

# MINING DEVELOPMENTS

## MAGAZINE

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## Copper 360 Limited listed on the JSE



The JSE announced a new copper listing on the Alternative Exchange (AltX Board), Copper 360 Limited (CPR).

This is the second company to list on the JSE

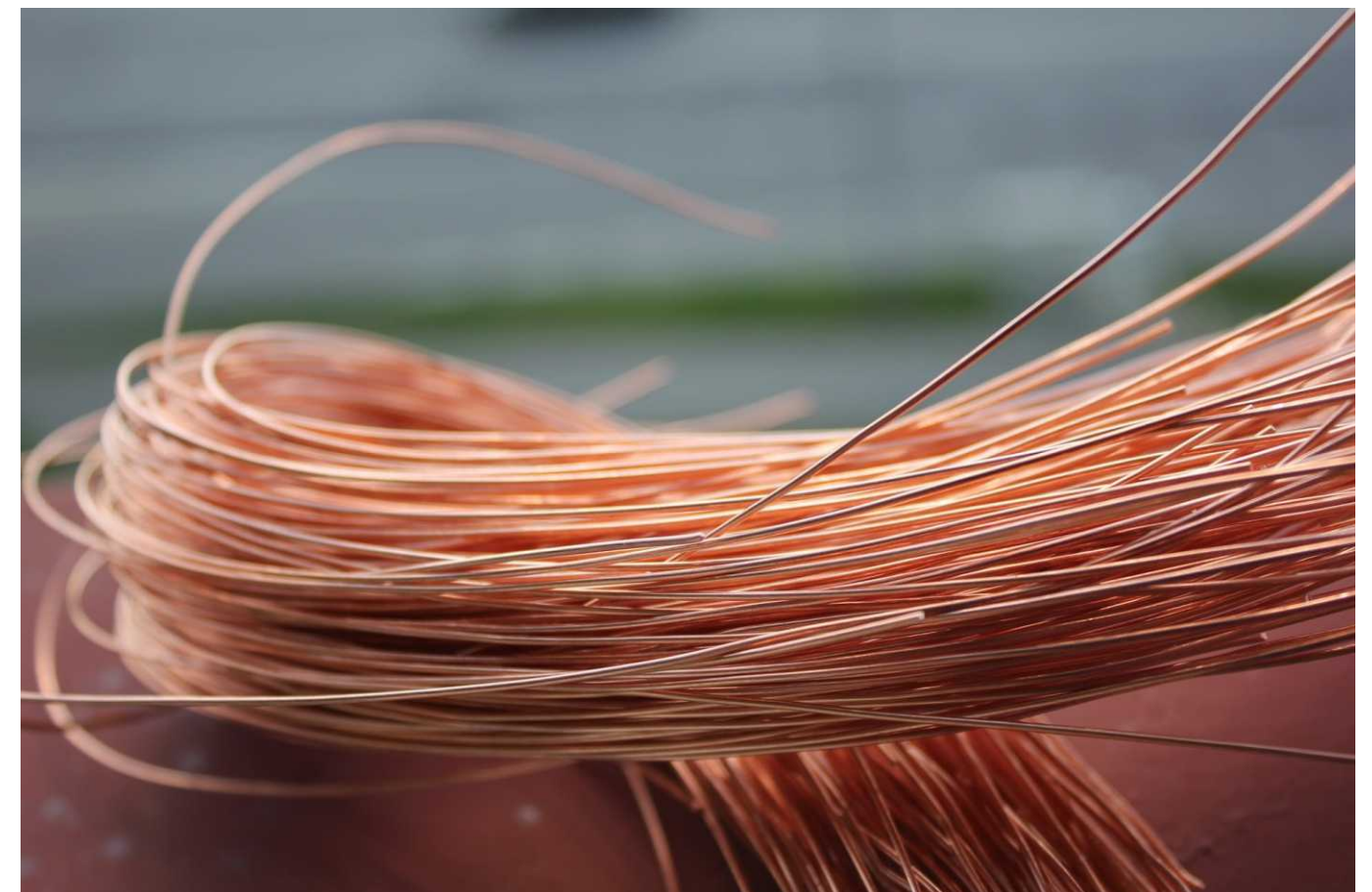


this year, pushing up the number of listed companies on the bourse to 303 with an overall market capitalisation of R22.76 trillion.

Copper 360 is a copper mining company with operations based in the Northern Cape, building South Africa's next major copper producer.

Formed in November 2022, following a reverse take-over of copper producer Big Tree Copper, and copper mining company SHiP Copper, the company has a focus on producing premium copper that will yield high cash margin.

The company's Mining Right covering 19 000







A listing on the JSE gives companies like Copper 360 access to deep and highly liquid capital markets while providing investors exposure to Africa's great growth potential through a trusted entry point.

The AltX market focuses on good quality, small and medium sized high growth companies. AltX provides smaller companies a springboard onto the JSE Main Board with a clear growth path and access to capital.

"We are proudly South African, bold, brave and innovative. We have tenacity, endurance and courage but always remain humble. We never give up! We are building South Africa's next copper Giant. We are Copper 360 – Hello Copper and hello JSE!" concludes Nelson.

Copper 360 is one of 44 companies in the basic materials sector listed on both the Main Board and AltX Board of the JSE.

hectares to the north of the town of Springbok holds 12 copper mines (some with developed infrastructure) and 60 copper prospects with advanced geological datasets. It is estimated that the Life-of-Mine across the various operations is over 100 years.

Jan Nelson, chief executive of Copper 360 said, "Coming to the market means we give South Africans exposure to the only pure copper exposure available to them with further major growth. It opens up a capital market for us and allows us a network to further develop strategic partnerships. It also raises our profile and South Africa."

Using a cluster mining model developed by Copper 360's chair, Shirley Hayes – where several mines feed into one process facility – Copper 360 will create a new 'Copper Country'. With a centralised process facility, smaller

orebodies become economically viable, and have the potential to add up to greater benefits for copper mining in the region.

"The mining sector is a vital driver of economic growth in South Africa. With mining revenues reaching over R1.18 trillion in 2022, it is imperative that the country continues to focus on investing in this sector. South Africa holds some of the world's largest reserves of precious metals, refractory metals, base metals and energy minerals. As such, we are pleased to welcome an emerging giant in the copper mining industry to the AltX Board which we launched in 2003 to catalyse the growth of small and medium size businesses such as Copper 360," says Sam Mokorosi, Head: Origination and Deals at the JSE. "It is heartening to see small and medium sized companies leverage the JSE as a strong platform for capital access and future expansion."

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# Africa renews momentum for mining sector growth



"Mineral wealth must bring development to Africa," said Marit Kitaw, the Interim Director at African Minerals Development Center, from Cape Town during the annual Mining Indaba.

Host South Africa has committed to empowering junior mining companies, managing energy and regulatory impediments and attracting more investors.

According to South African President Cyril Ramaphosa, an off-the-shelf online cadastral system that will provide much-needed transparency on existing mining rights, exploration permits and known geological features, for the South African mining industry – a system that could provide an example to the continent.

"This is essential for the operation of a modern mining rights administration system, which in turn is vital for the growth of the industry,"

Ramaphosa explained.

The current system has resulted in licensing backlogs in their thousands, limiting the number of companies undertaking active explorations.

On energy, Ramaphosa indicated the government was "facilitating investment in new generation capacity by private producers by removing the licensing threshold for embedded generation projects."

World Bank projects that the global mining industry begs for an excess of US\$1.7 trillion in investment to meet global mineral products demand.

Sierra Leone, Mali, Namibia and Tanzania are actively revising policies and establishing state-owned miners to tap into mining opportunities.





Sierra Leone, in 2022 passed two laws that have been critical in changing mining activities.

On the other hand, Mali is pursuing a more protective and domestic strategy for its mining industry.

According to Lamine Seydou, the Mines, Energy and Water minister, "the mines developed by Sorem will offer 100% of the benefits to the state."

Just like Mali, Burkina Faso is also seeking to leverage its domestic systems to maximise returns from gold, the country's primary revenue-generating mineral.

Beyond regulatory frameworks, some countries, including Namibia and Tanzania, have invested more in attracting foreign investors to unlock their mining sector potential.

Mining plays a vital role in Namibia's economy. Between 2000 and 2022, revenues from mining averaged \$2583 million, hitting an all-time high of \$4018 million in the third quarter of 2022.

Accounting for close to 10% of the country's GDP, Namibia prioritises partnerships while simultaneously looping in Namibians and local investors.

A 2021 law requires all applications for mining licences in Namibia to have 15% of owners being Namibians.

Tanzania has also shown a renewed commitment to leverage its extensive mineral deposits for economic achievements.

Beginning in 2020, there has been widespread renegotiation of the agreements and policies guiding mining activities in the East African country.

The Natural Wealth and Resources Act of 2017 has been amended recently. They now compel sector investors to make the government own at least 16% non-dilutable, free carried interest from mining proceeds.



Between 2020 and 2022, Tanzania signed close to 10 major agreements with investors in the mining sector targeting gold, Nickel, and Graphite.

Despite the developments, value addition remains a prime opportunity for Africa to increase mineral revenues.

Some African countries are tapping into bilateral and multilateral partnership opportunities to increase value addition for minerals.

Angola, Zambia and the DRC recently agreed to establish the Lobito Corridor Management Institution. This agency will manage a trade corridor off the Atlantic Ocean port of Lobito.

Battery technology, critical to improving electric vehicles' driving range, is heavily dependent on minerals buried beneath the surface of Africa, with DRC and Zambia possessing some 70% of the world's cobalt reserves.

Harmony, another mining bigwig, is reportedly considering Green Hydrogen options to power its machinery.

However, as different countries propagate activity in the sector, experts point out the need for increased industrialisation within the continent to achieve value addition.

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# Are modular process plants the most suitable solution to fast-track production?

For the mine that is looking to fast-track production, the modular process plant may seem to be the ideal solution – a pre-assembled unit means quicker delivery time, installation and operation, all which, in theory, results in a better and quicker return on investment for the mine.

They can be particularly useful at mines in remote locations, those with approximately five years life of mine or less, and various open cast ore processing with the flexibility to relocate the modular plant when required.

On the face of it, the plus point of modular plants is that manufacturing and quality control is done off site, and everything is then delivered to site pre-assembled at the same time. Modular plants are therefore often easier to install, with reduced installation time and a smaller team required during installation.

However, there are various engineering criteria that must be considered for an off-the-shelf process or materials handling plant, advises Freddy Mahlare, Head of Process Engineering at UMS Group.



“While these units have often proven successful in various applications, there are several things to be considered to ensure that the system is going to perform as intended, the biggest of which is that often, standard design modular plants have a capacity limitation.

For example, if a mine wants a 20 000 t/pm or smaller generic designed chrome process, a modular plant could be suitable for this application. However, if the same operation requires to operate at increased throughputs to this and processing/producing challenging ores/products, then it would not just be a case of replicating the 20 000 t/pm module.

In such an instance, a modular plant design might not be suitable, as it would be possible to overlook various engineering and process requirements, and the process operability could be compromised resulting in increased operating costs and reduced efficiencies.”

Mahlare explains that the design of any process



plant, be it modular or bespoke fixed, requires comprehensive engineering to be undertaken – essentially, to identify if the ore body can be economically processed.

The next step is to develop capital expenditure based on engineering process design criteria required for that specific plant. The plant is then laid out on structural and 3D drawings so that the owner can determine from an operability point of view whether they can safely access operation positions, and if they can maintain the specific equipment.

“If you bypass the engineering, some of these steps can be missed, and the plant can become inoperable and require excessive maintenance input with associated cost implications for the end user,” says Mahlare.

“In our experience, modular plants can be successfully installed if we work as a team with the client and the modular plant manufacturer from the onset. We can either design the plant or work with an established supplier who has already done the background engineering, then lay it out considering the interface and infrastructure requirements and work together with the supplier to manufacture it accordingly. If we have not been involved in the process design criteria, then we cannot guarantee the throughput of the overall operations.

“Modular plants can work if applied within the correct selection criteria for such a solution, the necessary engineering is taken into account, and if we work as a team with the client and supplier to ensure that the project is set up to succeed,” concludes Mahlare.

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ISSUE 84

## WHEN SMOKE GETS IN YOUR EYES

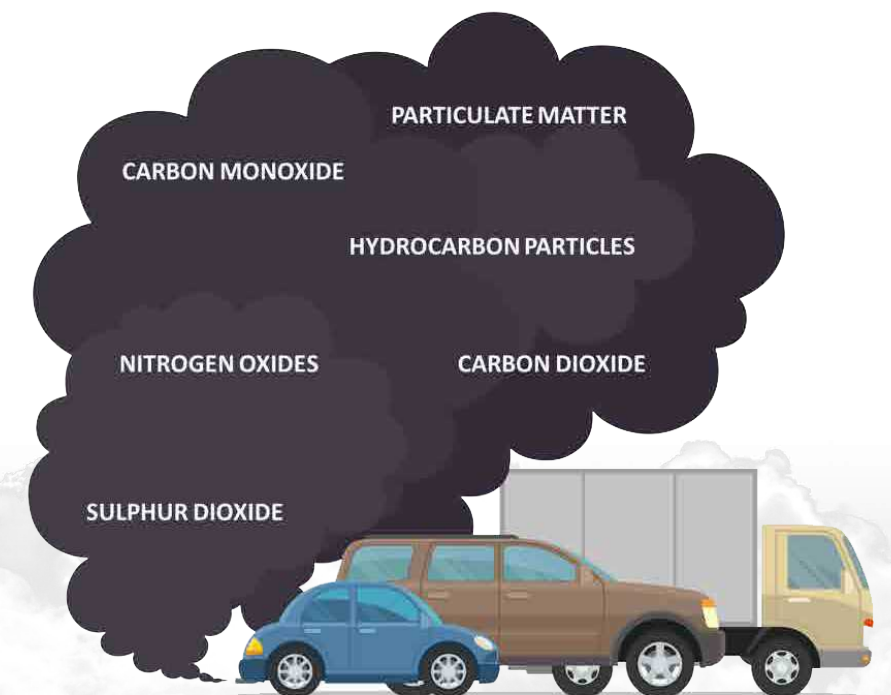
By Dave Scott

### ABSTRACT

Just Google 'exhaust smoke' and be prepared to sift through approximately 22 100 000 results (0,41 seconds) – an exhausting info overload.

The author has been involved with trucks since 1966 and has never seen a driver fined for excessive exhaust smoke, or a truck owner taken to task for any abnormal emissions. And no wonder – the RTA regulations are so vague as to be unenforceable.

It is not only the exhaust emissions we see (mainly due to particulate matter) that are cause for concern, but the ones we do not see – carbon monoxide and dioxide, nitrogen oxides, hydrocarbon particles and sulphur dioxide – which are truly dangerous.



### SOUTH AFRICAN RTA EXHAUST SMOKE REGULATIONS

209 (c) No person shall operate on a public road a motor vehicle - if the exhaust gas or smoke from the engine is so dense as to cause a nuisance to or obstruct the vision of other road users.

308 (1) (k) No person driving or having a vehicle on a public road shall – cause or allow the engine thereof to run in such manner that it emits smoke or fumes which would not be emitted if the engine were in good condition or ran in an efficient manner.

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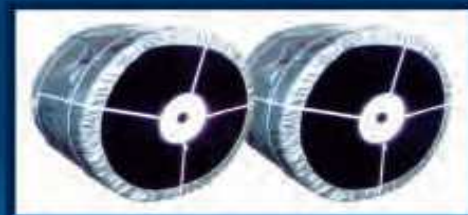
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## VISIBLE SMOKE

Distinction must be made between particulates and visible smoke: particulate matter is defined as anything that is collectable on a filter (**particulates may be present in exhaust emissions even though no visible smoke is apparent**); the defining character of exhaust smoke is that it is comprised of solid or liquid aerosol particles that absorb or deflect light.

Just because it is smoke free it does not mean a vehicle exhaust is 'clean'. Air contaminants that frequently pour out of exhaust systems – especially very old vehicles – are carbon dioxide, nitrogen dioxide, sulphur dioxide, particulates, ozone, benzene, toluene and xylene, 1,3-butadiene, formaldehyde and acetaldehyde, benzo(a)pyrene. For example - Benzene can be harmful if it is swallowed, inhaled, or touched. It is a member of a class of compounds known as hydrocarbons. Human exposure to hydrocarbons is a common problem.

<https://medlineplus.gov/ency/article/002720.htm>

There were about 1.446 billion vehicles on Earth in 2022 and South Africa's share of this by July 2022 was 11,897,500 on our roads – 0,82% of the world total. That means we only have an approximate 1% share of the global, polluted, climate-changing vehicle population. But a low stat base is no reason to ignore the issue, because badly tuned engines (petrol and diesel) are expensive to operate, at over R21/litre.

Efficient, well-maintained diesel engines do not emit clouds of smoke. Modern, turbo-intercooled, electronically managed diesel engines are designed to operate with clear exhaust gases at any altitude. The reduction in exhaust back-pressure with increasing altitude speeds up turbine and compressor activity to counter the effects of higher altitudes. Apart from obvious environmental problems caused by diesel fuel exhaust fumes the real issue is that fuel is being wasted through incomplete combustion. In addition, exhaust smoke accelerates servicing requirements and engine wear rates. Exhaust smoke is costly.

Global warming – climate control – is all about fuel consumption and not to be confused with emission standards which focus on clean-air fuels and emission controls.

### EUROPEAN EXHAUST STANDARDS COMPONENTS

- Particulates - PM
- Nitrogen oxides - NOX
- Carbon monoxide - CO
- Non-methane hydrocarbons - NMHC
- Opacity

### GREENHOUSE GASES

- CO<sub>2</sub> – carbon dioxide
- CH<sub>4</sub> – methane (24-25 kg CO<sub>2</sub> equivalent)
- N<sub>2</sub>O - nitrous oxide (298 kg CO<sub>2</sub> equivalent)
- H-FKW – hydrofluorocarbons (15.000 kg CO<sub>2</sub> equiv)
- SF<sub>6</sub> – sulphur hexafluoride (22.800 kg CO<sub>2</sub> equiv)

While mandatory vehicle emission standards have been in place in many countries for several years, South Africa has only introduced emission specifications for new passenger car models approved for sale with effect from 2005, and for all new vehicle models (passenger cars, SUVs, LDVs and on-road trucks) with effect from 2006. As from 2008, all new vehicles sold need to comply with Euro 2 emissions specifications (as modified). This lags the introduction of enabling unleaded petrol, which has been marketed in South Africa since 1996.

Here are the main types of diesel exhaust smoke encountered on the road –

## BLACK EXHAUST SMOKE



This is very visible, resulting from large soot particles, indicating incomplete combustion due to localised rich mixtures in a combustion chamber. Here are the main causes of black smoke:

- Incorrect injector pressures – generally too low
- Poor injector spray pattern
- Out-of-spec injection timing
- Over-fuelling – wrong spill rate or governor setting
- Inadequate air supply – blocked air filters or intercoolers or worn turbochargers.
- Abnormally high diesel fuel cetane number

In summary, the most common causes of black smoke are faulty injectors, a faulty injector pump, a bad air filter (causing not enough oxygen to be supplied), a bad EGR (exhaust gas recirculation) valve (causing the valves to clog) or even a bad turbocharger.

Sooting crankcase lubricants causes thickening that can end up in gelling and bearing failure. It also accelerates ring sticking, carbon and sludge deposits as well as engine wear rates.



## WHITE EXHAUST SMOKE



Typically pale grey in colour, this is caused by visible liquid fuel particles in an exhaust. This indicates that fuel is passing through a combustion chamber without vaporising or igniting. Constant thick white smoke is usually a sign that coolant is being burnt. The main causes of white smoke are –

- Low diesel fuel cetane number – check for blending with illuminating paraffin.
- Engine is over-cooling.
- Misfires
- Burned valves.
- Late injection timing
- Poor injector spray pattern – fuel impingement on cylinder walls
- Low compression

Not all unburned fuel passes out of an engine. Some fuel condenses, causing fuel dilution. White smoke will cause higher engine wear rates, particularly of both rings and liners.





## BLUE EXHAUST SMOKE

Blue smoke is not diesel fuel related. This comes from burning excessive amounts of crankcase lubricant in combustion chambers. Typical causes are:

- Worn rings.
- Worn valve guides.
- Incorrect honing pattern.

And do not expect exhaust smoke to arrive in distinct black, white, or blue clouds – it could be a mixture of all three depending on the technical problems that are present.

Drivers have an important role to play as foundation observers of exhaust smoke. Does a driver debriefing include a check-item that covers exhaust smoke? If there is visible smoke, when does it occur – on start-up, acceleration, deceleration and what is the colour? Excessive exhaust smoke must be reported and recorded. There must be an exhaust smoke SOP (Standard Operating Procedure) in the driver's job description.



The evidence of a wide-spread malpractice in diesel fuel adulteration is found in reported sales of illuminating paraffin (kerosene). Press reports on paraffin data in South Africa point to a two-fold increase in kerosene consumption over the past three years (2020 to 2022), from 600,000 kilolitres annually to over 1.2 million kilolitres. Does this mean that the number of consumers using paraffin for cooking and lighting has doubled during this period? Evidence of excessive kerosene in fuel will not be readily visible at start up – just a loud, cold, engine knock. The lack of fuel lubricity in kerosene will be evident with increasing engine mileage as abnormal wear sets into engine combustion components – here comes exhaust smoke, and engine failure is the ultimate indicator.



A 16-page Government Gazette No. 11331 dated 31 August 2021, repealed the Regulations regarding petroleum products, specifications and standards that were published under Government Notice No. R.627 in 23 June 2006, to make the Regulations as per the schedule that was attached. 10ppm sulphur diesel and biodiesel figure strongly in this Gazette. This was all to come into effect on 01 September 2023. But this was all upended in Gazette No 11446 dated 24 June 2022 when the Minister of Mineral and Energy Resources amended the effective date of 01 September 2023 to **JULY 2027. The clean air fuels implementation is now four years out.** Cough.....

## So why worry about exhaust emissions?

Without publishing a thesis, here are a few practical starting points:

- Conduct MBWA (Management By Wandering Around) at cold start to spot and record smoke offenders.



- Train the drivers to observe and report exhaust smoke on defect reports and start-up check lists.
- Overfilling on engine lube dipsticks is an evil that will promote blue smoke.



- Track and reconcile individual vehicle oil and coolant consumption with excessive smoke reports. Modern coolant systems are sealed, and expansion tanks should not require constant topping-up. Coolant loss is evident in white exhaust smoke.



- It is important to know when smoke is generated – usually a tell-tale sign of damaged piston rings occurs when bluey-grey smoke leaves the exhaust while the vehicle is accelerating.



An 'expert' observation from someone out there was that 'Electronics work with smoke. When the smoke escapes, electronics stop working!' This brings everything to a grinding halt. But not so with exhaust smoke, which gets tolerated every day – visible on the road – until engine failure and costly downtime.

It is also an environmental issue – accepting exhaust smoke without countermeasures flies in the face of climate care, which has become the major issue of our time.



## About the writer...



*Dave Scott is an award-winning journalist and author, with a career spanning over 50 years in the transport industry. He is a member of the SA Institute of Tribology (SAIT) and editor of their newsletter, taking a keen interest in the application of lubricants to road transport maintenance and the cost of ownership. He also serves as the technical correspondent for FleetWatch magazine and the truck correspondent for AutoForum magazine and has done for many years.*

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# Harmony Gold appoints Chipo Morapedi-Mrara as the new Head of Communication and Branding

Harmony Gold has announced the appointed of Chipo Morapedi-Mrara as Head of Communication and Branding, effective 1 May 2023.

Morapedi-Mrara has over 16 years of leadership experience in the mining industry and extensive experience in internal and external strategic communication, government relations, and stakeholder engagement, among other roles. She joins Harmony after nine years at AngloGold Ashanti.

Mashego Mashego, Executive Director at Harmony, said, "The Company is pleased with the appointment of Chipo. As a strategic communications Specialist, I am confident that Chipo will use her unique skills and experience to drive our communication and branding initiatives across the group."

"Our communities will benefit immensely from her experience in global communication and her role in developing communication strategies in markets across the African continent."



Commenting on her move to Harmony, Morapedi-Mrara said, "I am excited to join a company with a rich culture and an incredible depth of expertise and experience that spans over 70 years."

Morapedi-Mrara holds an MSc in Strategic Management from the University of Derby in the United Kingdom and a Bachelor of Arts in (Media Arts) majoring in Marketing and Screen Studies from Deakin University in Australia.

Most recently, she completed an Executive Development course in Strategic Leadership at the Gordon Institute of Business Studies (GIBS).



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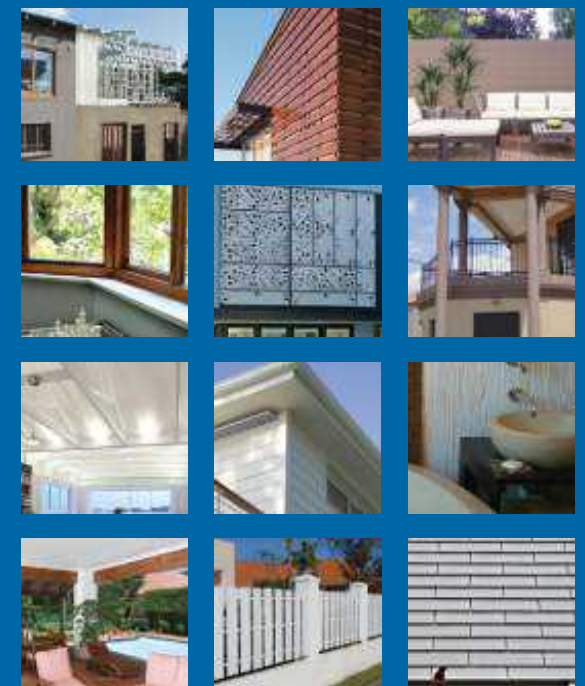
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▶ Everite Building Products has over the years established a reputation for producing a variety of outstanding quality products which have been used in a wide range of external and internal applications.

Nutec is the registered name for products manufactured without asbestos as a raw material. Nutec fibre cement product are manufactured using a mixture of cellulose fibre, cement, silica and water.

Everite is renowned for its comprehensive range of Nutec Roofing and Cladding Solutions and includes fibre-cement roofing, cladding, ceilings and building columns amongst others.

Nutec fibre-cement high performance properties and added benefits include: the use of safe renewable fibres; considerable tensile strength with enhanced dynamic load bearing properties; excellent thermal properties; water-and wind resistance; hail resistance; fire resistance and resistance to fungus, rodents and acid.



➤ Everite Building Products, is an appointed licensee by the Xella Group to manufacturer Hebel Autoclaved Aerated Concrete (AAC). Everite Building Products is the only manufacturer of AAC in Africa.

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# Construction phase of Menar's new R600m colliery project is in full swing



"We've started working on the box cut with the anticipation that first coal will be extracted sometime around July/August this year," Menar MD Vuslat Bayoglu said.

The R600-million capital being expended on the Gugulethu project in Mpumalanga makes up more than half of the R1.04-billion worth of investment in South Africa pledged by Menar at President Cyril Ramaphosa's South Africa Investment Conference.

Menar pledged an overall R1.04-billion at the fifth SA Investment Conference to fund two mining ventures that fall under its subsidiary, Canyon Coal. A further R440-million will go towards developing the Thuso project, also in Mpumalanga.

The fully licensed Gugulethu Colliery, southeast of Hendrina, is projected to create 400 jobs.

Developments have progressed well, despite delays in the construction of the road at the beginning due to heavy rains.

Two teams working on the box cut are removing the topsoil and stockpiling it separately.



The refurbished processing plant infrastructure is scheduled to be operational by September.

The first phase of opencast operation is expected to produce 200 000 t of run-of-mine coal a month. The second phase, which consists of underground mining, should resume in seven years.

Thuso, in Bethal, is also fully licensed and work on its infrastructure plan is being finalised.

"If the coal prices stabilise, we should be able to start developing Thuso by the fourth quarter of this year. Both these mines will supply the export market because the local market is currently not viable due to Eskom not burning enough coal," Bayoglu points out.



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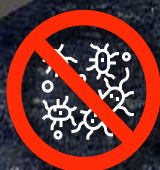
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