polymetallic system with identified potential for nickel (sulphide and laterite), PGMs, copper, gold, lithium and rare earth elements.

Prospectivity for nickel, copper and PGMs (e.g. platinum, palladium, rhodium and others) is associated with a linear NW-SE trending zone of iron and magnesium rich rocks (ultramafics), the Haneti-Itiso Ultramafic Complex (HIUC). The principle target zone is an 80 km long ultramafic belt with grades from surface sampling of up to 13.6% nickel and 2.33 g/t combined platinum and palladium.

Within the ultramafic belt is the principle target, Mihanza Hill, where 2015 geophysical work identified significant extensions to nickel sulphide prospective target rock formations, and geochemical interpretation has identified prospectivity for chonolith type nickel-copper-PGM mineralisation.

Also, within the Haneti licence area there is identified Greenstone belt gold potential to the west, where there is extensive artisanal gold mining in an area a few kilometres to the east of Shanta Gold's 0.7 Moz Singida project.

Furthermore, Haneti has the potential for lithium, tantalum niobium and REE mineralisation – demonstrated by host pegmatites in an area where sampling has returned a high-grade sample of 2.6% lithium and strongly anomalous results in niobium and tantalum, key to the company's future plans.

While Katoro is also progressing two other gold projects in Tanzania, Coetzee states that Haneti is key to the company's plan to expand its commodities portfolio. "We have always believed that Haneti has the potential to become a world-class deposit. As

> "We are still in the early stages of exploration work but we have done quite a lot of work in the last few years,"
>
> **LOUIS COETZEE**

Dolerite on HQ-P20137

such, from a Katoro perspective, it is key to enable our declared intention of moving into the battery metals space, which has become an important focus for us," explains Coetzee.

Exploration update

In May last year, Katoro conducted follow-up soil sampling in the central part of the HIUC. "This extended the strike length of previously identified high priority areas and the findings have been utilised to inform planning for a proposed drill programme. Furthermore, it also identified a new, previously unidentified exploration target," adds Coetzee.

"We are still in the early stages of exploration work, but we have done quite a lot of work in the last few years. This includes mapping, airborne survey data and geophysical studies. We've done some chemical analysis as well."

"As a result, we have now identified three primary drill targets. We've done all the early stage work preparation for the bore drill programme and we are now in the process of doing the final preparation for the first phase of exploration drilling."

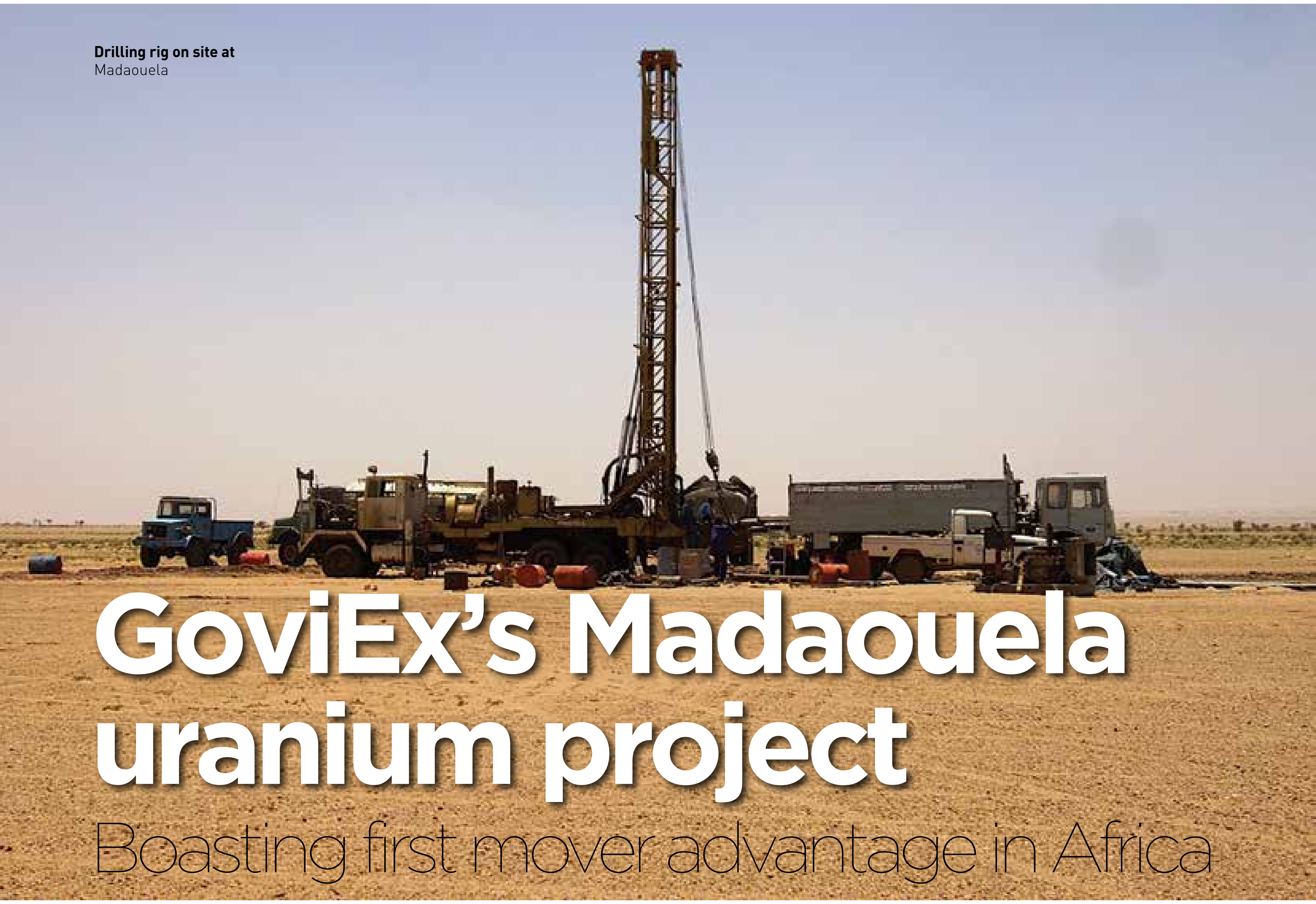
Business as usual

Haneti straddles the Dodoma, Kondoa and Manyoni districts, all within the Dodoma (Administrative) region. Access to the project is via Dodoma by tar road for 50 km and well-maintained gravel road for another 38 km to the village of Haneti. "Access within the project is by a dense network of 4WD navigable roads and bush tracks that provide good penetration through most of the tenements," add Coetzee.

Also, while many mining companies are dissatisfied with Tanzania's new mining act, calling some of the amendments draconian and not investor-friendly, Coetzee states that Katora has had no challenges of any kind doing business in the country.

"We have been operating in Tanzania for the last 20 years. When the new Tanzanian mining act was passed, many people were up in arms about the new regulations and we were also concerned. But our reason was motivated by the fact that we have, as a matter of principle, always been well above the new minimum social and labour statutory compliance requirements. So, we are confident we will continue to steadily progress Haneti," he concludes. MRA

Sampling begins at Haneti



Drilling rig on site at Madaouela

GoviEx's Madaouela uranium project

Boasting first mover advantage in Africa

Like coal, uranium will continue to be a valuable energy source across global territories – despite perceived environmental dangers. The uranium market has retracted in recent years on the back of negative perception, but this will undoubtedly drive prices higher as supply quantities have moved into a deficit. This is good news for TSXV-listed uranium junior **GoviEx Uranium** who is looking to take advantage of changing market fundamentals and use its first mover advantage in Africa, CEO **DANIEL MAJOR** tells **LAURA CORNISH**.

IN SHORT
GoviEx's Madaouela project in Niger boasts one of the largest undeveloped uranium mineral resources in the industry and will be ready to hit the construction-ground running when prices improve.

GoviEx's commitment to its Niger-based Madaouela uranium project is unwavering, which is impressive considering the company has been working to advance and develop the asset since acquiring it back in 2007.

Unfortunately, the U_3O_8 (uranium) market has not been in the company's favour to date, but this has not deterred the company or Major from working towards establishing a mine which offers market value and a return on investment.

"Uranium inventories from American and European utilities are declining and, with recent production cuts, will lead to a uranium supply deficit, driven further by growth in demand for nuclear power generation," Major states.

"This gives us every confidence that the price will ultimately improve, which we would ideally like to see settle around US$55/lb – making our project financially viable," he continues.

What is the plan until then?

Any junior mining company knows that a depressed commodity pricing environment has its benefits, and this is certainly the case for GoviEx.

The company is using its time advantage to re-evaluate and improve Madaouela's project economics – preparation that will make it fund-raising and construction ready as soon as prices shift. "We want to be seen as having a first mover advantage to develop a new uranium project when the time is right," Major emphasises strongly.

Consequently, the last 12 months saw GoviEx introduce a programme to revisit the entire project from a technical perspective to de-risk and reduce operating and capital costs considerably. The results from this are due in Q2, 2020 and will form part of the feasibility study currently underway, which once completed, will enable the company to open up discussions to start securing project finance and offtake agreements.

Outlining some of the work conducted over the past year, Major indicates that the company has focused largely on changing the front and end circuits of the process plant that were established during the pre-feasibility study.

This has seen the company change its upfront process technique from a commercially unproven ablation technique to gravity recovery. This is not only recognised as a successful recovery technique, but will further reduce the contained calcite and sulphuric acid required, which are the project's major consumables.

Towards the back end, the company has also elected to replace solvent extraction with ion exchange, which will allow for an easier and more cost effective process of extracting its molybdenum by-product.

"We believe the combination of these changes has the potential to reduce our costs and we consider this a significant incentive for potential investors," Major notes.

Madaouela project advantages

The fully permitted Madaouela project has much to showcase for interested investors and has the support of the local government, which is important in a country not well recognised or understood by global markets.

Niger has been producing uranium since 1971 and offers the skill sets necessary for GoviEx to employ from within the country

In July 2019, GoviEx's wholly-owned subsidiary GoviEx Niger entered into definitive agreements with the Republic of Niger to finalise the commercial terms to progress Madaouela.

The key commercial terms covered by the signed definitive agreements between the State and GoviEx include:

1. A Nigerien operating company to be named Compagnie Minière Madaouela SA (the Madaouela Mining Company) is to be incorporated by the company into which the Madaouela I mining permit will be transferred.
2. Pursuant to the Mining Code, the State is to receive a 10% free carried interest from the capital of Madaouela Mining Company.
3. The State is to receive an additional working interest of 10% in exchange for approximately $14.5 million of claims due by the company to the State, comprised of the final €7 million Madaouela I mining permit acquisition payment and settlement of previously challenged, three years of area taxes ($6.6 million). The company is to receive a final, complete and unconditional release without reserves in respect of the debt, upon the transfer of the additional working interest.
4. The State has agreed that the payment of surface rights required under the Niger Mining Code, with respect to the Madaouela I mining permit, shall be deferred, without interest, penalties or fees, from the period commencing 1 January 2019, until the earlier date of GoviEx closing a financing for the construction of a mine for the Madaouela I mining permit or three years from the incorporation of the Madaouela Mining Company.
5. The State has agreed to issue new nine-year exploration permits for the areas previously covered by Madaouela 2, Madaouela 3, Madaouela 4 and Anou Mélé exploration permits, as well as the ▶

$25/lb

The average uranium price in 2019 – which dropped and climbed marginally over the 12-month period

Evaluating core samples for Madaouela on site in Niger

Madaouela core samples

renewal of the Eralrar exploration permit, in order to allow GoviEx to continue its exploration activities on the Madaouela project.

Reviewing the project, Major reveals that the pre-economic assessment study outlines a 2.7 Mlbpa uranium production target, which equates to 65 Mlb over a 21-year lifespan at a 0.14% grade. This is "above average" for Africa, Major notes.

Based on the current project, before the proposed optimisations, GoviEx would require $360 million to build the project and, once operational, would operate at an all-in sustaining cost of $30/lb. It has a two-year construction timeframe.

While getting Madaouela to a construction-ready point is the priority, Major notes the greater potential the area has to offer: "We have six licences – we have exploration upside."

Looking forward

GoviEx is positioned, subject to increasing uranium prices, to obtain project financing to move towards the development of its flagship Madaouela project. "Our team has been operating in Niger for more than 10 years and benefits from much of the key infrastructure (road access, skilled mine labour, ground water and grid power) necessary to develop this strategic asset," Major stresses.

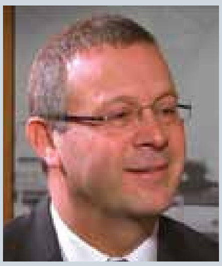
Even though the spot uranium price declined slightly in 2019, the company sees reason for optimism in the uranium market fundamentals. The World Nuclear Association's (WNA) Fuel Report issued in September 2019 highlights improving market dynamics; and demand expectations have improved in an environment of supply constraint and drawdown of utility inventories.

The WNA 2019 Fuel Report forecasts an improvement in nuclear energy demand of 2% compound annual growth rate in the reference case from the demand forecast in its previous report in 2017. This improved forecast is supported by the reported 55 new reactors currently under construction and government policy changes resulting in extended reactor lives in the United States and France.

The supply constraint shouldered by the major uranium producers has resulted in the supply of uranium being in a deficit in all of the forecast scenarios in the WNA 2019 Fuel Report.

"Projected increased demand and supply constraints have already been noted in the long-term with rising prices, and we believe this will extend through to uranium prices in 2020," Major concludes. MRA

> "Uranium inventories from American and European utilities are declining and will lead to a uranium supply deficit,"
>
> **DANIEL MAJOR**



WHAT YOU SHOULD KNOW ABOUT NIGER

It may not be a typical mining destination but Niger has been producing uranium since 1971 and offers the skill sets necessary for GoviEx to employ from within the country.

Being located within the Sahara dessert is one of the company's biggest challenges, but it will keep its consumables to a low to help compensate for this. Security risks are also a top agenda concern, but the company has not encountered any difficulties to date in this regard, and as mentioned, will operate with a local workforce to reduce this threat as much as possible.

A large-scale coal-fired power station with spare capacity can provide the project's energy requirements, but GoviEx is evaluating solar power options as well.

Africa remains lucrative For junior explorers

Opportunities are aplenty for exploration in Africa, both in known and unexplored parts of the continent. This is according to leading exploration, mining and environmental consulting services, **The MSA Group. GERARD PETER** reports.

The MSA Group offers a turnkey outsourced exploration service

With the push towards getting more electric vehicles (EV) on the roads to reduce pollution, one would expect that it would be the battery metals market that would be most attractive to junior explorers in Africa. However, according to MSA's senior exploration geologist Luke Peters, exploration in this sector is still immature and reactive to relatively short term periods of increased demand or more commonly, to perceptions and forecasts of future demand or supply. While battery metals exploration is expected to continue to increase in the future it is still gold and base metals that currently attract the most exploration funding.

Peters believes that EVs are here to stay and are riding the growing wave of global public opinion focused on environmental and climatic concerns. "It is predicted that there will be around 100 million of these vehicles on the road by 2030. We are currently a far cry from that, but when the demand for EVs does increase and the supply is constrained, then we will see a renewed focus on exploration within the battery metals sector."

As the demand for battery metals increases there will also be more interest in exploring for substitutes and alternatives. "If you look at the EV market, the technology is changing all the time. For now, there is a demand for lithium and there will be for the foreseeable future. Going into the next 10 to 15 years, the rapidly changing battery technology may require different commodities, which will create new opportunities for those junior explorers that are ready to act."

Renewed interest in the Kalahari Copperbelt

According to principal consultant Mike Robertson, the appetite for exploration in Africa is driven by the demand for commodities, attractiveness of mining legislation and ease of doing business in a region. "From an investment point of view, Botswana is right up there, with Namibia not far behind. What we are seeing is that the Kalahari Copperbelt is attracting a lot of attention. There has been intermittent exploration in that region from the 1960s onwards; however attention shifted to the Central African

WHY WOULD JUNIORS GIVE THE CONTINENT A MISS?

Dave Dodd, HOD: Geology, says one factor that dissuades juniors from exploring the continent is that many countries are seen to have a high-risk profile, regardless of how investor-friendly their mining legislations are. "In addition, exploration on the continent revolves around commodity demands and capital requirements. For example, if you look at gold, the payback period is quick, infrastructure requirements relatively insignificant and the capex is relatively low, while if you look at potash, your entry requirements and capex are high and these resources tend to be located in high-risk countries."

Copperbelt, largely because of higher grades and the fact that much of the Kalahari Copperbelt is under cover, which makes exploration difficult."

However, Robertson points out that, in the last few years, there has been increasing interest in the Kalahari Copperbelt and this has primarily been driven by the availability of high resolution aeromagnetic data. This allows companies to see through the cover and get a good idea of the underlying geology of the area and to understand the mineral deposit model a lot better.

"In addition, the combination of techniques such as airborne electromagnetic surveys and ionic leach geochemistry also helps us see through the cover. Application of these techniques has seen new projects coming on line, some of which are advanced, while others are still at a greenfield stage."

West Africa garnering great interest

Meanwhile, Craig Blane, manager: exploration services, adds that there is a lot of interest in West Africa, particularly from junior companies. "What's interesting in this region is that where major companies are shutting down in areas known for their mining operations, juniors are picking up ground around these mining areas and have had significant success to date. This proves that not all previously operated mines are done and dusted."

According to Peters, how much progress juniors make in Africa often depends on the jurisdictions in which they operate. "If you look at West Africa, most countries have very investor-friendly mining legislation tailored for foreign investment. This makes it conducive for junior explorers to invest in the country and develop projects which, at the end of the day, will benefit the country."

Robertson adds: "The MSA Group has worked extensively in West African countries over the past 10 to 15 years, primarily in the gold space but also including diamonds, iron ore and bauxite. Our most recent work includes projects in Côte d'Ivoire, Mali, Burkina Faso, and Guinea." He further adds that the best exploration opportunities likely exist in Côte d'Ivoire and Guinea because these countries are largely underexplored and are a current focus of attention. "Our data show that over 250 Moz of gold has been discovered over the past 25 years, with about 40 new mines starting up over that period, clearly indicating that there is plenty of potential in West Africa."

Nigeria: misunderstood and underexplored

Russell Johnson, MSA's senior exploration geologist who is active in Nigeria, explains that today's Nigeria is misunderstood and poorly represented by media. This has resulted in its exploration potential largely being overlooked by Australian and Canadian Juniors.

Well known for its offshore hydrocarbon wealth, Nigeria's inland exploration sector has been largely stagnant in comparison to other West African Countries. However, this is likely to change as reforms over the past five years have created global interest in key mineral and metal exploration.

The interior mining activities are dominated by artisanal mining activities, leaving deeper deposits relatively underexplored or undiscovered. Structurally complex, the interior has multiple interesting metamorphic belts and regional-scale shear zones that could potentially host mineralisation. The base and critical metal prospectivity of Nigeria is particularly attractive within these features, with very large pegmatites being exploited by artisanal miners for gemstones, tantalum and more recently lithium.

There is no doubt that once junior and mid-tier mining companies begin to apply modern exploration methodologies and perform detailed geological studies in Nigeria, new discoveries will be made.

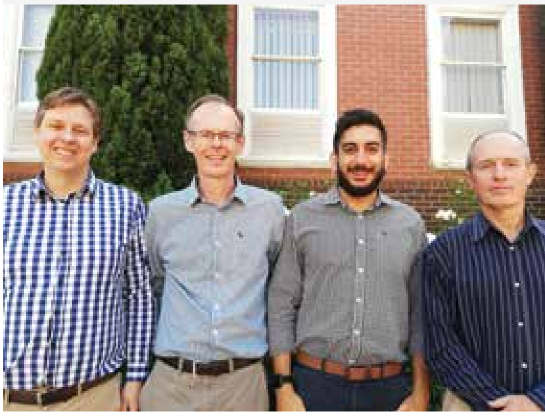
Regions bubbling under

Furthermore, according to Dave Dodd, HOD: Geology, there are lesser-known regions that hold plenty of potential for junior explorers. One such example is Angola. "The combination of all the new data that will be available imminently, combined with new legislation, makes it an attractive proposition. Angola is of interest to junior explorers focussed on copper hosted where the Lufillian arc extends from the DRC into Angola. There are also opportunities for diamonds on cratonic areas; and where the Kunene Complex extends from Namibia into Angola there is also exciting nickel potential."

Robertson adds that there is also a lot of focus on Sudan, Africa's third largest gold producer. "Most of that production comes from artisanal mining; it's a large country that is very underexplored and with a government actively trying to attract investors through legislation amendments, this is another region that holds enormous potential," he concludes. MRA

TURNKEY EXPLORATION OFFERING

Started in 1983, The MSA Group is a specialist consulting company offering a broad range of services, ranging from early exploration, on the ground field services, target generation, mineral resource estimations to feasibility studies. In addition, the company has a comprehensive environmental service offering and a diamond exploration and evaluation laboratory. Craig Blane explains that the company has worked in 45 countries in Africa and the Middle East. "Given our vast experience, knowledge and local contacts, we are able to offer international companies, such as Canadian or Australian listed explorers, an outsourced turnkey exploration service. This includes identifying targets, designing and managing drill programmes, contracting laboratories and delivering high-quality reports to these companies in compliance with the appropriate reporting codes."



From left: Craig Blane, Dave Dodd, Luke Peters and Mike Robertson

With traditional funding drying up, juniors should look to tech platforms for financing

Image: 123RF.com

Breaking ground in Africa

The junior mining sector in Africa holds the biggest key to unlocking long-term sustainability in the industry, yet the ability to develop new projects on the continent is becoming increasingly difficult with hundreds of companies trying to access a shrinking pool of funding and investment opportunities. So how can juniors become more investible, asks **GERARD PETER**.

The topic was discussed in great depth during a webinar hosted by *Mining Review Africa* late last year. Moderated by editor-in-chief, Laura Cornish, the panel featured three notable experts in the juniors field – Errol Smart, CEO: Orion Minerals; Grant Mitchell, head of the Junior and Emerging Miners' Desk: Minerals Council South Africa; and Olebogeng Sentsho: Simba Mgodi Fund.

The main topic of discussion centred on the challenges in unlocking traditional funding options for the junior mining sector and how to overcome these.

According to Mitchell, the most important thing is for a country to create a regulatory environment that is conducive to investing in junior mining companies. "Take South Africa for example," he states. "In this country, the regulatory environment is primarily targeted at large mining companies. The junior sector is growing; however, the regulatory environment doesn't really support them."

As such, Mitchell recommends that there needs to be some sort of relief for juniors in the form of a separate Code of Practice for smaller mining companies. In addition, he advises that governments offer tax incentives to these company to create a larger appetite for investment in a country.

Meanwhile, Smart opines that good projects will always get good finance, and it's not only about government regulatory policy or tax incentives. "At last year's *Africa Down Under* conference in Australia, the stats showed Australian companies have substantial mining interest on the African continent," he explains.

"We should stop hiding behind excuses about why investment is not happening. At the end of the day, there is a shrinking pool of capital internationally and only the best projects get money. Traditionally, junior mining investment in Africa has come from Australia and Canada, where access to capital is limited these days."

Smart succinctly states that juniors should not 'fall in love' with their projects. Rather they must be realistic and be prepared to back the best ones. "Sitting back and saying there is no money is simply not true. It's a competitive world out there so juniors have to work hard to secure funding."

Go big or go home

Weighing on the topic of juniors making themselves more investible, Sentsho says that there are five key factors that juniors should take into account. "Firstly, look at the commodity you are mining; is there a demand for it or is it a mineral that is in decline?" she advises.

"Secondly, put together a detailed financial model that will make sense to investors. Thirdly, put together a proper prospectus that goes all the way through the value chain. An investor needs to be confident that you have a well-thought out business model, from exploration through to final productivity."

Fourthly, Sentho advises that juniors should also do the research into who they want to seek international investment from. Investors from different countries, she says, have specific requirements that they look at in order to protect their investments. Therefore, it is important to know what their objectives are in order to attract their interest – such as regions and countries they prefer to invest their money in and what they look for in a company's leadership team.

Lastly, she says, juniors should aim big. "A lot of juniors prefer not to be listed companies. This says to the investors that you are a subsistence miner with no ambition to grow your operation. You just want to mine marginally so that you can make your money and get out.

"The projects that stay in the minds of investors are those with the biggest dreams; it's those companies who have a well-thought out business model and financial plan to take their company all the way up to listing."

SCAN THE QR CODE AND LISTEN TO THE FULL WEBINAR HERE.

> "The projects that stay in the minds of investors are those with the biggest dreams,"
>
> **OLEBOGENG SENTSHO**

Alternative funding options

While traditional funding sources are drying up for juniors, new cash resources could be found in alternative funding methods. According to Sentsho, with the advent of 4IR and the Industrial Internet of Things, technology is set to play a major role in mining. "As such, juniors should use technology platforms such as crowdfunding and blockchain to fund their projects."

With traditional funding channels lowering their risk appetite for exploration in Africa, there are no doubt a number of hurdles to overcome – financial and regulatory. And while these will be difficult to overcome, it is not impossible for juniors in Africa to attract investment. MRA

Six of the best

Helping juniors attract funding

At this year's ***Investing in African Mining Indaba***, there was a strong emphasis on the development of the junior mining sector as an important part of growing and sustaining the mining industry. **GERARD PETER** reports.

As one of the world's largest investment events, *Mining Indaba* attracts junior mining companies seeking investment opportunities. The 2020 iteration brought together more than 600 global investors and corporate development teams and 280 executives from junior mining companies.

The event provided a platform for junior miners to promote their projects and raise their profile to global investors and international media; to build relationships amongst a high-profile investment community; and to gain a better understanding of what investors are looking for.

Tom Quinn, *Mining Indaba's* head of content, stated: "One of our primary goals as event organisers is to connect junior miners with capital. We remain dedicated to helping junior mining companies secure funding through a number of avenues."

> "We remain dedicated to helping junior mining companies secure funding through a number of avenues,"
>
> **TOM QUINN**

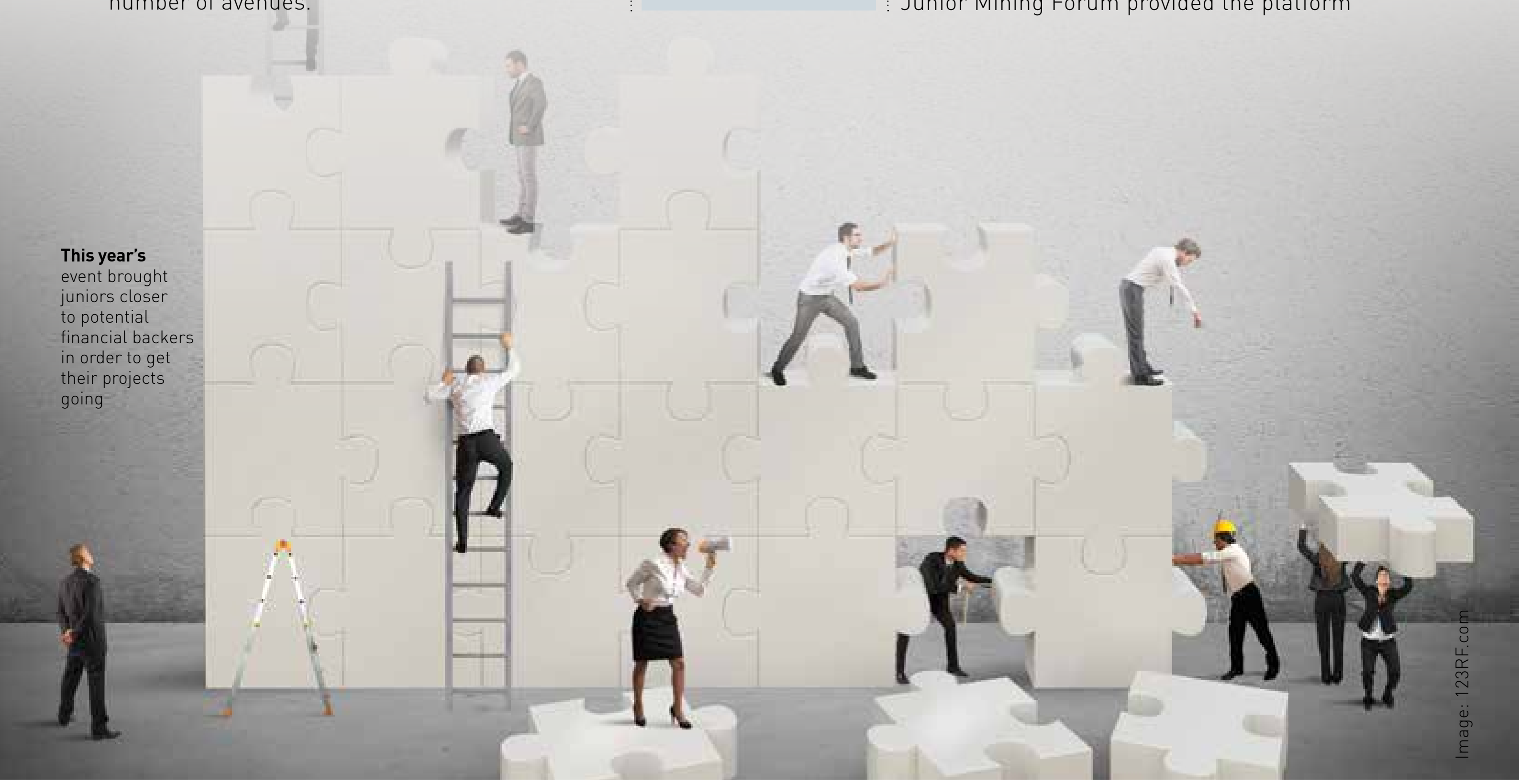
The six ways *Mining Indaba* helped juniors secure funding at this year's event were:

1. Junior Mining Showcase

This was a dedicated exhibition space for junior and mid-tier mining companies. Strategically placed next to the Investor Lounge, the showcase brought junior miners close to capital holders, encouraging organic interactions. This space offered maximum visibility to investors through branded booths and an opportunity to showcase exciting projects in Africa. Restricted morning access for mining executives and investors provided an intimate and private atmosphere to conduct confidential meetings.

2. Junior Mining Forum

Through expert discussions with investors, analysts, junior miners and end users, the Junior Mining Forum provided the platform



This year's event brought juniors closer to potential financial backers in order to get their projects going

Image: 123RF.com

to explore factors driving investment decisions within African mining markets. The insights gained from the forum assisted junior miners in thinking about how to increase their appeal to investors. Top discussions at this year's Mining Indaba included: Are we reaching a long-run bull market in gold? Are junior gold projects in west Africa attractive to investors? Kickstarting exploration activity in southern Africa.

3. Investor Relations Service

The personalised Investor Relations Service (IR) helped facilitate investment goals at *Mining Indaba*. Using in-depth knowledge of mining financial markets, the IR team built a comprehensive understanding of each company's investment proposition – at the point of registration, the investment criteria of over 600 investments is captured to match mining companies with those investors most suited to them. The IR team used this information to help arrange meetings with only the most suitable investors, financiers and analysts.

4. Special rates for juniors mining

Mining Indaba offered junior mining companies one of the lowest rates available, making participation at this year's event and access to investment opportunities more accessible.

5. Investment Battlefield

This was a platform for juniors to pitch exciting emerging projects in Africa to potential investors. Successful participants benefited from new connections with high-profile investors and international media coverage. The investor judges also offered direct feedback on how to maximise appeal to attract funding, significantly increasing chances of junior miners securing capital.

6. Business matchmaking

Mining Indaba's business matchmaking service allowed attending companies to filter through more than 6 000 delegates – quickly and easily – to find top business matches. This service uses intelligent matchmaking to facilitate meaningful interactions with appropriate financiers. MRA

BUBBLING UNDER

At this year's *Mining Indaba*, the organisers partnered with mining and exploration consultancy, The MSA Group, to showcase Africa's most promising junior mining projects.

In the lead-up to the event *Mining Indaba* released the 20 Projects to Watch in 2020 series. The four-part series focused on the most promising Top 20 Junior Mining Projects in Africa for 2020 in the precious metals, battery materials, bulk and base metals and energy sectors.

The aim of the series was to provide an understanding of the future mining landscape in Africa and encourage and inspire investors and management teams who will be at the forefront of developing the next wave of world-class mines on the continent.

The projects featured were:

Precious metals: Caledonia Mining, Hummingbird Resources, Mako Gold, Perseus Mining Limited and Tietto Minerals

Bulk and base metals: Danakali Limited, Deep-South Resources Inc, Emmerson Plc, Orion Minerals Limited and Trevali Mining Corporation

Energy: Global Atomic Corporation, GoviEx and Marenica Energy

Battery and EV materials: Arc Minerals, Mali Lithium, Mkango Resources, NextSource Materials, Peak Resources Limited, Prospect Resources and Walkabout Resources

"As part of our goal of connecting junior miners with capital, this year our four-day programme and dedicated platforms provided junior miners with the opportunities to build relationships and seek funding amongst the high-profile investment community attending the event." concluded Simon Ford, portfolio director of *Mining Indaba*.

SUSTAINABILITY

Big on the agenda, for juniors

Image: 123rf.com

H2, 2019 saw advisory, assurance, tax and transaction services company **EY** release its findings on the top 10 business risks facing mining and metals in 2020. While the report is pertinent to the entire mining sector, two points in particular hold significant relevance for the junior industry which must now consider more than just the 'typical' risks in their mining project development preparations. Compiled by **LAURA CORNISH**.

According to EY's report, there have been significant fluctuations in mining risks, as well as new risks coming into the top 10 – for the third year in a row.

"The fluctuations in the risks, as well as new risks, highlight the ongoing disruption in the sector," the report notes, while adding: "It's worth noting that there are always opportunities in time of change."

The themes of licence to operate and disruption run through EY's 2020 risks, as social responsibility and broader stakeholder demands intensify alongside the need for digital transformation, greater risk taking and innovation.

On the plus side

Identified as trend No.8, EY reveals that there could be a significant supply crunch in the next 10 to 15 years.

"Exploration technologies have already made significant advances as miners explore new digital technologies; [but] lower exploration budgets, fewer major discoveries and declining grades in existing deposits are particularly concerning when you consider that the outlook is for growing mineral demand as a result of the global growth and the demands of new world infrastructure," EY's report reveals.

This bodes well for the junior sector considering the majors are the likely cause for a drop in exploration spend. As supply deficits materialise, commodity prices will increase and fuel greater exploration spend. This is a major plus for juniors.

But there are many challenges to overcome: some unchanged over the decades, some relatively new – such as digital technologies – and some that are familiar but have become more prominent considerations, particularly for the junior mining sector. This speaks to the issue of sustainability.

Licence to operate

Licence to operate (LTO) is EY's No.1 risk for the second year in a row – a theme which runs through this year's risks, as social responsibility and broader stakeholder demands intensify.

"44% of our business risks survey respondents put it at the top of the list. The extended period of elections and resultant government changes have brought uncertainty to the political environment, creating volatility in the commodity markets. In addition, the sector is facing greater scrutiny from end consumers demanding a transparent ethical supply chain as well as a lower carbon footprint. Shareholder activists are also driving many miners, particularly those with coal assets, to reshape their portfolios by either reconfiguring existing operations or executing divestments," EY highlights.

This is undeniably a potential added strain for the junior sector, which must continue prioritising

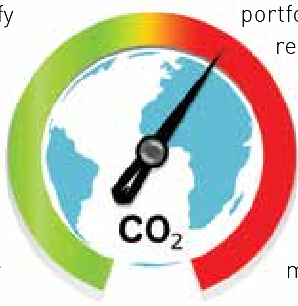


Image: 123rf.com

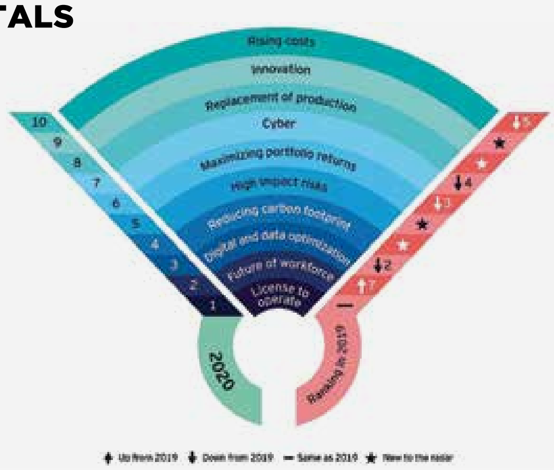
its core focus: advancing a project up the value chain through the correct technical processes, in order to secure finance. Incorporating the must-have LTO requires another box is ticked – before the mine is even built.

Pressure on miners to reduce impact in carbon emissions and energy use

Another consideration for juniors which was not a top priority a few years back speaks to sustainability on a broader level – reducing carbon footprints – identified as EY's No.4 business risk. "The transition to a low-carbon economy is well underway and the pressure to accelerate this transition seems to grow every day. Leading mining companies are recognising the importance of reducing their carbon emissions," says EY.

For the junior sector, it makes investable sense to consider these options upfront and incorporate them into the mine strategies.

EY'S TOP 10 BUSINESS RISKS FACING MINING AND METALS



"The clean energy transition is [however] going to be mineral intensive, providing an enormous opportunity for mining companies. There are significant opportunities for lithium, cobalt, copper, aluminium, nickel and many other minerals," EY notes – opening the exploration door for the junior industry. MRA

Report source:

1. EY information: https://www.ey.com/en_za/mining-metals/10-business-risks-facing-mining-and-metals.
2. Source: EY survey over 130+ execs from the EY Global Mining & Metals sector.
3. Corporate Exploration Strategies: Overview of exploration trends, S&P Market Intelligence, 6 November 2018.

Stability in Africa
A continuing concern

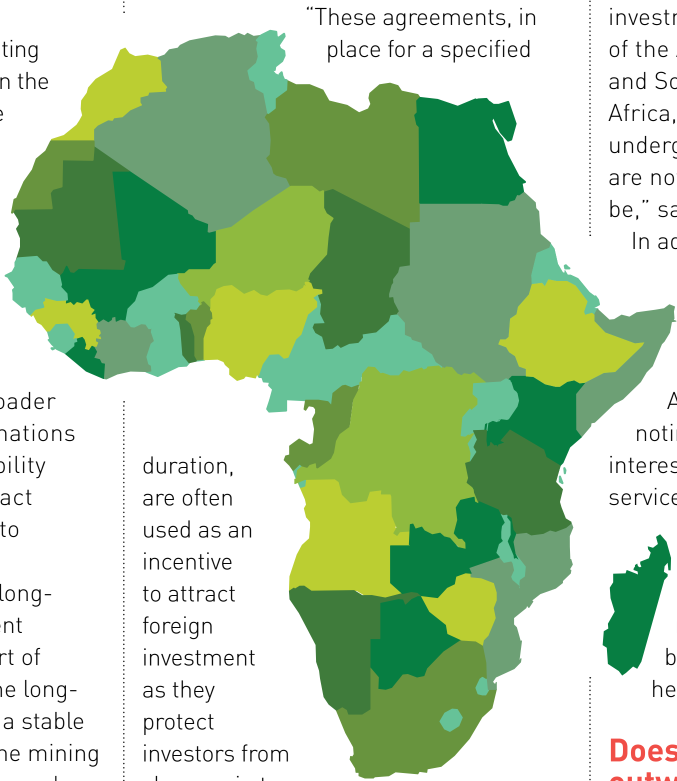
With over 100 junior and mid-tier member mining companies actively exploring and successfully operating in Africa's resource-rich mining sector, the **Australia-Africa Minerals & Energy Group** (AAMEG) believes that Africa remains ripe with opportunity for those who know how to navigate its political and legislative pitfalls. **CHANTELLE KOTZE** spoke to CEO **WILLIAM WITHAM** about how to manoeuvre the challenging African mining landscape.

"Successful are those mining companies that can anticipate, prioritise and mitigate risks and who can see through the haze of misinformation and be able to distinguish turbulence from genuine crisis," says Witham.

The AAMEG – a body representing Australian companies engaged in the development of Africa's resource industry – understands that while Africa has always had its challenges, the last few years were particularly turbulent from a legislative, health, security and geopolitical point of view.

There is consensus among AAMEG members, and the broader mining industry, that African nations need to maintain political stability and security if they are to attract investors to commit capital into their economies.

Stable countries, with clear, long-standing democratic government structures that have the support of their people are important in the long-term. The knock-on effect that a stable government structure has on the mining industry is that there is an increased likelihood that the mining agreement that you enter into will last over time – as frequent changes in government may impact on a mining company's security of tenure.



As a result of this, Witham stresses the importance of signing stability agreements and stabilisation provisions in long-term mining agreements, which will enable mining companies to operate under stable fiscal conditions despite changes to government structures.

"These agreements, in place for a specified duration, are often used as an incentive to attract foreign investment as they protect investors from changes in tax rates and other fiscal variables," he says.

With 54 countries on the continent, you cannot treat Africa as a whole as there is no one-size-fits-all approach to dealing with instability in Africa. In terms of stability on the continent, Witham however does note that some regions have greater stability than others.

"In general, many of the Francophone African countries in West Africa have some of the more stable democracies in Africa and have become good investment destinations, while some of the Anglophone countries in East and Southern Africa – such as South Africa, Zambia and Zimbabwe – have undergone many recent changes and are not as attractive as they used to be," says Witham.

In addition to becoming a more attractive investment destination, West Africa also holds many new mineral resource opportunities for AAMEG members, says Witham, noting that there has been strong interest from Australian explorers and service companies in Burkina Faso, Côte D'Ivoire, Guinea and Senegal.

However, access to finance for exploration as well as security risks have been two of the barriers to entry in this jurisdiction, he notes.

Does this mineral wealth outweigh in-country law?

In the long-term, while AAMEG remains bullish about what Africa has to offer from a mineral resource perspective, Witham cautions that the complex nature of doing business

Image: 123rf.com

Image: 123rf.com

The general wave of increasing terrorist violence has been one of the major headwinds faced in Africa in recent times

in the developing economies of Africa cannot be underestimated and that Africa's untapped mineral potential does not always outweigh the risk of doing business.

With many African countries growing their economies quite quickly, Africa still holds potential for AAMEG members, with some of them even looking to diversify into more than one country as a means to spread their risk, says Witham.

The in-country mining, tax and investment legislation is very important in that if the country does not have a supportive fiscal regime, it will deter rather than attract investment. By way of example, Witham explains that there are about three or four countries globally that have great mineral endowment, but have undergone virtually no exploration because their laws do not attract direct foreign investment.

Another threat to the mining industry has been creeping resource nationalisation in host countries through the incremental raising of royalties and taxes. Host governments are using resource nationalisation as a means to wrestle revenues away from mining companies, the result of which has deterred investment into some African countries.

This move by some African countries to drastically increase the percentage of local ownership, coupled with an increase in tax and royalties, has removed the incentive to invest in mineral resource projects and reduced the number of investable projects in Africa.

"Because money goes where it is wanted, countries with more supportive fiscal regimes are often the beneficiaries of exploration and the resultant investment in mineral project development", says Witham.

Security risks the major headwind in Africa

The general wave of increasing terrorist violence has been one of the major headwinds faced in Africa in recent times, says Witham. The terrorist violence taking place in the Sahel region of Burkina Faso in West Africa claimed the lives of over 4 000 people in 2019, according to the United Nations.

> "Because money goes where it is wanted, countries with more supportive fiscal regimes are often the beneficiaries of exploration and the resultant investment in mineral project development,"
>
> **WILLIAM WITHAM**

Burkina Faso is home to abundant natural resources. With 14 gold mines in production – as well as approximately 20 Australian companies in various stages of exploration and development – the country remains a highly attractive region for investment, Witham notes.

With a positive gold climate and considered one of West Africa's best-known underexplored gold regions with a fantastic population, Burkina Faso is brimming with potential, but several mining companies have been affected by the terrorist violence and this has affected investment into exploration. "Although the AAMEG is focused on minimising risks for its member companies operating in the region, the terrorist violence has highlighted the challenge in developing legitimate and socially responsible mining operations in parts of Africa," Witham points out.

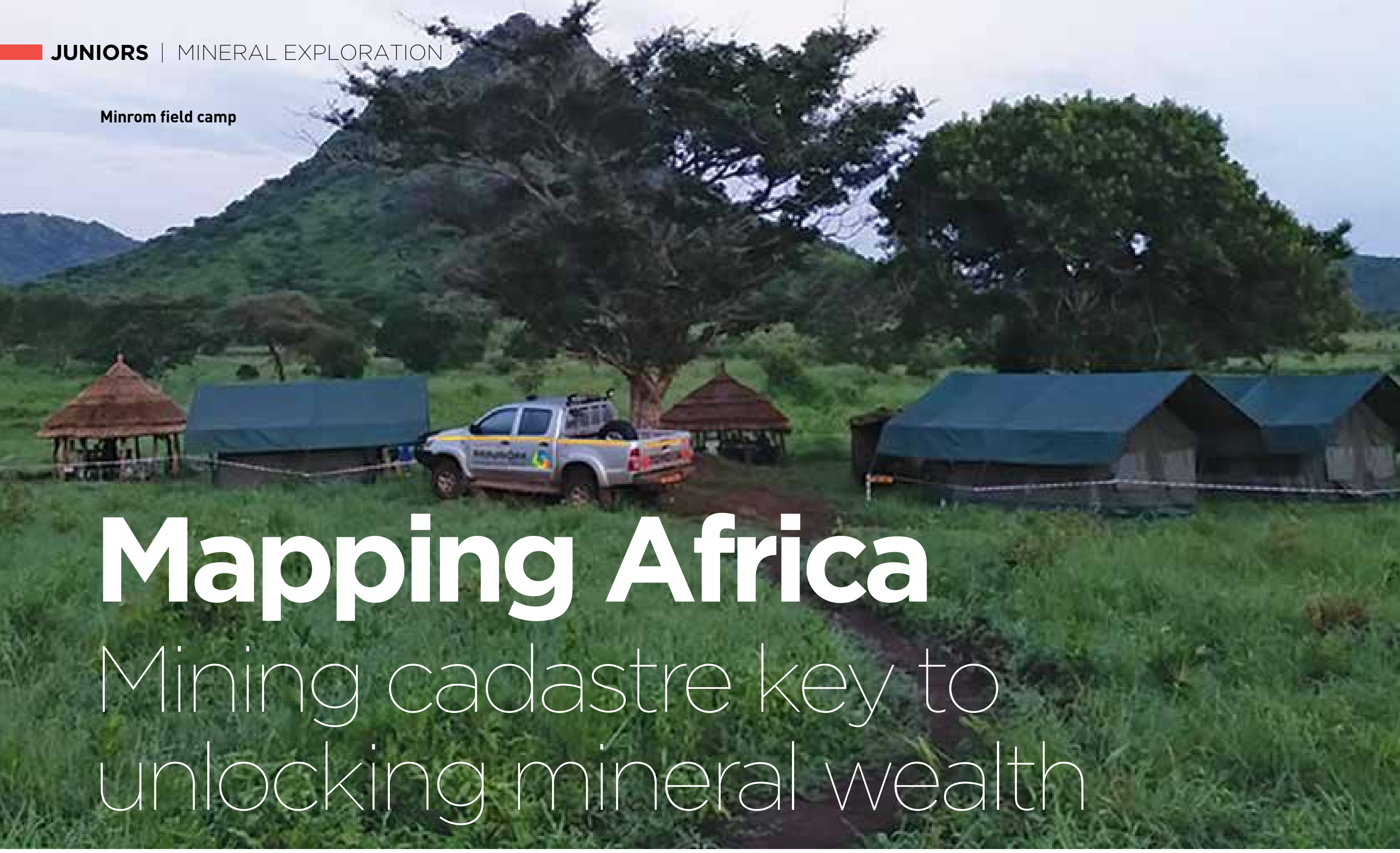
Witham is calling for better communication between governments, mining companies and the investment communities so that each party can better understand one another's needs. As an advocacy group acting on behalf of its members, AAMEG is able to facilitate improved communication among its members and the respective governments in the countries in which its members operate, while also carrying out a significant amount of advocacy with NGOs to also ensure that the host countries are receiving their fair share of resources. MRA

NEW TREND IN AFRICA EMERGING

The AAMEG is noting a trend at the moment in which the mining industry is adopting new technologies and services to help them attain their goals. The organisation has seen investment companies employ their own geologists for improved decision-making and service companies are applying for their own tenements to explore.

This is a move away from the traditional notion whereby only exploration and mining companies hold tenure and contracting companies come in only to provide services. The AAMEG is now seeing a merger of companies and their roles and a more interlinked ecosystem of companies that provide different services.

This is in line with the global trend towards unlocking efficiencies, where traditional exploration and mining companies have smaller management teams and fewer staff members.



Minrom field camp

Mapping Africa

Mining cadastre key to unlocking mineral wealth

The key to attracting mineral exploration into resource-rich African countries is having access to reliable, publicly-available geological data. For African governments, having geological information available to potential exploration companies could translate into the attraction of billions of dollars in mining investment. Junior miners, the backbone of the mineral resources sector, covet this free-to-use geological data as it is often at the mercy of low commodity prices, with limited investment appetite and exploration budget, writes **CHANTELLE KOTZE**.

Most countries in Africa have, for many years, undertaken mining sector reforms that support transparent and sustainable management of their natural resources in order to increase development gains and reduce poverty. In low commodity price environments, government reforms would focus on securing investment into the mining sector and the improvement of fiscal policy in a bid to maximise the economic contribution of natural resource development. There has also been a move by governments to ensure proper social and environmental protection.

More recently, the strategy of governments has been to provide a more integrated and comprehensive approach to natural resource management.

The World Bank has been instrumental in funding projects aimed at reforming Africa's mineral rights management. It has done so by providing funding for projects intended to consolidate mineral geological data coverage across Africa, through the use of electronic mineral right cadastre systems.

Although often funded by the World Bank, the management of these mineral right cadastre systems remains the responsibility of a country's mineral resources ministry and is used for the efficient administration of mineral titles throughout a country, while promoting standardisation and accessibility of this information in the public domain.

According to mineral resource management specialist Minrom director Oscar van Antwerpen, the proper implementation and administration of electronic mineral right cadastre systems will greatly improve stakeholder communications, attraction of investment and ensuring transparency of information and significantly reduce the possibility of corruption creeping in.

The first component of the mineral industry value chain is the issuing of exploration and mining licences – without which mining companies are unable to begin any sort of exploration. "Having an efficient electronic mineral right cadastre system enables attraction of investors, and the development of a country's mining rights by allowing potential explorers to view the locations of possible mineral deposits, mineral distributions and mineral tenements – thus promoting mineral exploration in Africa," he says.

Another key component in ensuring a thriving mining sector is the security of land tenure, van Antwerpen notes. While the mining laws within a country guarantee this tenure, it is the administration of the laws and regulations, through an efficient mineral right system aided by an up to date cadastre system, that ultimately determines their efficacy," he notes.

Moreover, an efficient mineral right cadastre system also enhances investor confidence in the mining sector by ensuring transparency around security of land tenure. The increased level of transparency, and subsequent security of land tenure that a mineral right cadastre system provides to the investment community, acts as a base through which the investment community and private sector can finance physical mine development.

According to van Antwerpen, about 60% of countries in Africa make use of land management software – with an example of such as FlexiCadastre (rebranded to Landfolio) – to automate the mineral title workflows, improve compliance and expedite the overall mineral right application process. These include Namibia, Ghana, Zambia, Uganda, Togo, Tanzania, South Sudan, Malawi, Mauritania, Liberia, Kenya, Guinea, Ethiopia, the Democratic Republic of Congo, Côte d'Ivoire, Cameroon and Mozambique.

On this FlexiCadastre system, one is able to see the mineral occurrences within the respective country. It also outlines which of these mineral occurrences has a reconnaissance licence, exploration licence or mining licence available for application, with a detailed outline of who owns the respective licence and information on when it was applied for and when it expires, says van Antwerpen.

South Africa faces shortcomings

Meanwhile in South Africa, the South African Mineral Resources Administration Database (SAMRAD) is one of the best studied, mapped and well documented mineral resources databases, according to van Antwerpen. The Mineral and Petroleum Resources Development Act makes provision for the implementation of a "flexi cadastre system" to view mineral right tenements, and while this system is active, it is not available to the public and investment community as is the case in Namibia and other African countries.

He acknowledges that since the SAMRAD system was launched in 2011 to replace the country's onerous manual application and licensing process – which has historically been plagued by backlogs and delays, as well as the double granting of rights – it has fallen short of providing a reliable, transparent electronic system for investors to review at a glance the availability of rights and ownership of rights.

Not only has this hampered the exploitation of South Africa's mineral resources, it has also been detrimental to securing investment into South Africa's already stressed mining industry, says van Antwerpen.

Because exploration is the key to unlocking South Africa's mineral resource future, van Antwerpen calls for greater efficiency in the issuing, awarding of prospecting and mining rights through SAMRAD as a means to reignite South Africa's exploration industry.

Despite the shortcomings of SAMRAD, the government has said that it is actively working to improve the SAMRAD online application system to make the process of applying for mineral titles more transparent and efficient. MRA

The mining engineer of the future will require additional tech skills

Learning curves

Creating the workforce of the future

The onset of the Fourth Industrial Revolution (4IR) in Africa bodes well for the junior mining industry. However, the introduction of a myriad of technological advances also requires the workforce to have a new skillset. The question is: Are universities equipping future mining engineers with the skills needed that will make them employable in this new age of mining? **GERARD PETER** reports.

Image: 123RF.com

It's not rocket science. Automation, virtual reality and robotics, to name just a few, along with the Industrial Internet of Things (IIoT), will require mining engineers to be more tech-savvy and have a different thinking approach. So, does this mean that skillsets required of future mining engineers will differ greatly from current engineers? Also, does this mean that the calibre and requirements of engineering students accepted into universities will change?

According to Professor Fred Cawood, director of the Wits Mining Institute, this is not the case. "The requirements to enter into the course remain the same as the core skills required to become an engineer have not changed," he says.

What is required, he points out, are additional skills required for mining in 4IR. However, Cawood states that engineers do not have to have an expert knowledge of new technologies or disciplines used in mines. "There needs to be common ground. Rather, what is needed is that engineers are equipped with enough knowledge of these technological developments such as coding, blockchain, etc. In that way, they can collaborate with the tech experts to ensure that a mine operates efficiently."

> Today, our undergraduates are much more tech-savvy than any other generation before them,
>
> **PROFESSOR FRED CAWOOD**

Collaboration between various disciplines in mining is key in 4IR, states Cawood. To that end, Wits University built, in partnership with companies like New Concept Mining, Gold Fields and Sibanye-Stillwater, the Wits mock mine. Following completion of the mock-up facility, the Sibanye-Stillwater Digital Mining Laboratory (DigiMine) was created, which is a state-of-the-art mining laboratory enabling the research programme on the mine of the future at the Wits Mining Institute. The aim of the laboratory is to make mining safer and better using digital technologies.

DigiMine comprises a 'mine', complete with surface, vertical shaft and mock underground excavations that are all 'communicating' live with the control room. In addition, the mock mine has a life-size tunnel, stope, lamp room and other features. It is equipped with the digital systems that will enable the research for the mine of the future. More importantly, says Cawood, it brings all various mining disciplines together to solve typical day-to-day issues at mines.

"The various disciplines sit around the table and workshop various problem scenarios and see which discipline the responsibility lies with. For example, an electrical problem will be identified and the mining engineering students will then have to collaborate with the electrical engineer to solve the problem.

"What is fascinating is that at the end of the day, these students might be registered for mining, but for two years, they work closely with the other disciplines and in doing so they learn extra skills that will allow them to carry out a meaningful conversation with the various experts in a mine to solve problems. As far as I know, the DigiMine is the only one of its kind in the world."

Furthermore, Cawood believes that mine engineers can make themselves more employable in 4IR through postgraduate qualifications in these new disciplines. "Today, our undergraduates are much more tech-savvy than any other generation before them.

"Therefore, they have the necessary ability to learn new technological and computer skills. What they do need, however, is an older generation that asks questions – not solves problems for them. The better the questions we ask, the better equipped they will be to use their tech and computer skills to solve problems," he concludes.

Wits: Students at Wits DigiLab

While machines will do the linear work in 4IR, the role that humans play on a mine will never be obsolete; however, their roles will change and with it, new skills will be needed.

Professor Ronny Webber-Youngman, HOD: Department of Mine Engineering at the University of Pretoria (Tuks) says that it is important for mining engineering students to get exposure to the soft skills associated with 4IR. "At the 2016 World Economic Forum (WEF), Alex Grey presented a paper on the 10 skills required in 4IR. The top three skills identified overall were complex problem solving, critical thinking and creativity. From the complete list of skills, more than 60%, such as Emotional Intelligence, people management, service orientation, etc. were related to non-technical (soft) skills. As such, universities cannot ignore educating and training their students in non-technical skills."

It is for that reason that Webber-Youngman implemented the Mining Engineering Leadership Academy (MELA) at Tuks in 2015 in addition to teaching the technical skills required for the job. "We realised that our students needed to develop their own soft skills and in that context, leadership skills are very important in order to make them more employable".

In order to address this issue, Webber-Youngman explains that in the mine design project for final year students, 80% is dedicated to technical mine design principles also incorporating 20% management and leadership activities, which incorporates team building as well as social awareness around mines.

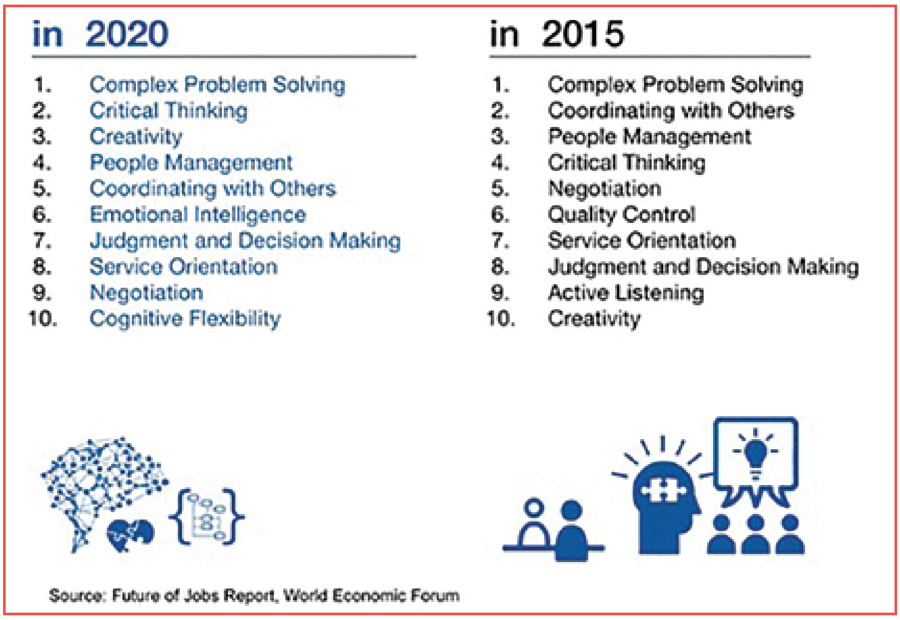
"For example, we had the team that was responsible for the relocation of the residents in Dingleton in the Northern Cape speak to the students about the complexities around the mining environment that they will have to deal with. In doing so, we were able to show our students that mining is not all about the technical aspects: mining is largely a people business".

Going back to the WEF report, Webber-Youngman believes that the first requirement, complex problem solving, is acquired with the students gaining the expert technical knowledge. "The second skill is critical thinking," he adds. "Now, in the context of an academic programme, we encourage our students not to accept the norm, but rather challenge it through critical and creative thinking."

In any mining set-up, in the present and the future, effective verbal communication skills are key, not only from an operational point of view, but also more importantly, to ensure a safe, healthy and productive work environment. However, given the fact that the younger generation's preferred method of communication is non-verbal through texts and email, how will they survive in a mining environment?

Webber-Youngman is very aware of this fact. "In MELA, we also include conflict management principles and one of the key issues that we amplify is that you cannot resolve conflict via a WhatsApp, sms, or for that matter, any social media platform; you have to deal with it face-to-face. In order to do this, we also emphasise Emotional Intelligence (EQ) is required to be able to confront an issue.

"I get really 'excited' when I see my students are in conflict state and I tell them that they need to deal with the conflict in person and not use a



The top 10 skills required in 4IR

Tuks uses VR to teach students about safe blasting practices

> "... One of the key issues that we amplify is that you cannot resolve conflict via a WhatsApp, sms, or for that matter, any social media platform,"
>
> **PROFESSOR RONNY WEBBER-YOUNGMAN**

phone as a conflict management tool – it's a necessary skill that will help them prepare for the workplace," he adds.

Africa has the youngest population in the world, and sadly, 60% of its youth are unemployed. Learning the skills required in 4IR – technical, computer and people skills – will go a long way to creating new jobs and realising the continent's true mining potential. Therefore, it is commendable that Wits and Tuks are taking a lead creating the workforce of the future – one that will inevitably impact the junior mining sector, which comprises such a large contingent of new entrants into the industry. MRA

Loesche

Hitting the junior market with force

Milling specialist **Loesche** may be recognised for its superior, German-engineered products but states that this should not detract the junior industry from designing their flowsheets with more cost effective, inferior products. The company offers various investment options that make the purchase of its mills a viable option for miners who have yet to start generating cash.

"Some junior miners are open to asking for help in obtaining their project development goals which we can help facilitate through investment options offered by Loesche," says Loesche SA sales manager Jonathan Smith.

"The company offers three financial models: toll milling, rent-own and joint ventures. Each financial model option varies and is tailored to suit the customers' needs and will include favourable finance interest rates. When coupled with its operation and maintenance offering which successfully delivers on relieving the customer of day-to-day operational headaches, Loesche is a service provider worth partnering with. "Our contracts ensure Loesche's commitments within our offer documents, and incorporates penalties for non-compliance," Smith notes.

DID YOU KNOW?
By incorporating Loesche equipment, mines can reduce power usage in their comminution circuit by 30 – 40%, effecting improved profitability.

Milling digitisation a plus for first-time users

Loesche has incorporated digital technology into its service offering with an in-house designed operating software that complements the quality of the milling process, Smith explains.

Loesche's LM master software allows the owner to optimise the performance and availability of the mill, live in the control room or remotely offsite. The software optimises the mill performance continuously, adjusting automatically to ensure the lowest power usage and optimal production.

"We call this the Loesche Artificial Intelligence system for plant operation and mill optimisation. Online controls and instrumentation allow the user to verify and record critical values and adjust the mill's performance whilst the mill is in operation," Smith outlines.

For juniors looking to secure the fast return on their investments, the incorporation of Loesche's digital milling technology will put them in the right direction towards achieving this. MRA

"Loesche has had large success with mining institutions that are focused on change for the better and to improve recovery with the reduction of downtime, maintenance, water usage, chemical usage, and waste being pleasant additional benefits. Loesche is able to help in all these spheres with the bonus of improved recovery of the mineral,"

JONATHAN SMITH

Get smart

Exploring the subsurface

The Smart Exploration project is an ambitious project with state-of-the-art solutions funded under the European Union's Horizon 2020 funding scheme.

GPS-time synchronization system

Being showcased at this year's PDAC, the project develops cost-effective, environmentally-friendly tools and methods for geophysical exploration in highly challenging brownfield and greenfield areas to address ever-increasing community and environmental issues, as well as reduce the return time on investments.

Since the inception of the project, the 27 partners comprising the project consortium have worked together to meet the task of developing solutions for deep mineral exploration. The solutions have been tested and validated under diverse mining conditions (surface, underground, open pit, brownfield, greenfield). Even though these solutions are developed for mineral exploration purposes, they have cross- and multidisciplinary applications and can be used by other industries.

Smart Exploration has developed five software applications and five prototypes throughout the project lifetime, meaning a complete package of solutions for deep mineral exploration is available at one address.

Software

- 3D frequency and time-domain electromagnetic modelling
- Thin-sheet time domain modelling and IP responses
- New solutions for near-surface problems and related deeper imaging improvements
- Generation of additional data from sparse active-source data with lower environmental impact
- Scattering/diffractivity imaging, improved resolution depth imaging

Prototypes

Three out of five prototypes have been validated and will launch in Canada.

- GPS-time synchronization system for denied environment such as underground mines
- Electromagnetic broadband frequency seismic source (E-Vib)
- Deep-probing time-domain electromagnetic helicopter-based system (HTEM).
- Slimhole modular system for mining boreholes
- UAV-Mag-EM for fast and over difficult terrains data acquisition

Two out of five prototypes are currently in the last phase of development and will be launched after validation. The three validated prototypes are:

GPS-time synchronization system

This system provides GPS-time signal in a microsecond accuracy in denied spaces (e.g. in underground mines). With this unique system, conventional recorders used on the surface can be synchronized as an array for deep exploration inside a mining environment.

E-Vib: Electromagnetic broadband frequency seismic source

This system generates acoustic signals like voice speakers for seismic imaging purposes as a result of minimized distortion due to a frictionless design and a broad bandwidth at full force (2-200Hz). This allows lower in force and smaller sized sources to reach greater depths (680 kg; →3 km). Being able to manufacture smaller sources and operate those sources with electricity, rather than hydraulic systems, results in a much improved situation of doing seismic acquisition.

HTEM: Deep-probing time-domain electromagnetic helicopter-based system

This system leads to an increased transmitter signal and enhanced depth of investigation. The developments include both hardware upgrades for increased signal strength and improved noise reduction and software upgrades to facilitate the low repetition rates down to 6.25 Hz.

Several presentations will be given during the events and the three validated prototypes will be showcased at the EU booth at PDAC. MRA

DRC Mining Week opening session in Lubumbashi last year

DRC Mining Week 2020

Trending topics

Finance, tech and juniors will be firmly in the spotlight at this year's *DRC Mining Week*.

Taking place in Lubumbashi from 17 to 19 June, this will be the 16th edition of the event in the heart of the Copperbelt, which has grown substantially over the last few years. Hon. Willy Kitobo Samsoni, DRC's Minister of Mines, will address the opening session of this year's conference.

With the support of the Ministry of Mines, the Federation of Congolese Enterprises (FEC) and strategic partners, *DRC Mining Week* will gather some 5 000 local and international mining stakeholders and influencers in the public and private sector doing business in the country. The event will feature at least six international pavilions including Germany, Zimbabwe, China, South Africa, UK, and France.

Other early confirmations of high-level industry expert speakers for the event include Amedeo Anniciello, CEO: Standard Bank, DRC; Gustave Nzeng Rubuz: chairman KCC–Glencore, DRC; and Richard Robinson: MD Alphamin Bisie Mines, DRC.

↑ Prof Willy Kitobo Samsoni

Focus on the future

New at the event this year will be a dedicated Finance and Investment Day to provide insights into the availability of funds and capital to penetrate this challenging but extremely promising strategic market. Another first is the Women in Mining session and Junior Mining Forum that will focus on understanding investors' mindsets towards junior mining and discussing how well prepared junior miners are to compete for funding in the DRC, compared to South Africa, Australia and Canada.

Other conference highlights will include an indepth look into commodities to emphasise the DRC's growing reputation as a sought-after mining investment destination, particularly with regards to battery metals. Says *DRC Mining Week* event director Elodie Delagneau: "With the surge in the global demand for rechargeable batteries and electric vehicles, the DRC is fast becoming a provider of choice, thanks to the volume and high grade quality of its cobalt and other strategic metals."

The event will also host a Technologies and Innovation session, discussions on developing enablers for value addition in the region; processing and beneficiation and tools for a sustainable value chain. The conference will also look to the future, specifically what the sector may look like in 2050 and the speed of digitisation of mining in the region.

The sessions on policies and regulation will unpack how the DRC can improve its business climate to attract more FDI; focus on governance issues and creating a responsible mining culture, traceability and tracking; local skills development and creating a "Made in the DRC" brand; and discussing the benefits of legalising artisanal mining in the country.

Giving back

DRC Mining Week has also renewed its partnership with local non-profit organisation BUMI, which is focused on helping orphaned and vulnerable children in the Lubumbashi region.

Sarah Moser, project coordinator at BUMI, says being the project of choice as social responsibility outreach programme for *DRC Mining Week* has benefited their organisation as it has raised awareness in the mining sector about the protection of vulnerable children, investment in youth education and support to communities.

"We are happy to see that more and more companies are becoming aware of their responsibility and implementing social projects, not only to comply with the regulations (i.e. minimum 0,3% of revenue for contribution to development projects) but also because they value social investments," says Moser.

Several local mining companies and suppliers have joined forces with BUMI to improve the living conditions of the children they serve. MRA

Sarah Moser (third from right),
DRC Mining Week team members and BUMI kids!

INTERESTED IN BEING PART OF THIS FLAGSHIP EVENT?

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