

KAMOA COPPER AWARDS CHINA NERIN ENGINEERING CONTRACT FOR COPPER SMELTER

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DRC- LÉON MUBIKAYI APPOINTED PCA OF THE MINING FUND

Léon Mubikayi Mubalamate is the new Chairman of the Board of Directors of the Mining Fund for Future Generations (Fomin). He was appointed this Friday, December 3 by the presidential ordinance.

He will be accompanied by Faustin Biringanine, Director General of Fomin and Arlette Kabila Mawuwa, Marie Jacqueline Lumbu and Léon Mondole, all members of the Board of Directors of this institution.

Long before occupying this post, Léon Mubikayi was national deputy of the UDPS / Tshisekedi and president of the CACH parliamentary group.



KCM CEO CHRISTOPHER SHEPPARD RETIRES FROM THE COMPANY

KONKOLA Copper Mines (KCM) has announced that its chief executive officer Christopher Sheppard has retired and will be leaving the company on November 12, 2021. In a statement, Tuesday, KCM provisional liquidator Milingo Lungu said Enock Mponda had been appointed as acting CEO and would also act as CEO for KCM SmelterCo Limited while Moses Chilambe had been appointed to act as CEO for Konkola Mineral Resources Limited (KMRL). "Konkola Copper Mines Plc (KCM) informs its business partners and stakeholders that the Chief Executive Officer, Mr Christopher Sheppard, has retired.



BOTSWANA AND DE BEERS FURTHER EXTEND SALES AGREEMENT

Botswana and De Beers have extended their current sales contract by another year, the diamond miner said on Friday, citing logistical challenges presented by the Covid-19 pandemic.

This is the second extension of the agreement for the sale of Debswana's rough diamond production. The agreement was due to expire at the end of 2020, but was extended to the end of 2021 and now the end of 2022.

De Beers said the extension period would give the company and the Botswana government further time to complete discussions regarding the contract renewal. The miner reported that good progress had been made during 2021.

De Beers is currently responsible for selling 85% of Debswana's diamonds.



GEMFIELDS EARNS RECORD REVENUES AT LATEST MONTEPUEZ RUBY AUCTIONS

Gemstone miner Gemfields' latest series of mini-auctions for rubies mined at the Montepuez mine, in Mozambique, has generated a record \$88.4-million in revenue.

Of the 107 lots on offer during the seven mini-auctions, held between November 8 and December 9, 104 were sold. The average price achieved was \$132.47/ct.

"This has been the strongest ruby auction in Gemfields' history and we're very pleased with the trajectory and growth of the downstream ruby sector. Professionalised and dependable supply has always been the key to unlocking growth. "The strength of the results we've seen this week for both emeralds and rubies means that Gemfields has achieved a new record for yearly gemstone auction revenues of \$239-million, a very pleasing result for 2021," comments

CANADA'S AMBASSADOR TO CHINA APPOINTED NEW RIO TINTO CHAIRMAN AS MINING GIANT BATTLES TO REHABILITATE ITS REPUTATION

Canada's departing ambassador to China has been appointed as chairman of Rio Tinto and lead its rehabilitation.

Dominic Barton will take over from Simon Thompson after the mining giant's annual meeting in May.

Barton, 59, has been Canada's leading diplomat in Beijing since 2019 and has been praised by prime minister Justin Trudeau for playing 'an integral role in shaping and pursuing Canada's priorities with respect to China'.

He also recently secured the release of two businessmen accused by Chinese authorities of espionage.





METSO OUTOTEC TO SUPPLY TECH TO NEW YORK PLANT

Metso Outotec has signed an agreement with Li-Cycle North America Hub to supply manganese, cobalt and nickel solvent extraction technology for a battery recycling plant to be built in Rochester, New York, United States.

The company explained that it would deliver three modular VSF X solvent extraction plants and related Dual Media Filters and basic engineering to the plant.

Jari Algars, president of the metals business area at Metso Outotec, said the "energy-efficient" technology is part of the company's Planet Positive product range and will help customers reduce emissions during operations.

"The Li-Cycle project will be an important new reference for Metso Outotec in the battery recycling business," Algars said.

The value of the agreement was not disclosed.



SANDVIK FINALISES GWS TAKEOVER

Mine equipment manufacturer Sandvik has completed the acquisition of the US-based GWS Tool Group from its owners, L Squared Capital Partners.

Sandvik described GWS Tool Group as "an established and fast-growing provider of made-to-order round tools with a large exposure to the general engineering and aerospace segments."

It predicted that GWS Tool Group's revenues to be SEK 875 million (\$96.1 million) in 2021. The newly acquired company will be reported in Walter, a Sandvik Manufacturing and Machining Solutions division.

The deal was previously announced in November when Sandvik explained that GWS' strong US operational presence and speed to market capabilities would improve Walter's value proposition and position in manufacturing advanced components and lightweight materials.

Stefan Wilding, chief executive officer and president of Sandvik, described the acquisition of GWS as "an important step" in its growth strategy in North America.



HH, TSHISEKEDI HOLD TALKS IN KINSHASA, AGREE TO RESOLVE TRADE BARRIERS

Zambian President His Excellency Hakainde Hichilema held very fruitful bilateral talks with His Excellency Félix Antoine Tshisekedi Tshilombo in Kinshasa yesterday.

Their talks centred around trade and investment and long-standing border issues between our two countries, which they agreed should be resolved harmoniously.

They also agreed that trade and investment can be enhanced if they normalise border challenges. This would not only allow both countries to focus on the creation of business opportunities, but that such efforts would in turn improve livelihoods, health and education for the people of DRC and Zambia.

They expressed willingness to deal with these challenges with determination because the two countries share common history, values and cultures, that would be further cemented if these outstanding matters were amicably resolved.

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ALPHAMIN PROGRESSES DRC EXPLORATION, IDENTIFIES CASSITERITE INTERCEPTS AT MPAMA NORTH

Dual-listed Alphamin Resources, which produces about 4% of the world's mined tin from its operations in the Democratic Republic of Congo (DRC), has identified a strike extension at its Mpama North mine, from visual cassiterite drilling intercepts.

Additionally, the Mpama South high-grade assay results were received and now include drilling intercepts within 200 m of the Mpama North orebody.

Indications following these results note that Mpama South and Mpama North are zones of high-grade mineralisation offset and displaced by a fault, and that the areas now have the potential for synergies and fast-tracking of underground access to Mpama South.

In terms of the drilling programme at Mpama North, by the end of October, 12 drill holes (about 6 167 m of drilling) had been completed, uncovering the existence of a crosscutting fault causing a downward and westward offset of the deeper mineralisation.

By refocussing drilling closer to the final drill line from previous exploration, holes drilled at 75 m further along strike succeeded in intercepting significant zones of cassiterite mineralisation.

Alphamin on November 8 said drilling would continue to refine the company's understanding of these mineralised areas with the objective of adding significantly to the current life-of-mine.

Mpama South, meanwhile, has completed 18 047 m of drilling (across 69 additional drillholes), of which assays for 57 drill holes have been received to date.

The first three phases of drilling will form the basis of a mineral resource estimation exercise, the results of which are expected to be announced in January 2022.

An updated estimate will be announced later in the first quarter of 2022 from the ongoing Phase 4 drilling, the miner said.



GALILEO SIGNS OPTION AGREEMENT TO EARN 51% INTEREST IN ZAMBIA COPPER/GOLD PROJECT

Aim-listed Galileo Resources has entered into an option and joint venture (JV) agreement with Garbo Resource Solutions to earn an initial 50% interest in the Shinganda copper/gold project, in Zambia.

Galileo has committed to spending \$500 000 on exploration and evaluation at Shinganda over a two-year period.

"This project fits the Galileo model in that the licence areas have good copper and gold intersections from previous campaigns. The agreement gives us the opportunity for new deposit discovery and/or small mine production potential.

"We look forward to working on this project commencing early in the New Year," Galileo CEO Colin Bird says.

Galileo plans to review past exploration data and undertake a drilling programme to test the tenor and extent of the shallow copper/gold mineralisation indicated by previous drilling and nearby mining.

Once it has earned the 51% interest in Shinganda, Galileo will have the option to increase its interest to between 65% and 85% by entering into a JV to develop a mining operation.



THE CREATION OF A GOLD REFINERY AND A GOLD BANK BY A TURKISH FIRM ON CARDS IN THE DRC

The creation of a gold refinery and a gold bank on the agenda of the exchanges between the Minister of Mines, Antoinette N'SAMBA KALAMBAYI and the officials of the Turkish company Niziplioglu

This Monday, November 8, 2021, a delegation of the Turkish company Niziplioglu Kıymetli Madenler San. ve Dış Tic. A.Ş, accompanied by the Minister of Foreign Trade Jean Lucien Mbusa, came to present to Minister N'Samba Kalambayi his project to create a refinery and a gold bank in the DRC.

Led by Mr. Murat Niziplioglu, President of board directors, this family mining structure prioritizes the development of congolese man.

"Being a family business, working for several years in Turkey, we are specialized in the mining field and we preferred to come and set it up in Congo. Our motivation is that the DRC is a country that is full of enormous natural resources," he told the press at the end of this hearing.

And to continue,

"Through this investment, we also want to participate in improving the social conditions of the Congolese population, that is to say, giving work to the Congolese by creating a properly local company that will refine Congolese minerals, instead of sending them outside the country. the observation is that in the DRC, there is the class of rich and poor."

Copperbelt **KATANGA** *mining*

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KAMOA COPPER AWARDS CHINA NERIN ENGINEERING CONTRACT FOR COPPER SMELTER

Ivanhoe Mines (TSX: IVN; OTCQX: IVPAF) Co-Chairs Robert Friedland and Yufeng “Miles” Sun are pleased to announce that Kamo Copper has awarded China Nerin Engineering Co., Ltd. (Nerin) of Jiangxi, China, with the basic engineering contract for the planned, direct-to-blister flash smelter at the Kamo-Kakula Copper Complex that will incorporate leading-edge technology supplied by Metso Outotec of Espoo, Finland, and have a nameplate capacity of 500,000 tonnes a year of approximately 99%-pure blister copper.

The contract was signed earlier on November 18th 2021 by Mark Farren, CEO of Kamo Copper, and Wu Runhua, General Manager of Nerin, at a virtual ceremony held at the Kamo-Kakula Mine and Nanchang City. Jinghe Chen, Chairman of Zijin Mining; Zhang Xiaobo, Chairman of Nerin; along with Mr. Friedland and Mr. Sun, joined the signing ceremony to offer their congratulations and support for this important project milestone.

The planned Kamo-Kakula smelter is to be built adjacent to the Phase 1 and Phase 2 concentrator plants, and is designed to use technology supplied by Metso Outotec and to meet the International Finance Corporation’s (IFC) emissions standards. The smelter has been sized to process the majority of the copper concentrate forecast to be produced by Kamo-Kakula’s Phase 1, Phase 2 and Phase 3 concentrators. With a nameplate capacity of 500,000 tonnes per annum of blister copper, it is projected to be one of the largest, single-line blister-copper flash smelters in the world, and the largest in Africa.

Nerin is an international engineering company with more than 60 years of experience in smelter engineering and construction projects globally. Nerin actively promotes the advancement of smelting technology through its own research and development, and establishing various partnerships with global industry peers, including Metso Outotec.

Since its inception in 1957, Nerin has undertaken more than 4,000 engineering and construction projects in 60 countries, including numerous large-scale, flash smelting projects, which comprise approximately 47% of the world’s current flash-smelting capacity. Notable projects include the upgrading of Rio Tinto’s Kennecott smelter in Salt Lake City, Utah, United States, and the upgrading and expansion of Glencore’s PASAR smelter and refinery in Isabel, Leyte Philippines. Nerin’s exceptional capabilities in flash-smelting technology, combined with its significant experience in the DRC (including the Luabala Copper Smelter near Kolwezi that is treating approximately one-third of Kamo-Kakula’s current concentrate output, and Tenke Fungurume’s copper hydrometallurgical plant) will help ensure a smooth execution of the planned smelter at Kamo-Kakula.

The smelter is expected to be built concurrently with the project’s Phase 3 mine and concentrator expansion, and the upgrading of turbine 5 at the Inga II hydropower complex. The additional 162 megawatts of renewable electricity from the Inga II upgrading project will be needed to power the Phase 3 expansion and on-site smelter.

The next stages in the smelter project development will be the completion of basic engineering, which is expected to take approximately seven months, and the ordering of the long-lead equipment, followed by earthworks which are expected to commence in Q2 2022. The

awarding of the Engineering, Procurement and Construction Management (EPCM) contract is expected to occur shortly after the commencement of the earthworks.

The overall execution timeline will be dictated by the basic engineering, but is expected to be approximately three years. The expected capital cost is in the region of US\$700 million (100%-basis) for the enlarged smelter, to be financed with cash flows from Kamo-Kakula.



(L-R) Kexin Liu (Cathy), Ivanhoe; Tao Feng, Ivanhoe; Chao Zhou (Peter), Ivanhoe; Wu Runhua, Nerin; Xiaobo Zhang, Nerin; Feng He, Nerin; Hu Hu, Nerin; and Xiaowei Yang, Nerin.

An onsite smelting facility has compelling cost and environmental benefits, including a reduction in the volume of copper concentrate shipped from the mine by approximately one half or more, and the associated logistics costs, export taxes and concentrate treatment charges. The smelter also will produce sulphuric acid as a by-product, creating a new revenue stream for Kamo Copper.

There is a strong demand and market for sulphuric acid in the DRC to recover copper from oxide ores. Copper mines in the DRC currently import significant volumes of sulphur used in sulphur-burning acid plants to produce sulphuric acid for the treatment of oxide copper ores. The DRC also imports sulphuric acid, primarily from Zambia.

Kamo-Kakula currently is producing an extremely high-grade, clean copper concentrate containing approximately 55% copper and extremely low levels of arsenic by world standards – approximately 0.01%. Approximately 35% of Kamo-Kakula’s Phase 1 concentrate is sent to the local Luabala smelter for processing into blister copper ingots – containing approximately 99% copper – while the remainder is transported via trucks and ships to international smelters for

Kamo Copper’s executive team members at the virtual signing ceremony. (L-R, seated): Ben Munanga, Chairman; Mark Farren, CEO; and Rochelle De Villiers, Co-CFO. (L-R standing) Zhilin Li, Deputy General Manager; Annebel Oosthuizen, Executive, Finance; Xuelin Cai (Minty), Co-CFO; and Yong Chen, COO.



A 3D illustration of the planned direct-to-blister flash smelter at the Kamo-Kakula Copper Mine that will have a nameplate capacity of 500,000 tonnes per annum of blister copper.

treatment.

Mark Farren commented: “Today’s signing of the smelter basic engineering contract with Nerin highlights our commitment to the people of the DRC to derive more economic benefits from Kamo-Kakula by maximizing in-country beneficiation. Achieving the transformative potential of Kamo-Kakula’s unrivaled copper resources requires creative thinking that supports the DRC’s priorities of economic growth and diversification through value-addition, processing and beneficiation.

“Nerin is a highly-respected engineering firm with the people and in-country expertise to deliver a first-rate, on-site smelter that will be among the largest of its kind in the world. They successfully built the local Lualaba Copper Smelter, to which we are sending about a third of our current concentrate output.

“After a great deal of due diligence, the partners at Kamo Copper collectively agree that the state-of-the-art, environmentally-friendly technology offered by the Metso Outotec direct-to-blister smelter best suits the unique low-iron, low-sulphur and ultra-high-grade concentrate produced at Kamo-Kakula, and aligns seamlessly with our goal of producing the world’s ‘greenest copper’.

“The Kamo-Kakula smelter will be powered by clean, renewable hydropower and will incorporate leading-edge sulphur capture. Shipping 99%-pure blister copper ingots produced from an on-site smelter, instead of shipping copper concentrate, will result in a

significant reduction in Kamo-Kakula’s concentrate transportation costs and Scope 3 emissions.”

Wu Runhua, General Manager of Nerin (seated, centre) and Xiaobo Zhang, Chairman of Nerin (standing behind Wu Runhua), and other members of China Nerin Engineering join members of Ivanhoe Mines’ Chinese representative office at the signing ceremony in Nanchang City, China, with the Kamo Copper team on the screen in the background.

Benefits of the Metso Outotec direct-to-blister smelting technology

Approximately one-half of the world’s primary copper currently is produced using flash, direct-to-blister smelting technology. Metso Outotec recently signed a major engineering and technology contract for the delivery of a landmark copper smelter complex to be built in Gresik, East Java, Indonesia. The project owner is PT Freeport Indonesia and has a value of EUR 360 million (US\$424 million).

The Outotec technology produces high-quality blister copper in a single flash furnace without the need for separate converting stages or ladle transportation. The process and equipment have undergone continuous development over the last 70 years, which has led to one of the safest, most environmentally-friendly, and most reliable smelting processes for treating high-grade copper concentrates.

Summary of direct-to-blister smelting key features:

- Often the most profitable process option for concentrates containing more than 30% copper.
- Results in high copper

recovery.

- Requires no converting process.
- Low capital and maintenance costs.
- Integrated controls with continuous process.
- High sulphur recovery due to single, continuous, stable gas stream, leading to minimum emissions to the environment.
- Low capital and operational costs for sulphuric acid plant.



A Metso Outotec direct-to-blister flash smelter furnace in operation.

Kakula is projected to be the world’s highest-grade major copper mine, with an initial mining rate of 3.8 million tonnes per annum (Mtpa) at an estimated, average feed grade of more than 6.0% copper over the first five years of operations, and 5.9% copper over the initial 10 years of operations. Phase 1 is expected to produce approximately 200,000 tonnes of copper per year, while the Phase 2 expansion is forecast to increase production to approximately 400,000 tonnes of copper annually. Kamo Copper is on track to complete the Phase 2 expansion in Q2 2022.

Based on independent benchmarking, the project’s phased expansion scenario to 19 Mtpa would position Kamo-Kakula as the world’s second-largest copper mining complex, with peak annual copper production of more than 800,000 tonnes.

Aerial view of the Kamo-Kakula Copper Complex. The planned smelter is to be built within the area outlined in red, adjacent to the Phase 1 and 2 concentrator plants (in yellow circle). The backfill plant is circled in blue.



JUBILEE METALS SAYS PROJECT ROAN NEARLY COMPLETE, FINISHES INYONI PGM UPGRADE

Jubilee Metals Group PLC) said the construction of Project Roan in northern Zambia is nearly complete with commissioning activities targeted to start in December, slightly ahead of schedule.

The project is targeting the production of 10,000 tonnes per annum (tpa) of copper units through an integrated copper processing plant. It remains on track to start delivering copper concentrate to the upgraded Sable Refinery for further refining during the first quarter of 2022, said Jubilee.

In addition to Project Roan, Jubilee is targeting the construction of a further two copper concentrating facilities as part of its Northern Zambian refining strategy, as the company targets the delivery of more than 25,000tpa by the end of 2023.

Elsewhere, Jubilee has completed its approximately US\$21mIn construction and commissioning programme to upgrade the Inyoni PGM operations in South Africa. Inyoni is now able to process a wide variety of third party PGM feed materials, making it one of the only large scale PGM plants capable of processing blended ores.

Jubilee said it retained its PGM target for the current financial period at 50,000 ounces, despite the interruptions to operations during the construction and commissioning of the upgrade programme.

"Further significant progress has been made over recent months at both

our South African and Zambian operations, as well as outside the African continent, with the collaboration with Cyprus-based Caerus Mineral Resources," said chief executive Leon Coetzer.

Yesterday, Caerus Mineral Resources PLC said it signed an 18-month extension to an option agreement with Jubilee allowing them to continue to assess the multiple waste stockpiles on Caerus' concessions.

"Our implementation team at Project Roan has successfully navigated the various challenges faced due to the impact of the Covid pandemic and its knock-on effect on international logistics and freight movement and construction activities," said Coetzer.

"The state-of-the-art copper concentrator which will be able to produce both a copper oxide and a copper sulphide rich concentrate, and following some reprioritisation of the commissioning schedule, is nearing completion with staggered commissioning activities set to commence in December 2021, targeting the first commercial production during March 2022.

"Owning 100% interest in the Southern Refining Strategy, which incorporates the Sable Refinery and Project Roan, captures all of the earnings potential and total flexibility, putting us in a very strong position going into 2022."

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AVZ RAISES A\$75M FOR LITHIUM PROJECT- DRC

AVZ Minerals Limited (ASX: AVZ, "the Company" or "AVZ") is pleased to announce it has received firm commitments for a placement to raise \$75 million (before costs) with 85% of funds coming via new global institutions and the balance from existing

sophisticated shareholders including cornerstone investor Suzhou CATH Energy Technologies ("CATH").

The placement was significantly oversubscribed and further confirms the significant level of interest in the Company's world-class Manono Lithium and Tin Project ("Manono Project") situated in the Democratic Republic of the Congo ("DRC").

The successful capital raising allows the Board of AVZ ("Board") to efficiently progress towards a Final Investment Decision ("FID") for the commencement of project development at the Manono Project, as well as providing foundation support for AVZ's longer term strategic vision to vertically integrate via further investments into downstream lithium processing opportunities.

The proceeds from the capital raise will allow the Company to undertake its early site works program to accelerate the project development timetable ahead of a decision on the Permis d'Exploitation (or Mining Licence).

Commenting on the capital raising, AVZ's Managing Director, Nigel Ferguson, said: "This capital raising marks an important milestone in our journey to develop the Manono Project which strengthens the financial position of the Company and will assist to keep the Project timeline within reach, despite the award of our Mining Licence taking longer than we had previously anticipated".

"We are in close consultation with the DRC Government authorities that are undertaking the Mining Licence assessment and are confident of delivering a favorable outcome for all stakeholders – most importantly the people of the DRC and our shareholders".

"Such a significant cash injection further de-risks the Company during a time where increased market volatility is apparent and global economic uncertainty still remains.

"The placement also assists our financing discussions, providing capital for up-front debt finance establishment costs and ensuring minimum liquidity requirements are met which provides AVZ with a solid foundation to negotiate favourable terms.

"We welcome our new shareholders and thank our existing shareholders for their continued support, in what is expected to be an exciting time in the development of this truly world-class asset."

Placement

The Placement comprises 150,000,000 new Shares (~4% of shares on issue post the Placement) at an issue price of \$0.50 per Share, to raise \$75 million (before costs) utilising the Company's existing ASX Listing Rule 7.1 capacity.

The issue price represents a 22% discount to the closing price on 7 December 2021. The lead manager and book runner on the Placement was jointly undertaken by Cantor Fitzgerald and Curran & Co.

An indicative timetable for the Placement is set out in Appendix 1. The timetable remains subject to change at the Board's discretion, subject to compliance with applicable laws and ASX Listing Rules.

AVZ will use the funds to:

Negotiate the extra 15% equity in Manono from the Government from a strong cash position

Undertake early-works program, including upgrade of roads, bridges and progress camp construction;

Progress various technical studies with respect to LiOH conversion and infrastructure initiatives that further enhance the Project;

Negotiate final project financing requirements from a position of enhanced balance sheet strength; and

Provide necessary working capital for corporate requirements, including potential new exploration opportunities.



DRC TO END GLENCORE EXPORT OF RAW COBALT

The Deputy Prime Minister of the Democratic Republic of Congo (DRC) has told Swiss delegates at the COP26 climate conference in Glasgow that her country will no longer accept the export of its raw materials, notably cobalt, by commodities giant Glencore.

“The raw materials belong to us,” said Eve Bazaiba, who is also the DRC’s environment minister, in an interview with news platform Geneva. “They will now have to be processed locally.”

Bazaiba said the DRC wanted a more equal trade partnership in raw materials with Switzerland. She transmitted this message to the head of the Swiss delegation at COP26, Franz Perrez, when they met for a bilateral meeting on Friday. Perrez confirmed to news agency Keystone-SDA that the subject had been discussed but did not elaborate.

“Cobalt cannot be exported, transformed and manufactured into batteries outside the country, while we are reduced to selling our teeth to afford a green vehicle,” said Bazaiba.

Glencore operates two cobalt mines in the DRC. The country supplies more than 60% of the world’s cobalt, a by-product of copper and nickel mining that forms an essential component of rechargeable batteries powering smartphones, laptops and electric cars. Artisanal and small-scale mining of cobalt has been linked to unsafe working conditions and the use of child labour.

In her meeting with Perrez at the climate conference, Bazaiba said she also pressed Switzerland to convince other rich developed countries to honour the “polluter pays” principle, so that funds can be made available to help developing countries like the DRC fight global warming.

Disappointing turnout at climate protests

Activists in Lausanne and Zurich turned out in smaller numbers than organisers had hoped on Saturday, dubbed the Global Day of Action for Climate Justice, as the international COP26 conference of parties to the Paris Agreement reached the half-way point.

Around 500 took part in a rally in Lausanne, well below numbers of similar actions in the past, including the climate strikes of 2019 that saw more than 10,000 people converge on the French-speaking city. The protesters, from a cross-section of movements and age groups, denounced what they called “empty words” of leaders at the conference in Glasgow, where tens of thousands of demonstrators rallied on Saturday.

In Zurich, just 150 people turned up to call for “a change of system, not climate”, while in Geneva around 50 people had gathered, the Keystone-SDA news agency reported.

The Deputy Prime Minister of the Democratic Republic of Congo (DRC) has told Swiss delegates at the COP26 climate conference in Glasgow that her country will no longer accept the export of its raw materials, notably cobalt, by commodities giant Glencore.

KCM NEEDS \$270 MILLION TO DEAL WITH FLOODING MINE, MINISTER TOLD

About \$270 million is needed for the procurement of a pump chamber meant to pump out water at three shafts which are flooded at Konkola Copper Mines (KCM) in Chililabombwe.

KCM General Manager Technical Services Davy Mubita said that currently, the mining firm is spending close to \$4.2 million monthly to pump out 375 cubic litres of water underground.

Mr. Mubita said that if only the mine can rump up production to full capacity, the mining firm can find the money but it is struggling because the mine is still under care and

maintenance.

The General Manager of Technical Services added that the firm cannot mine further than 1,390 meters underground because it is still wet.

Mr. Mubita was speaking when he briefed Minister of Mines and Mineral Development Paul Kabuswe before proceeding underground for a familiarization tour.

And Mr. Kabuswe said Vedanta Resources PLC was the worst investment Zambia had ever had, adding that putting the mine under care and Maintenance was not the solution to ramp up production at

KCM.

Mr. Kabuswe, who is also Chililabombwe Member of Parliament said soon, Government will announce its position over the future of KCM.

He said Government is looking at how best it can fully revamp operations at KCM because it has the capacity to produce over three million tonnes of Copper in the next ten years.

The Minister further added that the issue of flooding underground is one of his key priorities, hence his visit underground to find a way forward.

DRC: REINFORCEMENT OF SECURITY MEASURES AROUND SHINKOLOBWE, A MINING SITE RICH IN URANIUM

The work to secure the Shinkolobwe mining site located in the territory of Kambove and rich in uranium in Haut-Katanga is continuing. It is in this context that the head of the provincial executive went to the place on Tuesday to reassure himself not only of the progress of the work but also of the security around the Shinkolobwe site, 150 km from Lubumbashi.

"At this point, it must be said that we are satisfied with the work that is being done here and it also proves that the Shinkolobwe site is completely secure and no one can claim that the site is being operated. We have the assurance that Shinkolobwe is secure. and we will continue to intensify with the surveillance, elements of the DRC Armed Forces and the police are around the Shinkolobwe site to monitor," Jacques Kyabula Katwe said on Tuesday, on the spot in Shinkolobwe in Kambove territory, governor of Haut-Katanga.

The Générale des Carrières et de Mines

(Gecamines) has erected bollards in the prohibited zone and the gutters were also dug nearly three and a half meters in length and width in double format, according to the explanations of Gécamines experts at governor of Haut-Katanga, and this to prevent access to this prohibited site.

It is from this mine, 150 kilometers north of Lubumbashi, that the uranium used to manufacture the first atomic bombs dropped in 1945 on Hiroshima and Nagasaki was extracted.

Belonging to the state-owned company Gécamines, it has been officially closed since 1960 and the last presidential ordinance confirming this closure dates back to 2004.

However, the clandestine exploitation of the mine continues and "we informed the authorities about it last June", said at the time, Paul Kisimba, activist of human rights and the civil society of Likasi, located city 30 km from the mine in the territory of Kambove.



ALBERT YUMA A POWERFUL PRO-KABILA EXECUTIVE, HAS BEEN OUSTED FROM GÉCAMINES, DRC

The DRC president Felix Tshisekedi has removed Albert Yuma Mulimbi as chairman of the state mining firm Gécamines.

The now former chairman of Gécamines was ousted on Friday after longtime allegations that billions of dollars in revenue had gone missing, a move officials said was intended to fight corruption as the country becomes increasingly important in the global clean energy revolution.

Albert Yuma Mulimbi, the chairman of the company since 2010, was replaced by President Felix Tshisekedi of Congo just days after The New York Times published an article revealing new allegations against Mr. Yuma.

At Gécamines, Congolese mining giant, Albert Yuma, has been replaced by Alphonse Kaputo Kalubi as chairman of the board, according to this decision dated Friday and read Saturday on public television. Close to Prime Minister Jean-Michel Sama Lukonde, Mr. Kaputo is a retired former Gécamines executive.

Gécamines, controls production of metals such as cobalt and copper, crucial resources in the push to expand electric vehicles and other renewables. Without his chairmanship, Mr. Yuma will no longer have a significant role in partnering with international companies over major mining deals.

"It is hard to underestimate the importance of this development — it is a significant step in the fight against corruption in Congo," said J. Peter Pham, who until January served as a senior Central Africa official with the U.S. State Department. "Albert Yuma and the mining sector stand at the nexus of natural resources, political and economic power in the country."

At least for now, Mr. Yuma will retain his role supervising the reform of small-scale and informal mining in Congo, one industry executive said. His plans include buying cobalt from the informal miners, also known as artisanal miners, and regulating pricing. Cobalt produced by artisanal mining, as opposed to industrial operations, makes up about 30 percent of the nation's output.

He has also announced plans to increase safety at these sites. Child labor and frequent injuries

and deaths associated with such mining have drawn international attention, driven away new U.S. investors and even made some automakers reluctant to buy cobalt from Congo.

The 66-year-old businessman, who made his fortune in textiles, Albert Yuma is close to former President Joseph Kabila, whose political family has been subjected to an offensive by President Tshisekedi since December 2019.

He is also the president of the Federation of Congo Enterprises (FEC), a powerful employers' union in the DRC.

Mr. Yuma was also a slayer of foreign NGOs like Global Witness, which argued in 2017 that \$ 750 million had been embezzled from Gécamines funds at the end of the Kabila years (January 2001 – January 2019).

At the end of 2020, the re-election for the sixth consecutive time of Mr. Yuma at the head of the employers' union FEC had been challenged as never before in court by his rival.

The DRC is responsible for more than two-thirds of the world's cobalt and is also a major copper producer. Though prices have skyrocketed in recent years, Gécamines was criticized during Mr. Yuma's tenure for signing deals with foreign mining companies, including entities backed by the Chinese government. The arrangements effectively turned over the country's extraordinary mineral wealth for foreigners to profit.

Top American State Department officials had urged the Biden administration to impose sanctions on Mr. Yuma, who stated that he had by his own count been accused of diverting as much as \$8.8 billion in mining revenues over the years.

He was separately banned in 2018 from entering the United States, and he has since hired a team of lobbyists and lawyers in Washington to try to fight back and head off any sanctions, which could freeze money he has in international banks.

Mr. Yuma, a longtime power broker in Congo

and one of the country's richest businessmen, did not respond on Friday to a request for comment. But in a series of interviews with The Times in recent months, he called the accusations against him fabrications by outside provocateurs seeking to undermine Congo's sovereignty.

In one document he provided in October, he called the allegations "veritable smear campaigns," saying that his critics wanted "to sully his reputation and blur his major role in favor of the country through the reform of its mining policy."

For decades, Gécamines has been one of Congo's largest sources of revenue, controlling concessions granted to major international mining companies and collecting royalties from them. Last year, the firm generated \$324 million.

Mr. Yuma was placed in his post as chairman by the country's former president, Joseph Kabila, who American officials believe worked closely with Mr. Yuma to divert agency funds toward political ends, and also possibly to enrich Mr. Kabila's family.

He was reappointed chairman in 2019, after Mr. Tshisekedi took office. That year, Mr. Yuma had been under consideration to serve as prime minister of Congo, a move the United States opposed because he was planning to serve as Mr. Kabila's proxy, State Department officials told The Times.

Mr. Yuma will now be replaced by Kaputo Kalubi Alphonse, whom Mr. Tshisekedi had named to Gécamines' administrative council three years ago. As a sign of the key role that Gécamines plays in Congo, Mr. Tshisekedi's spokesman announced the new appointment on national television on Friday.

Leon Mwine, who was appointed by Mr. Tshisekedi to a top post at Gécamines in 2019, said executives realized they had to prove to the world that the agency could change course.

"Values — such as honesty and transparency and integrity — these core values are what we need to be competitive on the international market," Mr. Mwine said.

RANKED: TOP 10 MINES WITH WORLD'S MOST VALUABLE ORE

In mining, grade is king. Across the commodity spectrum, some of the most anticipated results — which can determine the scope of a mining project — are assay values from drill testing.

As one of mining's most influential figures, Robert Friedland, sums it up:

"Mining 101. High grade is good. Low grade is bad."

"The higher the grade, the smaller the environmental footprint, Friedland has said. "The higher the grade, the smaller the plant; the less the electrical consumption, the smaller the labour force, the smaller the tailings pond, the less the global warming gas per unit of metal produced."

The value of the ore is calculated by multiplying the contained metals and minerals per tonne in the proven and probable reserves by the ruling price for the commodities.

Silver and gold shine on the top ten list of mines with the most valuable ore, compiled with data provided by our sister company Miningintelligence.

RANKED: Top 10 mines with world's most valuable ore 2

*Commodity prices as of October 27

Top listed uranium producer Cameco's Cigar Lake uranium mine in Canada's Saskatchewan province takes top spot with ore reserves valued at \$9,105 per tonne, totaling \$4.3 billion. After a six-month pandemic induced halt, Cameco restarted operations at Cigar Lake in April.

Pan American Silver's Cap-Oeste Sur Este (COSE) mine in Argentina is in second place, with ore reserves valued at \$1,606 per tonne, totaling \$60 million.

In third place is Alphamin Resources' Bisie tin mine in the Democratic Republic of Congo, which saw record production in Q420, with ore reserves valued at \$1,560 per tonne, totaling \$5.2 billion. Fourth place goes to Alexco Resource Corp's Bellekeno silver mine in Canada's Yukon territory, with ore reserves valued at \$1,314 per tonne for a total value of \$20 million.

Kirkland Lake Gold, which recently merged with Agnico Eagle takes two spots in the top ten list, for its Macassa gold mine in Canada and Fosterville gold mine in Australia at fifth and sixth places, respectively. Macassa has ore reserves valued at \$1,121 per tonne for a total value of \$4.3 billion while Fosterville's ore reserves are valued at \$915 per tonne for a total of \$5.45 billion.

In seventh place is Glencore's Shaimerden Zinc mine in Kazakhstan, with ore reserves valued at \$874.7 million for a total value of \$1.05 billion. Alexco Resource Corp's takes another spot with Flame and Moth silver mine in the Yukon territory with ore reserves valued at \$846.9 per tonne, for a total value of \$610 million.

Rounding out the top ten are Hecla Mining's Greens Creek silver-zinc mine in Alaska with ore reserves valued at \$844 per tonne for a total value of \$6.88 billion. Western Areas Spotted Quoll nickel mine in Australia with ore reserves valued at \$821 per tonne — a total value of \$1.31 billion.

Source: Mining.com

BARRICK SHIFTING INTO GROWTH GEAR, SAYS CEO MARK BRISTOW

Since the merger of Barrick Gold (TSX: ABX; NYSE: GOLD) and Randgold Resources early in 2019, the new gold major appears to be completing a full circle under the leadership of Mark Bristow by increasingly prioritizing value-adding grass-roots exploration and development, he tells The Northern Miner.

After kicking off a period of top-tier gold-industry consolidation, the company has been focusing on "right-sizing" the portfolio, focusing only on Tier 1 and Tier 2 assets. But getting back to value creation through the drill bit is something close to the former Randgold Resources executive's heart and an activity he is increasingly able to accomplish as most of Barrick's operating assets are currently performing well.

Bristow has been very vocal about his commitment for Barrick to remain a Canadian company and has been talking about the company's commitment to secure a new top-tier asset in the mining-friendly jurisdiction since the Denver Gold Forum in September.

"We remain Canada's biggest gold mining company, and Hemlo remains our only strategic operation here," says Bristow in an interview. "I've been very outspoken about my commitment to grow our portfolio in Canada. We're very committed to doing that, but as you know, we are very focused on Tier 1 assets," says Bristow.



TESLA TO BUY 45 GWH OF LFP BATTERIES FROM CATL

Citing a post by 36kr, Chinese website CnEVPost says Tesla has agreed to buy 45 GWh of lithium-iron-phosphate batteries from CATL to meet its expected demand for the Model 3 and Model Y in 2022. The Model 3 and Model Y are currently available with LFP batteries in their standard range versions, with the former having a 55 kWh battery and the latter a 60 kWh battery.

The purchase will be enough to power about 800,000 vehicles. The company sold 627,350 cars in the first 9 months of this year. Tesla's Nevada battery factory will soon increase production to produce more than 40 GWh of batteries in 2022, and with additional supplies from Panasonic and LG Chem, Tesla's 2022 sales could be at least 1.5 million

units, the 36kr report says, citing industry sources. That report claims that even as the new contract was being announced, CATL and Tesla were in talks about increasing the order further.

LFP is rapidly becoming the chemistry of choice for medium- and low-price electric vehicles. Data released earlier this month by the China Automotive Battery Innovation Alliance showed that LFP battery installations in China have continued to grow in the past two months after surpassing ternary batteries for the first time this year in July.

According to the data, China's battery installed base in September was 15.7 GWh, up 138 percent year on year and 25 percent

from August. Among them, ternary batteries installed a total of 6.1 GWh, up 45.6 percent year-on-year and up 15 percent from August. However, LFP battery installation volume increased even more, with 9.5 GWh installed in September, up 309 percent year on year and 32 percent compared with August.

What do all these numbers mean? Simply this: The EV revolution is accelerating, thanks in part to lower prices and improved performance for lithium-iron-phosphate batteries. Going forward, NMC and other traditional lithium-ion battery chemistries will be reserved for high-end and/or high-performance vehicles. Most of us will be quite happy to drive a car that takes a blink of an eye longer to sprint to 60 mph but costs considerably less to buy.

SKC Safety, Health & Environment South Africa (PTY) Ltd



Personal & Environmental Air Sampling Equipment/Accessories

- Air Sample Pumps & Accessories
- Sample Media for Gases & Vapors
- Passive/Active Samplers
- Media & Samplers for Dust/ Particulates
- Bioaerosol Samplers
- Portable Instruments
- Surface/Dermal Sampling
- Service/Repair & Calibration
- Analytical Services on Water, Soil & Air Samples
- Personal/Environmental Noise Monitoring
- Whole Body Vibration Monitoring
- Environmental Air Quality, Water & Light Monitoring
- Environmental Heat Stress Monitoring



COBALT-RICH CONGO TRIES TO PUSH INTO BATTERY MANUFACTURING

Democratic Republic of Congo's government said on Wednesday it would push to develop domestic battery manufacturing capacity to add value to its exports of minerals such as cobalt and copper.

Congo mines around two-thirds of the world's cobalt, an ingredient in lithium-ion batteries, and is Africa's leading producer of copper. Demand for the minerals is rising to power electric vehicles and electronic devices.

But Congo, which ranks among the world's least developed countries, exports its minerals for only a fraction of the final cost of the batteries, which are mostly manufactured in Asia.

Speaking at a two-day business forum in the capital Kinshasa, Prime Minister Sama Lukonde announced a series of measures aimed at speeding the development of a battery manufacturing industry.

He announced the creation of a Battery Council with the aim of "piloting the government's policy to develop a regional value chain around the electric battery industry."

In addition, he said the government was committed to launching a special purpose vehicle that would mobilise private sector funding to support battery manufacturing.

Neither Lukonde nor President Felix Tshisekedi, who also participated in the forum, provided specific details about how long these initiatives would take to set up or how they would be funded.

Weak governance, pervasive corruption and limited infrastructure have long deterred major investments in Congo beyond resource extraction.

President Hakainde Hichilema of neighbouring Zambia, Africa's second-largest copper producer, told the forum his country was ready to work with Congo and others in the region to develop Africa's industrial capacity.

"We need to synchronize our continental strategy and value chain," he said.

Several development banks, including the African Development Bank, also signed a pledge to help develop Congo's battery industry, but the text of the agreement was not immediately available.

LITHIUM-ION BATTERY FACTORY ESTIMATED AT 39 MILLION USD IN THE DRC AGAINST 112 MILLION USD IN CHINA

In a study released during DRC AFRICA BUSINESS FORUM, BloombergNef argues that the Democratic Republic of the Congo could leverage its abundant cobalt resources and hydroelectric power to become a low-cost, low-emission producer country. lithium-ion battery cathode precursors.

The research paper estimates that it would cost \$ 39 million to build a 10,000 metric tonne cathode precursor plant in the DRC. That's three times cheaper than a similar factory in the United States would cost, whereas if it was built in China or Poland, it would cost \$ 112 million and \$ 65 million, respectively.

The market analyst's data also shows that the emissions associated with the production of batteries could be reduced by 30% compared to the existing supply chain that crosses China, if the cathode precursor materials – the intermediate material between the raw and finished cathode material – were produced in the DRC, with Poland handling the production of cathode materials and cells, and Germany the final assembly of the pack. This is due to the DRC's proximity to

cathodic raw materials and its heavy dependence on hydroelectric power stations.

In a press release, reported by mining.com, Kwasi Ampofo, lead author of the report and head of metals and mining at BNEF, argues: "The DRC's cost competitiveness stems from its relatively cheap access to land, and its low engineering, procurement and construction costs, or EPC compared to the United States, Poland and China".

In his opinion, European cell manufacturers are currently heavily dependent on China for battery precursors. However, the raw materials for batteries are, in most cases, imported into China from Africa and refined before being exported to Europe. According to him, European automakers can reduce their emissions by shortening the transport distance and capitalizing on the DRC's hydroelectric network and proximity to raw materials.

The electric vehicle market represents an opportunity of \$ 7 trillion by 2030 and \$ 46 trillion by 2050, according to projections by BloombergNerf.

T3 PROJECTS AWARDED THE CONTRACT FOR LUILA ACID TANK FARM RELOCATION PROJECT BY KAMOTO COPPER COMPANY SA (KCC)

According to the advert posted on their LinkedIn page T3 Projects has been awarded the Luila Acid Tank Farm Relocation Project by Kamoto Copper Company SA (KCC) in the Katanga Province of the DRC.

About T3 Projects

T3 Projects is a superior SMEIPP (structural, mechanical, electrical & instrumentation, piping & platework) construction contractor, offering services to the mining, industrial, power and oil & gas sectors throughout Africa.

T3 Projects was born from the acquisition of Group Five Projects (Pty) Ltd in August 2019 by the Teichmann Group.

Leaders in the field of SMEIPP construction, the former Group Five Projects team offers a wealth of knowledge and experience as we continue to successfully deliver projects in remote parts of Africa.

With a permanent presence in Ghana since 1996, followed by The Democratic Republic of the Congo in 2004 and Burkina Faso in 2006, T3 Projects complements the Teichmann Group's existing product offering by providing innovative construction solutions that ensure effective and efficient delivery of construction projects in the mining and industrial sectors across the continent.



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TEAM CATERPILLAR DEVELOPS FIRST FULLY AUTONOMOUS WATER TRUCK

According to Craig Watkins, MineStar Commercial Manager, "We are all working towards the autonomous mine of the future." Why? Because for mining customers operating trucks in remote and rugged environments, autonomous and fleet monitoring solutions like MineStar keep operators safe and mining operations running better than ever. When an important mining customer requested autonomous technology to be applied to water trucks on their site in addition to the mining trucks themselves, Team Caterpillar got to work developing the first fully autonomous water truck, the 789D.

Product engineers and software developers from across the company were fully engaged in this project. Then, customer facing teams ensured the solution aligned with the customers' goals and reported feedback to the internal teams to enhance the end result. Andy Verheyen, Senior Electronic Engineering Manager who helped develop the MineStar technology for the water truck said, "This is the first time we are applying this technology to a water truck and we will be able to use what we learn to inform future water trucks. This is the current example of how we are expanding what's possible with autonomy but there are other parts of the

business where this same outside-the-box work is being executed. From a career's standpoint, this speaks to the range of projects someone with interests in automation could be part of." From electrical engineers to marketing professionals, the range in skillsets necessary to bring a product like this to fruition is just as broad as the project opportunities across Caterpillar.

Craig says, "When we automate more vehicles, the whole operation moves faster and becomes safer." Craig explains that water trucks are a critical asset on the mine site as they eliminate dust coming from vehicles running down dirt roads, which enables the rest of the mine to operate more quickly- but doing it safely is important. Over-watering the roads can cause slick driving conditions. The autonomous technology prevents over watering, which is a sustainable solution that drives mine site efficiency.

Craig said, "This project was very exciting. Since I joined Caterpillar in 2005, MineStar has been on the bleeding edge so the status quo has been doing new things. The success of the fully autonomous water truck is an exciting look at what other opportunities await." Are you ready to apply your skillset to the opportunities at Caterpillar?

Sweden-based mining equipment manufacturer Epiroc has unveiled the Pit Viper 270 XC blasthole drilling rig (PV-270 XC), which can improve mining operational efficiencies and be integrated into existing automated systems.

The company said the PV-270 XC has been designed specifically to provide flexibility and that it can increase load capacity by as much as 42.5 tonnes, explaining that the technology "builds on the high industry standard of performance and innovation of the Pit Viper 270 series."

The PV-270 XC can be integrated with the Epiroc Rig Control System and be run with an operator on-board using options such as AutoDrill and AutoLevel, Epiroc said.

Additionally, it can enable one operator to run one or multiple units, allowing companies to implement autonomous drilling and contribute to the "lowest total cost of ownership in the blasthole drilling industry in its class."

"It [PV-270 XC] provides a foundation to add new functionality and options later without a major rebuild of the machine," Epiroc said. "Autonomous drilling can be implemented with almost no human interaction with the drill."

Heino Hammann, product line manager – Blasthole at Epiroc Drilling Solutions, said the company had successfully deployed more than 500 Pit Viper 270 rigs to mining environments.

EPIROC RELEASES THE PIT VIPER 270 XC



LUBUMBASHI UNIVERSITY SCIENTIFIC BREAKTHROUGH

Kinsevere's environmental monitoring samples will no longer have to leave the Congo for analysis. In fact a testing solution is within very close reach now that the University of Lubumbashi (UNILU) environmental analysis laboratory is the first in the Congo to receive certification, overseen by the Southern African Development Community Accreditation Service.

Patrick Nkulu, Kinsevere Deputy General Manager Operations and General Manager representative, attended the official accreditation certificate ceremony. He praised the local scientific community's capabilities.

"This accreditation, of the now leading

environmental analysis laboratory in the Congo, bolsters local and nearby expertise according to the standards of the ISO 17025 standard," he said.

The University rector, Full Professor Gilbert Kishiba, said he was honoured to have an analytical laboratory that meets international standards.

"UNILU's academics and scientists can now provide a proven service to the resources industry. The accreditation paves the way for signing other research contracts," he said.

Kinsevere has invited other mining companies and Congo investors to also reach out to the University of Lubumbashi.

Jean Marie Kanda, Dean Polytechnics Faculty, presented prizes and medals to more than 30 new ambassadors of the Polytechnic, including Patrick Nkulu and Senior Mining Engineer Ursule Ntumba, who is Kinsevere's first female mining engineer. Both Patrick and Ursule are UNILU graduates.

Other guests included the representative of the Minister of Higher and University Education, the Provincial Minister of Mines and the Commissioner for the Environment, eminent researchers, professors and mining companies operating in the Haut-Katanga and Lualaba provinces.



'KEY TO STOPPING MINE DEATHS'

Mining companies in South Africa should adopt technologies and solutions that enable mine modernisation to improve safety measures for workers, according to attendees of MineSafe 2021.

A stakeholders' statement from the Minerals Council of South Africa said companies had agreed to adopt technologies that help adopt safety leading practices, such as collision prevention systems, to address "transport-related risks," in pursuit of 'Zero Harm' production.

Additionally, stakeholders agreed to accelerate the adoption of production technologies like faster rock drills to shorten the mining cycle and drilling outside the box cut, which reduces risks to operators.

They will also implement a holistic, risk-phased plan on collision-prevention systems with ecosystems readiness for industry-wide adoption by December 2023.

The Minerals Council of South Africa said the commitments had been made to reduce the number of workers killed in South African mines. It said 69 people have so far been

killed in mines in 2021.

That is up from 48 in 2020 – the second consecutive year deaths have increased – a situation it described as "unacceptable."

"The urgency of interventions to address health and safety and, more specifically, the continued loss of life of the employees in the mining sector cannot be understated," the Minerals Council of South Africa said.

"Work is already underway to address falls of ground and transport-related accidents which are the leading sources of fatalities."

KAMOA COPPER'S GREEN ENERGY FOCUS NOW ON THE INGA II HYDROPOWER PLANT TO POWER KAMOA EXPANSIONS

In August 2021, Kamoakakula's energy company signed an extension of the existing financing agreement with the DRC's state-owned power company SNEL to upgrade turbine 5 at the Inga II hydropower complex. Since June 2021, rehabilitation scoping works and technical visits have been conducted by Stucky Ltd. of Renens, Switzerland, and Voith Hydro of Heidenheim, Germany, a leading engineering group. Voith Hydro, the contractor for the turbine 5 upgrade, has successfully rehabilitated two turbine generators at the adjoining Inga I hydropower plant, a project that was financed by the World Bank.

Turbine 5 is expected to produce 162 MW of renewable hydropower, providing the Kamoakakula Copper Complex and the planned, associated smelter with

abundant, sustainable electricity for future expansions. Early works related to the removal of sand from the area around turbine 5 is nearing completion, which will allow the engineering team to complete the scoping work. Dismantling of turbine 5, starting on the alternator level, has commenced. Basic engineering for the design of a new turbine wheel and runners is ongoing at Voith's Heidenheim offices.

The substation at the Inga II hydropower facility, alongside the Inga River.

Kamoakakula's green energy focus now on the Inga II hydropower plant to power Kamoakakula expansions 2

Kamoakakula and Ivanhoe Mines senior management teams with auditors from international accounting firm PwC at one of the high-grade mining areas at the Kakula Mine.

Kamoakakula's green energy focus now on the Inga II hydropower plant to power Kamoakakula expansions 3

Landscaper Jenny Mutimpa LeDoux working in the gardens at Kamoakakula village.

Kamoakakula's green energy focus now on the Inga II hydropower plant to power Kamoakakula expansions 4

Kona Mumongo Grace, a farmer in the village of Kaponda, and his daughter Tshisola, with tangerine orange tree seedlings for planting at his home. The seedlings were among 3,200 donated by the Kamoakakula Sustainable Livelihoods Program to promote sustainable development in local communities.

Kamoakakula's green energy focus now on the Inga II hydropower plant to power Kamoakakula expansions 5



NEWMONT MINING FORMS NET-ZERO PARTNERSHIP WITH CATERPILLAR

US-based gold producer Newmont Mining has collaborated with mining equipment manufacturer Caterpillar to deliver a zero-emissions mining system to improve safety and productivity in the industry.

The collaboration will contribute to Newmont's greenhouse gas (GHG) emissions reduction targets.

Newmont previously pledged to reduce more than 30% of its GHG emissions by 2030 and achieve net-zero carbon operations by 2050.

The partnership will enable the two firms to validate equipment, infrastructure, technologies and processes that would help transform surface and underground mining operations.

As part of the strategic alliance, Newmont will initially invest \$100m to support the deployment of an all-electric autonomous haulage fleet in two continents.

The gold mining firm plans to deploy up to ten Caterpillar-developed battery-electric zero-emissions underground haul trucks at its Tanami mine in the Northern Territory in Australia by 2026.

Caterpillar will also deliver an automated haulage fleet of up to 16 for deployment at Newmont-operated Cripple Creek and Victor mine in Colorado, US, through 2023.

Newmont president and CEO Tom Palmer said: "A year ago, Newmont announced industry-leading emission reduction targets because we understand the human contribution to climate change.

EV BATTERY COSTS SET TO RISE IN THE YEAR 2022

The cost of batteries for electric vehicles is set to rise in 2022 as supplies of raw materials fail to keep up with rising demand.

Prices for battery-grade lithium carbonate in China jumped this year to a record high of 261,500 yuan (\$41,060) per tonne, more than five times higher than last January.

Other commodities used in cathodes have also been rising.

The cobalt price has doubled since last January to \$70,208 a tonne, while nickel jumped 15% to \$20,045 a tonne.

For the near-term outlook, passenger EV sales are set to more than quadruple to 14 million units in 2025, representing 16% of the global market, according to Bloomberg NEF.

According to S&P Global Market Intelligence, lithium supply is forecast to jump to 636,000 tonnes of lithium carbonate equivalent in 2022, up from an estimated 497,000 in 2021. But demand will jump even higher to 641,000 tonnes, from an estimated 504,000.

"We're entering a sort of new era in terms of lithium pricing over the next few years because the growth will be so strong", Wood Mackenzie research director for battery raw materials Gavin Montgomery said in a note.

"Lithium supply will face a number of vulnerabilities, including geographical concentration at both the mining and refining level, as well as the limited presence of established and large mining players," said Fitch in a recent report.

Cobalt has the potential to extend gains in 2022 after doubling in price in 2021, according to Marubeni Corp., a major Japanese trader.

"Demand is growing at a faster pace than anticipated," said Yoichiro Suga, Marubeni's non-ferrous metals and materials trading general manager.

SANDVIK: THE TECHNOLOGY DRIVING MINING'S ELECTRIFICATION JOURNEY

The 2015 Paris Agreement saw 195 countries commit to making changes to prevent global warming from surpassing 2.0 °C above preindustrial levels, although ideally no more than 1.5 °C above. To meet these goals, all industries are under pressure to adopt new innovations that enable them to reduce their carbon footprint. To date, the mining industry is seen as one sector that has generally been slow to adopt new technology and it remains one of the world's largest carbon emitters.

Swedish engineering company sandvik is spearheading the shift towards using sustainable mining technology and is championing mining electrification. Electrification in mining, if widely adopted by the sector, would help to significantly reduce mining emissions and help the industry achieve Paris Agreement goals.

THE BENEFITS OF MINING ELECTRIFICATION

Electrification of the mining industry is set to be one of the biggest shifts the industry has seen.

For several decades, the mining industry has relied on equipment fueled by diesel and equipment has long been designed with combustion engines, enforcing restrictions on the capabilities of the equipment given the size of these engines.

Mining infrastructure is forced to accommodate these large vehicles that release significant levels of greenhouse gas emissions. As a result, the industry suffers from huge inefficiencies related to the need for tunnel space, which adds to the costs of mining operations.

Switching from diesel-fueled equipment to electric offers the mining industry the chance to reduce its emissions and update

and streamline its processes. Underground mining electrification will likely play a vital role in enhancing mining productivity and reducing costs as well as boosting its sustainability.

Sustainable mining technology will help the industry be more productive while providing a safer environment for staff. Underground mining electrification means that workers would be exposed to less noise and vibration, as well as fewer emissions in the air they breathe.

While making the move from diesel to electric offers a wealth of benefits to the mining industry, it is not a simple switch to make. To take full advantage of the benefits of mining electrification, mining companies must understand that the strategic plan of the mine should be reassessed. Phased implementation, with a flexible design, is vital to integrating electric equipment successfully in a cost-effective way. Electrification offers companies the chance to review their operations and highlight areas of inefficiency to be tackled when converting to electric. As a result, the industry will not only see reductions in emissions but lower overheads, higher productivity, enhanced efficiencies, and improved safety.

THE SUSTAINABLE MINING TECHNOLOGY THAT WILL HELP TO REDUCE MINING EMISSIONS

Engineers at Sandvik have carefully considered the notion that converting from diesel to electric is not just a question of updating current equipment so that it can run on batteries or electric motors. Successful mining electrification requires the rethink of equipment and the infrastructure that supports it.

Sandvik highlights that when it designs

electric mining equipment, it considers everything from how the equipment will work, what its "refueling" requirements will be, and how its needs will require different infrastructure.

Sandvik designs its electric mining equipment from the ground up, making it truly fit for purpose and allowing it to be as beneficial to sustainability and efficiency as possible.

To overcome the new challenge that electrification brings – recharging, Sandvik designed swappable batteries for its equipment that can be changed in a quick and easy way without high demands for new infrastructure.

The operator takes the equipment to the battery swapping bay where the depleted battery can be dropped out and a fully charged one can be picked up. A process that takes mere minutes and requires no extra equipment or specific heavy infrastructure. Sandvik's electrified mining equipment was showcased at the 2021 MINExpo International®, where its new battery-electric truck, Sandvik TH550B, was launched.

The future of mining is electric, and companies such as Sandvik will be fundamental to facilitating the change from diesel to electric. The company's innovative equipment solutions offer an easy way to adopt sustainable mining technology that will help the industry drastically cut its carbon emissions and play its part in helping the world meet the goals of the Paris Agreement.

Over the next few years, it is likely that we will see more mining operations adopt electric equipment, ushering in a new era in mining.



SOLID-STATE BATTERIES PROMISE ELECTRIC CAR POPULARITY BOOST, BUT TECHNICAL MOUNTAINS AWAIT

Solid-state battery technology should be the knight in shining armor for the electric car revolution, as it steps in to slash the cost of batteries and make living with a plug-in car just like an internal combustion engine (ICE) only better.

The trouble is, the timetable for adoption keeps slipping and a mass market-ready product isn't likely this decade, allowing time for other solutions like fuel cells to make up lost ground.

Solid-state batteries promise fast, ubiquitous charging, and enough power to outrun ICE cars not just in the city, but on the fast lane of highways too on the long-distance race to the summer sun.

Solid-state batteries are a work in progress at the moment and the date for a possible triumphant debut recedes as one problem is solved only to unearth another in a kind of high-tech whack-a-mole game. From an expected imminent

debut, the introduction date for mass markets has receded well past 2030 for many analysts, and this spells trouble for electric cars because they must be truly affordable by then for average wage earners. After all, by 2030 countries like Britain will have banned the sale of new gasoline and diesel cars, and big manufacturing countries like Germany, France and Italy may well join them, although Germany's new coalition has held off for now. If there are no new electric cars costing as much as the cheapest ICE ones – say €10,000 (\$11,200) – by 2030, a huge number of people will be excluded from the market causing them much angst as they wait for the bus. Manufacturers won't be happy either as their sales are decimated.

Meanwhile, IHS Markit INFO expects European Union battery electric cars to hit 50% of sales by 2030. In the U.S. the target is 50% of sales to be either all-electric, plug-in hybrid or fuel cells by 2030.



GREEN TRAINS ON THEIR WAY TO POWER ONE OF THE WORLD'S MOST ABUNDANT MINING REGIONS

A global mining organisation and an Australian rail operator will attempt to build greener freight solutions to service one of the most resource-rich regions in the world.

Australian rail company Aurizon has partnered with British mining giant Anglo American to replace diesel trains with hydrogen in the North West Minerals Province in Queensland.

The region is home to several mines and is internationally renowned for its abundance of copper, zinc, lead, silver, cobalt, nickel, and vanadium — the demand for which is increasing alongside global renewable energy efforts.

The two organisations have launched a feasibility study to look at implementing the hydrogen technology on Aurizon's Mount Isa rail corridor, which operates between the North West Minerals Province and Townsville, as well as the Moura rail corridor between Anglo American's Dawson mine and Gladstone.

SHIFTING TO CLEANER FREIGHT

Rail freight produces 16 times less carbon pollution than road freight, according to peak rail body the Australasian Railway Association.

A 1 per cent shift of freight from road to rail in Australia would reduce accident, emission, and health costs by \$71.9 million per year, the association estimated.

Aurizon has partnered with Anglo American to study how to implement hydrogen fuel on freight trains.

"Hydrogen is a gas and it can be used as a fuel source. The neat thing about hydrogen is that you can make it from renewable energy, from renewable electricity," the managing director and chief executive of Aurizon, Andrew Harding, said.

"That's why it's got so much attraction for use in projects that are designed to lower carbon emissions.

"The date Australia has chosen for net zero is 2050 and Aurizon commits to that.

"Hydrogen offers enormous opportunity in decarbonising and continuing to improve the competitiveness of Australia's export supply chains.

"So, to make that happen we've got to now start implementing and testing quite a range of different technologies, and this is one of those.

The chief executive of Anglo American in Australia, Tyler Mitchelson, believes the collaboration with Aurizon is a great example of the power of partnerships to help address the urgent issue of climate change

"Displacing our use of diesel is critical to eliminating emissions at our sites and along our value chain," he said.

BUILDING FROM THE GROUND UP

While hydrogen fuel is being trialled on haul trucks in Anglo American's South African coal mine, the company's technology is yet to be applied to freight trains.

"This is all new technology that's not available off the shelf. So, you actually have to build your hydrogen fuel cell; you have to build the battery pack that would go with it," Mr Harding said.

The system combines hydrogen a fuel cell with battery hybrid power units.

"Then you have to strip out the diesel system from the locomotive and replace it with your battery equivalent."

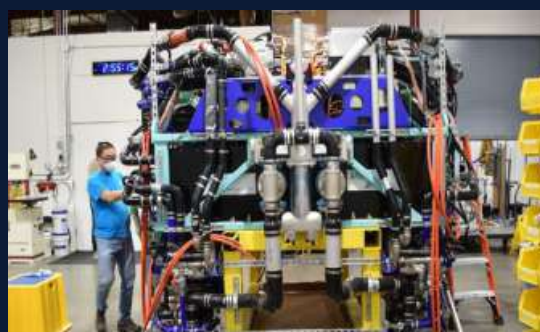
Aurizon had set aside at least \$50 million to spend on projects that help transition the company to net zero by 2050, Mr Harding said.



The Aurizon north-west rail corridor.



A long freight train in Australian countryside



Low angle hydrogen system

FIRST QUANTUM MINERALS TO APPOINT TRISTAN PASCALL AS NEXT CEO



First Quantum Minerals Ltd. ("First Quantum" or the "Company") (TSX:FM) today announced that the Board of Directors will appoint Tristan Pascall, currently the Company's Chief Operating Officer (COO), to the role of Chief Executive Officer (CEO). The appointment will take effect at the Annual General Meeting (AGM) to be held in early May 2022, at which time Philip Pascall, the Company's current Chairman and CEO, will retire from the CEO role and will continue to serve as Chairman of the Board. The Company will nominate Tristan Pascall for election as a director at the AGM.

The appointment of Tristan Pascall represents the culmination of a succession planning process led by independent directors on the Board's Nominating and Governance Committee, comprised of Robert Harding, Andrew Adams and Kathleen Hogenson. The Committee engaged Egon Zehnder, a leading executive recruitment firm, to assist them in the process. The search focused on identifying outstanding leaders with substantial mining experience and included both internal candidates and a worldwide external search. Following a thorough evaluation, the Committee determined that Tristan Pascall was the best candidate and submitted its recommendation to the Board of Directors, which voted unanimously to approve the recommendation. In his current role of Chairman and CEO, Philip Pascall abstained from voting.

"After a thorough search process, we are very pleased to appoint Tristan Pascall as First Quantum's next Chief Executive Officer. Tristan has demonstrated impressive leadership in his current role as COO as he navigated the successful ramp-up of our largest asset through the challenging

environment presented by the global pandemic. Tristan's previous hands-on leadership experience of eight years in Zambia and four years in Panama has given him a deep knowledge of our assets, operating teams and local partners. His practical, on-the-ground experience with our people and projects, combined with lessons learned from the countries where we operate, embodies the Company's culture and makes Tristan the right leader for First Quantum," said Robert Harding, Chair of the Nominating and Governance Committee and Lead Independent Director. "We believe Tristan's combination of operational, strategic and capital markets experience, as well as the strong stakeholder relationships he has developed, are fundamental to the continuity of our unique core capabilities, namely industry-leading project execution and operational excellence."

Tristan Pascall joined First Quantum in 2007 and held progressively senior operational roles in Africa and Latin America until 2020 when he served as Director of Strategy and later became Chief Operating Officer in January 2021. Prior to assuming his executive leadership roles, Tristan was a key member of the teams that delivered on several major greenfield and expansion mining projects which now collectively represent most of the Company's net asset value. His responsibilities from 2009 to 2015 included the initial development, construction and operating the Sentinel mine in Zambia. Starting in 2015, Tristan led the development of the Cobre Panama mine, now the Company's largest copper mine with the world's largest single-throughput copper concentrator plant, and built the operations team which now stands at more than 5,000 people. Prior to joining First Quantum, Tristan spent eight years in corporate finance and investment banking

with a focus on resources and heavy industry in Australia, Europe and Asia. Tristan graduated from the University of Western Australia with a Bachelor of Engineering (Honors) and Bachelor of Commerce and completed an MBA at INSEAD.

"I am very excited to continue to build upon the momentum we have established at First Quantum. It is deeply humbling to be selected to lead such a highly talented team, all of whom have contributed to establishing a unique entrepreneurial culture," said Tristan Pascall. "As we enter our next stage of growth, I look forward to building on First Quantum's accomplishments of the past two decades."

Philip Pascall co-founded First Quantum Minerals in 1996 and has served as its CEO and Chairman ever since. He retires as one of the longest-serving CEOs among the world's major mining companies. Over the course of his stewardship, the Company has grown from the construction of the Bwana Mkubwa project in Zambia designed for 10,000 tonnes a year of copper production, to become the world's sixth largest copper producer. First Quantum has operations on five continents, employing more than 20,000 people and producing over 800,000 tonnes of copper annually.

"On behalf of the entire company, I would like to thank Philip for his extraordinary leadership. Over the span of a quarter century as CEO, Philip has demonstrated a capacity to solve problems others could not and to bring unique solutions to complex project issues," said Mr. Harding. "The Board believes his ongoing involvement as Chairman will be a significant competitive advantage and form a uniquely complementary combination with Tristan's hands-on, collaborative leadership style."

OCCUPATIONAL SAFETY &
HEALTH
MANAGEMENT

ISO 45001:2018

ENVIRONMENTAL
MANAGEMENT

ISO 14001:2015

QUALITY
MANAGEMENT

ISO 9001:2015



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We have **virtual training, online training and online audits** besides our normal onsite solutions to enable you reach your organisation targets, cost effectively. Our training covers **awareness, implementation and internal auditor training** for **Environmental Management System (ISO 14001:2015), Occupational Safety & Health Management System (ISO 45001:2018), Quality Management System (ISO 9001:2015), Integrated Management System (IMS)** among many other standards and courses.

Online Training, Virtual Training & Online Audits

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