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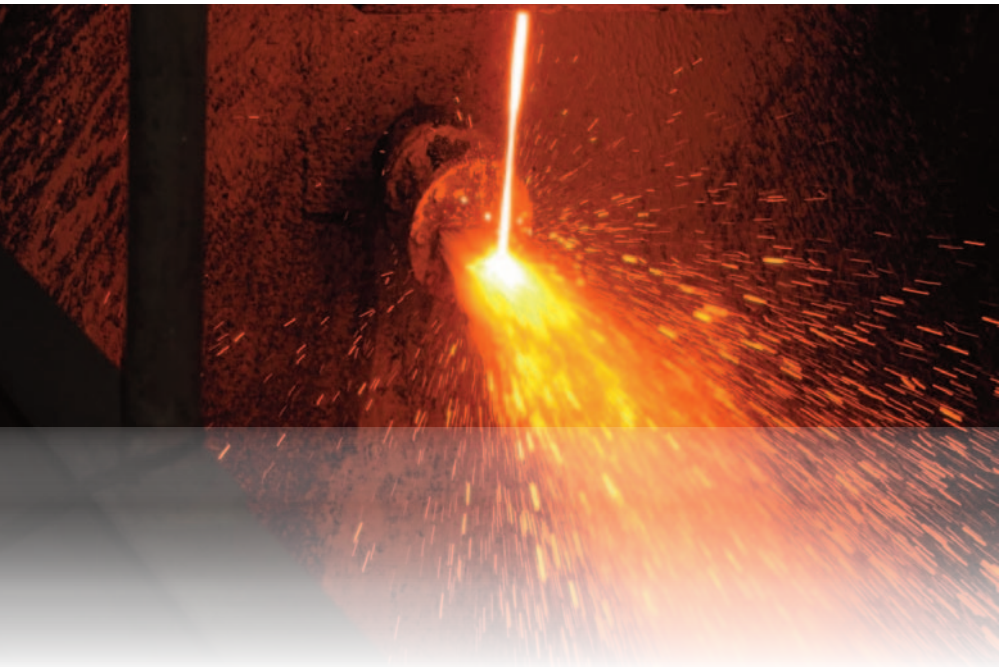

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Mining ZIMBABWE

Dedicated to the Zimbabwe Mining Industry

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ABOUT PUBLICATION

Mining Zimbabwe is the premier source of Zimbabwe Mining news. Our core focus is on the ever evolving face of the mining industry, trends, new technologies being developed and used to improve this crucial sector, as well as new opportunities and investments arising from it. Mining Zimbabwe sole purpose is growing and empowering the mining industry and highlighting all its challenges as well as putting forth expert solutions.

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EDITOR'S NOTE

Mining Zimbabwe at this juncture would like to extent greetings to its most appreciated audience, it was a pleasure to exhibit at Mine Entra and meeting face to face with some of you exchanging ideas and thoughts, we thank you.

The month of October was a jubilation and business booster to the Mining industry in Zimbabwe, all roads were heading towards Zimbabwe International Trade Fair (ZITF) grounds in Bulawayo to witness and promote the movement of the mining industry in Zimbabwe.

Mining Zimbabwe as a provider of intelligence to the mining community and a platform for business transaction harnessed the grace to participate at Mining, Engineering and Transport expo (Mine Entra) 2018 for the first time as an exhibitor. More than 230 companies both local and international show cased their products at mine Entra, Mining Zimbabwe happened to be the sole mining news and intelligence provider at this year's expo.

For almost two decades the economy of Zimbabwe has been under a strong depression, sanitizing it has been a huge problem which required strong economic sectors to back it up, thanks to the mining industry, it has remained an optimistic breadwinner and had reinforced the economy of Zimbabwe under difficult circumstances.

Mine Entra which took place from 10-12 October was officially opened by the minister of Mines and Mining development on the 11th of October, the event gave an assurance to unlock the latent, opportunities and growth prospects throughout the mining community and its related sectors.

Many exhibitors at this year's Mine Entra described the event as an eye opener and great networking event, educational conferences which took place at the exhibition where designated as an illumination especially to the small scale miners.

The event which took place under the theme, "Mineral Beneficiation: catalyst for economic growth" did well to promote the vision to reset the economy of Zimbabwe and attract investors both local and international in the mining industry, was well placed in promoting the ease of doing business in Zimbabwe.

The event though an eye opener and an illumination chamber in the mining industry, one wouldn't be surprised if it had attracted more investors than it did, there is still a great latitude of improvement on marketing the event locally and regionally, the event was not recognized in the public discourse, it didn't carry much weight as it should have done being one of the biggest exhibition in Zimbabwe.

Mining Zimbabwe as the leading mining publication in the region managed to distribute over 5000 flyers and magazines to both visitors and exhibitors at the event, there was a great appreciation from our audience with regards to the content offered by Mining Zimbabwe, Mining Zimbabwe was hailed for bringing intelligence and a mouth-watering insight of mining events and activities happening in Zimbabwe and the regional community.

The Mining Zimbabwe team also had a lot to learn at this year's Mine Entra and has dedicated and vowed to improve on their short-falls, the team swore to strive under any cir-cumstances and continue to make Mining Zimbabwe audiences proud to be associated with a great brand in Mining Zimbabwe.

Mining Zimbabwe will conclude by spreading a word of love to you our most valued audience, and we will be motivated if you leave your comments on our social media pages, you are also welcome to write either by email or WhatsApp.

MINE ENTRA 2018 IN PICTURES

As gold miners are tattering at the verge of collapse

Suppliers demanding payment in Forex

Calls to allow gold miners to export grows

There is growing consensus that the Government of Zimbabwe should temporarily allow mining house to export their gold but under tight monitoring mechanisms as big miners like Metallon Gold Corporation and Rio Zimbabwe are tattering at the verge of collapse.

There recent spike in prices for several mining consumables and the growing demand of foreign currency by several suppliers has seen most mining companies facing multiple difficulties to produce.

The situation has been biting to the extent that RioZim recently announced its intentions to halt production at some of its gold producing units while the country's largest gold producer, Metallon has not been in production at Shamva mine in the past one week.

Metallon is however considering paying mining-equipment suppliers in gold because a cash shortage in Zimbabwe is hampering its plan to expand output as according to the laws of the land, ordinarily mining firms are supposed to sell gold to Fidelity Printers and Refiners.

Chamber of Mines Zimbabwe in a communiqué recently said issues resolved in the Gold Producers Committee to be presented to the RBZ Governor, said COMZ wants to bring challenges facing the mineral producers on the back of the recent developments in the market. COMZ said the majority of suppliers and service providers (inclusive of some Government entities) are no longer amenable to RTGS as a form payment.

"In isolated instances where RTGS are still accepted, the local input prices have moved upwards as much as six times," said COMZ.

Mining expert Kenneth Bartholomew told Mining Zimbabwe that an urgent action need to be made by Government to make sure that miners remain viable on the back of biting economic challenges.

"I agree fully that Rio Zimbabwe and other big gold mining companies be allowed to export the gold they produce so they don't close. If they had to close it would cause such a rippling effect and hurt thousands of people. Please allow them to export, said Bartholomew.

Group CEO of Michsub Africa Tendai Choto added that Government needs to demonetize the bond notes as it is failing to meet the basic function of money.

Tendai Choto

"The Government has to demonetize the Bond Note. Right now it's not meeting the basic function of money, which is the "medium of exchange" and the key characteristics such as store of value and unit of account.

"The Bond note is no longer generally accepted as money as people have resorted to USD and Rand. So Mining Housed are on the brink of collapse as most of their cost structures are in USD and there's pressure to pay Suppliers and service providers in Hard currency for Business continuity," said Choto.

"What we are seeing happening around the Bond Notes is an issue of Confidence. People don't have confidence in them mainly because of what happened around 2007-8 as a result of political and economic instability," he said.

Choto noted that Zimbabwe has a unique opportunity to get its fundamentals right as the country is blessed with both natural and human resources. However, there's need for tight monitoring and closing all loop-holes which may result in externalisation.

Economist Paison Tazvivinga said Mining has helped shape the Zimbabwean economy. It turned largely pastoral communities into industrial ones. It necessitated establishment of modern institutions like Zimbabwe School of Mines. It drew large numbers of Zimbabweans from subsistence economies into paid employment. Mining also attracted foreign capital. However, despite its significance to the economy the sector continue to face challenges in form of regulatory uncertainty, administrative inefficiency and unavailability of critical national infrastructure among others.

These challenges are compromising business performance and its contribution to socioeconomic development. Despite these challenges, i urge mining houses not to ignore the substantial growth prospects that the country offers.

Executives may use an analytical approach to understand the stakeholder landscape, ensuring that an effective stakeholder engagement strategy is in place. The strategy should seek to create shared value for stakeholders, resulting in mutually beneficial and productive relation-ship between the mining company and government. The two can either emerge stronger through effective collective leadership or follow a pathway to value destruction through domination of self interest. It is essential that a certain regulatory framework results from constructive dialogue among stakeholders. this must result in a clear shared understanding of transformation and empowerment so as to promote the sustainable contribution of mining operations in meeting expectations of all stakeholders. It must also result in solidifying cash flows which will underpin mining companies ability to invest in major capital projects that are needed to sustain and grow their production profiles. A sustainable and profitable business has a better chance of delivering value to all stakeholders including government and employees, than a short life operations.

Minerals for the future

For the past two decades, Zimbabwe has experienced a pervasive economic collapse with majority of the challenges caused by policy inconsistencies, bad policy choices, economic mismanagement and political instability.

This led to de-industrialisation with a sharp decline in manufacturing and agriculture productivity and output, which consequently caused a sharp increase in unemployment and poverty.

Although it is not fully developed, the mining industry in Zimbabwe presents an opportunity for economic stimulation that may lead to economic recovery, but requires broad-based economic reforms. There have been growing calls for government to consider investing focus on minerals which presents better prospects for the future as minerals fossils' future remains bleak.

Analysts and mining players are calling for the pre-selling of minerals like platinum, coal and diamonds inorder to extract value as threats to their future value in the cog of global industrialisation remains up in the air.

Lithium (Tantalite and Spodumene) and Antimony, minerals for the future Zimbabwe stands to benefit immensely from exploitation and value addition of antimony and tantalite minerals going into the future as espoused in the country's beneficiation and value addition strategy.

A document done by the Minerals Marketing Corporation of Zimbabwe (MMCZ) described two minerals as resources for the future in consideration of an anticipated rise in global demand for the minerals by the fast growing information communication technology industry. MMCZ said industrial and technological mineralslike tantalite and antimony provide opportunities for value addition and beneficiation because of the rising demand on the global market for fast growing information and technology industries and their use of clean energy. "They have been described as the minerals of the future and Zimbabwe still has vast deposits of these minerals yet to be exploited."

Tantalite and antimony are mainly used in promoting green technology. Tantalite is mainly used in the manufacture of small-sized electrolytic capacitors and high power resistors. Its size and weight makes its capacitors attractive for many portable electronic devices including cell phones, personal computers and Ipad screens to mention a few.

Tantalite is found in Mberengwa, Bikita, Mutoko and Seke while antimony, an lustrous gray metalloid, is found in nature mainly as a sulde mineral and is extracted primarily from stibnite, which contains 72 percent of the mineral and 28 percent sulphur.

It is used for many technological and industrial purposes as a hardening alloy

Minerals for the future

The Great dyke

for lead especially storage batteries and cable sheaths as well as bearing metal, solder and semi-conductor technology. In Zimbabwe antimony reserves are found in the Great Dyke, which passes through Kwekwe, Bubi, Mberengwa, Kadoma and Shurugwi.

What Government needs to get value from minerals for the future

Zimbabwe ought to come up with a clear stand-alone beneficiation strategy policy that clearly stipulates government's expectations and how it intends to promote value addition. Currently the beneficiation policy can be interpreted from the Zimbabwe Agenda for Sustainable Socio-Economic Transformation (ZIMASSET).

The beneficiation strategy is not clear as compared to other countries like South Africa and Namibia, which clearly stipulates how government plans to achieve value addition goals. Several requirements are supposed to be met for downstream beneficiation to be successful.

The issue of operating cost has a large impact on the decision by the mining companies to beneficiate or not. Zimbabwe has capable human capital in the diaspora, it is a duty of government to create a conducive environment that attracts them back home and also remove infrastructure bottlenecks.

Another important factor for value addition to take place is the availability of domestic market. If the economy is transformed, so that money is in the hands of many people through the inclusive participation of productive sectors of the economy, the demand for commodities such as lithium will grow which will also eventually grow the manufacturing Industry.

Calls to pre-sale minerals like coal, platinum and diamonds to get value

There has been increasing calls for African Governments to consider pre-selling minerals like coal, platinum and diamonds as their futureviability remains bleak with the rise in recycling and


Diamonds

synthetic products together with the ban on fossil minerals like coal and asbestos across the board.

Zimbabwe Government has been on a drive to revive mines like Hwange Colliery Company and Shabani Mines at a time when there have been rising calls in the world to ban those minerals.

Analysts are proposing the pre-selling of those minerals to get value before they are completely banned from trading on the world market. Besides the ban, demand for those minerals has been declining as well.

Southern African platinum miners have been experiencing a tough time over the past few years amid falling prices and sentiment in the market for PGMs has turned even more negative as fears of a trade war have escalated.

For developed economies, coal has proven not to be part of the future for countries like America and the focus now is more on renewable energy. The same with diamond mining, the sector is under serious threat from spotless synthetic diamonds produced in factories. Liberation Coal Mining Limited chief executive Victor Tskhovrebov said the future of coal mining remains bleak basing on the fact there are few coal mining projects development happening globally at the moment.

"Very few coal projects are in development globally. Its costly and the future of coal generally is dull, no one is keen to invest taking into account that so called clean sources of energy developing fast," said Tskhovrebov.

Economic analyst Richard Mawarire noted that the issue of pre-sale much depends on how Government will employ


Coal

the funds we receive from the presale.

Exploration in Zimbabwe on the rise

The Zimbabwean mining sector is expecting increased exploration activity after government has started issuing Exclusive Prospecting Orders (EPO's), something that has not been happening of late in the mining sector.

The EPO is obtained through an application made to the Mining Affairs Board.The maximum possible period of holding onto an EPO, according to mining laws is six years, initially for three years and possible extension for a maximum three years.

Funding challenges and delays in issuance of EPO's has been hampering the country's exploration drive which was set out to change Zimbabwe into becoming the jewel of African mining.

There is talk that Zimbabwe is under-explored with most of exploration data having been generated in the 50s and 60s and the Southern African country has not been subjected to exploration using modern techniques.

Chamber of Mines Zimbabwe chief executive Isaac Kwesu said there is expected improved activity in mineral exploration in the country after government started issuing EPO's.

"Of late government has not been issuing EPO's but that is a thing of the past now and we are expecting increased activity on exploration activities across the country. There has also been issuance of new mining licences and that alone is also set to increase exploration in the country," said Kwesu.

He said funding and the prevailing operating environment has been a challenge for miners to invest on exploration considering that the environment has not proper to attract fresh capital only for exploration.

Zimbabwe's mining sector has the potential to make significant contribution to the country's growth over the medium to long-term. Zimbabwe is a mineral rich country with great potential for further discoveries. The country has a huge and highly diversified mineral resource base dominated by two prominent geological features namely the Great Dyke and ancient Greenstone Belts also known as Gold Belts.

About 60 percent of Zimbabwe's land is said to comprise ancient rocks renowned worldwide for hosting rich varieties of minerals resources including gold, base metals (for example nickel, copper, zinc and lead) and industrial minerals(lime-stone, phosphates, clay and dolomites). Zimbabwe has got the second largest deposits of platinum in the world. However, the picture of the mining sector's contribution to economic growth in the long term remains unclear because so little has been done in terms of exploration to quantify the mineral reserves we have.


Platinum

"Funding has been a challenge in this country which has seen exploration activities slowing down of late but there are certainly set to change. Capital is required for exploration but securing that capital has been a challenge considering our current operating environment.
"On the capital required for exploration, the amounts differs depending on the type of mineralsand the extent to which the exploration will be done," said Kwesu.
Challenges being faced by new miners
The mining sector has been facing a lot of challenges and the new entrance has not been spared of those challenges.
These challenges include electricity supply, shortages of foreign currency, general rise in the cost of inputs, shortage of capital and international market movements.

On electricity, the Zimbabwe Electricity Transmission and Distribution Company commercial tariffs on average range from $0,13/KWh for on-peak usage, $0,07/KWh for standard usage to $0,04/KWh for off-peak usage.

These tariffs have remained uncompetitive considering the fluctuation mineral prices on the global market.

Like any other sectors, the rising cost of inputs and raw materials due to continued scarcity of foreign exchange has been a major hindrance.

New entrance in the mining sector are forced to pay more than the fair value of inputs and raw materials due to the multiple exchange rate system which eventually affects the prices of imported inputs.

With the right policy interventions going into the future, Zimbabwe's bright future is beckoning mainly anchored on minerals like lithium which is high on demand on the world market.

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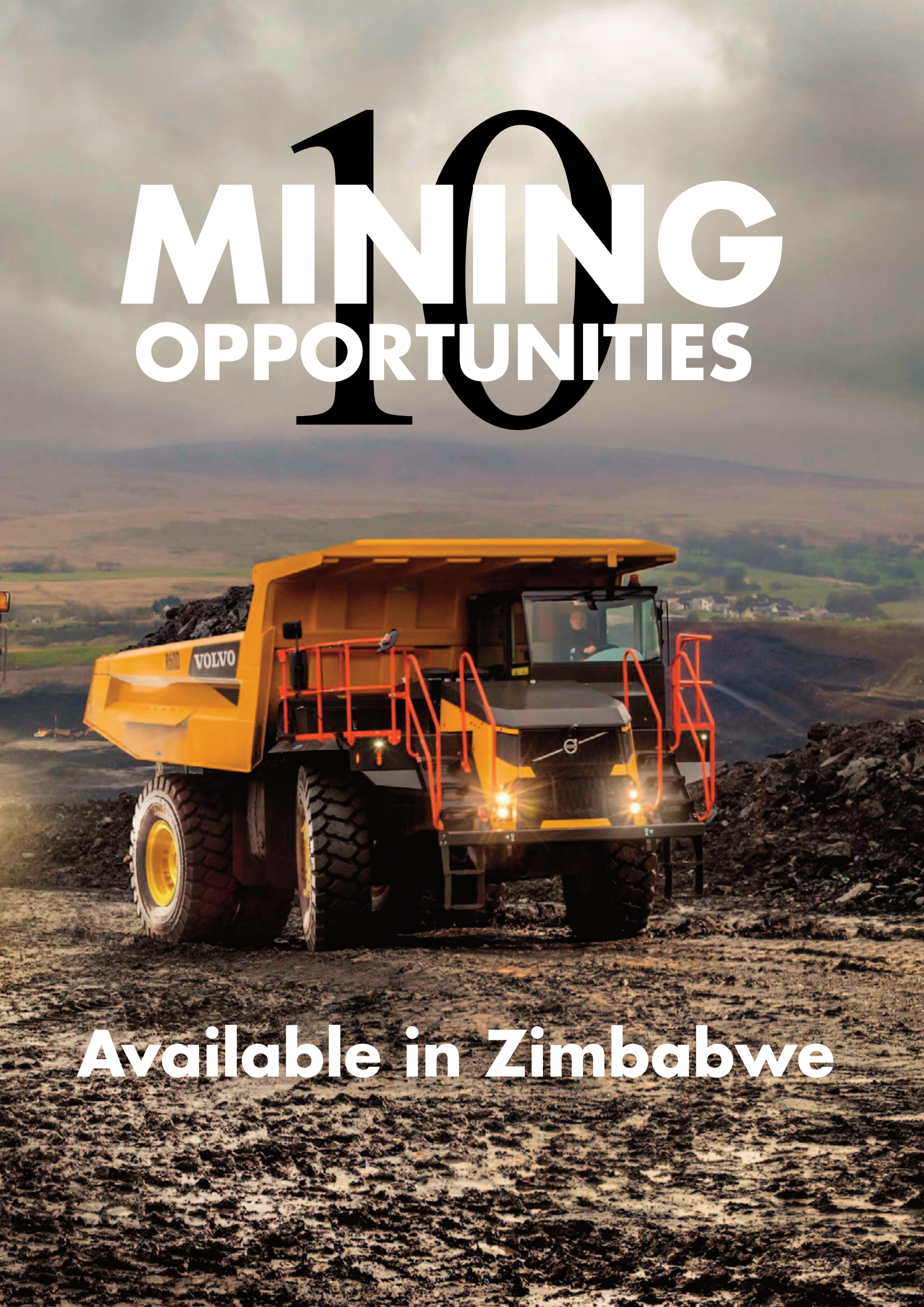
10 MINING OPPORTUNITIES



Available in Zimbabwe

10 Mining Opportunities available in Zimbabwe

There are plenty opportunities available in Zimbabwe's mining sector that could be exploited by both local and foreign investors.

Zimbabwe has about 60 mineral occurrences, the major ones being diamond, platinum, gold, nickel, lithium, chrome ore, iron ore, tantalite, asbestos, coal, granite, zinc and silver among others.

FACT
Zimbabwe has six out of 10 of the world's most valuable minerals.

Research also shows that Zimbabwe has six out of 10 of the world's most valuable minerals.

This massive resource base creates lucrative opportunities for investors in exploration, mining beneficiation among others.

Mining exploration

While addressing delegates at the 2018 Mining, Engineering and Transport expo held in Bulawayo in October, Mines and Mining Development Minister Winston Chitando admitted that the country has no record of its untapped mineral re-sources because there has not been any exploration work for the past decades.

This means Zimbabwe has been boasting of its vast mineral wealth without know-ing exactly what is underground.

exploration is a very big opportunity which arises in the mining industry which those with financial muscle can take advantage of. But this type of investment would require high amount of capital. In other words, it is not ideal for small scale miners.

Mining

Investors would also want to invest in mining activities in the country. As said earlier, Zimbabwe boasts of a huge and highly diversified mineral resource base dominated by prominent geological features, namely, an expansive craton, widespread greenstone belts (also known as gold belts), the famous Great Dyke, Precambrian and Karoo basins and metamorphic belts, according to

government records.

Investment opportunities exist in the mining of gold, diamond, platinum, nickel, lithium, chrome ore, iron ore, tantalite, asbestos, coal, granite, zinc and silver among others.

This could be done through joint ventures with Zimbabwe Mining Development Corporation, small scale miners and other miners facing financial constraints. For instance, according to Zimbabwe Mining Potential Booklet, there are over 4 000 recorded gold deposits, nearly all of them located on ancient workings. The same document identifies the country as having chrome reserves on the Great Dyke of approximate 10 billion tonnes. Deposits hosted outside the Great Dyke occur in some ultramafic rocks of the Shurugwi, Mashava and Belingwe greenstone belts, and ultramafic bodies in the Limpopo Mobile Belt.

Mining beneficiation

As alluded above, Zimbabwe is richly endowed with bountiful mineral resources

Continued on next page-

10 Mining Opportunities available in Zimbabwe

For years, the country has been exporting the majority of its minerals unprocessed.

There is a need for the country to derive meaningful benefit from its mineral resources by adding value into its minerals.

Given that government is still grappling with the economic woes that have dogged the resource-rich nation over the past few decades, those with capital could chip in.

To date, about five pilot value chains have since been identified as energy, stainless steel, pigment production, auto catalyst and diesel particulate filters, diamond processing and jewellery making.

Other vast investment potential is in the areas of platinum refinery, chrome smelting, diamond cutting and polishing, platinum refinery among others.

So investors can set up local mineral beneficiation facilities.

The Mines and Minerals Bill draft requires a proportion of mineral output being reserved for use in local value-adding activities and sold locally at a developmental price.

Zimbabwe Miners Federation

Zimbabwe Miners' Federation (ZMF) president, Henrietta Rushwaya told Mining Zimbabwe that they were looking forward to more investment coming into the country especially with regards to chrome sector.

"We are looking at more investment coming in especially in the chrome sector which is a bit short-changed for now because of the high financial requirements that go with the machinery. If you are a chrome miner, you would need an excavator, a dumper truck but as long as you don't have that within your reach, it is difficult for you to mine chrome at a large scale," she said.

Long term capital

Mining is capital intensive. According to Chamber of Mines of Zimbabwe (CoMZ) the mining sector needs fresh capital investment to ensure that positive growth and viability is maintained.

The mining body says mining companies need over US$7 billion to recapitalise their operations over the next five years, from 2018 to 2022.

But the challenge is that local financial institutions have not been offering long term capital, making it difficult for mining companies to borrow for recapitalisation or to sustain output growth or undertake new projects.

Most of them need to replace antiquated equipment that has become inefficient and costly. So there is an opportunity for mining investors to chip in and explore these massive opportunities available in the sector.

Machinery funding

Small scale miners told Mining Zimbabwe that they needed machinery to carry out their activities.

"We need small machinery that actually carry the order of the day in the gold mining industry. For instance, with the rain season looming you find that our miners lack small machinery like compressors, dewatering pumps, generators, explosives," Rushwaya said.

"These are some of the small items where we are saying if people come up with organized-based mining within the communities where they operate, it's easier for government, for instance, to assist in their form of scheme. Our miners are not keen to receive funding in the form of cash. They are keen to receive funding in form of the machinery. Let's empower them with requisite machinery and that way we won't go wrong," she said.

3 Inch Dewatering Pump

Continued on next page-

10 Mining Opportunities available in Zimbabwe

Employment opportunities: Women

For every direct mining job approximately three jobs are created in other sectors. Jobs are created in the industries that either supply goods and services to the mining sector, or use mining products for downstream value addition and so on. The mining sector is estimated to employ 45 000 people formally and about 200 000 people informally. Women can find employment at the different stages of the mining value chain. The industry also offers employment to both skilled and non-skilled women.

For skilled women, the sector absorbs women trained in technical fields such as geologists, metallurgists, technicians and also those with soft skills such accountants, lawyers, human resources practitioners.

As such, women and youth must take advantage of the employment opportunities that arise in other sectors through increased local content and enhanced linkages in the mining industry.

Training opportunities

Mining is a technical sector. Possession and utilisation of requisite skills is one of the key determinants on viability of mining projects. Apart from free technical advice from the Ministry of Mines and Economic Development, small scale miners, including women should pursue other training options, particularly with the Zimbabwe School of Mines (ZSM).

ZSM offers short training courses and diplomas to at affordable rates. So, ZSM and other institutions should take advantage of this and offer tailor-made courses for small scale miners.

Goods and services

Mining sector in Zimbabwe has created more than 45,000 formal jobs and more than 200 000 artisanal miners. With such huge numbers, women and youth can supply goods and services such as catering, personal protective, financial services, drilling, metallurgical, geo-mechanics, to name just a few, throughout the mining value chain. Gold buying agents

Government through its gold buying unit, Fidelity Printers and Refiners has issued out about 21 gold buying licences for small scale miners in a bid to stop illicit gold outflows.

Rushwaya said the move by government has actually made their members gold buying agents.

"So our small scale miners are now going to be gold buying agents in various gold mining districts where they operate. So if you are a member for instance, Umzingwane Association, one of your association members would be a buyer. This has been necessitated by the fact that there are certain quantities whose Fidelity Printers does not buy," she said.

"If you are producing less than 5 grams, Fidelity does not buy. So, all those that are producing less than the various stipulated quantities have been disadvantaged in the sense that they were now selling their gold in the black market. Now that Fidelity has accorded us the opportunity to acquire those buying licences.

She said they started with a number which they thought could be used for experimental purposes "which is 105 agents."

Electricity supply

One of the challenges faced by the mining sector is the cost of electricity which remained high, hampering the viability of mineral producers.

Current commercial tariffs from the Zimbabwe Electricity Transmission and Distribution Company on average range from $0,13/KWh for on-peak usage, $0,07/KWh for standard usage to $0,04/KWh for off-peak usage.

This is the highest in the region. Such challenges present a good opportunity for players in the energy sector to establish power generation plants in the country to cater these miners.

NEW VS AUCTIONED EQUIPMENT: Counting the cost

When purchasing auctioned equipment, consider the total cost of ownership. A new value-brand machine may save money over the long haul

It is an age-old question when considering equipment purchases: a new machine or an auctioned piece of equipment? Considering the auction market for construction equipment is roughly the same size as the market for new machines, it is a dilemma that nearly all equipment owners are facing.

Traditionally, the choice between new and auctioned equipment often involved comparisons of similar equipment. In those cases, the decision might come down to the application the machine is needed for, factors such as residual value, or one might simply be swayed by a good deal.

However, with the addition of so-called "value brand" equipment, there are far more options and details to consider when choosing between new and auctioned machines. These value brands are solid, well-made pieces of equipment, but lack the features of premium brands, which helps keep the price low.

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NEW VS AUCTIONED EQUIPMENT: Counting the cost

auctioned machines. These value brands are solid, well-made pieces of equipment, but lack the features of premium brands, which helps keep the price low.

Value brands have gained traction with customers with certain needs, such as for seasonal and low-hour applications, work that involves corrosive materials that degrade equipment, or projects that simply don't require premium features to complete. For many customers, value brands represent a third option that should be taken into consideration, complete with their own cost, benefit and applications analysis.

Total cost of ownership

For many equipment buyers, the most important consideration when making purchasing decisions is the Total Cost of Ownership (TCO) for each machine. This is the expected cost of buying and maintaining a machine over the course of its entire lifespan, or at least until that machine is ready to be resold again. Several factors influence TCO. A machine's sticker price, of course, is the first cost to be analyzed, but it does not reflect the inherent cost of purchasing and maintaining an auctioned machine.

Repair and maintenance costs can run as high as 75 percent of the machine's purchase price, and typically see a rapid increase in years four, five and six of ownership, which is when most auctioned machines are purchased.

With a new value brand machine, however, repair and maintenance needs are much lower. For example, the price of a new SDLG LG959 wheel loader is nearly the same as one would pay for a four-year-old auction-bought loader with approximately 6,000 hours of work on it. On average, the auctioned loader will rack up approximately $20,000 to $25,000 in repairs, while the SDLG will only cost around $5,250 – a difference of $15,000 to 20,000.

By its very nature, a new value machine will need less high-cost repairs and less maintenance, which translates to less downtime. In addition, new machines have warranties, so work needed in its first year of ownership will likely be covered, plus extended warranty plans are available.

Leveraging dealer relationships

With these purchasing decisions, one must also consider their relationship with their preferred equipment dealer, and how that factors into repair and maintenance scenarios. With auction purchases of machines there is risk, as one doesn't know the history of the vehicle, and must find a dealer to service and provide and parts, typically at a higher cost.

When buying a new value machine, one is purchasing from a dealer they know and may have worked with for years. These ongoing relationships are good for both the dealer and the customer. They will fully back the equipment's warranty needs, and often provide more timely service at a better price.

Of course, application needs are the ultimate dictator when deciding whether to purchase a new value brand machine or a machine from an auction. For those who are working in seasonal or low-hour applications, or just don't need the features of a premium machine, a value brand loader can provide a lower TCO, increased uptime and more return on investment.

Fuel consumption, how low can you go

The diesel engine has become a highly efficient power source but how much further can it be developed? In this article, Dr. Staffan Lundgren discusses whether the humble engine has a future, and if so what it looks like.

Despite being developed constantly over the last century to become a highly fuel-efficient power unit, the diesel engine is now under threat like never before. So 'what is the future of the diesel engine?' was the theme of questions asked of Dr. Staffan Lundgren, senior technology advisor for Powertrain at the Volvo Group.

Why has diesel remained such a popular power source?

Diffusion combustion – where the combustion is concentrated around the ignition and oxygen is diffused around the combustion area – is very efficient. It has minimal energy losses to the walls of the engine through radiation or convection – much lower than a gasoline engine. The basic diesel engine is very strong and can withstand very high pressures.

How efficient is it?

There have been big improvements – jumping from around 35 percent efficiency in the 1980s to today's 50 percent efficiency. That means half of the fuel is now being put into useful mechanical work. For reference – a gasoline engine is around 35 percent efficient. These gains have come from high-pressure common rail fuel injection systems, turbocharging and the introduction of computing power to control precisely the combustion and the aftertreatment management systems.

Is increasing fuel efficiency a customer's No.1 demand?

Yes, good fuel efficiency is the most important element, but customers also require good engine performance and durability. Then is has to be durable and meet emissions requirements – and these are sometimes in competition with one another.

Are engines also becoming more powerful?

There is an upside trend customers are moving larger loads and that requires greater power. The Volvo Group's largest output is now 1,000 hp. But compared to passenger cars, all heavy duty applications are still (relatively) under-powered.

The diesel engine is accused of being environmentally unfriendly. Can it clean up its act?

Making diesel engines very clean is possible and that is something that the heavy-duty industry has made greater progress on than the light duty sector. Part of the reason for this is that the efficiency demanded by customers in the heavy duty sector is much higher.

How hard has it been to increase efficiency while at the same time lowering emissions?

It has been a challenge to refine the thermodynamic process to compensate for the burden of having added the SCR aftertreatment system. But now we are back on track to increase efficiency step by step.

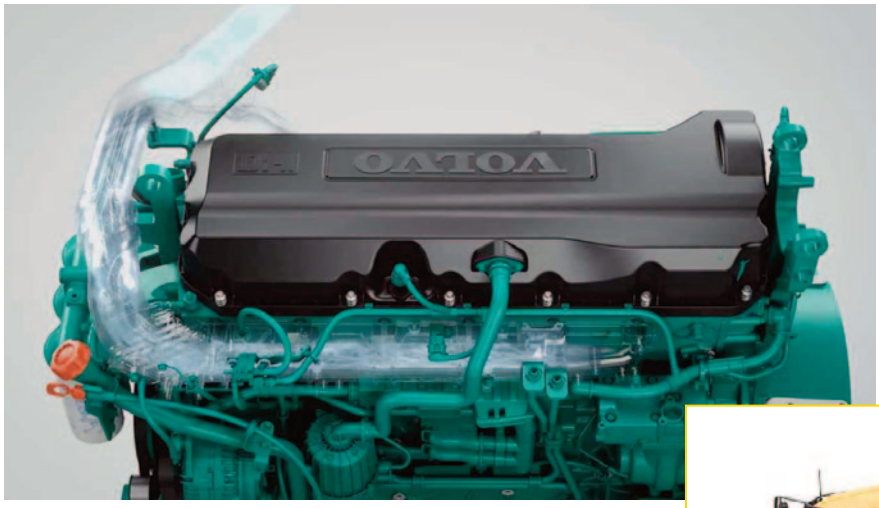
How much further can you go – zero emissions?

It depends on what you mean by emissions. If you propel the engine with fuel that has no carbon and couple it with an efficient combustion process that creates no soot, then zero emissions is possible. We have been working on using methane and DME (dimethyl ether) as clean alternatives to diesel. This is not a new idea, in 1900 the diesel engine was successfully run on peanut oil. The problem isn't with the technology of making the clean fuels work, but rather their availability. But if the supply issue of renewable fuels can be solved, then it is possible for diesel engines to run 100 percent CO2 free.

Don't clean fuels also have their own environmental challenges?

Bio-fuel production shouldn't compete

Fuel consumption, how low can you go



with food production – but there are other fuels where this isn't a problem. Electro-fuels (E-fuels) use solar or wind power to 'crack' water and combine it with CO2 from methane – and these fuels feature quite high efficiency – up to 80 percent claimed. This could be an interesting complement to electrification.

How do different fuels affect the combustion?

From an efficiency point of view the engine doesn't care if the fuel molecule comes from a fossil or a renewable source. So with investment in the right type of renewable fuels, the transition to renewables should be straightforward.

So how do we lower fuel consumption further?

The next big step in increasing engine efficiency/lowering fuel consumption is its combination with electromobility. The demand on engines in the future will not be so varied as it is today. There is a difference between how efficient an engine is at its 'sweet spot' and how efficient across the whole real-world operating range. Partnering engines with electric motors, as in parallel hybrids, allows the engine to run at its most efficient level. Without doubt, electrification will form part of the future combustion driveline solution.

Can other technology help lower fuel bills?

Examples are stop/start technology and 48V electric systems that power ancillaries electrically, rather than mechanically. These may all have future uses in heavy-duty applications, once their robustness is proven. But another important source of greater efficiency is heat recovery. This is not an easy task on heavy-duty engines, as they run relatively cold exhausts, but there is still hope to capture it and make it commercially viable.

What is the maximum efficiency an engine can achieve? The diesel engine has a theoretical system efficiency of between 55 and 60 percent. For reference, the best power stations operate at 50 to 55 percent efficiency, and fuel cells are also around 50 percent+ efficient – so diesel engines can be incredible efficient. This, added to the fact that engines working with electrification will often have a lower power demand, will mean fuel use is set to decline in the future.

How long can the diesel engine survive?

The diesel combustion engine remains a very cost-efficient solution for creating mechanical energy. That said, legislation, especially in Europe, is pushing towards electrification quite strongly, and that may impact directly on the combustion engine's longevity. Our feeling is that its use will be application-based, and that it will continue for a considerable time in long distance uses, such as ocean-going ships and long-haul trucks. But even here there will probably be a blend of technologies in use.

Is diesel part of the future?

The diesel engine – in a modified form – can be very clean and efficient. It also plays well with electrification. As a manufacturer we need to find the best solution, based on the decisions society makes. Whatever they are, we need to be prepared.

Caledonia Q3 2018 production update and earnings downgrade

Caledonia Mining Corporation Plc ("Caledonia" or the "Company") announces quarterly gold production from the Blanket Mine in Zimbabwe for the quarter ended September 30, 2018

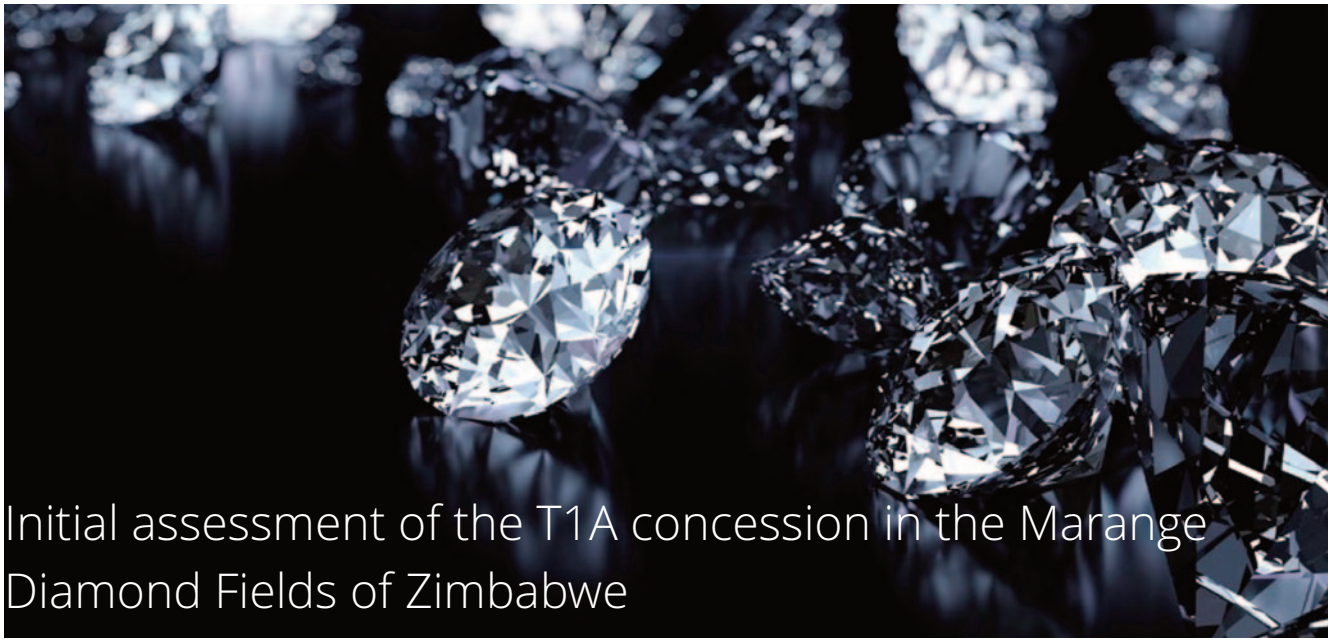
All production numbers are expressed on a 100 per cent basis and are based on mine production data and are therefore subject to adjustment following final assay at the refiners.

Approximately 13,978 ounces of gold were produced during the Quarter, 10 per cent above production in the second quarter of 2018 and 3 per cent below production in the third quarter of 2017. Gold produced for the 9 months to September 30, 2018 was 39,559 ounces, marginally behind the 39,710 ounces produced in the corresponding period in 2017. The improvement in production in the Quarter is expected to continue into the fourth quarter. The directors of Caledonia have taken a decision to marginally reduce and narrow the range of 2018 production guidance from 55,000 to 59,000 ounces to a range of between 54,000 and 56,000 ounces. Caledonia remains on track to achieve its production target of 80,000 ounces in 2021.

As a result of the adjusted 2018 production guidance and the recent weakness in the gold price, assuming the current spot gold price is maintained for the rest of 2018 and assuming no material change in the Company's operating costs, Caledonia expects full year 2018 adjusted earnings to be in the range of 140c to 150c per share. This is a reduction from the previous earnings guidance of 165c to 190c per share but is 3 per cent to 12 per cent higher than the earnings achieved in 2017.

Commenting on the announcement, Steve Curtis, Chief Executive Officer, said: "Production of 13,978 ounces in the third quarter of 2018 is a welcome improvement on the production levels achieved in the first two quarters of 2018. The Company expects this improvement to be maintained in the fourth quarter of 2018. Not withstanding the improved operating performance, we believe it is appropriate to adjust and tighten our production guidance for 2018 from the previous level of 55,000 to 59,000 ounces to a slightly reduced level of 54,000 to 56,000 ounces. Along with this adjustment and in light of the weaker than budgeted gold price in recent months we have issued new earnings guidance for 2018 of between 140 and 150 cents per share."

"Grade during the quarter continued to be below expected levels and remains a key area of focus for the business. I am pleased with the progress that our technical teams have made with our focus on improved mining practices to minimise dilution and I have confidence that their efforts will continue to deliver results. We remain confident in the underlying geological model for Blanket and that the longerterm potential of the ore body is robust. We expect grade to return to budgeted levels in the fourth quarter of 2018." "The sinking of the central shaft continues according to plan and within budget, we look forward to commencing production from the central shaft in 2020 which is expected to deliver the Company's growth plan to achieve 80,000 ounces by 2021."



Initial assessment of the T1A concession in the Marange Diamond Fields of Zimbabwe

Botswana Diamonds plc ("BOD") is pleased to announce that it and Vast Resources plc ("Vast") have received a preliminary geological assessment of the Heritage Concession ("Block T1A") within the Marange Diamond Fields of Zimbabwe.

Vast has a due diligence access agreement and pre-agreed joint venture terms on the Heritage Concession and as announced on 4th October 2018, BOD has entered an agreement with Vast under which BOD will be engaged on due diligence, exploration, mining and marketing on the Heritage Concession.

Highlights

• Potential for modern alluvial placers
• Possibility for older conglomerates

Next steps are to carry out geological Mapping of the concession and hopefully advance to a trial mining programme

John Teeling, Chairman, commented, "We have completed a desktop assessment of the Heritage (T1A) Concession in the Marange Diamond Fields. This assessment, has outlined significant potential on the concession and proposes the next steps which include mapping and trial mining if indicated."

Further detail

The Heritage Concession, also named Block T1A is 6,913 hectares in surface area. The property contains several targets for modern alluvial diamond placer deposits. The grades of the known modern alluvial placers which drain the Marange Diamond Fields range in grade from 50-500 carats per hundred tons ("cpht"), most typically 100-200 cpht. There is also potential for remnants of the basal Umkondo (conglomerate) unit in the concession, which runs at grades from 100-3,000 cpht elsewhere in the Marange Diamond Fields.

FACT
This assessment, has outlined significant potential on the concession

Outside the eastern edge of the property is the closest known diamond mine within the Marange Diamond Fields. Situated within Block E2, the deposit was discovered and operated from late 2010 until 2016. Records indicate an average stone size of c.5 cts/stn and an average diamond value of c.US$80/ct from this block. It is generally estimated that over60 million carats have been recovered from the entire Marange Diamond Fields to date.

The next steps will be to investigate the potential of the modern alluvial diamond deposits and of the older conglomerates on the property. Assuming positive results, the field work will be closely followed by drilling, pitting and bulk sampling which will form part of a pre-feasibility study and this may entail further funding beyond the initial US$1 million committed to the programme by Vast.

This release has been approved by James Campbell, Managing Director of Botswana Diamonds plc, a qualified geologist (Pr.Sci.Nat), a Fellow of the Southern African Institute of Mining and Metallurgy, a Fellow of the Institute of Materials, Metals and Mining (UK) and with over 33-years' experience in the diamond sector.

The EIA and Small Scale Artisanal Miners

Zimbabwe is endowed with vast mineral resources, especially along the Great Dyke. As such, the mining industry has expanded over the years and is a significant contributor towards the nation's Gross Domestic Product. The mining industry is characterised by large, medium and small scale miners.

The Agency uses various tools to achieve sustainable mining, including the Environmental Impact Assessment. Sustainable mining is usually an issue with the small scale and artisanal miners. However, the government has recognised that the artisanal and small scale mining sector is contributing significantly to economic growth hence the need to make legal provisions which ensures that they do their operations in a sustainable manner.

What does the Law say about Mining?

Mining is a prescribed project listed in the First Schedule of the Environmental Management Act CAP 20:27 of 2002. All prescribed projects have the potential to cause environmental degradation hence should undergo the Environmental Impact Assessment process before implementation. This is in accordance with section 97 of the Environmental Management Act.

An Environmental Impact Assessment (EIA) is a process which identifies the environmental impacts of a development project and clearly outlines measures to mitigate the negative impacts caused during project construction, implementation and decommissioning. The Environmental Management Act defines an Environmental Impact assessment as 'an evaluation of a project to determine its impact on the environment and human health and to set out the required environmental monitoring and management procedures and plans'. The EIA is thus a tool that enhances sustainable development where environmental, economic and social pillars are mainstreamed in the project in a balanced manner.

Are Small Scale Miners operating according to the law?

The majority of the small scale miners are operating without Environmental Impact Assessment (EIA) Certificates which is a violation of the law. One of the reasons cited by the small scale miners in terms of complying with the said legislation is lack of financial resources to undertake the EIA process.Some of the miners with EIA certificates are failing to comply with the submitted Environmental Management Plans (EMPs) mainly because of lack of understanding of the full contents of the so called "voluminous" EIA documents.

What is the way forward?

In order to improve compliance, the Agency has come up with a strategy aimed at accommodating small scale miners by assisting them to develop a generic and simplified Environmental Management Plan .The Agency has developed operational guidelines for small scale miners in line with the provisions of the Act. The guidelines have been simplified to enable easy understanding by the small scale miners. These guidelines will reduce the cost of the Environmental Impact Assessment Process by removing the need for environmental consultants who require a separate fee.

Continued on next page

The EIA and Small Scale Artisanal Miners

What Are the Requirements for Registration?

• Registration certificate from Ministry of Mines and Mining Development
• Approved Siting of Works Plan
• Consultation with the farm owner/land owner and neighbouring land users
• Completed Small Scale Miners EMP Form
• Payment of EIA review fees @ $253.58

An inspection should then be carried out by EMA and other stakeholders to authenticate the information provided with what is on the ground and provide technical advice on mitigation of environmental impacts.

Thereafter, an Environmental Impact Assessment certificate can be issued to the proponent. The certificate is initially valid for two years then it would be subject to annual renewal during the operation period of the project. For the certificate to be renewed, the proponent should be submitting quarterly reports which provide an update of what the proponent is doing in terms of mitigating the environmental degradation caused by the mining operations.

What environmental and social issues are associated with Mining?

Mining activities are usually associated with the following environmental risks; destruction of vegetation, veld fires, land and water pollution, land disputes and mismanagement of hazardous substances, among other issues. Strategies should be put in place and implemented to ensure that the issues above are addressed by the proponent and EMA monitors compliance.

For more information contact EMA on; eep@ema.co.zw. Follow us on Facebook; Environmental Management Agency and Twitter; @EMAeep. Alternatively, call us on: Tel 08677006244 and Toll-free 08080028; or use our WhatsApp platform 0779565707.

Outlook for mining in Africa

Underground Mine in South Africa

Image credit: reuter

Resource-rich Africa has long been targeted by international investors and perhaps no more so than today. New technologies linked to the development of electric vehicles and rechargeable batteries have increasingly turned the spotlight on metals such as cobalt and copper, mined in a number of African countries.

Given that Africa is also a major producer of gold, diamonds, bauxite and platinum, the continent holds a preeminent position in the global resources industry. And as 2017 saw a strong rebound in the price of most metals, many African governments received more in taxes and royalties to help spur economic growth.

The resources sector around the world benefited from robust global GDP, as well as strong demand for minerals related to new technologies. It has been a year that has seen significant price recovery, almost across the board.

A big story has been cobalt, with the price up an astonishing 100 percent on the year. Cobalt is used in lithium-ion batteries that power EVs and about 60 percent of global output is from the Democratic Republic of the Congo (DRC). Analysts at UBS have forecast that cobalt demand will double by 2020 to approximately 200,000 tons a year; new projects are required over the longer term to avoid a deficit.

Copper, too, is linked to electric vehicles and renewable energy not to mention global growth. Enough copper goes into electric vehicles and their charging units that it could lift demand by a quarter in the years ahead, according to analysts at Bernstein Research. Again, this is good news for African producers of copper, which includes DRC, Zambia, Botswana and South Africa.

Goldman Sachs, previously a copper bear, has said the metal's bull run in 2017 (prices are up about 25 percent) to more than US$7,000 a ton in October was grounded in fundamentals and not speculation. The bank has forecast a 130,000-ton copper market deficit in 2018.1

Miners are keenly searching for new sources of copper and cobalt in minerals-rich DRC.

Additionally, Africa accounts for more than 20 percent of global gold output, and London-listed Randgold is a key player with operations in Senegal, Mali, DRC and Côte d'Ivoire. Its shares were up 16% in 2017, against a gold price rise of 10%.

And while we are not in the grips of another commodities super-cycle, fueled by a Chinese boom of the kind we saw up until 2012, the prospects for 2018 are promising.

Mining in Africa is not without its challenges, though. The DRC is a case in point. A humanitarian crisis brought about by civil unrest and political instability means there is significant country risk. A new mining code is on the horizon that aims to bring in more taxes, and this has alarmed mining groups.

South Africa has faced uncertainty brought about by a new mining charter that hit dividends and saw the market capitalization of SA-listed entities drop to June 2015 levels. But improved prices brought the SA industry back into profitability, showing the first substantial increase in revenue—ZAR 43 billion in more than five years.

In White & Case's annual mining survey, about 45.1 percent of respondents said that heightened risk of resource nationalism across Africa made it difficult to justify investment, but nearly 42% said the risk was manageable and no worse than in the recent past. And almost 13 percent believed the potential returns outweighed the risks.

A related question about the biggest challenge in Africa highlighted country/political risk, i.e., the possibility of government interference. About 64.5% of respondents named it as the chief obstacle. By contrast, the problem of inadequate infrastructure was only mentioned by almost 10 percent of respondents.

Outlook for mining in Africa

In a year that saw Acacia Mining in conflict with the government of Tanzania over disputed tax payments, such a reaction is not surprising. Barrick—Acacia's largest shareholder—agreed to cede 16 percent of Acacia's three gold mines in Tanzania to the government and pay US$300 million toward resolving a row that ultimately saw the resignation of Acacia's CEO Brad Gordon and finance director Andrew Wray.

A not dissimilar dispute blew up in Zambia in 2015 when the government announced a steep increase in royalties for both deep and open pit mining, but eventually backpedaled after warnings of mine closures and thousands of job losses.

According to White & Case's survey, accelerating economic development in Africa is key to unlocking Africa's potential for minerals development in the future. The IMF, incidentally, still forecasts that Africa will be the second-fastest growing region in the world between 2016 and 2020, with annual growth of 4.3%

The respondents were also asked about African jurisdictions they considered most favorable for Western business. Botswana, Egypt, South Africa, Namibia and Ghana all scored highly. Countries scoring poorly included Eritrea, Sierra Leone, Ethiopia and Guinea.

Impediments to business still need to be removed, according to the World Bank's Ease of Doing Business report in 2016. This showed only seven African states were placed in the top half of the ranking: Botswana, Mauritius, Morocco, Rwanda, Seychelles, South Africa and Tunisia.

Looking to 2018, miners will be privately hoping that cobalt prices do not go too much higher for fear of killing off electric vehicle demand. Carmakers have said they are shifting to higher nickel batteries that use less cobalt over the next decade. The tightness in the cobalt market today is accelerating the search efforts to find a substitute.

Mining companies saw their share of challenges in their Africa operations in 2017. Rio Tinto suspended one senior executive and accepted the resignation of a second in 2017 after discovering US$10.5 million in unexplained payments to a consultant in Guinea. The company also faces fraud allegations over coal assets it once owned in Mozambique.

As the switch to growth gains momentum, M&A activity improved in 2017, with some signs of a shift from largely divestment-led drivers to strategic-led deals focused on growth. China Molybdenum, for instance, secured a 56 percent stake in Tenke Fungurume Mining, one of the world's largest known copper and cobalt resources in Katanga Province, DRC for US$2.65 billion.

The appetite to raise more capital in the sector is expected to grow. While issuing more equity will remain an attractive option, increasingly, industry participants will also consider the efficiency of their overall capital structure.

The bias toward equity funding, which is more expensive than debt, is increasing the sector's weighted average cost of capital. The focus on lowering financial risk will ease going forward, with activity in debt markets picking up once again.

Citigroup said in December that stronger global GDP and the rising oil price had helped drive the amount of money invested in commodities to the highest in more than four years.

Goldman Sachs is also bullish on the overall sector heading into 2018 despite "significant divergences" in its views on metals: "The difference lies in the supply dynamics...while copper supply is likely to become increasingly constrained over the coming years, aluminum supply should become more abundant."

"A positive carry in key commodity markets and already strong global demand growth across the commodity complex reinforces the case for owning commodities, and hence we maintain our 12-month overweight recommendation, now with a forecasted return of almost 10 percent," the bank said in a client note.2 That would help producers everywhere, not least of all in Africa.

The data quoted in this article is from a December 2017 – January 2018 White & Case survey of 40 senior decision-makers in the mining market.

All Minerals and location found in Zimbabwe

Agate	Nyamandhlovu, Chikomba, Lupane
Aluminum	Mutare, Nyanga, Mwenezi
Amazonite	Nyamandhlovu, Rushinga
Amethyst	Nyamandhlovu, Hurungwe, Hwange, Makonde, Lupan
Antimony	Kwekwe, Bubi, Mberengwa, Kadoma, Shurugwi
Arsenic	Bubi, Shurugwi, Mutare, Gwanda
Asbestos	Masvingo, Gwanda, Matobo, Mberengwa, Insiza, Makonde, Umzingwane
Aventurine	Masvingo, Beitbridge
Barites	Kwekwe, Mwenezi
Beryl	Hurungwe, Kariba, Goromonzi, Harare, Mudzi, Rushinga, Mutoko, Bindura, Marondera, Gutu, Buhera, Bikita, Chegutu, Hwange, Mberengwa, Gweru
Bismuth	Gwanda, Insiza, Goromonzi, Hwange
Cesium	Mudzi, Bikita, Goromonzi
Calcite	Hwange, Bindura, Chiredzi, Mwenezi
Chromium	Mberengwa, Guruve, Makonde, Gweru, Kwekwe, Shurungwi, Chegutu, Kadoma, Gwanda, Insiza, Masvingo, Chirumanzu
Citrine	Marondera, Harare, Goromonzi
Clay	Harare, Bulawayo, Gwanda, Gweru
Coal	Gokwe, Chiredzi, Beitbridge, Mwenezi, Hwange, Lupane, Binga, Kariba, Hurungwe, Bikita
Cobalt	Kwekwe, Insiza, Shamva, Bubi, Bindura
Copper	Makonde, Kadoma, Mutare, Chirumanzu, Chegutu, Kwekwe, Shurugwi, Beitbridge, Gokwe, Bindura, Chipinge, Bikita, Insiza, Makonde, Harare, Bulawayo, Shamva, Chiredzi, Nkayi, Mudzi, Chegutu, Bindura, Kwekwe, Hurungwe, Bubi, Makonde, Bikita, Gwanda, Masvingo.
Cordierite	Hurungwe, Beitbridge, Chimanimani, Rushinga, Makuti
Corundum	Beitbridge, Chiredzi, Shurugwi, Marondera, Mberengwa, Mazowe, Rushinga, Insiza, Goromonzi, Wedza, Makoni
Diamond	Gweru, Bubi, Beitbridge, Binga, Mwenezi, Mutare, Chivi
Diatomite	Hurungwe
Dolomite	Mutare, Beitbridge, Makonde, Mudzi, Masvingo, Rushinga.
Emerald	Gutu, Masvingo, Insiza, Mberengwa, Hurungwe.
Feldspar	Harare, Bikita, Umzingwane, Goromonzi
Fireclay	Hwange, Chiredzi, Kwekwe, Lupane, Nkayi, Kadoma, Kwekwe
Flint clay	Mwenezi, Beitbridge
Fluorite	Hwange, Guruve, Binga
Garnet	Beitbridge, Hurungwe, Mudzi, Guruve, Rushinga, Marondera
Graphite	Hwange, Hurungwe, Kariba, Makonde
Gypsum	Beitbridge
Gold	Every district in Zimbabwe
Iron	Kwekwe, Mberengwa, Harare, Kwekwe, Buhera, Gweru, Charter, Chiredzi, Masvingo, Mazowe, Kadoma.

All Minerals and location found in Zimbabwe

Jade	Masvingo
Kaolin	Kwekwe, Mutare, Bubi, Hwange, Kadoma, Mazowe, Harare, Umzingwane, Nkayi, Chegutu
Kainite	Hurungwe, Nyanga, Mudzi, Rushinga
Lead	Mberengwa, Kwekwe, Gokwe, Mutare, Wedza, Hwange
Limestone	Mberengwa, Gwanda, Bindura, Shamva, Mazowe, Kadoma, Umzingwane, Gweru, Chegutu, Chimanimani, Mudzi, Harare, Hurungwe
Lithium	Goromonzi, Mudzi, Buhera, Bikita, Chegutu, Hwange, Harare, Insiza, Rushinga, Mutoko, Mutare, Hwange
Magnetite	Gwanda, Nyanga, Kadoma, Mwenezi, Insiza, Buhera, Mberengwa, Beitbridge, Gweru
Manganese	Kwekwe, Gweru, Makonde, Mberengwa
Mercury	Bubi, Kadoma
Mica	Hurungwe, Rushinga, Kariba, Hwange
Molybdenum	Kwekwe, Insiza, Shurugwi, Makonde, Chipinge, Gweru, Mutare
Mtorolite	Guruve, Mutare
Nickel	Bubi, Makonde, Kwekwe, Insiza, Guruve, Shamva, Shurugwi, Matobo, Chegutu, Bindura, Gweru.
Ochre	Gweru, Kwekwe
Palladium	Kwekwe, Makonde, Shurugwi, Chegutu
Phosphate	Buhera
Platinum	Kwekwe, Makonde, Shurugwi, Chegutu, Centenary
Pyrite	Shurugwi, Gwanda, Mazowe, Kadoma, Bulilimamangwe, Shamva, Hwange.
Salt	Mwenezi
Sapphire	Mudzi
Selenium	Makonde
Silica	Gweru, Kwekwe, Makonde, Chegutu, Gokwe, Harare, Goromonzi
Sillimanite	Hurungwe
Silver	Makoni, Makonde, Kwekwe
Talc	Bubi, Guruve, Insiza, Nyanga, Mutare, Mt Darwin, Mberengwa, Goromonzi, Mutoko, Wedza, Kwekwe, Makoni
Tantalum	Hurungwe, Guruve, Kariba, Mudzi, Mutoko, Shamva, Bindura, Harare, Goromonzi, Murehwa, Mt Darwin, Rushinga, Mazowe, Marondera, Gutu, Masvingo, Buhera, Bikita, Mutare, Hwange, Chivhu, Mberengwa, Chimanimani, Makoni, Insiza
Tin	Hurungwe, Mudzi, Shamva, Bindura, Goromonzi, Harare, Rushinga, Mt Darwin, Nyanga, Gutu, Bikita, Hwange, Masvingo, Mutare
Topaz	Hurungwe, Gweru, Mutare
Tungsten	Hurungwe, Kariba, Shamva, Mazowe, Rushinga, Bindura, Guruve, Mt Darwin, Harare, Mudzi, Goromonzi, Bulawayo, Insiza, Matobo, Gwanda, Umzingwane, Bubi, Buhera, Mberengwa, Kadoma, Bikita, Shurugwi, Mutare, Chipinge, Chegutu, Kwekwe, Chiredzi, Wedza, Gweru, Hwange, Masvingo, Makoni
Vanadium	Mt Darwin, Guruve, Bulawayo
Vermiculite	Buhera, Mudzi
Zinc	Kwekwe, Gokwe, Nyanga

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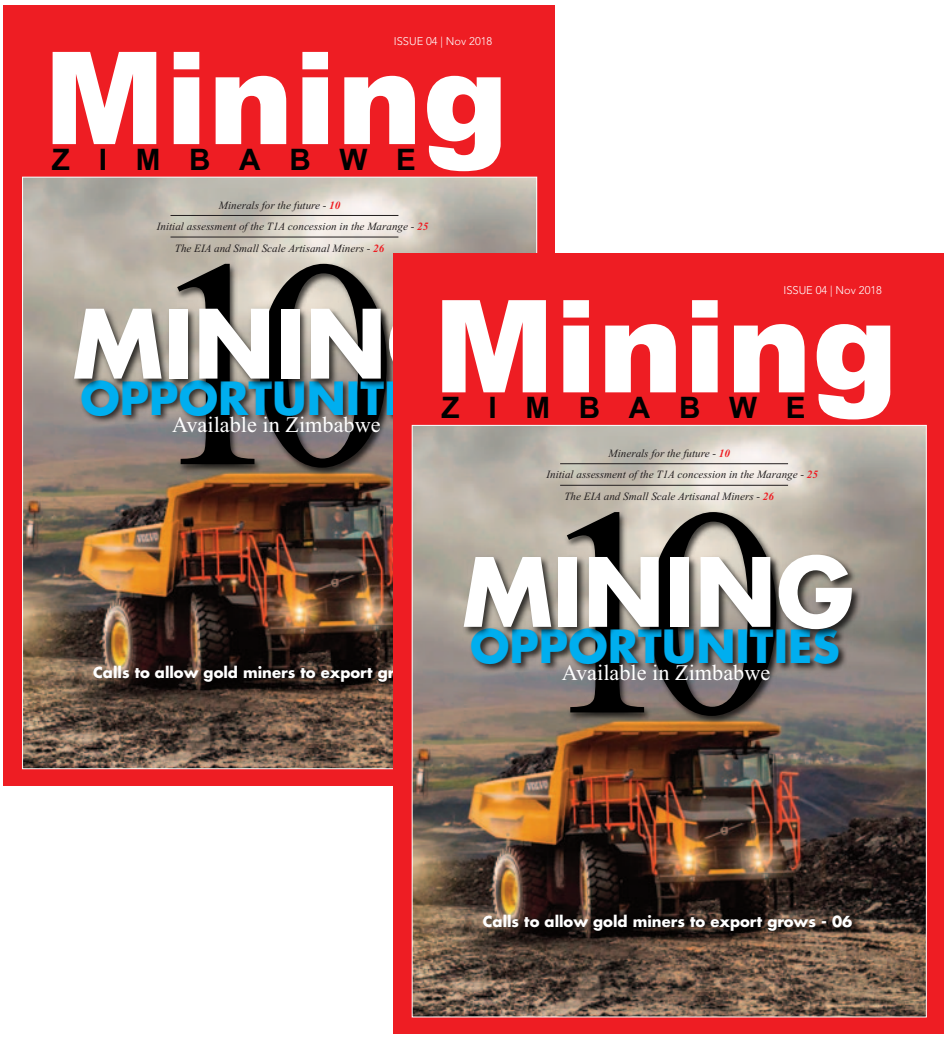

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