

MINING & TRADE *Review*

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By Our Reporters

Mining firms have welcomed the change in Malawi's political landscape that has seen Malawi Congress Party (MCP) President Lazarus Chikwera replacing Democratic Progressive Party (DPP) leader Arthur Peter Mutharika as State President following his triumph in the court ordered Fresh Presidential Elections.

Mining investors whom Mining & Trade Review interviewed said the peaceful political transition has inspired business confidence as it manifests that Malawi is a country which respects the tenets of democracy and the rule of law.

The investors urged the new administration to deal with bureaucracy in the public sector and ensure that documents such as licenses are

processed in time.

The mining companies that have moved in to congratulate Chakwera and Vice President Saulos Klaus Chilima on their triumph include leading consulting group Akatswiri Mineral Resources, rare earth prospecting group Mkango Resources, oil search firms Rak Gas and Hamra Oil, Yazam Mining Company, Shayona Cement Corporation, Cement Products Limited, Crown Minerals, Ilomba Granite Mining and Equipment & Parts Suppliers.

Representatives of ASM and civil society groups working in the minerals sector have also welcomed the new administration while urging for reforms to ensure that ASMs and impoverished communities in mining areas benefit from the sector.

(Read detailed comments from the Civil Society Groups, Chamber of Mines and Energy, and ASM representatives in our articles on pages 3, 13 and 17)



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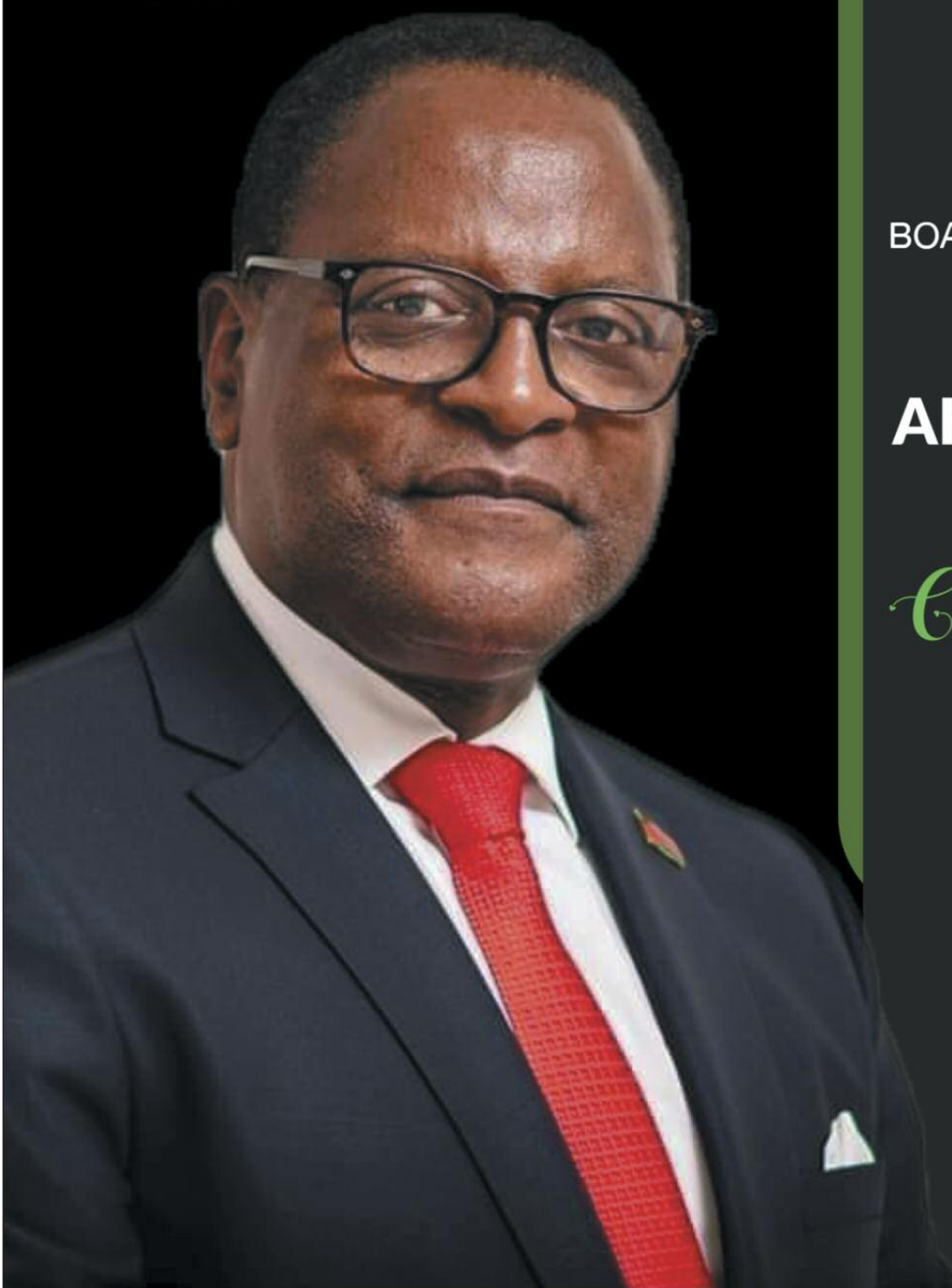









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Civil society demands reforms in mineral sector

By Tawonga Nyirenda

Civil Society Organisations working in the extractives sector have advised the newly elected government of President Lazarus Chakwera to work on a number of reforms in the mining sector to ensure that it adequately benefits Malawians.

National Coordinator for Natural Resources Justice Network (NRJN) Kennedy Rashid said that the new government needs to amend some Acts of Parliament to ensure that the mining sector thrives.

Among other things, Rashid said the Mines and Minerals Act 2019 (MMA) needs to be amended so that Community Development Agreements (CDA) are implemented fairly in the sector.

He said: "We need an amendment of the Act to provide that medium scale miners are also mandated to sign CDAs as currently CDA has been designed to be implemented by large scale miners only but we do not have any large scale mine in operation in Malawi which implies that the communities are not benefiting directly from mining."

"For example, Mchenga Coal Mine in Rumphi has existed for over 35-years as a medium scale mine and has not adequately benefited communities around it. If the miner had signed a CDA, communities would have had legal basis to demand their benefits."

Rashid also said the new government needs to gazette and start enforcing MMA regulations to ensure that there is sanity in the mining sector.

In order to address the issue of illegal mining by artisanal and small scale miners (ASMs) across the country, Rashid said there is a need for government to establish a specific institution to look into the buying and selling of precious minerals.

"We need to amend the Reserve Bank Act which gives power to buy and sell gold to the Reserve Bank of Malawi. We need to institute a special institution that can look into the buying and selling of reserved minerals," he said.

Rashid said the civil society expects the new government to formalize and start regulating the ASM subsector.

He also said that the new government needs to operationalize the Access to Information Act so that citizens access information on minerals at a local level.

Rashid said: "We expect the government to ensure that there is transparency and accountability in the extractives sector."

"The government should be open enough to disclose the production data, revenue data, social payments made and licensing processes."

"We also expect the government to inform the community on the Kauniuni Geo mapping report using the language they can easily understand."

Rashid also said the people of Malawi are eager to know the owners, benefits and progress of several mining projects such as Kayelekera Uranium in Karonga, Kangankunde Rare Earth in Balaka, and Chimwazulu Corundum in Ntcheu.

He stressed the need for implementing the Extractive



Kamoto: There is need for transparency

Industry Transparency Initiative (EITI) report recommendations.

"We expect the new government to start implementing the EITI report recommendations as it does not make sense to be given the same recommendations everytime the report is produced", he said.

National Coordinator for Publish what you Pay Malawi who is also Extractives Programme Coordinator for the Centre for Environmental Policy and Advocacy (CEPA) Gloria Majiga Kamoto conquered with Rashid saying that unless the new government facilitates good governance and expedite some legal reforms, the mining sector will not substantially benefit poor Malawians.

Kamoto said there is need for expeditation and finalisation of reforms of the Petroleum (Exploration and Production) Act, Forestry Act, Environmental Management Act, and MMA regulations to ensure that Malawi and its citizens get tangible benefits from the mining sector.

Kamoto also said that the civil society expects the new



Rashid: New government must implement EITI

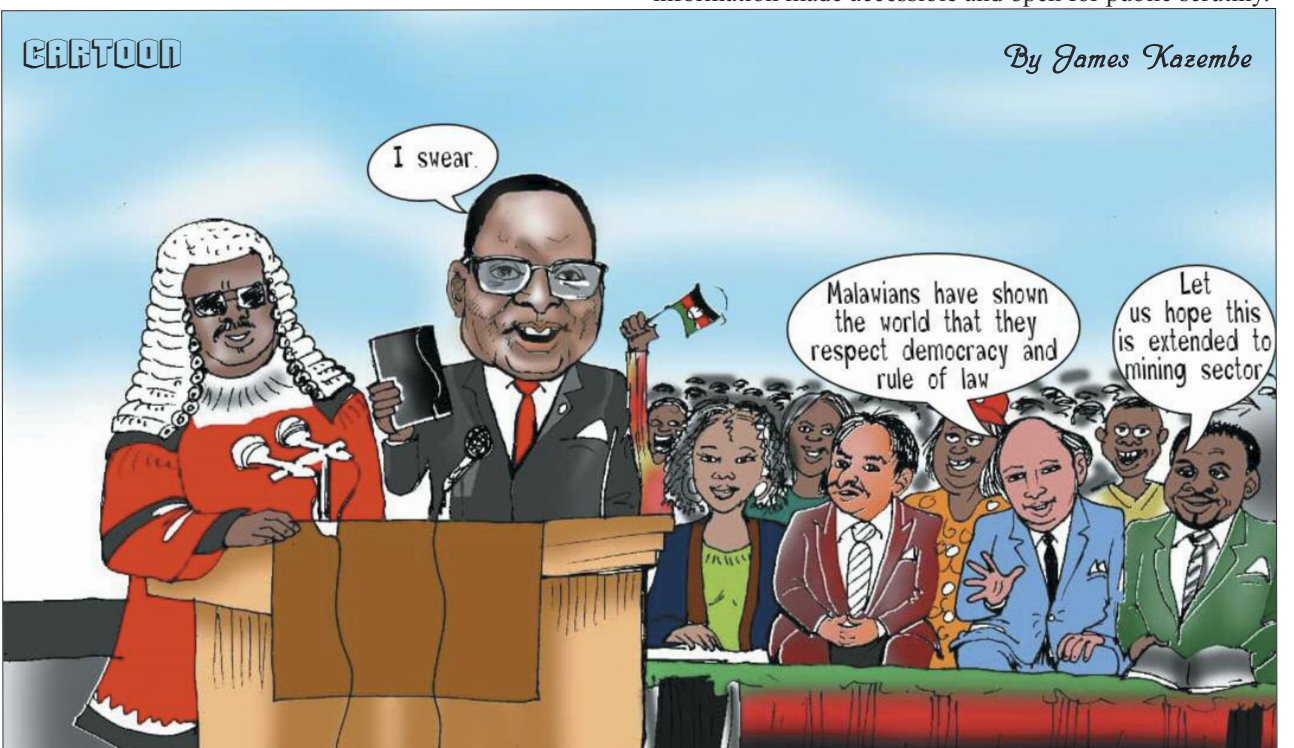
government to be committed to the sector by allocating resources to relevant agencies to conduct their operations.

She advised the new government to take the mining sector seriously to ensure that it contributes to national development without the costs of the environmental damage.

Kamoto also said that there is need for adequate coordination between departments in the enforcement of policies.

"An adequate consideration needs to be made on whether extractives projects are worth to be associated with environmental costs. Specifically, the oil and gas contracts which have been contentious and based on an outdated institutional framework need to be analysed and revisited and a cost benefit analysis done," she said

Kamoto also stressed on the need for transparency and accountability in the mining sector adding that mechanisms enabling participation of the people should be upheld and information made accessible and open for public scrutiny.



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By James Kazembe



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Visionary Leadership is Key to National Development & Prosperity

EDITORIAL

BY MARCEL CHIMWALA,
PUBLISHING EDITOR

Mining sector deserves government attention

This is a special moment for Malawi as the country is going through a change of leadership from the rule of the Democratic Progressive Party to the Tonse Alliance led by Malawi Congress Party President Lazarus Chakwera.

We at *Mining & Trade Review* thank the DPP leadership for the effort it invested in the mining sector which has seen the country reviewing the outdated 1981 Mines and Minerals Act to come up with a new law which provides that large scale mining companies engage communities to sign community development agreements (CDA).

We also thank the previous DPP led government for approving the Artisanal and Small Scale Mining Policy, starting to review the Petroleum (Exploration and Production) Act 1983 and pursuing work to review the Upstream Petroleum Policy.

With the same good will, we congratulate the pair of President Chakwera and running mate Saulos Chilima for attaining power at this opportune time when the mining sector needs strong and visionary political leadership for the Malawi community to adequately realise its benefits.

We, therefore, join civil society groups, the Chamber of Mines and Energy and representatives of small scale miners quoted in our main articles in passing the message to the new leadership that there is a need for political will to spearhead growth of the mining sector to facilitate national economic development.

As National Coordinator for Natural Resources Justice Network Kennedy Rashid said in the article on Page 3, one area that the new leadership has to look at is that of lack of transparency in the sector.

We join the civil society in urging the new leadership to facilitate that the country has District Mining Officers in all mining districts who will be responsible for updating rural communities on mining projects in their areas.

Certainly, this will ensure that conflicts between mining companies and communities in mining areas are avoided as members of the community will be making decisions at an informed position.

We also agree with the civil society on the need for the new government to facilitate new legal and policy reforms including that medium scale miners should be mandated to sign CDAs.

In Malawi, the only large scale mine is Kayelekera Uranium mine which is now on care and maintenance but the country has a number of medium scale mines so as Rashid says, the country is losing a lot in terms of direct benefits of mining to communities in mining areas because of this legal deficiency as in the absence of CDAs, these communities can only benefit from mining projects through corporate social responsibility which is voluntary for the company.

Certainly, making it mandatory for medium scale miners to sign CDAs just like large scale miners will help to overcome conflicts between members of the community in mining areas and investors which have become common in the country.

The other thorny issue which the new government needs to address is that of illegal gold mining which continues in a number of hotspots across the country as the previous government failed to use law enforcers to stop the miners.

As Chairperson of Nyasa Mining Cooperative Percy Maleta says in our article, the new government has to show political will to formalize the ASM subsector in order to put this situation under control.

We agree with Maleta that just as the government allocates funds to small scale agriculture to reduce prices of fertilizer, it should also start allocating adequate funds to mining including for formalization of the ASM subsector.

Another important issue that the new leadership has to look at is the issue of delays in processing government documents. The sector needs political will to motivate government employees to process these documents including licenses with speed.

It frustrates investors to wait for ages for a mere government document which can be processed within an hour.

To sum up, while congratulating the leaders we urge them to give the mining sector the attention it deserve as a sector with potential to create jobs and rake in foreign exchange.

Government establishes mining investment company



Chilumanga: Mining company to fill gap

By Wahard Betha

Government has established the Malawi Mining Investment Corporation (MMIC) which is mandated to promote optimal development of the mining sector to boost the country's economy through maximization of national revenue.

The new state-owned company has been registered with the Registrar of Companies and is ready to start operating when funds for initial capital are identified.

The Ministry of Natural Resources is reportedly pushing to acquire a loan from the Reserve Bank of Malawi through Export Development Fund (EDF) to launch the new company. The company will be required to pay back the loan to EDF when it starts making profits.

A concept on the development of the new company accessed by *Mining & Trade Review*, says that once the Company starts functioning it will achieve various objectives that the mining sector is currently lacking.

Reads the concept: "The objectives of MMIC include to catalyze private sector investment into the mining sector through engagement in advanced exploration and mining activities aimed at bringing projects to bankability phase for on-sale to the private investors; to act as the Government's agent for the administration of its equity interests in mining operations; to maximize national benefits through go-it-alone or partnership investment into mineral extraction as well as exploration and exploitation of strategic minerals of national importance such as energy minerals and minerals for fertilizer manufacturing."

It says further to that, the company intends to promote in-country beneficiation and downstream processing of minerals including mineral value addition; provide technical advice to the Government to support negotiations under mining development agreements; and serve as a vehicle for pooling financial resources to bankroll local investment into the mining sector.

"In view of the foregoing objectives, the company shall endeavor to acquire mineral tenements and engage in advanced mineral exploration and mining activities; and acquire and hold interests in any undertaking, enterprise or project associated with the exploration, prospecting, mining, refining, grading, producing, cutting, processing, buying or selling or marketing of minerals," says the report.

The company shall also endeavor to carry on,

either singularly or jointly with any other person, firm, corporate or business entity, operations and activities whether as a principal agent, contractor or otherwise; mobilize funds from local and foreign investors for investment in mining operations; create employment opportunities for qualified citizens of Malawi; and play an advisory role as regards matters of negotiations between government and investors.

Asked on whether the roles of MMIC will not overlap with those of the Department of Mines (DoM) and Geological Survey (GSD), Deputy Director of the Department of Mines Peter Chilumanga said the MMIC will not overwrite with any government institution but work as a collaborative entity to fill the gaps that are there in both DoM and GSD.

He said: "The MMIC shall fill the gap in the GSD by conducting advanced mineral exploration activities in order to generate advanced geo-scientific data which will be much more appealing to investors."

"The company will also collaboratively work with DoM by conducting the mining feasibility studies in a quest to support the mineral sector growth and development in the country through provision of more credible and investor-attractive mining and mineral processing feasibility study data."

The GSD is mandated to promote sustainable exploration of mineral and petroleum resources and assessment of geological hazards in the country while the DoM is instituted to promote sustainable exploitation of mineral and petroleum resources for the socio-economic growth and development of the country.

Chilumanga said both departments have been striving to carry out their respective mandates due to limited resources owing to inadequate funding from treasury.

He said the company will also assist to build, strengthen and sustain a strong collaboration with tertiary research institutions such as the universities offering mining related courses in order to build, strengthen and sustain its capacity in mining project implementation and finance management.

"MMIC will operate as a commercial company, like any other company in as far as compliance with mining legislations is concerned, and will not have direct governmental authority to avoid unnecessary distortion, which could jeopardize the gains already realized in the mineral sector," he said.

He said MMIC and private investors will be legible to go into a joint mining venture following a bankable mining feasibility study.

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Exploration drilling results expand Kasiya rutile prospect

By Wahard Betha

A SX-listed group Sovereign Metals has reported further exceptional rutile exploration results from its Phase 4 drilling works at its large, high grade Kasiya deposit in Lilongwe.

Sovereign's MD Julian Stephens says the results have expanded the mineralized footprint and increased area of very high-grade rutile surface.

Stephens says: "The drilling results from Kasiya continue to be exceptional. The footprint of high-grade rutile mineralisation continues to expand and displays what we believe to be some of the highest-grade, thickest and spatially expansive rutile drill-intercepts globally."

"New Quantitative Evaluation of Materials by Scanning Electron Microscopy (QEMSCAN) mineralogy results show that rutile is very well liberated with excellent sizing characteristics suggesting it should be suitable for all major end-use markets."

"Kasiya is emerging as a truly special discovery within the Company's broader licence package where we have identified a new, potentially globally significant rutile province."

The Phase 4 drilling comprised further 17 hand-auger holes for 175m over four drill-lines, bringing the total number of holes reported to 79.

The results show high-grade and thick rutile drill intercepts as predicted by the Company's now refined geological exploration targeting model.

Stephens says: "Importantly, the highest-grade intercepts are almost always from surface. The mineralized footprint continues to grow and take on definition at +5.5km strike length with surface widths up to 3km."

"The results reported also show the high-grade envelope bifurcates into two zones toward the southern extent of reported drilling. The mineralized envelope continues to be open in both directions along strike and laterally to the east."

The high-grade rutile has been encountered as deep as 14m below surface in some holes (the depth limit of hand-auger drilling) but generally has an average thickness of approximately 7m to 8m.

He says the current geological interpretation is that high-grade, free-dig rutile mineralisation is likely to continue vertically to the base of saprolite in the areas where holes terminated in mineralisation.

Stephens says the depth of mineralized saprolite can be reasonably assumed from existing geological knowledge to be around 25m from surface whereby deeper drilling techniques such as air-core, diamond-core or sonic will need to be employed to confirm this at Kasiya.

QEMSCAN mineralogy analysis on the non-magnetic fraction of heavy mineral concentrates (HMCs) from routine drill samples in the 45µm to 600µm fraction show clean and well liberated rutile grains with a particle size distribution d50 averaging 129µm.

"This is comparable or better than other leading natural rutile products in the market," he says.

Particle size distribution is an important consideration for end-users of natural rutile since it influences efficiency and performance in downstream applications.

The favourable particle size distribution of rutile from Sovereign's Kasiya deposit demonstrates the potential to produce commercial rutile specifications suitable for all three major rutile end-use markets including pigment,



Stephens and geologist Samson Mhango

titanium metal and welding flux.

Sovereign's ongoing rutile work programs for Kasiya and its other rutile prospects within the Malawi Rutile Province include; Step-out and regional drilling at Kasiya and the broader surrounding area to identify extensions and satellite mineralised zones, work toward the maiden JORC Resource Estimate for Kasiya which is on target for third quarter of 2020, bulk-scale metallurgical test-work well underway on a 1-tonne representative sample from Kasiya, and push-tube drilling at Kasiya to twin hand-auger holes and to obtain cored samples for specific gravity (SG) determination and initial geotechnical analysis.

Mining and tailings studies are ongoing in order to feed in to a future Scoping Study while a regional desktop targeting exercise using all available knowledge and datasets is continuing with the goal of discovering more high-grade, Kasiya-like rutile mineralisation further afield.

Rutile is a genuinely scarce commodity which is used as pigment (paints, plastics and paper), welding rods and for titanium metal.

Its global supply is in structural deficit as there are only mature mines with declining grades and a general lack of new rutile-rich deposits to fill the gap.

Sovereign is upbeat on its investments in Malawi which Stephens describes as a stable, transparent jurisdiction with significant potential and appetite for mining which is increasingly attracting international investment.

He says the other positive attribute for Kasiya is that it



Rutile in high demand on global market

is located in an area with ready infrastructure to take the product to the global rutile market including an established rail network direct to Mozambique's Nacala Port, and Sovereign already signed a memorandum of understanding with the rail operator.

There are also paved roads surrounding project locations; grid power is becoming available across license areas; an established labour pool and other industrial services, and plentiful water sources for operations.

In its ongoing exploration work in Malawi, Sovereign has so far identified four advanced rutile prospects plus multiple targets encompassing two discrete styles of rutile mineralisation; saprolite-hosted and sand hosted.

The saprolite-hosted rutile prospects include the Kasiya, Railroad, Railroad West and other lesser explored locations where exploration results are still coming. The Bua Channel is a sand hosted rutile prospect ranked among the four advanced prospects.

In light of the novel coronavirus (Covid-19) pandemic, Sovereign have recommenced drilling and sample preparation activities on a limited basis with a reduced and safe personnel level.

"The Company is actively evaluating the situation for all risks to employees, communities and general operational safety and will make any required adjustments as the situation evolves, or as required by the Malawi Government," says Stephens.



Exploration work underway

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Govt. gives update on reforms in upstream petroleum sector

With oil exploration work going on in Malawi, the government is implementing a number of reforms to set the ground for oil production if commercial discoveries are made. *Mining & Trade Review's* Wahard Betha engaged Head of Oil and Gas Desk at the Ministry of Natural Resources, and Mining Cassius Chiwambo to get updates on the reforms in the subsector. Excerpts:

How do you look at the future of upstream petroleum subsector in Malawi?

Firstly, let me assure Malawians that the future of the sector is very good and promising, taking into account that the Ministry is in the process of developing a first ever Petroleum Exploration and Production Policy as well as reviewing the petroleum legislation. The Policy is very comprehensive and is in accordance with international best practices. On the other hand, the exploration reports coming from the Multinational Cooperatives which we have in Malawi show that our geological formations have a very high potential of hosting Petroleum.

In brief, can you explain what new things we should expect in the new Petroleum Act?

The process of reviewing the Petroleum (Exploration and Production) Act of 1983 commenced some years back, and we are at an advanced stage now. The Ministry with technical support from Commonwealth Secretariat conducted a diagnostic assessment of the current Act to identify gaps in the it, and several issues were identified for reform in light of the Policy (Draft) and international best practices.

The new Act will ensure harmonization with the principles enshrined in the Policy (Draft), the African Mining Vision and international best practices for the sustainable management of natural resources. These principles are capable of supporting the government to achieve the Sustainable Development Goals (SDGs) and the Agenda 2063. The first and important issue is resource ownership. You are aware that in the Petroleum (Exploration and Production) Act of 1983, Petroleum resource ownership is vested in the Life President on behalf of the people of Malawi. In the new Act, the entire property of petroleum, in, under or upon any land or waters in Malawi will be vested in the Republic; but without prejudice to the exercise of any right under or pursuant to the Act.

The new Petroleum Act will also address issues to do with transparency and accountability, good governance, balanced fiscal regime, maximization of local content and environmental sustainability among several other issues.

What is the progress in the development of the new Petroleum (Exploration and Production) Policy? When will it be submitted to Cabinet Committee for approval?

The development of the Policy is at an advanced stage. The Principal Secretaries, Committee on Environment, Energy and Infrastructure Development endorsed the draft Policy and recommended that it should be submitted to Cabinet. Meanwhile, the Ministry is working tirelessly hand in hand with the Office of President and Cabinet to have the Policy submitted to Cabinet the soonest.

Will you also explain in brief what is the overall progress in oil and gas exploration activities that



companies are conducting in Malawi? Should we have hope that sizeable discoveries will be made?

You are aware that Malawi was demarcated into six (6) Blocks and all Blocks were awarded to exploration companies in 2011 and 2013 by Government. Holders of Blocks 1 and 6 relinquished in 2018 having failed to find financial partners. Meanwhile, we have four (4) operational licenses which are being held by two (2) companies. The two vacant Blocks will be up for grabs by eligible companies once Government advertises them and this will only be upon government's adoption of the draft Petroleum Policy.

Exploration companies submit annual progress reports to update Government on progress. Geological and geophysical reports for all Blocks that Government has been receiving show that preliminary prospects of Petroleum in the country are very good and promising and the likelihood of finding commercial petroleum discoveries is high both on-shore and off-shore.

Can you assure Malawians that the oil and gas exploration operations will continue without any environmental implications on land and in Lake Malawi, which is a valuable asset for the nation?

One of the challenges that the Ministry is facing is continued misconceptions towards the sector of which one of them is that oil and gas exploration will cause negative environmental implications on land and in Lake Malawi.

Let me take this opportunity again to remind and reassure Malawians that licenses that were awarded to companies are for exploration works only not production. Government has a comprehensive legal framework which aims at safeguarding the interest of the general public and protect the environment for sustainable economic development of Malawi. In the Policy that the Ministry has formulated, Environmental sustainability is also one of the key guiding principles.

I will also remind Malawians that the Environment Management Act of 2017 has powerful tools for environmental protection such as Environmental and Social Impact Assessment, Environmental Audit and Environmental Monitoring. As mandated by the

Environment Management Act of 2017, Government is at an advanced stage in establishing an Environmental Protection Authority which is the principal agency for the protection and management of the environment and sustainable utilization of natural resources in Malawi. Government will ensure that the ecosystem both onshore and offshore is protected from any possible impacts of exploration activities.

Since the upstream petroleum subsector is relatively an emerging industry in Malawi, there should be a problem of lack of expertise in the industry among locals. How are you addressing this knowledge and skills gap?

Indeed, there is lack of expertise, but we have put in place several strategies addressing this challenge and soon it will be history. Firstly, let me inform you that our officers in the Ministry have been and will continue attending international short term trainings on oil and gas. Once they are back and reports are prepared, we make sure the information is shared. In some cases, we allow the trainee to come up with a mini-project to see the practicability of the knowledge within Malawi's sector. During these trainings or mini-projects, they also share experiences and lessons of best practices with other countries in Africa and across the world.

Secondly, the Ministry is also receiving technical support from a number of institutions such as the Commonwealth Secretariat. One of the components of the support is to build the capacity of locals. Commonwealth Secretariat is committed to facilitate capacity building activities in the country and a lot of them have been implemented already. Some notable institutions include the African Legal Support Facility (ALSF), the International Senior Lawyers Project (ISLP) and even the African Union through the United Nation Economic Commission for Africa (UNECA).

We also have familiarization tours to different countries within Africa and across the world to enhance the knowledge of our officers in the sector.

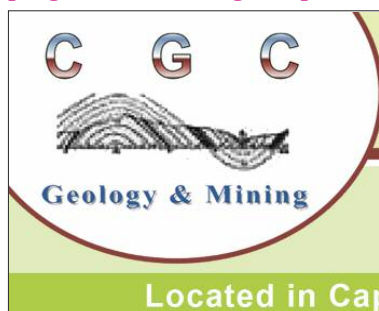
Lastly, but not least, the Ministry is also sending its officers to postgraduate studies to study different courses related to the sector which includes Petroleum Law and Petroleum Economics.

Please also provide us with any information you feel should be included in the article?

The Ministry, acknowledges and commends all media houses, both electronic and print for playing their rightful role in informing the general public about the Upstream Petroleum Sector. However, some media houses are ostensibly in the forefront disseminating some allegations without conducting proper investigations to establish the truth on the ground. It is my plea today that let us all join hands in promoting the sector by sharing accurate information only.

The Ministry is making strides in the direction of achieving the following objectives for the sector:

1. To have a robust legal and regulatory framework for the Upstream Petroleum Sector in the country; and
2. To have a strong institutional capacity for the Upstream Petroleum Sector in the country.



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with Ignatius Kamwanje



The Author is a Consulting Geoscientist with experience in Mineral Exploration, Mining Geology, ESIA, Ground Water Resources and Occupational Safety, Health and Environment.

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Ore body Assessment using resource estimation and modeling

Mineral deposit models are important in quantitative resource assessments since the grades and tonnages of most deposit types are significantly different and mineral types occur in different geological settings that can be identified from geological maps. Mineral deposit models are the keystone in combining the diverse geoscience information on geology, mineral occurrences, geo-physics, biogeography and geochemistry used in resource assessments and mineral exploration. Well-designed and constructed deposit models allow geologists to know from observed geological environments the possible mineral deposit types that may exist and allow economists to determine the possible economic viability of these resources in the region. Thus, mineral deposit models play the central role in transforming geoscience information to a picture that is more useful to policymakers.

Probably the most important part of synthesizing mineral deposit models is the planning stage, in which consideration of the purpose and possible uses of the models should determine the character of the models. Ideally, deposit models would provide the necessary and sufficient information to discriminate possible mineralized environments, types of known deposits from each other, and mineral deposits from mineral occurrences. Ore deposit Models used in assessment include descriptive models, Grade and tonnage models, deposit density models, economic model and quantitative models.

1. Mineral Resource Estimation

Most resource estimates are now undertaken by the use of computer-based block modelling methods. For these block models to be valid, it is best practice that they are constrained by the controlling geological elements of the deposit, such as geological boundaries, structure and the spatial distribution of grades and other attributes. These controls are derived from the geological interpretation carried out by the resource geologist during the resource modelling process. Geological interpretation initially involves the use of all relevant data to define the domain boundaries, which differentiate the various zones of mineralization in the deposit. These domain boundaries are incorporated into the computer model using such tools as wireframes, triangulation and gridding. The geologist then undertakes statistical and variogram analysis of grade data within these domains. This analysis provides the geologist with a measure of the spatial distribution of grades within each domain as in search radius and a means of defining an appropriate set of parameters which can be used in block grade estimation. The resource model is thus built by interpolating these domains with blocks and grades which should accurately reflect the geologist's understanding of spatial distribution of grades within each domain. Visual checking of the model against the relevant data is essential, as is progressive updating and refinement of the model as new data becomes available. As the resource database expands through feasibility to mining, the need for updated geological interpretation to control the resource model is no less important than during the exploration phase of the project. Without this continuing geological control the model ceases to be a valid base on which to make mine planning decisions.

Resource estimation is used to determine and define the ore tonnage and grade of a geological deposit block model that is developed by a resource geologist. There are different estimation methods that are used for different scenarios and this depends on the ore boundaries, geological deposit geometry, grade variability and the amount of time plus cash that is available. A typical resource estimation involves the construction of a geological and resource model with data from various sources. In a computer generated resource model, the important and significant steps of resource estimation are:

- Development, standardization and data validation of the database.
- Plotting of sections and geological modeling.
- Geostatistical analysis using the necessary tools and Q-Q Plots.
- Ore block modeling and estimation.

2. Geological Modeling

A geological model consists of a 3D representation of an ore body that is constructed by resource geologist on the basis of the knowledge of the known deposit using such

methods as reconnaissance/geological surveys, geophysical surveys, drillhole lithologs and assays. A geological model that represents the spatial locations and extents of rock types or ore types is an essential input for mineral resources evaluation and mine planning and, as such, affects all subsequent stages of the mining process. The typical workflow for assessing mineral resources consists of grouping the rock types or ore types into geological domains in which the quantitative variables of interest e.g. and/or geomechanical geochemical, geometallurgical, are assumed to be homogeneously distributed and then interpolating these variables within each domain using geostatistical analysis techniques.

Geological modeling is a key step prior to geostatistical estimation or running simulations for a chosen frequency of the grades within a mineral deposit. Although alteration, mineralization and lithological aspects should be considered in determining the geological model (domaining) for interpolation, common practice consists in contouring the grades and generating grade shells. Within each shell the grades are considered homogeneous and can therefore be interpreted as a realization of a stationary random function, allowing variogram analysis modeling, kriging or conditional simulation.

An orebody model serves as the geological basis of all resource estimation and it starts with a critical review of existing drill hole and surface or underground sample data as well as maps and plans with current geological interpretation. Drill hole or sample databases are set up to suit all the quantitative and qualitative information necessary to build a resource model. The creation of a geological model may include the following steps:

- 3D orebody modeling
- Sectional, longitudinal, 3D and multi-seam modeling
- Geostatistical, variography analysis of composites with spatial continuity

3. Block Model Estimation

Once the geological modeling is completed, the geological envelopes are divided into block models. Subsequently, the estimation of these blocks is done from compositing that are point measures of the grade of ore in the rock. A block model is a simplified representation of an ore body deposit and its surroundings that can be thought of as a stack of computer-generated "bricks" that represent small volumes of rock in a deposit (ore and waste). Each brick, contains estimates of data, such as elemental grade, bulk density and other geological or engineering entity values. Several different mathematical methods can be used to do the estimation depending on the desired degree of precision, quality and quantity of data and of their nature.

4. Resource Block Model

Block modelling helps the geologist determine shape, dimensions, and surface details by making 3D models. By making a series of block models in different shapes and sizes it gives the resource geologist a feel for the product. The block model is created using geostatistics and the geological data gathered through drilling of the prospective zones of mineralization. The block model is essentially a set of specifically sized "blocks" in the shape of the mineralized orebody. Although the blocks all have the same size, the characteristics of each block differs from one another. The grade, bulk density, rock type and confidence are all unique to each block within the entire block model. Once the block model has been developed and analyzed, it is used to determine the ore resources and reserves (with project economics considerations) of the mineralized orebody. Mineral resources and reserves can be further classified depending on their geological confidence. This discussion will not dwell on the reserve and resource types because they were once discussed in the previous articles.

5. Block Model Softwares or Brands

The most common block model types encountered in the mining industry are, Surpac, Micromine, Datamine, Vulcan, MineSight, Leapfrog, Mine plan and Rockworks especially in coal, industrial minerals like aggregates and other stratabound economic mineral deposits just to mention but a few.

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TECHNICAL FILE

by Dr. Grain Wyson Phillip Malunga FIMMM

Minerals, Geology, Environment & Corporate Affairs Consultant

Common issues in the Minerals Sector of Malawi

Abstract

The minerals sector has the potential to develop the economy of a country if it is looked at seriously. It is a massive employment creator, can contribute significantly to Malawi's GDP and stimulate development of downstream goods and services such as agriculture markets and vocational services.

It is now time to look at medium to long term national development programs that have the ability to create wealth for generations to come in a sustainable manner.

1.0 Introduction

The minerals sector in Malawi has in recent years seen vibrant exploration activities in the field of rare earths, niobium, coal, cement manufacturing (limestone mining), heavy mineral sand (titanium and zircon) and graphite. The artisanal and small scale mining in gold has also escalated indicating the potential Malawi has in discovering economic gold deposits.

These minerals have the capacity to contribute to Malawi's economic growth if we focus on addressing issues grouped in the following themes;

- The role of state owned enterprise in the mineral sector;
- Economic and financial issues;
- Environment and social issues;
- Legislative framework; and
- Regulatory framework.

2.0 Thematic review of the sectors

We need to diversify our economy by giving priority to productive key sectors through agribusiness development, energy development, mining and manufacturing.

Looking at mining, mining currently contributes about one percent of the country's GDP. Although the country has a wide variety of mineral resources, most remain unexploited. Only aggregate quarrying, coal and limestone quarrying for cement production and artisanal and small scale mining for gemstones and gold are being undertaken.

The following issues need to be addressed in order to establish a vibrant minerals industry that will benefit its people and widening government revenue base.

2.1 The role of State Owned Enterprise (SOE) in the minerals sector

Government's role in mineral development should be that of offering an enabling environment for private sector investment and partnership that benefits local citizens through divestiture when it has realised its return on investment after undertaking risky exploration activities shunned by exploration companies.

These pre-investment (exploration) activities have to be handled by a professionally managed State Owned Enterprise that will generate sufficient base data to reduce exploration costs by the private sector thereby encouraging them to invest in the more detailed and less risky stages of exploration.

This SOE will hold government shares in mining and assist in formalising of artisanal and small scale mining activities through financial, technical, and marketing arrangements for gemstones and gold. Industrial strategic minerals as prescribed by government will have to be managed by this Company in order to promote import substitution to save forex flight.

Recent airborne geophysical survey and geological mapping through "ground truthing" has identified several targets for high value minerals such as gold, platinum and diamond in addition to some industrial minerals which can be utilised locally. There is now little doubt that major economic deposits remain to be discovered.

2.2 Economic and financial issues

The design of a fiscal regime depends on how

government wants to balance between attracting Foreign Direct Investment and maximising Effective Tax Rate (or its fair share of proceeds). Average Effective Tax rate for solid minerals varies from 40% to 70% while for oil and gas is between 50% and 80%.

The government collects the following revenue from mining companies:

1. **Annual ground rent** per square kilometre. In Malawi, Exploration Licences pay MK10,000 per square kilometre while Mining Licences pay MK50,000 per square kilometre.

2. **Royalties** – These are a percentage of the value of minerals produced without taking into account production costs. Royalties vary normally between 5 and 10 %.

3. **Corporate Income Tax** – This is a percentage of net profit (after deducting operation costs). Corporate Tax may range from 30 to 35%.

4. **Withholding Tax** – This is a percentage of payments made to third parties. This can be in form of payment for services and dividends. In Malawi it is 20%.

5. **State equity participation** – This offers a share of profits to government as long as no operational risks are attached. This can be best managed by a professionally run SOE.

6. **Production sharing** - This is mainly practiced in oil and gas projects. Companies collect an agreed share of produced oil to offset exploration and development costs. The rest is shared between government and the resource company. The initial oil produced is subjected to a royalty charge.

Investors get attracted to countries with an open economy and those that facilitate investment. Their involvement in joint venture activities should not exceed 10 % of the total shares and should not be compulsory. The mining company should have the liberty to offer more than 10% if it gives them more investment security.

Recent preferences have been establishment of taxes on the basis of earnings in order to avoid distortion of investments and production decisions. The tax regime should not be discriminatory but be applicable to all investors be they local or foreign.

2.2 Environment and social issues

Environmental protection helps local communities to avoid pollution to water, air and land. Reasonable compensation and minimum deforestation build long lasting relationship with local communities.

Government should speed up establishment of an independent Environmental Protection Agency whose aim should be to balance between sustainable development and business profitability.

Social issues revolve around social investments and economic benefits for local communities. Social investments include provision of water, health services and education facilities. These should be reasonable enough and should not replace government obligations. Communities are happy where mining companies contribute to local economic development such as employment, partnerships with local communities on programs that empower local people to supply agriculture produce and other services. Electricity and roads open up rural areas to industrialisation and access to markets.

Community Benefit Sharing and government revenue should be reasonable and transparently executed

2.3 Legislative framework

A Mines and Minerals Act 2019 became effective in February 2019 replacing the 1981 Act. This has brought in favourable conditions for building a positive relationship between government and local communities on one side and private companies on the other side. Communities are now able to negotiate benefit sharing in medium to large

scale mining through Community Development Agreements (CDA).

Revelation of beneficial ownership of mining companies is possible through Extractive Industries Transparency Initiative and Access to Information Act. These offer confidence and transparency in revenue expenditure and utilisation if implemented. The mineral sector can best be served through these initiatives.

Introduction of Retention Licence offers hope to mining companies in time of economic down turn.

The new government needs to review all licence holders and withdraw licences from holders that have done nothing. This will speed up exploration activities within stipulated time and attract more deserving investors.

The Offices of the Commissioner and Registrar for Mines need to be established as a matter of urgency.

2.4 Regulatory framework

Mining regulations have taken long to be approved. These are important in implementing the Mines and Minerals Act 2018.

3.0 Conclusion

Malawi is endowed with a variety of mineral resources most of which remain unexploited. The geological resource base has a lot of information characterised by low value industrial minerals, semi-precious stones and energy minerals. We have not developed these minerals but have relied on importation of minerals and mineral products that could be sourced and produced locally. This is why we need an SOE to develop these minerals for import substitution and empowering of local citizens to take over exploitation of these minerals and create more employment.

Speedy development of the mineral sector can increase GDP growth by 10% and boost employment, government revenue, forex earnings and overall poverty reduction will be enhanced.

Access to information on revenue and utilisation coupled with beneficial ownership is crucial to the smooth development and running of the minerals sector.

The sector is faced with a number of challenges and constraints that need to be addressed if growth of the sector, contribution to the economy of the country and poverty reduction are to be realised within the short term. These include:

- i. Review of sectoral policies and statutes which are administered by other institutions in order to harmonise how we handle issues of land tenure, mineral rights, infrastructure contribution and environmental issues;
- ii. We have to support artisanal and smallscale mining through establishing credit facilities under local Micro-Finance Institutions, so miners can access initial working capital;
- iii. Increase funding to mineral related institutions (Geological Survey and Department of Mines and others) for providing technical support, training and access to appropriate value adding equipment for small-scale miners;
- iv. Strengthening of institutional linkages such as MITC with SOE for Mining and Export Development Fund on investment and exports;
- v. Government should be committed in exploration activities for high value minerals;
- vi. Building capacity of key institutions in the mineral sector;
- vii. Mainstreaming mineral sector into international agreements such as Bilateral or Multilateral Agreements.

Overall arching is the need for the sector to develop sustainably while at the same time preserving the environment for future generations.

Chitipa miner cries foul over unrealistic CSR demands from community

By Tawonga Nyirenda

Chitipa-based small-scale gemstone mining firm Gems and Ornamental Investment has bemoaned unrealistic demands for corporate social responsibility (CSR) projects by the people in the northern district.

Speaking during an exclusive interview with Mining and Trade Review, Secretary and Shareholder of the locally owned company Maggie Nundwe said that there is need for government or other stakeholders to conduct civic education activities on CSR and the New Mines and Minerals Act in the district to overcome the problem of conflicts between miners and members of the community due to unrealistic CSR demands.

"It is unfortunate that they are people in Chitipa who think that miners have a lot of money, and when they see a new miner in their community they start to make unreasonable CSR demands. For instance, they are demanding an electricity transformer which costs K34-million kwacha, a health post and boreholes from us, which does not make sense because we make very little money out of the mining business as ASMs," said Nundwe.

...from page 5 "For further investments in advanced mineral explorations and preparation of projects to bankability, MMIC will need capital injection of approximately MK 10 billion in the second year to prepare one project in a syndicated deal with other investors."

"Special focus will be on rare earth minerals and minerals for energy generation and fertilizer manufacturing. Once the project is brought to bankability, MMIC will either sell its interest to other investors while maintaining at least 10% equity in the project by way of exercising the right provided for in the new Mines and Minerals Act; or proceed to invest in mining and mineral beneficiation," reads the concept.

It explains that the additional capital injection in the following years will be used to scale up operations of MMIC through creation of Special Investment Vehicle (SIV).

The concept says the SIV will be responsible for raising funds for projects from both Malawians and foreign sources to allow pooling of funds from small investors without affecting controlling interest in MMIC.

Malawi remains a green field for mineral exploration and mining, endowed with abundant and diverse mineral resources most of which remain unexplored and unexploited to date.

These minerals include uranium, niobium, heavy mineral sands, bauxite, graphite, rare earth minerals, coal, limestone, dimension /ornamental stones, iron sulphide, vermiculite, nickel, platinum group metals, gold, copper and gemstones of various types, including aquamarine, tourmalines, rubies and sapphire.

The estimated seed capital for the first five years for MMIC is pegged at MK45 billion and capitalization plan is proposed at MK5-billion in the first year, MK10-billion second year, MK15-billion third year, MK10-billion fourth year and MK5-billion in the fifth year.

The concept outlines that MMIC in the first year will focus on establishment of a Gems Processing Centre which will be buying, cutting and polishing gemstones from small scale miners for the export market as the country has no structured market for gemstones despite having many small scale miners trading on gems.

The company shall have Board of Directors and Management selected from Government, Private Sector and Academia (University), and there will be a Chief Executive Officer with four Directors of Exploration and Drilling; Mining and Engineering services; Planning, Investment and Marketing; and Finance and Administration.

Nundwe said there is a need for people of Chitipa to emulate the behaviour of the people of Mzimba who do not come up with such unrealistic demands.

"This kind of behavior is not there in Mzimba where we have worked for so long. The people of Chitipa need civic education because their mentality is distorted on issues of CSR, we urge the Malawi Government and other stakeholders to help us in this area," she said.

The miners also called on the Malawi Government to speed up its plans to set up an organized market for gemstones in order to stabilize prices.

MD of Gems and Ornamental Investment Donald Banda commented that Chinese buyers are taking advantage of the lack of an organized gemstone market in Malawi to buy the gemstones at unrealistically low prices.

"We need government to intervene because the Chinese buyers take advantage of us due to lack of an organized market. They normally ask for unreasonably low prices; I remember they once wanted to buy fluorite at K25 per kg while they buy gemstones at as low as K100 per kg," he said

Banda said the other challenge for the mining firm is that the roads in Chitipa are in bad shape which makes



Flourite

access to the mines difficult.

"The government is not helping us in terms of roads. Even though we pay royalty to the Malawi government, income tax and returns to Malawi Revenue authority (MRA) the government is not constructing roads in the district," he said

Gems and Ornamental Investment is a mining company that has been operational since 2009 and currently the company owns 12 mines in Chitipa and Mzimba. The company mines fluorite, sodalite, aqua marine and Chevron.

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Covid-19 hits Malawi's construction industry



Phiri: Construction industry under threat

By Wahard Betha

The National Construction Industry Council (NCIC) says the outbreak of the novel coronavirus (Covid-19) has affected operations and the supply chain of the construction industry.

NCIC CEO Linda Phiri told Mining & Trade Review in an interview that the Covid-19 pandemic has hit the construction industry due to the sector's overreliance on imported products and government's restriction measures to ease the spread of the virus, which have lowered work performance.

Phiri said: "The Construction Industry has been affected mainly in three perspectives, first is the disturbance of the supply chain including source of materials both imported and local materials as borders, shops and factories either have remained closed or scaled down on operations."

"Secondly, the operations on sites had to be scaled down or modified which has affected the rate of progress of the works; and finally incorporation of measures to control and manage the spread of the pandemic has affected the financial performance of the construction industry."

Phiri said the pandemic has also affected the council's financial performance following the suspension of all trainings that the council offers and charges its levy.

The NCIC's financial performance is directly related to the performance of the construction industry as levy is charged on completed and certified works.

Phiri said since the trainings have been suspended and most projects slowed down, the rate of levy collection has slowed down, and this as well has resulted in non-collection of fees.

"Following the disturbances in the stated financial sources of the Council, if the situation continues to the end of the year the Council could lose over 30% of its revenue from levies and over 70% of its revenue from training fees," she said.

Meanwhile, in an attempt to fight against the pandemic, the Council has collaboratively implemented guidelines in all construction sites to ensure that all players are in line with certified preventive measures.

She said the guidelines include; ensuring proper sanitation facilities are in place and procedures properly followed with regard to personal hygiene, sanitizing and restrictive use of tools and equipment; social distancing; and general management of site.

Phiri urged stakeholders in all construction sites to follow the guidelines warning that the Council will be the daily watchdog monitoring compliance and that all non-complying projects will be suspended as a penalty.

NCIC works in liaison with various stakeholders identifying areas that need standards or adoption of standards and coordinating the development of various standards for the construction industry, and promoting the use and compliance with standards.

The Council also plays the role of ensuring that all contractors, consultants, material manufacturers and suppliers and all players in the construction industry are operating within roles set forth in the NCI Act of 1996 and codes of ethics of 2009.

Certification from the council gives a path way for construction companies to carry out construction related activities in Malawi while committing to professional and ethical conduct.

The Council also ensures that the players give a paramount consideration to issues of safety, health and welfare of the public; perform services only in areas of their competence; refrain from any corrupt practices and deception acts; and conduct themselves honorably and lawfully.

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ASMs seek attention from newly elected leaders

By Bester Kayaye

Local Artisanal and Small-scale Miners (ASMs) say they are expecting the newly elected President Lazarus Chakwera and his Vice Saulos Chilima to help in addressing problems faced by the subsector which has all along been neglected by authorities despite providing employment to thousands of Malawians.

Chairperson for Nyasa Mining Cooperative (NMC) Percy Maleta told *Mining & Trade Review* in an interview that the new administration needs to spearhead the transformation of ASM activities into more organized and modernized mining operations, and establish organized markets for precious minerals to promote transparent business transactions and curb smuggling.

He observed that local miners encounter challenges in a number of areas including awareness of the processes such as Licensing, Exploration, Mining, and Value Addition.

Maleta said: "We anticipate the new government to continue with the policies which are there while at the same time improve and increase support to the ASMs subsector by formalising illegal miners through formation of cooperatives."

"We want the new government to speedily regulate the sector and let it shine and not stifling it as has been the case where only large scale mining has been given room to



Maleta: Formalization of ASM will end illegal mining

flourish and shine yet contributing little if any," he said.

He said the new government should recognize that ASMs alone have the capacity to contribute over 100,000 jobs on top of the 1-million jobs it has been promising Malawians, bring in much needed forex and increase the tax base of the country.

Maleta stressed; "It is high time ASMs sub sector had its own budget under the Ministry responsible for Mines and not crowded in other sectors."

"We want someone to be accountable on how ASMs budgeted money is used, this alone will be a game changer."

He also said there is dire need for government to put up enough resources and address all aforementioned challenges ASMs are facing as well as adopt positive interventions from neighbouring countries on how ASMs are being uplifted and contributing to their respective countries' socioeconomic development.

Government is currently facing an uphill task to overcome illegal gold mining by ASMs in crowded hotspots across the country including Dwangwa river in Kasungu, Rivirivi river in Machinga, Makanjira in Mangochi, and Chiwamba and Lundu in Lilongwe

The exercise has attracted foreigners from a number of countries including Tanzania, Mozambique, Rwanda and China who use unchartered routes to buy the gold from unlicensed ASMs.

Government tried to use law enforcement agencies to stop the illegal mining operations but the operation has proved futile as the miners keep returning to work after the police operations.

The mining works which are being carried out using primitive equipment such as picks and holes are proving destructive to the environment with the rivers used to process the soil in search of the gold particles polluted.

The informal mining operations are also a cause of social problems including child labour, early pregnancies, marriage breakages, HIV/Aids and health experts warn that the crowded camps could be a breeding ground for the novel coronavirus (Covid-19) outbreak.

Lilongwe quarry miner bemoans high taxation

By Madalitso Mhango

Quarry miner Master Stone Breakers has called upon the Malawi Government to consider reducing some taxes that medium scale miners are charged so that the miners are able to survive the harsh business climate brought about by the novel coronavirus (Covid-19) pandemic.

Executive Director for Master Stone Breakers Alaa Jawad told *Mining & Trade Review* at his mine in Nanthenje, Lilongwe that with the existing high taxation rates, it is difficult for them to buy some of the inputs and equipment.

Jawad said: "We do import most of the tools and equipment used here and government charges import duty, we find the charges very high because business is absolutely slow due to Covid-19."

"We plead to the government to help us with duty free certificates for importation of heavy machinery which will enable our businesses to grow and provide more employment opportunities to Malawians."

He said besides Covid-19, political instability in the aftermath of the disputed May 2019 badly affected the company's quarry mining business.

"It has been hectic for us due to Covid-19 and post 2019 election demonstrations implying we have lost a lot of business since 2019," he said.

Jawad also urged government to put restrictions on issuing of quarry mining licenses in order to promote fair competition and ensure that miners adhere to standards.

He said: "There is unfair competition which is weighing



Jawad: We offer higher standards

on prices because anyone who wants to open a quarry mine is given a mining licence and others are just reducing prices to kill off competition with the intention of eventually monopolizing the market."

"We are at a disadvantage because our costs are higher than our competitors since we offer high standards," he said.

Master Stone Breakers has employed about 110 Malawians of which some of them are women who do office work.

The company is equipping local students from various universities and technical colleges with technical knowledge and skills in mining works through industrial attachments and internship programmes.

As part of Corporate Social Responsibility, Jawad said



The quarry mine at Nanthenje

the company has built a clinic, and drilled and repaired 15 boreholes in the surrounding area.

It is also constructing courts for the chiefs and donates books and some other learning materials to schools in the area.

He said the Company also buys some vegetables and other food stuffs from the community as a way of supporting them.

On the issue of covid-19 pandemic, the company encourages employees to observe social distancing, and provides soap, protective kits and hand sanitizers to the employees.

The company has invested US\$5-million dollars in the quarry mine project, and also operates in other countries such as Guinea, Ivory coast and Zambia.

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Experts call for resumption of limestone mining at Chungalume

By Bester Kayaye

Mining experts have called upon the Malawi government to award mineral rights to a private mining firm to conduct a fresh feasibility study at the closed Chungalume limestone mine in Zomba to ascertain the possibility of resuming limestone mining.

After taking over Portland Cement which had a clinker factory at the site in a privatization deal, French multinational Lafarge declared that the resources at the site had been depleted and in 2004 donated the factory site to government to create a barracks.

But speaking in an interview with Mining and Trade Review, Former Director of Geological Survey Department (GSD) James Chatupa claimed that there was never a resource estimation done of the Chungalume limestone deposit before closure implying that Lafarge only made its decision to close Chungalume based on business fundamentals as it would have not made business sense for the company which has other bigger clinker plants in the region to have Chungalume in operation other than just sourcing clinker from the neighbouring countries.

The Chungalume clinker production started in 1960 by the Nyasaland Portland Cement Ltd and a railway was built from Lirangwe to Chingale to take the clinker to Blantyre industrial site for production of Portland Cement.

State owned Malawi Development Corporation (MDC) bought the company and formed Portland Cement Limited in 1974 before Lafarge bought Portland in 2001 and closed Chungalume around 2004.

Chatupa said: "No exploration work was done in the Chungalume region. GSD mentioned this gap many times to MDC and Portland Cement Company engineers. There are limestone exposures from Chingale to Chinduzi which are probably extensions of the Chungalume prospect."

"The limestone mine and clinker plant provided work to many people in the Namadidi-Chingale villages. It is a densely populated region. Hence there is scope for future job creation if the clinker operation resumes."



Chatupa: There was never a resource estimation

"There is no need to interfere with the barracks as down the escarpment there are potentially large limestone resources, there are opportunities to be taken up, So, let us move on and create employment opportunities."

Historically, limestone is considered to be one of the resources forming pillars of industrialization aside from iron ore, sulphur, clay and rock aggregate.

Concurring with Chatupa's sentiments, National Coordinator for Chamber of Mines and Energy Grain Malunga advised mining companies to conduct proper feasibility studies before making decisions to start or close a mine.

Malunga said: "It is the only mode of understanding the potential value of your investment and profitability and availability of mineral reserves before investing."

"Companies that are properly constituted follow business principles of resource value assessment for a return on the investment. It is sad that most local companies avoid pro-investment studies and end up losing

money and start blaming government for their failures."

"Mining is a long term investment requiring three to seven years of resource assessment before you can think of exploiting your deposit for gains."

However, Chairman for Cement Products Limited (CPL) Aslam Gaffar opined that Lafarge would have closed the mine because "the recovery rate on limestone mined at Chungalume was only 30% as they was too much intermingling with dolomite hence expensive."

"However, I still think there was no valid reason to close and scrap the plant as good limestone could be ferried from Chenkumbi which is only 63 km away. Lafarge gets limestone from Chilanga, Zambia near Kafue which is far."

But Lafarge Cement Geologist Hendrix Manyimba defended the French multinational's decision saying the mine was closed upon proper consultations and calculations on its profitability as currently the firm imports clinker mainly from Zimbabwe and Zambia.

"The fact of the matter is that when Chungalume was opening around 1961 there were estimated deposits for about 50 years. About eight years prior to its closure the quality had deteriorated so much to the extent that the company was blending the limestone with high grade limestone from Balaka," Manyimba said.

He added that for those last eight years, drilling and blasting was a daily operation due to poor quality of reserves.

"By 2004, the only good limestone enough for less than five years was where the crushing plant was standing. Accessing this deposit meant relocating the plant and killing a natural river course and it proved more expensive and did not make any economic sense."

According to the 2020 Malawi Annual Economic Report, Malawian companies have invested a lot in the manufacturing of cement and increased production capacity of cement from 210 500MT in 2019 to 243 075MT.

In 2011, CPL invested \$50-million in a cement plant at Njereza in Mangochi, where it is also involved in limestone mining, cutting Malawi's annual clinker import bill by up to \$30-million.

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