MODERN MINING
November 2022 | Vol 18 No 11
For people who are serious about mining
CROWN PUBLICATIONS

ASTEC INDUSTRIES TELESTACK
reports exponential growth

- **Minergy eyes increased production** from Masama Mine
- **Power play:** Bannerman weighs its options
- **Tirupati Graphite** eyes the big league
- **CESA calls for greater** mining sector collaboration

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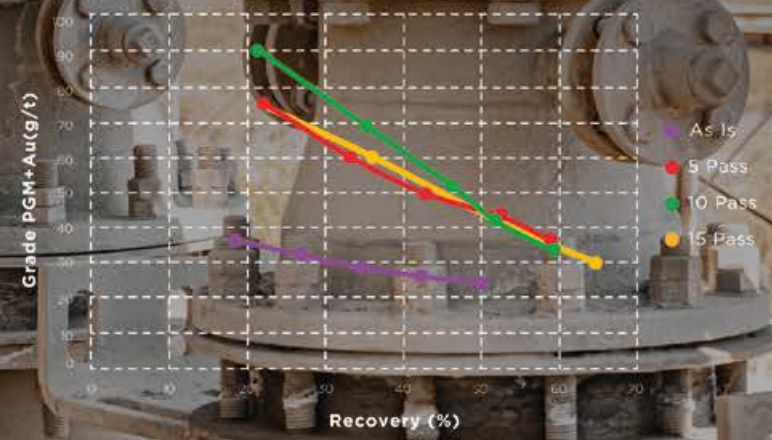

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ON THE COVER

Telestack, a division of Astec Industries, reports that demand for its product range has defied the norm to track exponential growth of between 10 and 15% per annum. See story on page 6.

COMMENT

Moving Swiftly ahead

Nellie Moodley

If you're a Swiftie, you would have heard that Taylor Swift has become the first artist in history to claim every slot in the top 10 of the US singles charts, overtaking Drake and the Beatles. This is thanks to her latest album, Midnights.

I guess if you are at the top of your game, as South African's are at mining, you are bound to be breaking barriers and pioneering some industry firsts too. On the subject of pioneering, South Africa's power workhorse, the Komati coal-fired power station in Mpumalanga, which has served South Africa since 1961, reached its end of life in October and is set to play a key role in the country's Just Energy Transition (JET) Strategy.

According to Eskom, the power plant will be converted into a renewable generation site powered with 150 MW of solar energy, 70 MW of wind energy and 150 MW of storage batteries, thereby continuing to put the site and its associated transmission infrastructure to good use, and provide economic opportunities to the community. A containerised micro-grid assembly factory has already been established on site.

"The Komati Repowering and Repurposing project is one of the largest coal-fired power plant decommissioning, repowering and repurposing projects globally and will serve as a global reference on how to transition fossil-fuel assets," Eskom said in a statement.

In line with furthering the green agenda, the power producer recently inked a lease agreement with Mainstream Renewable for a 1 650-hectare site where it plans to build and operate renewable energy plants. The lease agreement is part of a new initiative by Eskom to make land available around existing power stations to fast-track the connection of large quantities of renewable energy to the national grid.

With loadshedding still firmly on the agenda, mining houses continue to invest heavily in renewable energy, aiming for security of power supply and to reduce their carbon footprint.

In fact, gold miner AngloGold Ashanti, recently outlined its carbon emissions reduction target which is to achieve a 30% absolute reduction in its Scope 1 and 2 Greenhouse Gas emissions by 2030 through a combination of renewable energy projects, fleet electrification and lower-emission power sources.

Meanwhile, Anglo American has partnered with EDF Renewables to form Envusa Energy, which will develop a regional renewable energy ecosystem in South Africa. As part of the agreement, Envusa Energy is launching a pipeline of more than 600 MW of wind and solar projects in South Africa towards the development of an ecosystem that is expected to generate 3-5 GW of renewable energy by 2030. The first phase of Envusa Energy's renewables projects is expected to be ready for construction to begin in 2023.

This clean energy drive has reawakened nuclear energy conversations and sees Bannerman Energy, which has its Etango-8 uranium project in Namibia lined up and ready, watching and waiting to see if the appetite for uranium is reflected in higher prices (pg 20).

All these efforts are a clear indication that the drive to adopt clean energy is moving swiftly along even if, as consumers, we have yet to feel its impact.

But as the world transitions to clean sustainable energy, the Russia-Ukraine conflict continues to drive demand for coal as an energy source.

In the November edition *Modern Mining* features coal. Coal miner, Menar's MD Vuslat Bayoglu, shares his insights into the factors impacting coal and the commodity's resilience in the face of changing sentiment, while Botswana listed coal producer, Minergy, which is experiencing a turnaround in fortune, is eyeing increased production from its Masama Mine in Botswana.

Given the robust demand for coal, equipment producer Pilot Crushtec's DoppiaTrac DR400 double-roll mobile crusher is looking to catch the eye of collieries and coal mining contractors.

Our cover story, Astec Industries, highlights the progress being made by its Telestack division, which has, over the past three to four years, posted growth of between 10 and 15% per annum (pg 6). ■

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Published monthly by: Crown Publications (Pty) Ltd
P O Box 140, Bedfordview, 2008
Tel: (+27 11) 622-4770
Fax: (+27 11) 615-6108
e-mail: mining@crown.co.za
www.modernminingmagazine.co.za

Printed by: Tandym Print

Average circulation
April-June 2022: 12 617

Expect **more** sustainability

Solving the challenge of scrap tyres in a way that's practical and sustainable could be around the corner for Southern Africa. After successfully opening a thermal conversion OR tyre recycling facility in Chile that converts scrap tyres into base elements for reuse, Kal Tire is ready to bring this scalable solution to other regions.

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Kamoa Copper produces record 97 820 t copper in concentrate in Q3

Copper miner Kamoa Copper set a new quarterly production record in the third quarter of 2022 when it produced 97 820 tonnes of copper in concentrate, up from 87 314 tonnes produced in the second quarter and 55 602 tonnes produced in the first quarter. Kamoa milled 2.1 million tonnes of ore at an average feed grade of 5.6% copper during the third quarter, the company said.

Kamoa's Phase 1 and Phase 2 concentrator plants are both in commercial production.

The Phase 1 and Phase 2 concentrator plants also set a monthly production record in September 2022, producing 33 484 tonnes of copper in concentrate, while achieving a daily production record of 1 426 tonnes of copper in concentrate on 3 September. Ivanhoe Mines' Founder, Robert Friedland, commented: "Kamoa has effectively doubled its copper production rate to about 400 000 tonnes per year since the first quarter and is expected to be producing at an annualised rate of 450 000 tonnes per year by the second quarter of 2023. This all has been achieved ahead of schedule and on budget."

Management anticipates that the early commissioning of the Phase 2 concentrator plant in March 2022, about four months ahead of schedule, will enable Kamoa Copper to deliver in the upper range of its increased 2022 production guidance of between 310 000-340 000 tonnes of copper in concentrate.

Meanwhile, construction on the Phase 3 box cut and decline ramp for the two new underground mines, Kamoa 1 and Kamoa 2, is now complete. Phase 3 is expected to increase copper production capacity to about 600 000 metric tonnes per year by the fourth quarter of 2024, positioning Kamoa as the world's third-largest copper mining complex, and the largest copper mining complex on the African continent, the company said. ■

WPIC appoints Edward Sterck as Director of Research

The World Platinum Investment Council (WPIC) has appointed Edward Sterck as director of research, effective from 1 November 2022. Sterck joined the WPIC team in 2021, having spent over 15 years in sell-side equity research focusing on the mining sector, including coverage of major global platinum producers and diversified miners. In addition to research on mining equities, Sterck undertook supply/demand analysis for platinum, diamonds and uranium. Sterck brings extensive capital markets experience to WPIC with a career that has also spanned interest rate derivatives trading and advisory roles on corporate fund raising. He takes over the role from Trevor Raymond, who was appointed as CEO of the World Platinum Investment Council on 1 October 2022. ■

Anglo American partners with EDF Renewables to form Envusa Energy

Global miner, Anglo American has partnered with EDF Renewables to form a new jointly owned company, Envusa Energy, to develop a regional renewable energy ecosystem (RREE) in South Africa. In March 2022, the two companies signed an MoU to explore the ecosystem's development, designed to meet Anglo American's local operational power requirements and support the resilience of the electricity supply systems and the wider decarbonisation of energy in the country. The RREE is also expected to catalyse economic activity in the renewable energy sector.

As part of the agreement, Envusa Energy is launching a mature pipeline of more than 600 MW of wind and solar projects in South Africa – a major first step towards the development of an ecosystem that is expected to generate 3-5 GW of renewable energy by 2030. This first phase of Envusa Energy's renewables projects is projected to be fully funded and ready for construction in 2023. Envusa Energy is expected to supply Anglo American with a blend of renewable energy generated on Anglo American's sites and renewable energy transmitted via the national grid.

Nolitha Fakude, chair of Anglo American's Management Board in South Africa, said: "This is a significant milestone in Anglo American's global decarbonisation journey and another step towards South Africa's clean energy future. We are making great strides towards our 2040 target of carbon neutral operations while contributing to South Africa's just energy transition through our responsible approach." ■

Western Cape SEZ signs MOU with Sasol

Western Cape SEZ partners with Sasol to establish green hydrogen hub in Saldanha Bay

Freeport Saldanha Industrial Development Zone (also known as Saldanha Bay Industrial Development Zone – SBIDZ) recently signed a memorandum of understanding (MOU) with Sasol South Africa (Sasol) to facilitate a green hydrogen hub in Saldanha Bay.

The MOU follows on the heels of a joint development agreement (JDA) signed between Sasol and ArcelorMittal South Africa (AMSA) on a project aimed at addressing emissions reduction targets and exploring new value pools through sustainable product streams, including the Saldanha green hydrogen and derivatives project. Two of South Africa's biggest industrial operators, Sasol and AMSA, seek to achieve net zero carbon emissions by 2050. Kaashifah Beukes, Freeport Saldanha CEO said, "Saldanha Bay has a strong strategic fit with Sasol's ambition to be a leading driver and contributor to the development of SA's green hydrogen economy. In addition, Freeport Saldanha is a strategic partner for Sasol and AMSA, adding value to their exploration of new markets by bringing together several stakeholders to drive catalytic investments in sustainable industrialisation and product streams." AMSA, which is globally committed to ramping up its 'green' steel production, aims to be the first African green flat steel producer and will serve as the anchor customer of the envisaged facility. Using green hydrogen to produce direct reduced iron (DRI) will significantly reduce the process carbon footprint. ■

Orion secures R250-million for early works at Prieska Copper-Zinc Mine

Metal explorer and developer, Orion Minerals, has as entered a non-binding term sheet with the Industrial Development Corporation of South Africa (IDC) for a R250-million secured loan facility to fund early mining works and key pre-development activities at the Prieska Copper-Zinc Project, located in the Northern Cape. The proceeds of the loan will support the completion of the Bankable Feasibility Study (BFS) on the previously articulated Early Production Plan at Prieska, while also allowing the company to commence dewatering of the existing underground mine – a critical path activity. Orion and the IDC anticipate finalising and executing the definitive agreements for the loan in Q4 CY2022, with the IDC funding expected to be available for draw-down during late 2022. The Early Mining Works BFS for the Prieska Project is well advanced, with targeted completion in mid-2023. ■

Al Cook set to be De Beers new CEO

De Beers current CEO Bruce Cleaver.

Diversified miner Anglo American has announced the appointment of Al Cook as CEO of De Beers Group and Bruce Cleaver, current CEO of De Beers Group, as co-chairman of De Beers Group, both with effect from early 2023. Duncan Wanblad, CEO of Anglo American and chairman of De Beers Group, said: "Together with our partners in De Beers, we congratulate Al Cook on his appointment as CEO of De Beers Group following Bruce Cleaver's decision to step back to a non-executive role. Al Cook brings more than 25 years of international leadership experience, gained predominantly at BP and Equinor, most recently leading Equinor's multi-billion-dollar global E&P business across Africa, the Americas and Europe. He previously led Equinor's global strategy and business development, developing the company's net zero strategy." ■

Astec Industries Telestack increases its

Though the world economy continues to be impacted by the after-effects of the pandemic, Telestack, a division of global equipment manufacturer, Astec Industries, reports that demand for its product range has defied the norm to track exponential growth. According to Astec Industries regional product and sales manager, André Kruger, Telestack, a leading supplier of mobile conveying solutions has, over the past three to four years, been posting growth of between 10 and 15% per annum. By *Nelendhre Moodley*.

Over the past three to four years Telestack has been posting growth of between 10 and 15% per annum.

"Given this growth, the recent sales and service partnership between Telestack and Astec Industries is set to deliver significant benefits to South African mines, quarries, ports and plants," says Kruger, explaining that the partnership underpins the company's strategy of a pit to port product offering.

Astec Industries' Johannesburg-based Africa and Middle East business unit, Astec AME, will handle local sales and offer complete after-sales service and aftermarket support for all Telestack products in South Africa and through its dealer network in the AME & CIS regions. Ireland-based Telestack has been part of Astec Industries' stable since it was acquired by the group in 2014.

Telestack offers a comprehensive range of mobile conveying solutions including mobile ship loaders, ship unloaders, hopper feeders, truck unloaders, bulk reception feeders, stockpiling conveyors, link conveyors and telescopic stackers used in a wide range of industries such as mining, quarrying and agriculture, among others.

"To ensure a fully trained service department, the division, in conjunction with our dealers, undertook an intense training programme aimed at increasing our familiarity with the product range and embarked on a re-stocking programme to ensure we have sufficient stock on hand to support our customers adequately," says Kruger. "In fact, in line with our proactive stance, we continue to have an extensive stockholding and recently requisitioned two stackers and one hopper feeder. The products, which are currently en route, range in capacity from 500 to 800 t/h. In this way, we guarantee that we have products on hand to supply clients as the need arises."

Telestack's efficient shiploading system.

According to Kruger, the sales and service partnership came into play two years ago, following the call for all Astec Industries manufacturing subsidiaries, which were operating independently, to come under the single umbrella of Astec Industries.

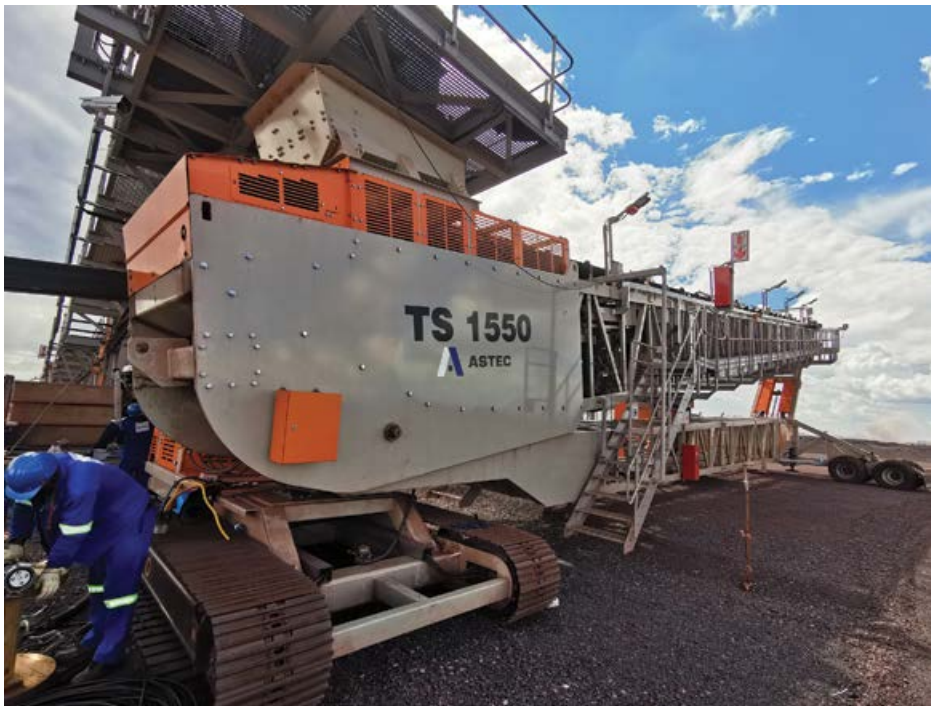
"We subsequently set up regional hubs throughout the world covering the various territories with the Africa-Middle East region taking care of Africa, Middle East and the Commonwealth of Independent States."

Factors driving demand for Telestack product

Telestack's fit-for-purpose range covers small scale, large scale, light and heavy-duty applications, ranging from 100 tph to 3 500 tph with all products designed and manufactured from high quality materials.

"Telestack premium quality products," explains Kruger, "are developed using robust high strength materials able to withstand the arduous African mining conditions, which ensures that equipment is able

growth and support in the region



to outlast standard industry products. This, in turn, guarantees that equipment has built-in longevity to lower the total cost of ownership significantly."

Given that mining companies face a typical 2 – 3% annual cost inflation, mining houses are keen to acquire products and equipment that reduce costs.

Apart from offering long-life products, Telestack's drive for continuous product improvement aligns with increased efficiency and the mining industry's drive for zero harm.

The equipment manufacturer's range of mobile units is designed to be operated from a central point away from a mine, quarry or port, and can be relocated easily to remote stations, or where required. The drive for efficiency requires that products need two people, at most, to manoeuvre the equipment for relocation. Further to this, Telestack offers the option to customise product features to meet the stringent safety requirements of the particular industries, such as mining.

"In South Africa," says Kruger, "Telestack's pit-to-port equipment range is gaining momentum, showing a marked uptake in the loading and offloading of bulk materials such as manganese and coal at the various ports. Telestack's range of equipment offers product sizes of up to 3 500 t, which allows for the transport of large quantities of product in a single haul. This translates to greater volumes, improved efficiencies and shorter delivery timeframes, which means that the products reach the end-user much faster."

The move from manual to mobile stacking at ports continues to evolve with Telestack's mobile ship loaders, truck unloaders, bulk reception feeders and telescopic stackers fast-tracking the evolution.

Kruger explains that manual ship loading and offloading often takes up to two weeks. "However, with the adoption of Telestack's range of mobile equipment, the turnaround time can be as little as two to three days. In fact, our client made the switch from mechanical ship-loading to Telestack's mobile range and reaped the benefit of a 48-hour turnaround time." Essentially, the machines are larger, faster and more efficient compared to the static products which continue to be in use. The client is now investing in more Telestack products to ensure faster turnaround times. "It is important to note that the cost of the products can easily be written off in the first 18 – 24 months. In this growing global market, it is not always sufficient just to meet the customer needs; we aim to go beyond."

Looking ahead

Astec Industries has an extensive footprint in Africa through its dealer network and services key areas on the continent. The company will continue to expand its footprint into new geographies offering its robust product range while providing back-up support and services, and improving its equipment range continuously to meet evolving customer needs. "Our business has done relatively well, even during the Covid pandemic, and 2022 has been an extremely encouraging year. Given that we currently have a number of initiatives in play, we anticipate that 2023 will deliver a favourable pipeline for the Telestack range of equipment," concludes Kruger. ■

Above: Telestack machines are larger, faster and more efficient when compared to the static products.

Left: Telestack equipment in operation at an aggregate operation in the UK.

Manual ship loading and offloading often takes up to two weeks, but with the adoption of Telestack's range of mobile equipment, the turnaround time can be as little as 2 – 3 days.

Price performance review

By Alana van Wouw, market analyst at Crane Ridge

As a result of the Covid-19 pandemic, 2020 saw a record 4.2% drop in global coal consumption, and within the 38 countries that comprise the Organisation for Economic Cooperation and Development (OECD), coal consumption fell by 15.2% in the same period. However, as with oil and natural gas, coal demand and consumption bounced back strongly in 2021, growing by 6.3%.

Coal consumption in non-OECD countries rose to a new record, while global coal consumption fell just short of the previous record set in 2014. Non-OECD countries now consume 81.5% of the world's coal.

Based on current trends, global coal demand is set to rise to 8 025 mt in 2022, the highest level ever seen, and to remain there through 2024.

Coal outlook: Demand and supply dynamics

Sanctions and bans on Russian coal following the country's invasion of Ukraine have disrupted markets, and various issues amongst other major exporters have contributed to supply shortages.

When the war in Ukraine began, European nations imposed sanctions on Russia that were designed to economically and financially limit the country's ability to finance the war. In the sixth package of sanctions against Russia, the European Union (EU) banned all imports of Russian coal.

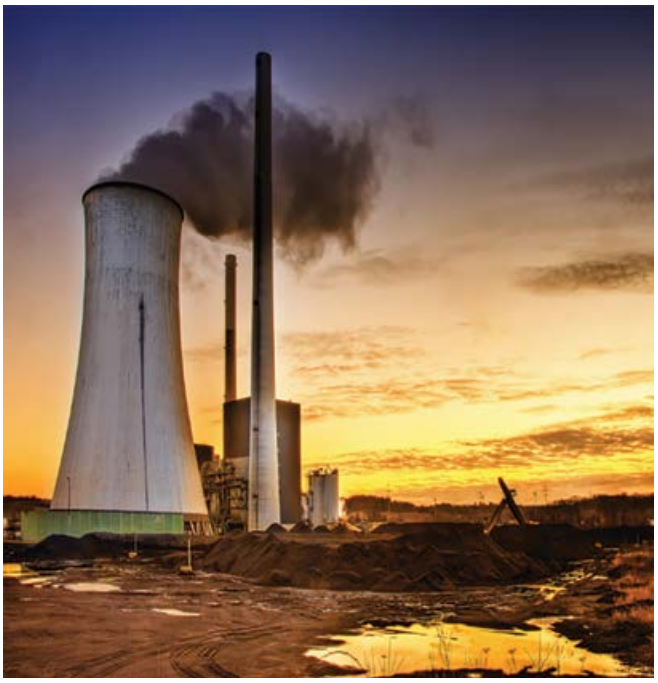
The ban was agreed in April with the import wind-down period ending on 10 August. Coupled with the oil embargo on Russian seaborne oil authorised in June and scheduled to go into effect at the end of the year, coal was the first Russian energy source to be affected by the sanctions.

EU requirements for coal during its winter periods saw a U-turn on the coal sanctions imposed on Russia. According to new guidelines from the executive branch of the European Commission, the transfer of some items, particularly coal and allied products, "should be allowed in order to combat food and energy insecurity around the world."

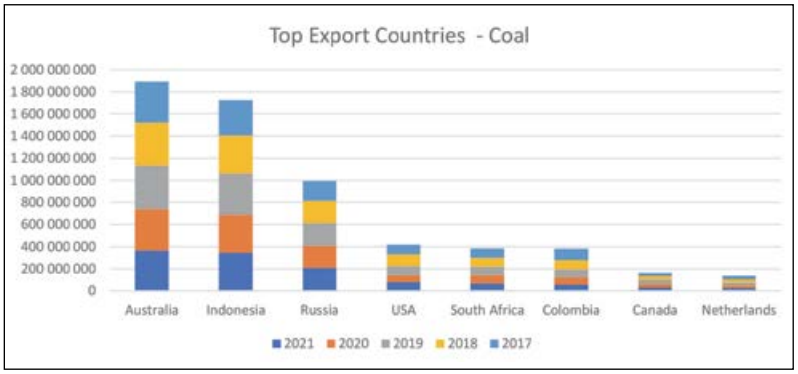
Coal consumption in the European Union is

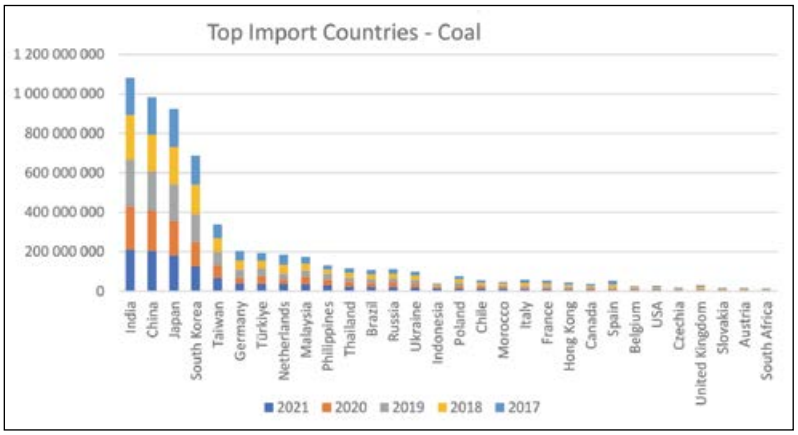
Right: Miners are investing in renewable energy projects.

Below: Coal demand is driven by demand from the electricity sector.



Global coal demand is set to rise to 8 025 mt in 2022.





expected to rise by 7% in 2022 on top of last year's 14% increase. This is being driven by demand from the electricity sector where coal is increasingly being used to replace gas, which is in short supply with resultant price volatility following February 24.

In addition, several EU countries are extending the lives of coal plants scheduled for closure; reopening closed plants; or raising caps on their operating hours to reduce gas consumption. However, Europe only accounts for about 5% of global coal consumption.

With other coal producers facing constraints in replacing Russian output, prices on coal futures markets indicate that tight market conditions are expected to continue well into 2023 and beyond.

Coal outlook: Factors to watch for

Energy markets are in a period of extraordinary turbulence as the world contends with the global energy crisis brought about by the Ukrainian situation and premature transitioning to alternate energy sources. While oil and natural gas are receiving much of the attention, coal markets are experiencing significant turmoil as a result. This has important implications for the many countries where coal remains a key fuel for electricity generation and a range of industrial processes.

In August 2022, RWE AG announced that it would restart three power plant units that were previously on standby amid efforts to cut down on the use of natural gas electricity generation. The restart, which will take place in the coming days, follows orders by the German government, the utility company said.

The three units – Neurath C and Niederaussem E and F – have a capacity of 300 megawatts each. They will be deployed until at least June 30 next year.

All three reserve power plant units, which run on lignite – also known as brown coal – had been originally planned to shut down permanently by next fall.

The trajectory of global energy demand, owing to the economic recovery after Covid-19 restrictions and current market disruptions, is not going in the right direction to meet climate goals.

COP 26 climate talks, held in November 2021, ended in a fierce disagreement over a pledge to abandon coal. A last-minute intervention by India successfully watered down the language of the pact from "phasing out" to "phasing down".

Without strong and immediate action by governments to tackle coal emissions – in a way that is fair, affordable, and secure for those affected – we will have little chance, if any at all, of limiting global warming to 1.5 ^{0}C. The realism of transitioning from coal in a managed way has become evident, leading to a more balanced future for coal production.

However, there are promising projects in the pipeline that will help in these efforts. One such is the German lignite coal generator *Lausitz Energie Kraftwerke AG* which plans to install 7 GW of renewable energy technology at former opencast coal mines in the Lusatia region by 2030.

The company expects to invest more than €10-billion to build the complex, which will combine solar photovoltaics, wind systems and energy storage solutions. ■

COP 26 climate talks, held in November 2021, ended in a fierce disagreement over a pledge to abandon coal. A last-minute intervention by India successfully watered down the language of the pact from "phasing out" to "phasing down".

Much maligned, coal proves its resilience

Vuslat Bayoglu, Menar MD.

By Vuslat Bayoglu, Menar MD

For centuries coal has been a vital cog in the world's energy mix. It lit the flames of the Industrial Revolution and these flames have grown brighter with every passing generation. And, while the 'imminent demise' of coal has been the subject of speculation and forecasts for decades, this versatile and cost-effective commodity continues to attract demand from developed and developing countries as they seek reliable and cost-effective energy to propel their economies.

The IEA notes that coal consumption in the EU is expected to rise by 7% in 2022.

Coalbrookdale, a small village in the UK, has been dubbed the cradle of the Industrial Revolution. This is because it was there, in 1709, that Abraham Darby discovered how to smelt iron ore using coking coal. Philip Riden in his journal article *The Output of the British Iron Industry before 1870*, notes that this discovery transformed the making of iron, with annual production in Britain increasing substantially from about 2 500 tons per annum in the early 1700s to 28 000 tons per annum by the 1750s to 180 000 in 1800 and 2.5 million by 1850.

The growth in British iron production was a catalyst for major industrial projects across Europe, such as the construction of bridges, extensive railway networks and the manufacture of machines. Coal-fired engines were crucial to the running of agricultural complexes, the establishment of factories, and the production of steamships and locomotives.

In addition to its metallurgical uses, coal was central to the Industrial Revolution as a power source. The steam engine harnessed the power of heat energy from coal which it transformed into mechanical energy. Ever since, coal has remained crucial to the industrialisation of economies the world over.

Coal remains crucial to the industrialisation of economies the world over.

Coal mining also played a fundamental role in bringing about peace and stability to post-World War 2 Europe by providing stable power and being the key ingredient for the European Coal and Steel Community, a precursor to the European Union (EU).

Peaks and Troughs

In 2020, global coal demand experienced its largest drop since the Second World War, declining 5% from 2019 levels. Coal's decline was only marginally down in power generation compared to industrial applications, such as steel manufacturing. Industrial sectors were severely subdued by global Covid-19 lockdowns.

Measures to slow the transmission of Covid-19, notably in the first half of 2020, resulted in a substantial drop in electricity demand. This in turn significantly affected the use of coal for power generation, which was made all the worse owing to low natural gas prices. In the second half of 2020, when countries relaxed their lockdowns and their economies rallied, coal consumption rose substantially, particularly in the emerging global industrial hubs of China and India.

At the same time, gas prices started rising leading to a greater uptake of coal in Europe. By the third quarter of 2020, global coal consumption had almost returned to 2019 levels. And then, during the final quarter of 2020, global coal demand increased by around 3.5% year-on-year. This was largely a result of the robust performance of the Chinese economy and the economic rebound in India. Another factor that aided the increase in demand for coal was extreme cold in parts of Asia, which meant that homes needed additional power for heating.

In 2021, with countries determined to recover losses incurred during 2020, industrial output and energy demands rose rapidly. Electricity demand greatly outpaced what renewable energy sources could supply, and natural gas prices were starting to rise sharply. Global coal power generation increased by around 9% in 2021, to 10 350 terawatt-hours (TWh), which was an all-time high for

coal consumption. Even in regions that have for years tried reducing their reliance on coal, such as the United States and the EU, coal power generation increased by around 20% in 2021 compared to 2020. Additionally, coal consumption increased by 12% in India and 9% in China respectively, in 2021, which led to coal power generation reaching record levels in both countries.

According to the International Energy Agency (IEA), the rebound in global industrial output and overall coal demand worldwide increased by 6% in 2021, which brought coal consumption to record levels it last reached in 2013 and 2014.

The IEA stated that beyond 2021, global coal consumption was set to revert to the pattern seen over the previous decade, which meant there would be declines in advanced economies (US, UK and the EU) that would be offset by growth in some emerging and developing economies (China, India and Vietnam). The IEA stated that this would mostly be driven by the power sector, where slow electricity demand growth and rapid expansion of wind and solar PV would gradually erode the coal power generation market share. The IEA noted another factor that would lead to coal usage decline, that is, lower gas prices. Nonetheless, based on 2021's analysis, global coal demand was set to increase to 8.025 billion tons in 2022, the highest level recorded and would remain at these levels through to 2024.

Ukraine War: Coal to the rescue

The war in Ukraine and the subsequent Western sanctions imposed on Russia which, in turn, reduced its supply of gas to Europe, has brought coal back into the mainstream. Several EU countries are extending the life of coal plants scheduled for closure, reopening closed plants or raising caps on their operating hours to reduce gas consumption. Several European countries such as Denmark, the UK, Italy and others are once again buying coal from South Africa.

Energy security took priority and coal, once again, was seen as the solution. As a result, global coal prices have increased substantially in the aftermath of the Russian invasion of Ukraine. ICE Newcastle coal for March 2022 delivery reached US$274.50 per ton on 28 February 2022, an increase of 9.15% compared to the previous day. Russia is the world's sixth-largest coal producer. And, with its imports falling under Western sanctions, coal importers had to look elsewhere. BP's Statistical Review of World Energy 2021 data showed that Russia's coal production reached 399.8 million tons in 2020. In terms of exports, IEA data revealed that Russia is the third largest exporter of coal after Indonesia and Australia, exporting around 200 million tons a year on average.

Several European countries are once again buying coal from South Africa.

The IEA notes that coal consumption in the EU is expected to rise by 7% in 2022, which comes in addition to 2021's 14% increase in coal use. This is being driven by demand from the electricity sector where coal is increasingly being used to replace gas, which is in short supply and has experienced substantial price spikes following Russia's invasion of Ukraine.

The Netherlands recently joined Britain and Germany, warning that it will have to use significantly more coal this winter to stave off looming energy shortages. The Telegraph reported in April: "There are growing fears that Russia's gas will be cut off, adding further to demand and raising the prospect of blackouts or energy rationing on the Continent."

Again it is coal that has come to the rescue, as it did during the Industrial Revolutions; in the post-World War 2 reindustrialisation of global economies; in the rebuilding of economies post the Covid-19 lockdowns and now again in Europe's coldest and darkest hour of need! ■

Left: For centuries coal has been a vital cog in the world's energy mix.

Below: Global coal demand is set to increase to 8.025 billion tons in 2022.

CEO Morné du Plessis.

Minergy eyes increased production

Having turned the corner, junior miner Minergy is revelling in the 'promising' outlook for coal and is confident that the commodity will continue to play a solid role in energy generation going forward. According to CEO Morné du Plessis, the last quarter of this financial year has been record-breaking, with the company achieving strong cashflows and profitability. This has been on the back of strong demand for coal from international markets, he says. By *Nelendhre Moodley*.

Masama Coal Mine.

Minergy's flagship asset is the 100% owned Masama Mine, located in the Mmamabula Coalfield of Botswana, which began production in 2019. The project represents the first step in the BSE-listed entity's strategy of becoming a mid-tier southern African coal mining company.

The turnaround in fortune for the coal miner comes on the back of the Russia-Ukraine war, which has seen the return to coal as an energy source following sanctions and bans on Russian gas. Russia is the world's largest oil exporter to global markets, and its natural gas fuels the European economy.

"We have sold more than 1.3 mt of coal since inception in 2019. We have also achieved the significant milestone of mining and processing 1 mt in the 2022 year."

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Traversing the tough road

According to Du Plessis, when the company began mining in 2019, it took the approach of a phased expansion of its processing operations.

"We took the decision to start mining and simultaneously progress construction of the processing plant. The plan was to rely on mobile equipment, which came with its own set of benefits and disadvantages. The benefit was that Minergy made an entrance into the market, with the cement industry loving our product, and we subsequently received our first offtake agreement. However, the production environment was continuously plagued by problems associated with using mobile equipment and, from a financial point of view, we were making losses because we were selling product below cost."

With the onset of the Covid pandemic and the low demand, quality and volumes of coal produced, together with the negative narrative relating to coal, the miner struggled to unlock the funding required to run day-to-day activities. Its woes were further exacerbated by freight rail entity Transnet's bottlenecks, which translated to the SEO not railing the required volumes of coal to the export market. This resulted in an oversupply of coal in the regional sized market – a market targeted by Minergy. The miner currently supplies 70% of the coal it produces to South Africa with the remainder allocated to the Botswana and Namibian markets.

The 2022 financial year saw the wheel of fortune turn in favour of the junior miner, which completed the construction of its coal processing plant in time to align with the skyrocketing demand for coal.

"In October last year, we completed plant construction, but demand from our key market was limited as a result of Transnet's bottlenecks. This encouraged us to look to at the global market."

Heartened by the robust coal prices, the coal producer supplied two vessels of coal from Walvis Bay this year and railed coal to the Port of Maputo to international markets, which greatly benefitted its bottom line.

The company hopes to increase coal supply to the more lucrative export market, leveraging off its increased volumes to meet the coal gap experienced by international markets.

"Owing to the pressures related to climate change, there have been no new mines developed in the recent past, which translates to limited supply from existing coal operations. Moreover, Europe, which was not in the equation for coal supply, has suddenly made a U-turn and, as a result, there is an insatiable demand for coal," he explains.

Du Plessis expects the international pricing for southern African coal to remain high, driven by continued supply shortages arising from the Ukraine war. "Minergy expects an undersupply in the regional market as a result."

Minergy currently supplies 70% of the coal it produces to South Africa.

from Masama Mine

Minergy has sold more than 1.3 mt of coal since 2019.

Strong demand for coal has seen the commodity trading well above $300/t for RB 1 coal specification, far above the $45 – $47/t it traded just prior to the onset of the pandemic.

"As a result of the Russia-Ukraine war, the price of coal at its peak traded at over $400/t and as there isn't an end in sight to the war, people are revisiting where and how they will source their energy."

The coal miner is well placed to supply into international markets, with its flagship asset geared to produce 125 000 tpm ROM and around 70 000 tpm saleable product.

"For the past two months we have been producing between 70 and 75 000 tpm of saleable product, which is above break-even. The opportunity exists to mine more; however, the project is stymied by limited plant capacity. We are currently evaluating the potential of expanding the plant's capacity, but this comes with funding requirements."

Coupled with capital constraints, Minergy remains challenged by the availability of water, as the Waterberg region is a water scarce region.

"Clearly, we would like to expand, in fact, double ROM production to 250 000 tpm with 150 000 tpm saleable product, but we remain constrained by access to funding and water availability," says Du Plessis.

The company is geared to produce 125 000 tpm ROM and around 70 000 tpm saleable product.

As it stands, the company's mining licence covers its 390 mt Masama resource, which has a plus 100-year LOM.

In a bid to raise capital, the miner is considering a listing on an international bourse, which Du Plessis says will "inject fresh cash into the business" to be used primarily to increase production and to refinance the expensive debt it currently carries.

Following the return in interest to fund coal projects, Du Plessis is eager to begin preparations for a listing which would either be on the Australian or a European bourse in the next 12 months.

"A secondary listing on an internationally recognised stock exchange remains an important strategic objective for Minergy," he said.

Further to this, Minergy has partnered with Jarcon Power and has submitted a bid for a new 300 MW greenfields coal-fired power plant in Botswana. The government, through the Ministry of Mineral Resources, Green Technology and Energy Security, invited the company's subsidiary, Minergy Coal, and three other selected local bidders to tender for the design, finance, construction, ownership, operation, maintenance and decommissioning at the end of its economic life, as an independent power producer.

"If the bid is successful, Minergy will be responsible for providing coal to the power plant for the duration of the power purchase agreement of 30 years, while other income streams are also envisaged," says Du Plessis, adding that this profitable sale of coal will have the benefit of ensuring a steady cash flow to Minergy and diversifying income streams. ■

"Clearly, we would like to expand, in fact, double ROM production to 250 000 tpm with 150 000 tpm saleable product, but we remain constrained by access to funding and water availability," says Du Plessis.

Local mobile crusher ideal for buoyant coal market

With South Africa's coal market picking up steam in recent years, there is even more reason for Pilot Crushtec's DoppiaTrac DR400 double-roll mobile crusher to catch the eye of collieries and coal mining contractors.

Jorge Abelho, Director Technical Support at Pilot Crushtec.

Ben Armitage, Sales Engineer at Pilot Crushtec.

Designed from the ground up specifically for coal crushing applications, the DR400 is Africa's only locally manufactured, fully mobile double-roll crusher. According to Jorge Abelho, director technical support at Pilot Crushtec, the design philosophy achieves the best balance of high performance and low running cost.

"We have focused on giving the customer a solution that delivers value, with average production rates from 300 to 350 tonnes per hour and as high as 400 tonnes per hour," says Abelho. "At the same time, contractors and mines can be assured of meeting stringent coal specifications with low fines generation."

The double-roll crusher gives the unit the ability to generate the required product size without the need for post screening. Abelho highlights the relatively low weight of the DR400 which, at 24 tonnes, reduces the cost of transport and site establishment.

Pilot Crushtec sales engineer Ben Armitage points to the highly competitive market for contractors in the coal sector – whether the coal is for power stations, petrochemical plants or export. The DR400 is equally at home with bituminous and anthracite coal applications.

High output, low fines

"End-customers require that contractors crush coal to their particular specifications, and the DoppiaTrac delivers on this with its adjustable double-roll crusher," says Armitage. "The type of crusher also drastically reduces the generation of fines, which leads to a higher yield of product and less waste."

Pilot Crushtec's DoppiaTrac DR400 is a track mounted, self-powered, single-stage double-roll crushing, sizing and stockpiling machine.

This has particular benefit for export coal, which often requires a washing plant to improve quality and raise calorific value of the end-product. Unlike a horizontal shaft impact crusher, which creates more coal fines due to the high levels of energy released through impact, the roll crusher forces material through a constant gap. The crusher uses just enough energy to break the material down to the size of the gap.

Armitage notes that monitoring of the DR400's performance has shown that its production of 0 to 6 mm fines can be as low as 5% in the end-product, depending on the feed grading. This compares very favourably to the levels of around 12% that are created by impact crushers. The hardness of coal also affects fines generation, with soft coal producing more fines. Similarly, high reduction ratios during

The DR400 double-roll crusher has a unique crushing action, which minimises fines generation.

crushing contribute to fines. Nonetheless, it is not difficult to see why these machines do not need final screening to achieve the required coal specification.

"Crushing efficiency is enhanced by feeding material into the crushing chamber at exactly the same speed as the drums are spinning," he says. "This minimises attrition and friction, even at the high intended throughput rates of 300 to 400 tonnes per hour."

Making connections

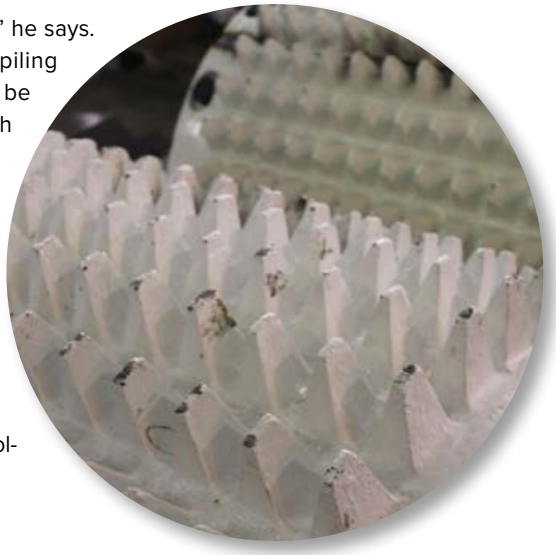
While the DR400's large hopper allows it to be easily fed by loaders or excavators, it can also be interlocked as part of a crushing train with upstream and downstream communication. When crushing run-of-mine coal, for instance, the DR400 can be 'connected' to a Metso Outotec Lokotrack LT106 jaw crusher – Pilot Crushtec being the southern African distributor for Metso.

"The connectivity between the two machines allows for an increased average production rate," says Armitage. "This is achieved by instant communication between the units to synchronise the feed-rate without needing manual operator intervention; the system is essentially able to optimise itself."

The on-board hydraulic rock breaker on the Lokotrack LT106 speeds up the handling of oversize material and prevents downtime due to blockages. Another important value-add from Pilot Crushtec is its modular stacking system, which reduces rehandling of coal and facilitates rapid sampling and testing. Stockpiles are created using a conveyor that slews on wheels, reducing the need for front-end loaders to continually double handle material.

"The coal needs to the sampled and tested before it is loaded onto trucks for delivery to the end-customer – and stockpiles can stand for up to 24 hours awaiting signoff," he says. "By increasing the stockpiling capacity, the DR400 can be operated continuously with samples taken in real time."

He emphasises that this solution has a double benefit. Not only does it cut down on the standing time of stockpiles awaiting approval, but also reduces the cost of double-handling large volumes of material.



The double-roll crusher gives the DR400 the ability to generate a guaranteed product size without the need for post screening.

Always safe

Pilot Crushtec has always put safety at the forefront of its designs, and the DoppiaTrac DR400 is no exception. Its safety features are aligned with leading mining companies' strict requirements, which allows the unit to go straight to work on any mining site.

"Our design includes a standard safety pack comprising full guarding around all moving parts, access points, nip points and crushing points," he says. "There is also an interlocking system, time delay start-up, pull cords and emergency stops to isolate the unit at the first sign of an emergency."

The mandatory sequential start-up sequence includes audible warnings before the start of each function, alerting all personnel that may be within an unsafe radius.

Efficiency

The operational efficiency of the DR400 is enhanced by its latest generation Volvo engine, with its EMS 2.3 engine management system. This delivers the lowest kW/tonne of any mobile double-roll crusher working in the coal sector. At a production rate of 400 tonnes per hour, depending on coal characteristics, the 160 kW output converts to a ratio of 0.4 kW per tonne.

"An important element of the low hourly cost is the impressive fuel consumption on this Volvo engine – as low as 17 litres per hour," says Armitage. "Contributing to this low consumption is a hydraulic load sensing system and optimised crusher chamber design, which reduce the power needed to crush the coal."

With its state-of-the-art design and workshop facilities in Jet Park, Pilot Crushtec is also known for the outstanding quality of its service offering. Support and spares are always just a phone call away, he says, especially as the DR400 has been locally designed and manufactured. Over 20 of these units are currently supported across South Africa, with one having already exceeded 22 000 hours of operation. ■

"We have focused on giving the customer a solution that delivers value, with average production rates from 300 to 350 tonnes per hour and as high as 400 tonnes per hour," says Abelho.

Coal is likely to prevail as the dominant base-load electrical power provider for the foreseeable future.

Clean Coal Technologies – *quo vadis?*

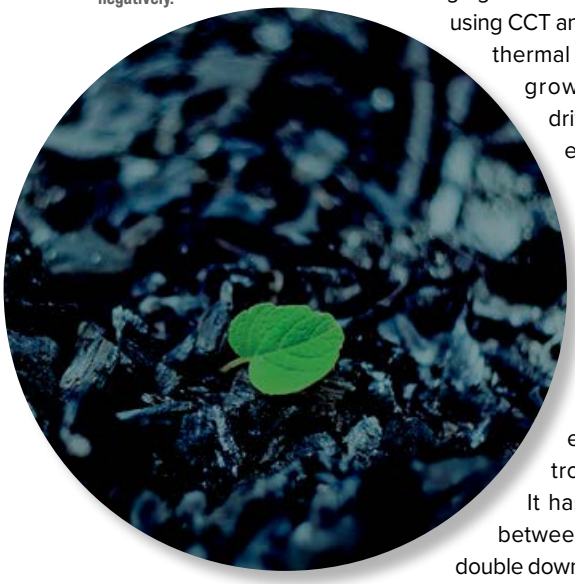
By Alan M. Clegg: chairman, Shumba Energy and Spencer Eckstein – director, business development, Ukwazi Mining Studies

Socrates famously stated: *"The secret of change is to focus all your energy, not on fighting the old but on building the new."* Any coal fired power plant (CFPP) projects constructed today will use Clean Coal Technologies (CCT) to enable permitting. Old power stations, such as those we have in South Africa that were predominantly built in the 1970s, do not have CCT, nor do the newer ones built in the 2000s, namely the air-cooled Kusile and Medupi.

The issues of Just Energy Transition and how to implement it are likely to generate further debate, and turn into a source of potential conflict between stakeholders, before becoming a reality in South Africa: not least because of governance failures and corruption scandals surrounding delivery on both sides of the aisle.

In contrast, other SADC countries, like Botswana, are forging ahead with plans to deliver new CFPPs using CCT and based on their own significant thermal coal resources and economic growth requirements, which are driven by the availability of cheap energy.

Burning coal to generate power impacts the environment negatively.



Globally, we have the COP27 Conference coming up in Sharm el-Sheikh, Egypt, between 6-18 November 2022 and now, following the Russian invasion of Ukraine, the exacerbated energy deficit in the developed, western economies has become a controversial energy delivery race. It has also highlighted the conflict between the 'green lobby' wanting to double down on the renewables proliferation strategy on one hand and the established, reliable fossil fuelled energy lobby on the other. The European energy crisis has also refocused attention on nuclear energy, which has been temporarily declared as a necessary evil and which has been allowed back into use, through sheer necessity.

So why is coal an issue?

Most mined thermal coal was created 200 – 300 million years ago from plant material that decayed and formed underground into carbon rich coal under very high heat and pressure. In South Africa, the bulk of our coal forms part of a particular geological feature referred to as the Karoo supergroup and is concentrated mostly in Mpumalanga.

Coal derived-energy formed the basis of the industrial revolution (c1760-1820) and throughout the British Empire became the dominant global form of energy, which continues today.

Coal contains a variety of chemicals such as sulphur, nitrogen and moisture, and when burned in a power station, produces carbon dioxide, sulphur dioxide, nitrous oxide and ash.

When claims regarding coal emissions are made and causal connections are drawn between emissions and climate change, its important for these claims to be evaluated objectively against the best

available scientific evidence; and evaluated in a manner that differentiates between long term natural shifts in climate (e.g. earthquakes, volcanoes, shifts in the earth's axis, etc.) and climate change due to human activity.

Burning coal to generate power does, via emissions of CO_2, impact the environment negatively. It is also true that when coal interacts with air, in some cases it produces spontaneous combustion. It is further true that when gaseous emissions interact with water in the atmosphere, acid rain is created. Surface and ground water can also be adversely affected by interaction with coal, when mined or when washed or used in a power station. Furthermore, there are always potential human costs associated with mining, particularly in underground mining operations, and these impact local communities and stakeholders.

However, the adoption and increased use of mechanised mining and monitoring technologies in coal mining has largely mitigated these risks, and mining companies are increasingly adopting 'Zero-Harm' policies as part of their ESG (environment, social & governance) profiles and practices.

The question remains: If coal is so harmful, why use it?

We use it because as an energy fuel source it is readily available and relatively cheap. It is also effective, particularly in creating baseload energy (energy that is always available within a 24-hour cycle and not dependent on environmental factors).

Interestingly, from a geopolitical perspective, it is not coal but oil that has shaped political conflicts and political alignments in Europe, the US, and the Middle East. It is the Petro-dollar that dominates the energy debate, while coal prevails generating c.60% of all global energy and c.83% of global electrical energy according to the International Energy Agency (IEA).

Coal beneficiation 'washing' reduces emissions of ash and sulphur dioxide when the coal is burned.

Critiques of renewables

Proponents of renewables claim that via the use of different, complementary technologies, particularly battery deployment for energy storage and the use of different combinations of battery metal chemistries, the costs of renewable per kw/h are consistently declining relative to other power sources or types. The critics of renewables argue that they cannot provide baseload energy; that they are grossly inefficient and that they are more expensive across the value chain.

How do we mitigate impacts from coal powered energy generation?

Locally and globally the focus remains on net zero

Botswana has significant thermal coal resources.

The level of market adoption for renewables has been variable, primarily driven by subsidies in some countries.

carbon emissions, to restricting global warming by 1.5 degrees Celsius (or more) and to move away from coal as a source of energy.

The main way the minerals and energy sector can contribute to mitigation efforts is to reduce CO_2 emissions from coal powered plants is to reduce the use of coal and other hydrocarbons and follow the new energy pathways.

The war in Ukraine and the energy crisis in Europe has inevitably re-opened debates around clean coal technologies (CCT) and the current global reinvestment in coal operations. It is the perfect storm to leverage and introduce CCT.

There are many elements to CCT, but appropriately combined within a CFPP design they are focused on two main results:

- Reducing total emissions (reduced carbon dioxide, sulphur dioxide, and nitrous oxide emissions, via carbon capture and/or carbon storage typically proposed for underground during or after combustion); and
- Focusing on higher combustion efficiencies for delivery of lower overall emissions.

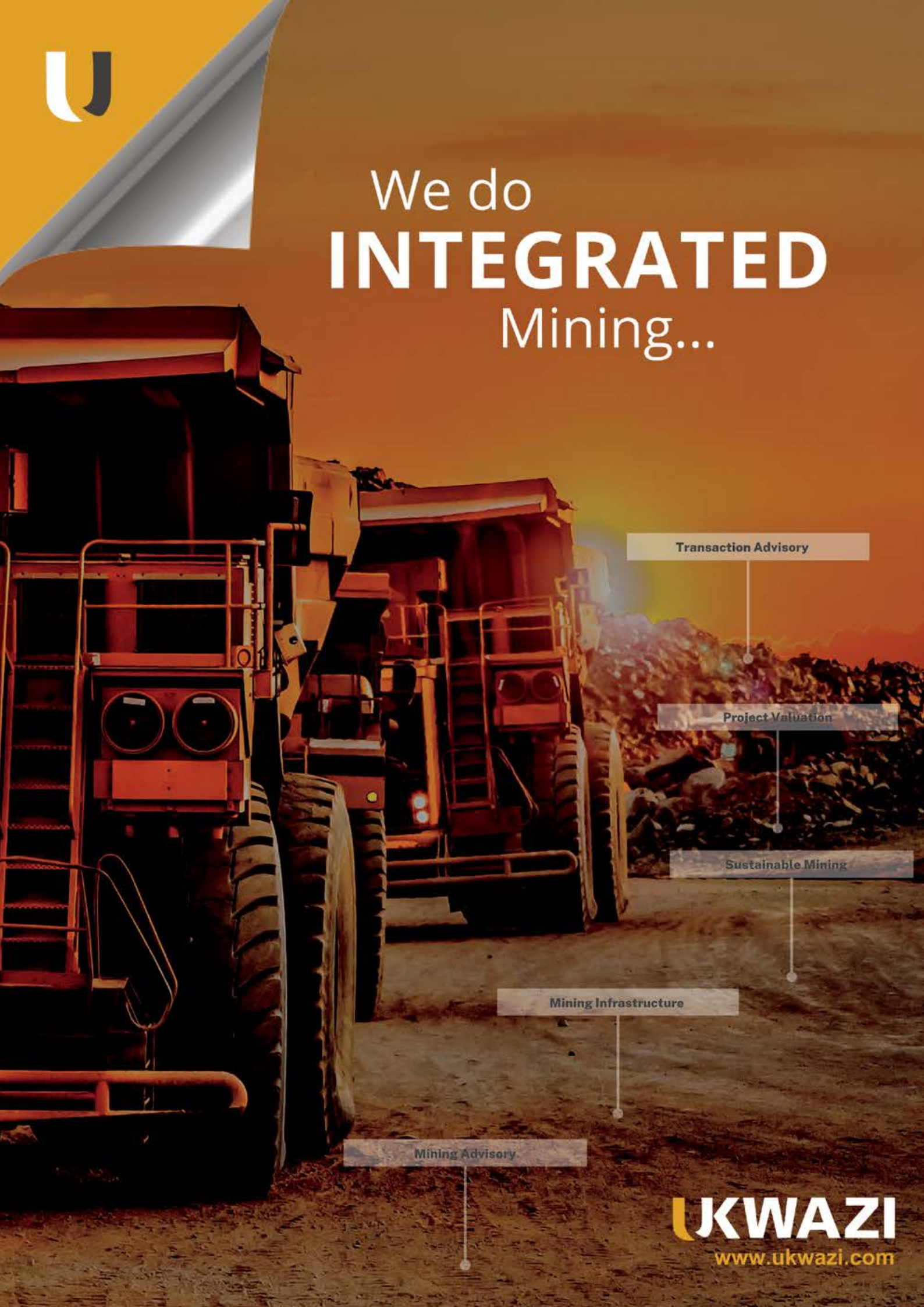
The suite of CCTs available includes:

- Coal beneficiation 'washing', which reduces emissions of ash and sulphur dioxide when the coal is burned.
- Electrostatic precipitators and fabric filters which can remove significant amounts of the fly ash from the flue gases, reducing emissions to within regulated levels.
- Wet flue gas desulphurisation to contain the output of sulphur dioxide to the atmosphere to within legal limits, potentially allowing for generation of secondary industrial production of sulphuric acid or gypsum, but the quantum depends on the level of sulphur in the coal.
- Low-NOx burners so coal-fired plants can reduce nitrogen oxide emissions by up to 40%. Coupled with re-burning techniques NOx can be reduced by 70% and selective catalytic reduction can clean up 90% of NOx emissions.
- Other technologies such as integrated gasification combined cycle (IGCC) and pressurised fluidised bed combustion (PFBC) ensure the coal burns more efficiently with lower emissions.
- Ultra-clean coal (UCC) injection to boilers from new processing technologies which reduce ash and sulphur, and which use pelletised washed coal fines produced using energy efficient cold agglomeration processes
- Gasification, including underground coal gasification (UCG) in situ, uses steam and oxygen to turn the coal into carbon monoxide and hydrogen.
- CBM (Coal Bed Methane) drainage for combustion and steam generation to drive turbines for electrical power generation. First low-capacity example of this is being commissioned in Botswana in next few years.
- Gas-to-Liquids (GTL) technologies using in-situ coal combustion for production of liquid fuels.
- Coal-to-Liquids (CTL) technologies for production of clean burning liquid fuels and useful petrochemical by-products called Aromatics, e.g., DBT (Dibenzyl-toluene) or BT (Benzyl-toluene) useful as LOHC (Liquid Organic Hydrogen Carrier) media for grid scale energy storage complementary for renewable energy generation

The technology options all come at different and increasing costs based on availability of metals and mineral components, variances in their respective EROI (Energy Return on Investment) and efficiencies and the level of market adoption for renewables has been variable, primarily driven by subsidies in some countries.

The mineral-energy complex may be shifting and evolving but given the ongoing proliferation and construction delivery of commissioned CFPPs, in particular in China (120 GW in 2021/22), India (40 GW in 2021/2022) and South-east Asia (90 GW in 2021/22); and noting that a CFPP has a life of at least 40 to 50 years, then coal is likely to remain as the primary base-load energy source globally to beyond 2070. According to IEA forecasts coal will move from 60% to 40%, Liquid Fuels from 14% to 5%, LNG from 10% to 20%, Nuclear from 10% to 20%, and Renewables from 6% to 15% of global energy generation.

In conclusion, and as Socrates said, we must focus on building the new. The reality is that coal is likely to prevail as the dominant base-load electrical power provider for the foreseeable future; and therefore, we have an obligation to pursue the adoption of CCTs for all new CFPPs, and as far as possible to retrofit certain technology elements of CCT in older power plants to improve existing CFPP emissions performance. ■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Power play: Bannerman weighs its options

Bannerman CEO, Brandon Munro.

Geopolitical tensions have put a spoke in the energy wheel, forcing countries to re-evaluate their energy plans as European nations, who turned away from nuclear energy to gas following the Fukushima nuclear accident in 2011, battle an unprecedented energy crisis, as they bear the brunt of the Russia-Ukraine conflict. By Nelendhre Moodley.

The conflict raises concerns about supply disruptions for energy and commodities, including uranium, which is used in power plants to generate electricity. This comes as countries around the world are considering using nuclear power plants to reduce their reliance on fossil fuels.

Added to this, the effects of climate change are wreaking havoc across the globe, with world leaders caught between a rock and a hard place as they ponder a mix of clean energy projects to ensure a sustainable future.

Uranium mine developer, Bannerman Energy, which has its Etango-8 uranium project in Namibia lined up and ready, is watching and waiting to see how this clean energy enigma plays out.

Will the energy crisis tempt consumers to return to nuclear with gusto or will there be a gradual inclination towards the energy source?

Bannerman CEO Brandon Munro believes that the energy mix will include all viable clean energy technologies with a greater emphasis on nuclear.

"After hydropower, nuclear energy is the largest source of clean energy in the world, delivering 10% of the world's electricity. In fact, it is responsible for more than half of the total amount of clean energy produced in the USA."

According to Munro, the case for nuclear energy remains strong, underpinned by the aggressive drive by China and Japan to develop nuclear power plants to meet their future energy needs.

"China is currently accelerating its nuclear reactor build programme, and is progressing construction of between six and eight nuclear power plants each year with the intention of increasing this to ten power plants per year for the next 15 years. By the end of this decade, China will be the largest single market for nuclear power, surpassing the USA. Japan is also making a play to accelerate the restart of the nuclear reactors that had been placed on care and maintenance following the Fukushima incident," Munro explains.

As new and existing markets increase their nuclear power ambitions, the long-term outlook for nuclear energy and, subsequently, demand for uranium to power the nuclear plants, looks positive.

Backing this notion is the International Atomic Energy Agency's (IAEA's) latest outlook for global nuclear capacity for electricity generation which sees the world nuclear generating capacity more than doubling to 873 gigawatts net electrical (GW(e)) by 2050, compared with current levels of around 390 GW(e).

IAEA DG Rafael Mariano Grossi says that owing to the impacts of climate change and the current energy crisis, governments are reconsidering their portfolios in favour of nuclear power. A number of member states are revising their national energy policies, and strategising to extend the operation of existing reactors with plans in place for the construction of advanced reactors, including the development and deployment of small modular reactors (SMRs).

CEO, Brandon Munro, on site at Etango-8.

Market fundamentals for uranium

Uranium experienced a boom from 2005 until the Fukushima nuclear reactor incident in 2011, after which it entered a bear market and only began emerging from extremely low prices in the past 12 – 18 months.

"In 2007, U_3O_8. traded at a high of $136/lb, softening to $74/lb and then sliding to a low of $18/lb at the depth of that bear market," explains Munro, adding that one of the challenges for uranium producers, after the Fukushima tragedy, was their inability to reduce their production fast enough to contend with declining demand.

"The declining market has finally turned. Excess inventory has been absorbed by financial investors and utilities are now buying to meet their consumption needs. However, the supply side is still slow to respond after years of under-investment and numerous political and environmental roadblocks in some countries," says Munro. Today, we sit with a significant sector deficit which is projected to continue till

Aerial view of the Etango project.

the end of the decade. For investors, uranium is now regarded as an exciting commodity for exposure to both the clean energy and energy security thematic. And according to Munro, with a strong balance sheet and one of the largest undeveloped ore-bodies in the world, Bannerman is perfectly positioned to take advantage of the next clean energy wave.

The ASX-listed uranium developer has been upgrading its flagship Etango project in Namibia since 2006, and benefitted from the last uranium bubble of 2007. This was a period highlighted by exponential growth in the price of natural uranium, which began in 2005. When the commodity peaked at roughly $300/kg (or ~$135/lb) in mid-2007, Bannerman was quick to take advantage of the favourable situation to raise the capital required to take the project up the value curve.

"The funds sourced during the boom were used for early-stage development of our project including over 300 km of resource drilling. And now that the project is close to being shovel ready, the markets have picked up in our favour," explains Munro.

But are market fundamentals sweet enough for Etango-8 development?

According to Munro, uranium is currently trading at a spot price of around $50/lb with long-term asset holders in a position to negotiate a premium for long-term contracts.

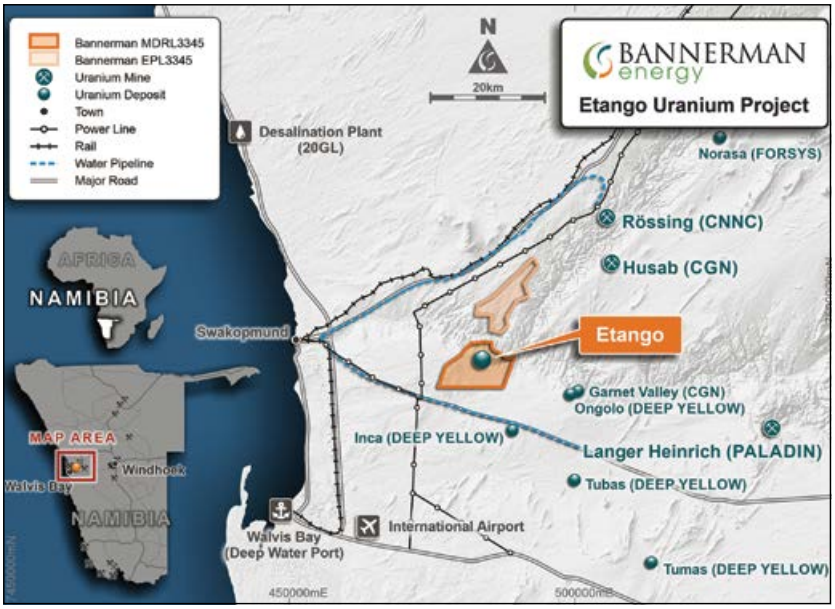
"The uranium price will need to move higher than $50/t to incentivise most developers, including Bannerman, to develop their projects into uranium mines. We will need to be patient for a little while longer to ensure that the price we start writing into long-term contracts will generate sufficient returns to reward shareholders' patience," says Munro.

Etango-8 in the starting blocks

The uranium developer's Etango-8 project, located in the Erongo Region of Namibia, 30 km South-East of Swakopmund, possesses a large-scale uranium mineral resource endowment of 207 mlbs of contained U_3O_8.

Following the completion of a Pre-Feasibility Study (PFS) on Etango-8 in August last year, which confirmed a strong technical and economic viability for a conventional open pit mine and heap leach processing plant for Etango's 8 mtpa throughput, Bannerman will, over the next 12 months, focus on

Etango Demonstration Plant.



Etango location map.

completing the DFS on Etango-8 and progress the front-end engineering and design (FEED).

"The immediate focus for Bannerman," says Munro "is on the final completion of the Etango-8 DFS, which is planned for this calendar year, followed by advancing the front-end engineering and design. From there, our focus will be on financing and construction, for which we will require total funding of around $300-million."

Although the Etango project was initially envisaged to be developed as one of the world's largest uranium projects, with a throughput of 20 mtpa capable of generating some 7,2 mlbs U_3O_8 (sufficient to power 17 – 18 GW of nuclear power projects), the company, in 2019, took a strategic decision to develop it as a smaller operation.

Aside from lower development hurdles, a smaller mine will allow Bannerman to begin production sooner, and thereby become cash generative more quickly than initially planned.

Following the revised plan, the project was subsequently renamed Etango-8, signifying a throughput of 8 mtpa throughput which would generate 3,5 mlbs U308 "or enough to power 7 – 8 GW of nuclear power plants".

"The decision to develop a smaller plant has been the largest single change in the past few years as we had already undertaken all the critical de-risking for the project, in the period between 2012 and 2019, when we completed a DFS on a larger scale project. Following the success of the DFS, we established and operated a pilot plant to prove the success of the project," explains Munro.

Etango-8 construction will take 18-24 months to complete, after which Bannerman will mine 60 mlbs of uranium during the first 15 years of the life of mine and thereafter look to mine deeper reserves.

"The Etango project," continues Munro, "offers scalability and the potential to unlock an enormous orebody over many decades, which is attractive to utilities looking to match the long life of their power projects to that of a long-life mining operation."

Despite being a low-grade bulk tonnage mine, delivering at a grade of 230 ppm, the Etango-8 project benefits from a homogenous orebody, a low stripping ratio and simple metallurgy. "In fact, the metallurgy is so amenable to heap leaching that we built a demonstration plant which we operated for three years to prove the extraordinary leach dynamics," says Munro.

Aside from being well located, being close to essential infrastructure such as road, rail, port and power, Etango-8 will access desalinated water from the local Swakopmund reservoir.

"Etango-8 is equipped with various advantages that will allow us unlock robust economics as the uranium price continues to improve," concludes Munro.

When constructed, Etango-8 will provide 750 permanent jobs to the community of Swakopmund. ■

Namibia

Namibia has been the 4th largest producer of uranium in the world for the last several years, rising to third in the past two years.

Bannerman is rolling out a number of community development initiatives.

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Tirupati Graphite eyes the big league

CEO Shishir Poddar.

London-listed graphite producer, Tirupati Graphite, which recently began production from its Madagascar assets, is finalising agreements that will see it expand its Africa footprint into key graphite producing regions and enable the miner to realise its strategy of becoming a producer of 8% of the global graphite market by 2030, CEO Shishir Poddar tells *Modern Mining* in an exclusive interview. By *Nelendhre Moodley*.

Graphite has been recognised as a critical and strategic mineral given that it is an ideal material for promoting green technology and is increasingly being used in applications related to energy storage, electronic products and photovoltaics. Its demand growth is largely underpinned by its use in batteries, which have been boosted by the soaring demand for electric vehicles.

S&P Global Platts Analytics has forecast global light-duty EV sales to rise to around 26,8-million by 2030, up from 6,29-million in 2021.

According to Poddar, graphite demand is expected, in the next eight years, to more than triple from its current global production of 1,5 mtpa, propelled by rising needs from the electric vehicle market.

"Globally, we produce 1,3 – 1,4-million mtpa of graphite, but most of that goes into applications other than energy storage (10 – 15%). By 2030, it is estimated that another 4 – 5-million mtpa of graphite will be needed to meet industry requirements. Conservatively, we have forecast around 3,5-million mtpa," he said.

Looking to take up as much as 8% of global market share, Tirupati Graphite will target 400 000 tpa of graphite production.

"Our current production from Madagascar," says Poddar, is insufficient to meet our growth projections, and we are actively seeking opportunities to acquire more resources. In fact, we recently undertook an acquisition arrangement to acquire the Montepuez and Balama Central projects in Mozambique from Australia's Battery Minerals, and we have our ear to the ground seeking out new graphite opportunities."

Apart from Mozambique, Tirupati Graphite is eyeing southern and eastern Africa as standout areas containing extensive graphite resources with Tanzania and Malawi, in particular, identified as clear options for geographical expansion.

Further to this, the miner recently announced that its subsidiary Tirupati Madagascar Ventures has entered into an agreement to acquire three additional mining permits in Madagascar, covering a total area of 31,25 km^2 and located in the vicinity of the company's existing projects. The consideration agreed for the acquisition is a total of MGA 800-million (£167 000).

Owing to the proximity to its existing operations, the company believes it can progress activities in the acquired projects in a timely and cost-effective manner alongside its other Madagascan projects.

While no JORC 2012 compliant mineral resource

Tirupati's Madagascar operations.

Tirupati's Madagascar operations.

statement is available for the permits, historical geological data and initial ground assessments suggest that the new permits have the potential to add two or three 18 000 tonnes per annum modular facilities for flake graphite production. This could therefore significantly add to the company's currently planned 84 000 tpa capacity across the Vatomina and Sahamamy projects.

"We are pleased to be acquiring additional permits near our existing projects in Madagascar. It is our priority to increase ground in Madagascar alongside other locations to preserve our long-term capacity targets and resource security, and these acquisitions can help us enhance our overall output from Madagascar by up to an additional 48 000 tpa in due course. It is our stated strategy to develop capacity of circa 8% of the global flake graphite market or 400 000 tpa by 2030. Our intention is for 50% of that capacity to be in Madagascar to take advantage of the favourable flake size distribution of its deposits. Acquisitions like this will be instrumental in enabling us to achieve our objective of becoming one of the most significant players in graphite as global demand increases for this critical energy transition mineral," said Poddar.

Graphite production in Madagascar

Madagascar is considered to host some of the world's best graphite deposits, in terms of quality and size of resource. It was this that encouraged Tirupati Graphite to set its sights on the country and subsequently acquire the Sahamamy and Vatomina projects.

Madagascar is the world's fifth largest producer of graphite, containing the world's third largest graphite reserves. Last year, the country produced 22 000 mt of graphite.

The world's top graphite producer remains China, which leads the way significantly at 820 000 mt of graphite produced last year, followed by Brazil with 68,000 mt, Mozambique with 30 000 mt, and Russia in fourth position with a production rate of 27 000 mt.

According to Poddar, aside from being blessed with some of the finest graphite deposits, Madagascar has an attractive mining code, offering a 40-year mining permit and an extremely supportive government, which is focused on promoting its mining sector to international investors.

The country has well-established infrastructure, including a road network (the national highway NH2), which runs close to Tirupati Graphite's two projects, Sahamamy and Vatomina.

The highway connects the projects to the capital city of Antananarivo and the country's main port

Tirupati Graphite develops, pilots, and implements bespoke equipment that promotes sustainable operations.

Aerial view of the Tirupati's Madagascar operations.

– Tamatave – which links to multiple shipping lines worldwide.

To get its Sahamamy and Vatomina projects off the ground and into production, the African miner invested around £14-million in capital expenditure, which included the cost of exploration and internal infrastructure developments, such as investment into the development of a 50 km road infrastructure and the cost of the 30 000 tpa processing plant.

Compared to the millions of dollars laid out by many of its peers in capital expenditure to get projects into production, Poddar says that the capex to develop the two Madagascan projects is relatively minute given the capacity perspective of 30 000 tpa production.

"We have extensive experience, extending to three decades of working in the graphite space, which has been key in helping us keep our costs extremely low. In fact, we manufactured the heart of the processing equipment and machinery inhouse, and undertook the entire engineering and development of our projects ourselves. And apart from being able to build our graphite projects at a fraction of the cost of other producers, we were able to do so at a much faster pace."

Although the Vatomina project is a greenfields project, the miner completely overhauled the dilapidated small brownfields Sahamamy operation, equipping it with the latest technologies to ensure it delivers to peak performance.

Tirupati Graphite's Madagascan projects are high-grade saprolitic deposits in well-delineated mining zones that have shallow mineralisation, which allows for free dig mining and thereby the ability to keep costs to the lowest quartile.

Commercial production from Vatomina, which has a production capacity of 9 000 tpa of flake graphite, commenced in December last year with the 18 000 tpa Sahamamy project, to be commissioned this year.

As the company aims at becoming a producer of 84 000 tpa of graphite concentrate by 2024, it will continually ramp up production, adding 18 000 tpa of concentrate before the end of 2023, to bump up production to 48 000 tpa.

Poddar explains that the orebody is blessed with the sought-after and highly priced large to jumbo sized flake concentration, making it an extremely attractive project. "Between 70% and 80% of flake size falls into the large to jumbo size category," he says.

By 2024, the company hopes to produce 84 000 tpa natural flake graphite with 30% in the jumbo category, 40% in the large category, 30% in the small category.

Current graphite production will feed the world's larger users of graphite. However, for the additional output scheduled to come onstream in the near future, the company is engaging with a different suite of graphite users, including those in the energy storage space, and is already in the process of engaging automobile giants and battery manufacturers.

Poddar says bringing its two graphite assets into production is a huge milestone and sets the ball rolling for the company to become a global graphite player. "Rarely does one come across a mining company that can say it has become a producer within five years of identifying an asset.

"And becoming an initial producer of 30 000 tpa of graphite concentrate brings us into an enviable position in terms of earning capacity and providing value for shareholders as we target further growth through additional exploration of our existing assets."

Graphite market

Many parts of the world, such as India, USA, Europe and Japan, are net importers of flake graphite.

The EU and USA have classified the material as a critical resource.

Tirupati Graphite's team conducts exploration activities in Madagascar.

Localisation focus

With the demand for electric vehicles set to soar, Tirupati Graphite is heeding the call for the localisation of manufacturing centres in developed countries and has in place an arrangement with an Indian company for progressing projects aligned with this strategy.

"We are in the process of further arrangements with Tirupati Speciality Graphite Private Limited (TSG) that will allow us to fast-track our strategy on hi-tech speciality graphite products and the graphene and advanced materials arena."

"On the back of global geopolitical turmoil, we are seeing an increased call for local manufacturing. Our intention is to build a downstream entity, possibly in the UK or in Europe, from which we will, for

instance, establish a battery grade product. If there is a Tesla plant in Europe that would like to have its anode material for batteries manufactured locally, we will establish a plant in the area to tie in with our downstream growth strategy. Essentially, Tirupati Graphite plans to develop local sources and we will do this in as many locations that need this type of service as we can."

According to Poddar, this drive is in response to the electric vehicle market which relies on large quantities of graphite.

"As a benchmark, a single Model 3 Tesla uses between 40 and 50 kg of graphite. With the uptake of electric vehicles set to grow exponentially over the next 6 – 8 years, the demand for graphite is expected to soar," which bodes well for the miner.

Integrated market offering

Being fully integrated from mine to graphene, with operations in Madagascar and prospects in India, Tirupati Graphite is working on becoming the benchmark in the worldwide flake graphite industry.

The company, a global multi-location resource operation, is setting up state-of-art-facilities to make products for conventional and new applications and is developing technologies and expertise through design, engineering, research and development.

"We place special emphasis on applications in green energy, energy storage, composites, graphene and others, securing the world's needs of this critical material and maximising value for all connected," says Poddar.

As it stands, Tirupati Graphite envisages three independent and complementary business verticals which will complete its basket of products from mine to graphene, all along the value chain.

Aside from primary mining and processing in Madagascar, TSG has a hi-tech graphite processing plant in India to produce specialty graphite, and a state-of-art graphene and technology R&D centre is being established in India.

The company currently produces 1 200 tpa expandable graphite-based flame-retardant material in India, with plans in place to expand this to >28 000 tpa specialty graphite products.

Sustainability

Underpinned by its drive to become a net zero carbon emissions emitter, Tirupati Graphite has been progressing technologies to meet this targeted objective.

"Despite being a small company, we released our first sustainability report last year. Through the use of green technologies developed in-house and implemented across our projects, we have been able to achieve significant milestones. To minimise waste in Madagascar we re-use the sand, a by-product of mining processing, in infrastructure development such as roads. Further to this, we recycle water – in fact, almost 100% of the water used across our operation is recycled. Our aim is to continue progressing technology that will lower our carbon footprint."

Above: For Madagascar Independence Day, Tirupati Graphite distributed clothes, food, and sports gear to the communities around its mining projects.

Left: Tirupati Graphite organises regular sports events in the local school.

Aside from efforts around social responsibility, which involve providing housing, schools and health services to its employees and the community surrounding its mining operations, Tirupati Graphite continues to 'green' the environment and in the last financial year planted 20 000 trees, an endeavour the company plans on progressing well into the future.

The miner's green energy drive saw the company recently commission a 100 kW hydropower plant at its Sahamamy graphite mine. ■

Properties of graphite

According to Poddar, graphite is a material with a special set of properties:

- ❑ It is a non-metal. However, it behaves like a metal and it is the only non-metal that can conduct electricity.
- ❑ Graphite is also used in pencils, steel manufacturing, and electronics such as smartphones. Perhaps its most important application is the lithium-ion battery, where graphite ranks above even lithium as the key ingredient.
- ❑ Owing to its atomic structure, it has a lubrication property and thereby an extensive range of applications in products such as greases
- ❑ A melting point of 3 600 degrees centigrade, which makes it suitable for use in refractory as it withstands high temperatures and tolerance without changing chemically. It is used in manufacturing processes ranging from steel and glass making to iron processing.
- ❑ Graphite is non-inflammable and has uses in products that are fire-resistant.
- ❑ Rolled single graphene sheets are 10 times lighter, and 100 times stronger than steel. Such a rolled sheet is also referred to as graphene, and this derivative of graphite is the world's strongest identified material and has been used to make super-strength, lightweight sports equipment.

Sukari open pit and processing plant.

Putting a world-class mine around the world-class Sukari orebody

Centamin plc, the London- and Toronto-listed mid-tier gold mining group, led by CEO Martin Horgan, is two years into the transformational reset of its flagship asset, the Sukari Gold Mine in Egypt, which is targeting a minimum of 500 000-ounce gold production per annum from 2024.

Sukari is one of Africa's top ten gold mines by life of mine and annual production, and the only commercial gold mine operating in Egypt. It has been producing for 13 years and recently celebrated the five millionth ounce from this world-class orebody. Looking forward, the mine has a 12-year life of mine (5.8-million ounces of Mineral Reserves) with significant upside potential to grow the 9.8-million ounce Measured & Indicated Resource (inclusive of Mineral Reserves) through robust orebody stewardship using modern technologies and targeted exploration.

Resetting for a more sustainable and growth-focused company

Centamin senior management launched a reset in 2020 that focused the corporate strategy on improving operating efficiencies and productivity and developing a culture of continuous improvement. In view of the significant investment required to reset the mine to achieve its long-term production goals, production at Sukari was reduced in the past three years, taking advantage of elevated gold prices, to ensure its long-term sustainability and consistency of gold production.

Sukari Gold processing plant.

The reset included expanding the underground operations and delivering a 10-year life of mine plan, with a target of adding three million ounces of reserves to the asset base, increasing the optionality of the mine plan, growing yearly production by 25%, achieving costs savings of US$150 million and reducing Lost Time Injury Frequency Rate (LTIFR) by 25%.

To date there has been a 23% increase in gold reserves, amounting to 1.1-million ounces more, including a 200% increase in the underground reserves, the largest increase in 10 years. Centamin has also decreased underground costs by 33% through transitioning from a third-party contractor to an owner operator model for underground mining; increased productivity using lightweight high-capacity truck trays; and has re-entered into higher-grade areas of the open pit through a waste stripping programme.

Investing for higher productivity and sustainability

Centamin's commitment to sustainability can be seen not least through its investment of $125.5-million into growth projects, including building a 36 MW solar power plant, optimising the tailings storage facilities, improving underground infrastructure, developing the paste-fill plant, and upgrading the Sukari camp.

The solar project, which encapsulates the sustainability strategy embarked upon by Centamin, is designed to reduce Centamin's diesel consumption for power generation by around 23% (22-million litres) and reduce its GHG emissions by 60 000 tCO_2-e per annum.

In parallel, Centamin is advancing investigations to further reduce its carbon intensity and reliance on diesel, including connection to the national grid and fuel switching to natural gas.

The company has committed to defining a climate change strategy by the end of the year. The strategy will set additional metrics, an ambitious

science-based target for carbon reduction by 2030, and will strive to align with a trajectory of emission reduction to net zero by 2050.

Another important capex project has been the integration of high-production truck trays. These are 40% lighter in weight and increase payload by 5%, reducing fuel consumption by 15-20% per tonne hauled.

Social license has always been central to Centamin's operations. To date, Centamin has distributed in excess of $800-million to its partners, the Egyptian government, by way of profit share and royalties. Centamin is also committed to increasing community spend and local procurement. Of the 3 800 people who work at Sukari, 94% are Egyptian nationals (with 77% of the leadership roles occupied by national employees).

In 2021, the company launched a substantial employee development programme to ensure it attracts and retains the best quality individuals.

Production

In the first half of 2022, Centamin produced 203 898 ounces of gold at a cash cost of $931 per ounce and an AISC of $1 446 per ounce. For the full year, Centamin expects to produce between 430 000 and 460 000 ounces at cash costs between $900 and $1 000 and an AISC of between $1 275 and $1 425, although, acknowledging continuing inflationary pressures, the company anticipates costs to be in the upper end of the guidance range.

The company has published a clear roadmap to produce in excess of 500 000 ounces per year, identifying significant potential for near-, medium- and long-term growth, including potential to increase the underground mining rates. A study, due before the end of the year, is currently underway. This will include a review of the Bonanza high-grade structures in Sukari's Bast area, which have demonstrated a consistent geological host that could allow for both underground and open pit growth potential.

Exploration

The Sukari Gold Mine is located within Egypt's Arabian Nubian Shield, one of the least-explored gold belts in the world. It is believed that there are other sizeable gold deposits like Sukari in this belt. The prospectivity of this underexplored belt has attracted interest from several mining companies, including Barrick Gold, the world's largest gold miner. In 2021, Centamin secured three sizeable exploration blocks covering 3 000 km^2 of highly prospective ground. Over the next two years, Centamin is investing $10-million in a modern exploration programme, which will identify and rank potential targets.

Looking further afield, Centamin has a suite of exploration projects in West Africa. The most advanced is the Doropo Project, located in Côte d'Ivoire. Currently it has a mineral resource inventory of 5.4-million ounces (including Inferred). The 2021 scoping study demonstrated positive economics and a PFS is underway, assessing the potential to be Centamin's next mine.

Centamin team examining the core.

Sukari has taken advantage of the elevated gold price.

Perfectly timed pragmatic cost-savings programme

The launch in 2020 of Centamin's cost-savings programme could not have been better timed.

Now, with the bulk of the mining sector seeking ways to cut costs in the short term due to inflationary pressures, Centamin is well ahead of the curve and, to date, has produced cost savings of $78-million, putting it firmly on track for its target of $150-million. The company is reviewing several additional opportunities for cost savings, including power optimisation, dynamic gas blend fleet, gravity circuit, water detoxification plant, regrind circuit and CIL controls. In addition to cost savings achieved through the underground owner-operated model, high-production truck trays and solar power plant, Centamin is also looking at several opportunities to improve operating efficiencies within the processing plant and further ways to optimise its supply chain, utilising local Egyptian suppliers where possible.

As at 30 June 2022, Centamin had $175-million in cash and liquid assets and zero debt. Senior management, led by CFO Ross Jerrard, is looking at how to maximise the strong balance sheet through a capital structure review, due out later in the year.

Looking forward

Since the reset, Centamin has delivered strong performance against guidance, with a clear focus on long-term value creation. Looking forward, with peak capex now behind the company and the reset reaching its last phase, the future looks bright for Centamin's Sukari mine. Centamin will continue ramping up production from this Tier-1 asset whilst keeping a tight grip on costs, and with the long-term goal of becoming a multi-asset gold producer by moving forward with the Doropo PFS. ■

CESA calls for greater mining sector

Against the backdrop of robust commodity prices, South Africa's mining sector continues to deliver a sterling performance and recently exceeded expectations, doubling distributions to shareholders to R190 billion, with taxes paid increasing by 14% and capital expenditure growing by 36%. But has this bounty trickled down to an integral component of the mining sector – consulting engineers – and what has been the overall impact on this segment of business? *Modern Mining* spoke to Consulting Engineers South Africa (CESA) CEO, Chris Campbell, to find out just how consulting engineers have been faring. By *Nelendhre Moodley*.

CESA chief executive officer, Chris Campbell.

According to Campbell, the current mining boom sees mining houses focused on optimisation and expansion initiatives with greater attention being given to investment in power projects aimed at stabilising power supply to ensure miners have sufficient energy to power their operations.

"Currently there are not many new projects – particularly projects of significance – being developed locally and this is due largely to the environment of political and policy uncertainty that has discouraged foreign investors from injecting the capital necessary to progress mining projects. Even greenfield and exploration projects are being hampered by the prescripts of the Mining Charter as miners work towards mining licence eligibility. It is not often possible to get a BEE partner that will invest in risk if there are no confirmed deposits to mine as is the case in exploration projects; it is, however, much easier find a BEE partner for a greenfields investment as the risk is much less given that deposits and life of mine, have already been established."

On a more positive note, though, optimisation projects and those related to tailings storage facilities (TSF) have increased, largely driven by the publication, in 2020, of the Global Industry Standard on Tailings Management (GISTM), which makes it clear that extreme consequences to people and the

There is need for mining companies to broaden their vendor base to incorporate new entrants.

environment from catastrophic tailings facility failures are unacceptable.

The GISTM provides a framework for safe TSF management of operational, decommissioned and closed tailings facilities with the aim of achieving zero harm to people and the environment.

The drive for TSF compliance follows the *Brumadinho* dam disaster, which occurred in January 2019 when the tailings dam at the *Córrego do Feijão* iron ore mine, in Brazil, suffered a catastrophic failure that resulted in 270 deaths and massive environmental impacts. According to a study, the dam collapse could have been predicted weeks in advance with the right monitoring technology.

More recently, the Free State Jagersfontein Tailings Dam Collapse resulted in a flood of mine slurry that swept away houses and cars, killed one person and injured scores of others, highlighting the importance of the need for local companies to take a proactive role in TSF monitoring. The reason for the Jagersfontein Tailings Dam Collapse, which took place in September, has been cited as structural failure of a mine tailings dam resulting in a mudslide.

According to Campbell, on the back of the 2020 GISTM policy document, greater focus is being placed on TSF related maintenance work with a substantial increase in workload for consulting engineering companies focusing on tailings and geotechnical aspects.

"Local and global mining companies operating in South Africa are working to ensure compliance. With target compliance dates already set, companies are keen to meet the stated compliance requirements by the outlined times. In fact, there are an ever-increasing number of requests for tailings stability assessments, tailings surveillance and record of services related to TSF."

The challenge, explains Campbell, occurs when there is a change in mine ownership, with more mature mines nearing the end of their life being procured cheaply by small-scale miners.

"Those looking to make a quick profit need to take cognisance of legacy related issues for which they become liable upon the purchase of the mine. It is therefore essential that potential new owners undertake an in-depth due diligence of mature mining projects to determine whether the associated potential risks are worth the effort of acquiring the asset."

Aside from investing in TSF related projects, on-going power challenges see miners focused on fast-tracking developments in the renewable energy space as they make a play at being self-sufficient and working to feed power into the grid.

Government's decision last year to lift the cap on private power generation from 1 MW to 100 MW has seen the mining industry quick off the mark to invest in power self-generation.

Mining operations often located in deep rural towns.

Greater focus is being placed on TSF related maintenance work.

According to Minerals Council South Africa, the industry already has a pipeline of 73 projects from 24 mining companies to generate 5.1 GW of electricity. The value of these projects is more than R65-billion. So far this year, the National Energy Regulator of South Africa (Nersa) has registered 295 MW for mining companies.

Although the mining sector is fast rolling out a number of renewable energy initiatives to bolster the energy supply-gap, the challenge remains the local power utility's constrained transmission capabilities.

According to Campbell, if mining houses, especially those located in the Northern Cape, pursue investment in large scale solar and wind projects, there is insufficient transmission capacity to transmit the additional capacity.

"Our power system currently feeds from the north to the south of the country, given that most of the coal mines and coal-fired power stations are located in the north-eastern quarter of the country, i.e.

Greenfield and exploration projects are being hampered by the prescripts of the Mining Charter.

Mpumalanga and Limpopo, and extend to KwaZulu-Natal and the Free State. On the back of renewable energy project developments in the Northern Cape and related areas, there is need for transmission capabilities that feed from the south up into the north as well as to the west and east. Eskom estimates the need for over 8 000 km of transmission capacity which has to be installed by 2026 if we hope to see the back of loadshedding."

Traversing the mine-field of challenges

Key among the multitude of challenges facing the consulting engineering sector, is the critical shortage of skilled personnel, particularly those with mining related knowledge and experience.

"Even if a consulting engineer is knowledgeable about infrastructure developments, mining related infrastructure development is a different kettle of fish entirely, requiring a vast set of mining related knowledge and experience. Although CESA has over 600 member companies, very few have mining specialisation. In fact, less than ten percent of our membership base has mining related experience."

Secondly, the push for bottom dollar rates but top dollar services has forced consulting engineers to reduce their fee levels drastically and, in some cases, to below a recommended rate for sustainability.

Campbell notes that clients' aggressive push for discounts has resulted in a highly constrained environment that is hampering the industry's ability to invest in the training of young engineering graduates.

"The unintended consequences of the low-income levels means consulting engineers are unable to absorb young graduates. In this country, there is a belief that when a graduate obtains an engineering degree, she or he is suddenly capable of undertaking the entire workload of an experienced consultant, which is a misconception. Engineering is an applied science and the graduate needs to spend time converting it to a level of competency. After the graduate has undertaken an extensive and wide variety of work and is deemed competent, only then is the consulting company able to charge for the work undertaken. As it stands, a significant portion of consulting engineering companies are unable to absorb this kind of cost with the result that there is a large pool of unemployed graduates, many of whom are leaving the country as they are unable to find employment and/or secure the experience they require," explains Campbell.

Thirdly, owing to poor succession planning, few young engineers are keen to pursue areas of mining specialisation, with the result that the mining industry's requirement for a profile of specialist knowledge and experience in aspects such as rock engineering, has led to a vast number of specialists working beyond normal retirement age.

Further to this, with mining operations often located in deep rural towns, specialists are required to work away from home for months at a time, a factor that young graduates frequently regard as unfavourable.

A further challenge, often encountered by consulting engineers offering their services to the mining sector, is the stringent health and safety requirements imposed by mining houses which necessitate

There is rise in demand for new age minerals such as battery metals and related commodities including lithium, vanadium and copper.

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The skills attrition is exacerbated by the exodus of skilled personnel from the sector to international destinations.

participating in induction programmes that, in many cases, stretch the length of a day.

"This is not useful for a consulting engineer whose job entails a site inspection of roughly an hour in an area with little to zero harm. The one size fits all practice is often not practical even when one appreciates the advisability of such practices. There is need for a meeting of the minds to discuss fairness and an improved risk management process, particularly as consultants can effectively only bill for the hour it takes to undertake the site inspection."

Campbell adds that the skills attrition is further exacerbated by the exodus of skilled personnel from the sector to international destinations, with both young and seasoned practitioners exercising their choice to work elsewhere. There is demand for their skills sets and this is coupled with improved pay and better quality of life abroad.

In addition to the vast quantity of consulting engineers moving abroad, a fair number are relocating to African jurisdictions where mining projects are being developed. According to Campbell, many projects in Africa are won on a turnkey basis which encourages partnerships between contractors and consultants.

Importantly, he says, there is a need for mining houses to expand their vendor list to incorporate more recent entrants to the sector.

"Mining companies tend to hold on tight to long established partnerships with long-standing consulting engineering companies. However, if the consulting engineering sector is to grow in knowledge and experience, there is need for mining companies to broaden their vendor base to incorporate new entrants. In this way, we will be able to expand our base of consulting engineers with mining sector experience and ensure a more sustainable pipeline of future engineers.

"From a CESA perspective, we believe it would benefit both, the mining industry and the consulting engineering segment, to cultivate a constructive partnership. Although we have a vast number of member companies, fewer than 50 are listed as having a track record of mining offerings. We would like to see this number grow substantially," he explains

Mining sector opportunities

Coupled with the rise in demand for new age minerals such as battery metals and related commodities including lithium, vanadium and copper, which ensure that the mining sector remains sustainable, there are the opportunities arising from digitalization, the Internet of Things, etc. which help with the drive to reduce costs, improve productivity and grow remote monitoring as related to TSFs.

"4IR tools aid in reducing the need for a physical presence at mine sites and assist the consulting engineering fraternity to improve service levels by using drones for TSF surveillance and monitoring, for example. These tools help to improve efficiencies and productivity while reducing costs..

"And, in a bid to encourage young aspirant graduates to fill the gap in mining sector specialization, universities are developing specific courses, such as those related to TSF, which bodes well for the sector" concludes Campbell. ■

CESA

CESA is a voluntary association of consulting engineering firms with a member base across the country of close to 600. CESA employs some 19 000 people.

Established in 1952, this year the industry body celebrates 70 years in business.

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South Africa requires urgent reform to kickstart mining

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

Ross Harvey, director of research and programmes at GGA.

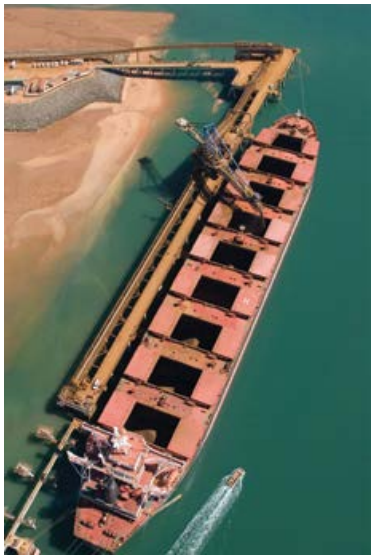
On 13 October 2022, Reuters reported that South African mining companies were losing $44-million a day in foregone export revenues. A labour strike at Transnet – the state-owned freight and logistics firm – prevented harbours from being able to ship cargo out of the country. The Minerals Council indicated that South Africa exports roughly 476 000 tonnes of bulk minerals a day, but 357 000 of those tonnes could not be shipped during the strike. To add insult to injury, 12 kilometres of cable was stolen during the strike, this at an estimated cost of $1.33-million. South Africa is becoming an increasingly difficult mining jurisdiction within which to do business.

A Fraser Institute Survey of mining investment attractiveness, conducted in late 2021, ranked South Africa in the bottom 10 of the 84 jurisdictions covered. The country ranks just slightly ahead of Venezuela, company one would not ordinarily want to keep. In the last five years, South Africa has fallen from 48th position (out of 91 jurisdictions covered) to its current position of 75th (out of 84). Even Tanzania, which faced significant difficulty during the years of late President John Magufuli, ranked - eight places higher than South Africa despite respondents complaining about excessive taxation.

Perhaps most usefully, respondents (mining sector executives in South Africa) indicated that uncertainty over environmental regulations, along with disputed land claims, were two significant factors that did not encourage investor confidence. In my previous column in this publication, I indicated that the Mineral and Petroleum Resources Development Act (MPRDA) required serious rethinking, not least for these reasons.

By way of example, a 2008 amendment to the MPRDA came into force on 7 June 2013. Never mind the five-year hiatus, the major problem was that the president at the time, Jacob Zuma, proclaimed certain sections would be excluded from being enacted. One of these was section 38B pertaining to Environmental Management Programmes (EMPr) and whether these constitute the equivalent of an environmental authorisation under the country's National Environmental Management Act (NEMA).

Helen Acton, a legal researcher at Good Governance Africa, has noted that: "Without a modified and enforced section 38B, there is a legislative vacuum concerning whether holders of prospecting or mining rights obtained under the MPRDA require an additional environmental authorisation



Above: The labour strike at Transnet prevented harbours from being able to ship cargo out of the country.

Left: South Africa exports roughly 476 000 tonnes of bulk minerals a day.

BRIEF

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under NEMA. ... The court has the unenviable task of resolving this statutory puzzle in the upcoming legal battle [regarding the court's interdict of Shell's application to conduct seismic exploration surveys off the Wild Coast]. Legislative clarity is urgently needed if the environmental governance of mining activities is to be effective and efficient."

Further amendments to the 2008 MPRD Amendment Act, enacted in 2013, eventually came into force in 2015 after having been sent back to the drawing board numerous times for failing to pass constitutional muster. In 2013, I wrote that the MPRDA was overly reliant on ministerial discretion, the very thing to avoid in a country's ambition of creating a stable and predictable minerals regulatory environment. At the time, the state had repealed section 9 of the original MPRDA, which declared that exploration and mining rights applications would be processed on a first-in-first-assessed (FIFA) basis. The repeal was premised on the promise of a regulatory code which was to be published later, yet another example of governing by fluctuating regulation instead of legal precedent.

As it was, the entire basis for mineral rights in the MPRDA was complex. The 2002 MPRDA, enacted in 2004, aimed to override the Minerals Act of 1991, which – according to Fred Cawood and Richard Minnit – had aimed to "reduce government involvement and to create a market for state-owned mineral rights". The ANC's Freedom Charter held the opposite view, that subsoil wealth was essentially collectively owned under the custodianship of the state, a shaky legal concept. Hence, as it stands now under the MPRDA, the state leases the mineral rights and receives royalties instead of granting private ownership.

This created a serious problem, however, especially in respect of how mineral rights governance clashed with communal land rights in mineral-rich areas. The latter remains unresolved despite section 25 (6 and 9) of the constitution explicitly calling for increased security of tenure in land formerly demarcated as 'homelands' under 'Greater Apartheid'. This lacuna has generated untold misery, well-articulated by Professor Aninka Claassens in 2015: "The effect [of a functionally continued enactment of the 1951 Bantu Authorities Act] is to consolidate the unilateral authority of chiefs in relation to land ownership and to deny other rural South Africans the right to decide for themselves how to use and share the newly discovered mineral wealth of the land they have owned and occupied for centuries."

The continued lack of legislative support for secure land tenure in the former homelands, whose population numbers nearly 20 million people, is compounded by a minerals regime that grants too much discretion to the Minister of Mineral Resources. The upshot is that community consultation in areas like Xolobeni and Richards Bay has been largely absent, and mining interests have eventually fomented violence. As Ramabina Mahapa put it in 2019: "Mining companies have usurped land belonging to rural communities without due regard for their property rights."

The MPRDA needs to be amended to provide clear guidance of the process to be followed when applying for mining exploration or production rights.

Good news in respect of the above may, however, be on the horizon. Two recent court judgements redefine the relationship between mining and land laws. A 2018 case brought by Baleni and Others vs the Minister of Mineral Resources and Others (the Xolobeni case) "affirmed that holders of informal rights under the Interim Protection of Informal Land Rights Act (IPILRA) must provide their consent before the mineral resources and energy minister can lawfully grant a mining right," as noted by Ramabina Mahapa in October 2022. A 2021 case brought by Casac and Others vs The Ingonyama Trust and Others "affirmed that the IPILRA applies to land held by the Ingonyama Trust..." In other words, the MPRDA must be read in conjunction with IPILRA (as inadequate as it may still be in terms of giving legal expression to section 25 (6 and 9) of the constitution).

In summary, mining companies are now clearly required to gain informed consent from those who have been allotted land, and not from the traditional authorities directly. In numerous past cases (Xolobeni being the most public), mining companies have simply aimed to strike a deal with the local chief and the Department of Mineral Resources, which has created major divisions within affected communities. This will no longer pass legal muster, which is good news.

Nonetheless, the state clearly must address the inadequacies within the MPRDA and IPILRA that led to the problems in the first instance. The IPILRA needs to do more to ensure security of tenure for those living in the former homelands, while the MPRDA needs to be amended to provide clear guidance of the process to be followed when applying for mining exploration or production rights in areas governed by IPILRA. Ultimately, the clash between mining rights as conceived in the MPRDA and land rights as conceived in the constitution need to be satisfactorily reconciled. ■

BME raises safety bar with high current detonator testing

Blasting and explosive solutions provider, BME, continues to push the boundaries of safety with its initiation system, this time testing the resistance of its AXXIS Titanium™ electronic delay detonators (EDDs) to high current AC voltages.

Tinus Brits, BME's global product manager – AXXIS.

"There are a number of different voltages that underground mines employ for their various machinery and equipment," said Tinus Brits, BME's global product manager – AXXIS. "The tests we carried out with an independent research partner were able to show that the AXXIS Titanium EDD is resistant to high current AC voltages."

The Department of Minerals Resources ARP1717 certification is relevant to this aspect of blasting, providing a foundation for the safety levels expected from blasting equipment, said Bennie van Nieuwenhuizen, quality manager for AXXIS.

"In line with our innovation focus and our commitment to safety, the tests we conducted were to push the boundaries even further in the interests of safe blasting and mining," he said. "We were therefore interested in characterising the response of our detonators at far higher currents and voltages than the standards require."

The context for these tests is that EDDs are typically deployed in mining environments where the range of energy levels is difficult to predict – as every mine will have its preferred power supplies. In some mining applications, EDDs are used near electrical wires or electric initiation systems.

"We were pleased with the results of the tests, which showed that BME continues to operate at the highest levels of safety," said Brits. "Our innovative approach ensures that our ongoing research and testing finds new opportunities for safe and efficient blasting." ■

WEG's withdrawal boards boost uptime at Ghana gold plant

A process plant at a gold mine in Ghana has become the first in Africa to install WEG's fully withdrawable WEG CCM06 boards, which safely improve the plant's flexibility when isolating selected circuits for maintenance and repair.

"The customer's existing motor control centre (MCC) regulated many operations, all of which had to be shut down when attending to a single item of equipment," says Foster Yeboah, regional sales manager for West Africa based at Zest WEG's Ghana branch. "This led to significant downtime, which the customer wanted to avoid."

The E-house at the manufacturing facility in South Africa.

The mine required a solution that would permit the plant to isolate the electrical feed to specific equipment, allowing targeted maintenance to be conducted on those items without necessitating a complete plant shutdown, says Yeboah. The answer came in the form of a double containerised electrical house or E-house with a key element of this solution being the fully withdrawable boards.

"The WEG CCM06 boards are compartmentalised, functional units which can be turned off and pulled out, without affecting the power to the other units," he explains. "This is a valuable feature when considering that important equipment such as mills and discharge pumps must ideally operate continuously to keep the plant efficient."

With the new MCC, operators will now be able to conduct a straightforward process of isolating the unit they want to attend to – simply by opening a latch, turning a shaft, and drawing out the relevant board. It is then secured to allow work to proceed safely on the specific equipment, while the plant continues running. Yeboah emphasised that access to the live parts is not possible when the functional units are removed, significantly enhancing safety. ■

Weba's order book grows as mining industry revives

After having endured poor demand for new chute installations in the immediate aftermath of the onset of the Covid pandemic, Wadeville-based Weba Chute Systems has seen its order book recover strongly in recent months. While much of the new business is coming from South Africa's mining sector, significant orders have also been received from mines in neighbouring states.

"When the pandemic hit, it was like crashing into a brick wall," says Mark Baller, Weba Chute Systems' managing director. "Many mining projects that were in the pipeline were either cancelled or deferred and – like most other companies – we went through a very testing time. With the revival of the mining sector this situation has now changed – to such an extent, in fact, that our financial year ending on 30 June 2022 was the best, in terms of revenue, in our nearly 40-year history."

One of the biggest of the new orders has been placed by a Zimbabwean platinum producer and will see nine chutes of varying size being delivered by the end of October this year. They will form part of the materials handling infrastructure required for a new portal that is being developed by the mining company. ■

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