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ENGINEERING AND MINING JOURNAL®

GBR
GLOBAL BUSINESS REPORTS

Mining in West Africa, Copperbelt and Angola

Driven by strong demand for gold and battery metals

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This report was researched and prepared by Global Business Reports (www.gbreports.com) for Engineering & Mining Journal.

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Cover photo: Process plant at Wahgnion, Burkina Faso. Courtesy of Teranga Gold Corp.

A REPORT BY GBR FOR E&MJ

MARCH 2021

Rich, yet underexplored, gold endowment

West African mining, stronger despite all

Mining site at night, Ivory Coast. Photo courtesy of Roxgold.

West African mining is enjoying a strong start to 2021. A younger and fitter population profile, but also the experience of dealing with epidemics like Ebola, have helped West African countries to minimize the impact of Covid-19. While some of their international peers stagnated for months, producers and juniors in the West African mining space have not only continued operations but accelerated activities in order to make the most of the boom in the price of gold.

The Birimian Greenstone belt, a gold-bearing geological structure, stretches across Ivory Coast, Ghana, Burkina Faso, Guinea and the Mali-Senegal border, forming two main parallel trends: the Houndé belt and the Boromo belt, as well as smaller anomalous structures such as the Hire Belt in Ivory Coast, the Sebba belt in Burkina Faso, the Siguiri basin in Guinea and the Sefwi-Bibiani and Ashanti belts in Ghana.

In the past 10 years, there have been 79 million oz discovered in the region, and US$5 billion spent. Nevertheless, these highly prospective grounds remain broadly underexplored. Countries like Burkina Faso and Ivory Coast, which make up 60% of the Greenstone belt, account for only 35% of discoveries made in this region. These vastly untapped lands spark the imagination of those seeking the next elephant gold discovery. With the spot price for gold averaging at US$ 1,769 for 2020, that multi-million oz deposit may not be too far away.

The price upturn is set to manifest itself differently in each of the gold-focused nations: With little exploration underway, but a solid production sector, Ghana is more likely to see its majors take greater risks to ramp up production. By contrast, younger mining jurisdictions like Ivory Coast will be better positioned to advance exploration projects.

West Africa has been the home of many company-making assets, including (former) Randgold's Morila mine, IAMGOLD's Sadiola, and B2Gold's Fekola, all in Mali. Similarly, in Ghana, AngloGold Ashanti's Obuasi and Iduapriem mines, Newmont's Aykem, and Gold Field's flagship Tarkwa represent tier-one assets that brought success to some of the most profitable gold producers in the world. Their stories have encouraged waves of exploration in the region, juniors following the "neurologies" or so-called "closelogies" formed by the positioning of these world-class discoveries.

Typical of West Africa is that juniors, developers and majors alike tend to build diverse asset portfolios in different jurisdictions, and sometimes in different minerals too. The region enjoys good levels of regional integration, with regulatory frameworks that often compete against each other, but also copy each other. Through the ECOWAS membership, the adherence to the ODAHA

Sébastien de Montessus, CEO, Endeavour Mining Corp.

treaty, and the African Continental Free Trade Area Agreement (AfCFTA) which is currently in progress, West African countries subscribe to similar rules, which is something that service providers have long leveraged to grow their business.

More and more, developers and producers take advantage of the cross-borders to de-risk their value proposition. The multi-jurisdictional focus is both an optionality that West Africa offers, as well as a necessity in a region where the political situation in one country can rapidly change. Illustrating this principle, Endeavour Mining operates three mines in Burkina Faso (Houndé, Mana, Karma and Boungou) and two in Ivory Coast (Ity and Agbaou), together with development and exploration across the Birimian belt. CEO Sébastien de Montessus explained this diversification is central to Endeavour's strategy: "Our focus on West Africa is a big part of why we're able to maintain a diverse and active portfolio with a lot of growth, optionality and exploration."

Also, IAMGOLD runs the Essakane mine in Burkina Faso and has an exploration pipeline that combines the Senegalese Boto project with the Malian Diakha Siribaya, but CEO Gordon Stothart speaks of going a step further by integrating assets within three jurisdictions, Senegal, Mali and Guinea, under the Bambouk complex now under development.

Reflecting on current demand for gold, Stothart expects the next five to six years to witness intense M&A activity: "Because many players have exhausted their high-grade resources, I suspect a market reaction when producers start shutting down operations and supply drops."

Under normal circumstances, a big rise in commodity prices would drive M&A transactions and a stronger appetite for consolidations, yet travel restrictions have slowed these from concretizing. The first transactions, however, indicate a trend towards asset-optimization. A noteworthy example is the US$2 billion acquisition of Teranga Gold by Endeavour Mining. Endeavour had already taken the title of West Africa's biggest miner after acquiring Semafo earlier in July 2020.

On the back of returning investor confidence, juniors have seen major re-ratings and their capital placements heavily oversubscribed. With an injection of both capital and enthusiasm, West Africa is perfectly suited to deliver the asset pipeline to respond to the new demand for gold in time to make the most of the current market. Besides low discovery costs, the turnaround times from discovery to production are very short. In only five years, Roxgold went from first drill hole to first pour at its Yaramoko mine in Burkina Faso. "Roxgold is a very different company to the one we were 12-18 months ago, having branched out from a single asset miner into multiple jurisdictions. We are well on the path to becoming a multi-asset producer, as we expect to more than double our production and cash flow within the next two years without the need to issue any shares," commented Roxgold CEO John Dorward.

Moreover, West Africa holds opportunities in other metals: Trevali is operating one of the only zinc-lead assets in Burkina Faso, the Perkoa mine: "Perkoa demonstrates that base metals can be found in the area. I believe more base metal mines will be active in the region in the coming decades, and we hope to be part of creating that opportunity in the country," said Ricus Grimbeek, president and CEO of Trevali Mining.

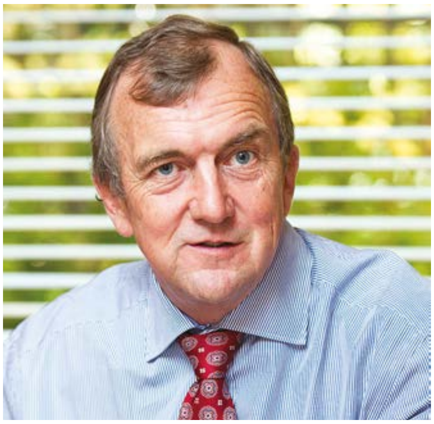
In the battery space, Iron Ridge Resources made the first lithium discovery in Ghana, defining a maiden resource of 14.5 million mt, running at 1.3 lithium oxide. The company has a lithium-gold combined portfolio and has recently been leaning more towards the latter commodity through the development of its flagship Zaranou gold project in Ivory Coast, expected to hold in excess of 10 million oz. Vincent Mascolo, the CEO of Iron Ridge Resources, explained the principle behind its different jurisdictions/different metals strategy: "The rationale behind it is quite simple: we seek to immunize our business against commodity cycles and external forces beyond our control. Two years ago, we were primarily valued on our lithium project, but this market later declined."

Gordon Stothart, President and CEO, IAMGOLD Corp.

The social license

Despite the contribution of mining to national GDPs, local employment, FDI, and its impact on generating related businesses, the question of whether the benefits of mining outweigh its negative impacts is regarded with some doubt. Acknowledging this predicament, the industry is now more unhesitant and outspoken about its goal: to prove that mining can be sustainable.


Will Coetzer, Managing Partner, Stratum International.


Mark Bristow, President and CEO, Barrick Gold.


Todd Burns, President, Cypher Environmental.

During the difficult months of the pandemic, mining companies showed immediate support to host governments in West Africa. Barrick donated US$1.5 million to the Malian government; IAMGOLD donated over US$1 million across Senegal, Burkina Faso, Mali and Guinea; while Endeavour gave over CA$6 million to help the region combat the pandemic, and these are only a few examples.

Beyond the pandemic, the mining industry has a broader socio-economic impact by supporting infrastructure development, and creating jobs and business opportunities for related services. In Burkina Faso, more than 14,000 people are directly employed in mining, and there are 1,000 supporting businesses related to mining activity. Most companies in the region hire over 90% of their employees locally. However, Will Coetzer, managing partner of Stratum International, believes West Africa may face a great challenge in attracting the workforce it needs: "Some people were stranded for months onsite in West Africa, making significant personal sacrifices during the pandemic. When the situation stabilizes, I expect they may reassess their risk-taking. (…) West Africa is a very expat-driven, fly-in, fly-out market, with no readily self-sufficient labor."

Mark Bristow, president and CEO of Barrick Gold, shared with GBR his holistic vision for ESG: "Poverty remains one of the greatest challenges facing the world today and, in Africa, gold miners can make a significant contribution towards the economic development of their host countries (…) This should go well beyond the payment of taxes and royalties and the creation of employment."

Environmental concerns are also becoming more central in light of the pandemic. The current crisis has brought closer to home the potential imminence of other crises, be they natural or man-made. For miners, ESG and safety requirements have consistently become more comprehensive; the challenge is to implement these evenly across the world. On a corporate level, players across the value chain integrate ESG into their business plan; Cypher Environmental, a fast-growing environmental solutions company from Canada, donates 12% of profits to charities and allocates 5% of the value of a mining contract to investment in local communities: "Our ESG policy stems from a desire to make the world a better place, not just through addressing environmental problems, but also by becoming a trendsetter and encourage other companies to give back," explained Todd Burns, Cypher's president.

The investment sector is the final contributor in driving sustainable development and this also has heralded a preference for projects with strong ESG mandates. The African Finance Corporation (AFC) is looking at projects from an ecosystem-creation perspective, together with its potential for downstream beneficiation. Osam Iyahen, senior director natural resources of AFC, said: "We invest in associated infrastructure for an asset, such as building a power station for a mine, and we believe this paves the right investment model Africa needs: No longer focused on individual investments, but on creating ecosystems around an asset."

Production and Exploration

Golden times for the production sector?

In West Africa, there are over 40 operating gold mines, many controlled by some of the world's largest mining companies, including Newmont, Barrick, B2Gold, Endeavour, AngloGold Ashanti, Nordgold, as well as mid-tier producers like Kinross, IAMGOLD, Gold Fields, Resolute, Golden Star, and Teranga Gold. The region's underexplored mineralization lends itself to mostly open-pit, near-surface, and thus cheap operations; most producers operate under an AISC of US$1,000/oz.

Years of controlling expenses are now paying off handsomely as those who looked after costs are reaping the benefits of high margins. This is also an opportune time to plan for the future. Hicham Aziz, country manager for CAT equipment distributor Saudequip in Senegal, commented: "Mining companies have handled the crisis very well, with gold producers ramping up production to take advantage of the bull market."

Time to build the pipeline for the future

Toronto-based Teranga Gold, one of the top performers on the TSX with mines in Senegal and Burkina Faso, dealt with a dilemma back in 2015 when its Sabodala mine in Senegal was maturing. Teranga's executive board pondered whether they should return money to shareholders or reinvest in the business, opting eventually for the latter. Teranga bought Gryphon Minerals in 2016, taking possession of two assets in Burkina Faso: the Wahgnion mine, which poured its first gold in 2019, and Golden Hill, an advanced exploration, grassroots discovery. "The board's decision was based on a view that the sector had underinvested during the bull market and that, ultimately, grades and production will decline," explained Richard Young, president and CEO of Teranga Gold.


Richard Young, President and CEO, Teranga Gold.

As the cash from Q2 and Q3 this year begins to reflect on their balance sheets, producers face the same question that Teranga had five years ago: how to best take advantage of current market conditions? Strong gold fundamentals and solid cash flows allow producers the opportunity not only to pay off debts, but also to cut lower grades, expand their exploration budgets, and increase their pipelines, whether through organic or inorganic growth.

The matter of building a future pipeline is the most urgent. In the last six years, mining activity has continued, but exploration slowed down. As more gold was being extracted, fewer deposits were being discovered. In West Africa, the region's landmark mines, including Morila and Obuasi, are reaching the bottom end of their existing resources, and even producing mines such as Gold Field's Tarkwa or IAMGOLD's Essakane mine have between 10 to 15 years of LOM.

For the first time in 15 years, Gold Fields managed to replace the depleting reserves at its low-grade, high volume Tarkwa flagship mine in Ghana, which produces over 500,000 oz/year: "I believe we did not offer Tarkwa its fair chance for exploration, and so we have now changed strategy and launched an aggressive and ample exploration program," said Alfred Baku, executive VP and head of West Africa, Gold Fields.

The industry trend has been to focus on advanced-stage assets or exploration around the main mines, while budgets for greenfield exploration have halved over the past three decades. Recently though, the world's largest producers have shown more predilection towards developing their exploration portfolios: "With its refocus on geology as a core discipline, Barrick's exploration programs span the continent's main gold belts, where it is hunting for new

Tier One assets as well as for additional reserves to extend the lives of its existing mines," Mark Bristow, president and CEO of Barrick Gold, told GBR.

Similarly, Teranga Gold has two contesting development projects that could turn into a third producing mine, the Golden Hill and the Afema, and has grown its annual production from 245,000 oz in 2018 to a projected 400,000 oz for this year. Exploration is also key at Endeavour Mining, which has one of the largest exploration portfolios in West Africa and discovered 8.4 million oz since 2016. After acquiring Exore Resources, ASX-listed Perseus came in the possession of 2,000 km^2 of land around its Sissingue mill in Ivory Coast, and the company will now pursue organic growth.

One hyped-up transaction is the ongoing battle for the takeover of ASX-listed Cardinal Resources, which has seen subsequent price increases in counter-offers by the two bidders: Russian producer Nordgold and Chinese competitor Shandong Gold. In a less mediatized transaction, Future Global Resources is acquiring a 90% stake in Bogoso-Prestea gold mine, also in Ghana, for US$95 million. Other lower-scale consolidations are represented by Hummingbird Resources buying Cassidy Gold Guinea for US$12.67 million, for a deposit of 1.1 million oz, grading 2.1 g/mt.

Growing momentum in the Junior space

Since 2013, the junior space has suffered wavering investment appetite. Through this period, juniors have decreased aggregate budgets by 10% year on year, according to S&P Market Intelligence's recent data.

Gold explorers in Africa trade at lower rates compared to their Australian and Canadian peers due to the political risks associated with the jurisdictions of operation. The median valuation for African gold projects is at US$18.87/oz, Australian juniors at US$44.74/oz and Canadians at US$29.81/oz, based on the Gold Junior Index. Undervalued, African-focused explorers have had a tougher job raising money in the cash-tight climate of the past decade, during which, only 25 major gold deposits were discovered. Nevertheless, more than 35% of all gold discoveries of the last 10 years were made in Africa. The undeniable resource potential is offsetting investors' and developers' risk aversion.

Moreover, discovery costs can be very low in West Africa, as junior explorer Tietto Minerals proved at its Abujar gold project in Ivory Coast, where it has been running intense drilling campaigns at record low costs of US$35 /m, while some Canadian explorers pay around US$150 /m.

Tietto also expects easy metallurgy: based on this year's met tests, the ore identified is soft and easy to process with recovery rates of between 96% to 98%. Based on these credentials, Tietto Minerals has seen its price share rise from AU$0.14 in March 2020 to a peak of AU$0.70 in July 2020, before coming down to AU$0.31 again in February this year. It remains one of the best valued companies in the region, and for good reasons: The Abujar gold project showcases a 3.02 million oz resource at 1.2 g/mt, following a consecutive third upward resource update. What excites the market is that Tietto has only drilled 10% of a land area of 1,114 km^2 of the main licence, and continues to show huge upside potential, so further resource growth will be the focus of its current 70,000 m drilling program.

When the soaring investment appetite for long-term value is met with short-term supply, explorers become essential players in closing this gap. Mike Brown, CEO for junior company Chesser Resources, expects to see a rush to assets in the short-term: "There is a scarcity of quality assets out there and so majors and mid-tiers will need a pipeline of projects to scale up resources," he told GBR.

Refilling budgets

Many West African juniors have seen massive re-evaluations, especially in Q3 2020, on the back of an encouraging news-flow of recent discoveries: In Guinea, Predictive Discovery showcased its Bankan asset, expected to be in excess of 2 million oz. One of the largest tenure holders in Burkina Faso, West African Resources defined a high-grade, 1 million oz resource at M1 South Shoot, while Chesser Resources is returning spectacular drilling results at its flagship Diamba Sud in Senegal.

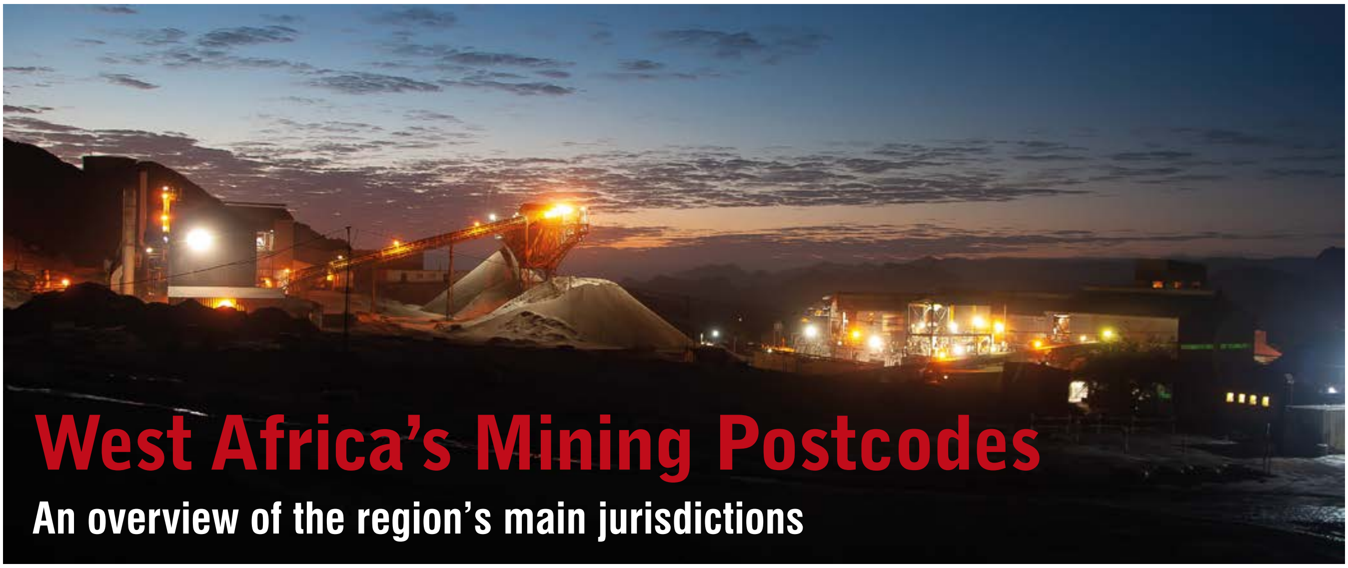
Completing one of the biggest capital placements, Tietto Minerals managed to raise AU$56 million, which will fund the PFS, DFS and start moving the Abujar project towards construction. “The market has started to realize the value of our existing resource. We have been granted the mining license and we are now working on the mining convention,” CEO Caigen Wang told GBR.


Caigen Wang, CEO, Tietto Minerals.

To a smaller degree, Mako Gold, selected among the five best precious metals companies in Africa to watch in 2020 by the Investing in African Mining Indaba, recently raised US$10 million in a heavily oversubscribed placement to advance its Napié project in Ivory Coast, for which it hopes to have a maiden resource for Q1 2021. Mako Gold actually completed two financing rounds, one in May and a second tranche in July, a decision which Peter Ledwidge, managing director, explained: “Some people were surprised by our subsequent AU$10 million raising happening so quickly, but the logic behind this was that it is better to cash up now, not knowing how long the bull market will last.”

Making the most of a friendlier investment climate, many juniors have gone to the markets over the summer and autumn of 2020 and found their placements oversubscribed. TSX-listed Roscan Gold closed a CA$7.5 million financing, topped up by additional investment from Warrants Exercise of another CA$3.3 million in July. Another Canadian junior, Newcore Gold, went to the market with an initial capital raising of US$10 million to fund their exploration campaign at the Enchi gold project in Ghana, but ended up cashing US$15 million after seeing its placement oversubscribed. Besides financing another 50,000 m of drilling, the raise also led to a diversification of Newcore’s investment base, already 39% management owned, to more institutional investors.

This summer, the African Gold Group (AGG) closed an oversubscribed capital raise at US$11.1 million within two weeks, also bringing in institutional investors. However, the company sits at the lower end of valuations in the region, despite its attractive near-term project with a published DFS. Its Kobada gold mine in Mali has an AISC of US$782/oz, which is in the lower cost quartile in the West African space, together with a 100,000 oz/y production following an increase in reserves from 500,000 oz to 755,000 oz. “African Gold Group remains very undervalued compared to our peers. As a near development operating gold producer, we are running at a market cap probably three to four times lower than our peers who are not even at the same stage as we are. I believe there is a massive opportunity in terms of investment upside,” CEO Danny Callow said to GBR.



West Africa's Mining Postcodes

An overview of the region's main jurisdictions

Rosh Pinah Mine, Namibia. Photo courtesy of Trevali.

West Africa is known as a high-risk, high-opportunity mining destination, and this profile has attracted a particular crowd of unwavering juniors, miners and investors. If producers have declared that they intend to stay cautious through the market upturn, juniors have been higher-risk takers, moving forward aggressively and flirting with shifting investors' preferences between different countries.

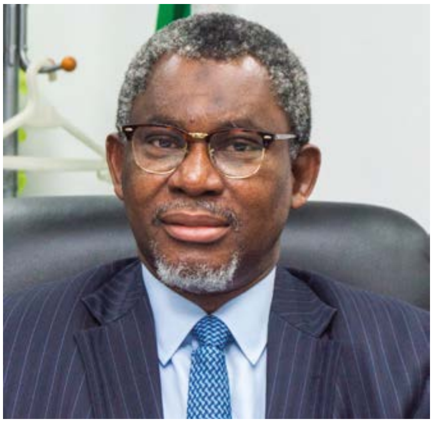
Although the Birimian belt stretches across multiple countries, these receive uneven investment attention. An attractive fiscal code, political stability and access to infrastructure play strongly into the choice. While the previous cycle favored Burkina Faso and Mali, this time around Ivory Coast is the rising star in the region. Security is a key differentiator in turning the tables. The coup to remove Ibrahim Boubacar Keïta in Mali has been the most prominent issue since August 2020, but the violence in the Sahel region has spread outside of Mali, and Burkina Faso is now the epicentre of the troubles. Meanwhile, West Africa's darling for gold production, Ghana, has been losing its appeal in terms of exploration funding. Simon Meadows Smith, managing director of SEMS Exploration Services, a consultancy and exploration services company based in Ghana, believes this is due to a lack of recent activity on the exploration front: "Ghana has suffered from a perception issue. It is seen as a well-trodden jurisdiction, surrounded by countries with easier and better opportunities. That perception is wrong; there are fabulous opportunities in Ghana, but the lack of a news flow has not encouraged investors."

By contrast, Senegal has become an attractive alternative by virtue of its reputation for stability. Nigeria is also promoting itself as the newest postcode for mining in Africa.

Ghana: Greenfield exploration needed to rejuvenate the mature market

The continent's largest gold producer after dethroning South Africa in 2018, Ghana remains the sub-region's prime-rated jurisdiction. Yet the country's maturity in gold production is also read as a downside; Ghana's prospectivity at surface is reduced considering the extensive drilling in the country, while its metallurgy is becoming more challenging and deposits are found at greater depths.

Ghana's faltering reputation for exploration was caused by a dearth of major discoveries in the last five years. With the exception of Cardinal Resources and Azumah Resources, there are a few greenfield projects underway. The country's stringent fiscal environment, compared to other "younger" jurisdictions, has not helped to attract new exploration. At the Ghana Chamber of Mines, president Sulemanu Koney has been advocating for junior-friendly policies, such as scraping VAT for services like assaying and drilling services, which are often outsourced, to make up for the high-risk nature of exploration and the urgent need to replenish the country's project pipeline: "We should create an environment in which mining companies can expand proactively and not wait for a pandemic to realize the importance of the gold sector," he said.


Arc. Olamilekan Adegbite, Ministry of Mines, Nigeria.

Ghana is often the trend-setter for regulation, having already triggered a movement towards more comprehensive local content policies. This year, the country is also revising its GIPC (Ghana Investment Promotion Centre) Act, raising the minimum requirement for foreign investment. Ivan Doku, principal resource geologist and country manager-designate at SRK Consulting, reassured that Ghana will remain a top investment destination in the long-run: "Investment decisions about exploration are based on a long-term view of the market. A host country's national policy framework on mining underpins decision-making – and the importance of political stability cannot be overstated."

The high gold prices in a jurisdiction producing 142.4 mt/y of gold have alerted some analysts that governments may increase taxation in a trend of 'resource nationalism.' George Kwatia, partner at PwC Ghana, is adamant the administration will remain mining-friendly: "The mining industry has been a staple of Ghana's history for centuries, and it remains the bedrock of our investment profile."

Mali and Burkina Faso: High prospectivity shadowed by security risks in the Sahel

On the podium of the top five largest gold producing countries in the region, Mali and Burkina Faso, both producing around 61 mt/y, cannot arouse much investment appetite due to security challenges on the ground. Intensified armed violence in Burkina Faso and the Malian coup of August 2020 are hallmarks of chronic insecurity in the Sahel region. Already experienced in mitigating such challenges, the production sector has been weathering the situation, but the exploration sector is struggling.

Gold production jumped to a high of 2.5 million oz/y last year, a volume which reflects the robustness of a sector made up of companies like Barrick, Endeavour, IAMGOLD, B2Gold, AngloGold Ashanti, and Resolute, all operating in either one or both of the countries. For Malian explorers who require lesser traffic of goods and capital, the political stalemate did not interrupt drilling, but they were more susceptible to price volatility. Roscan, a junior developer, saw its share price drop from CA$0.47 to CA$0.38 on the day of the coup. The destabilization in share prices reverberated to operators across the border in Burkina Faso: West African Resources share price decreased by 6.9% after the coup.

Junior explorers are less prepared to invest in security protocols, so that in Burkina Faso there are no sizeable explorers, and greenfield exploration will die out if the violence does not cease or the government does not intervene. In Mali, however, the junior space is more diverse, occupied by companies like African Gold Group, Roscan, Cora Gold, Firefinch and Compass Gold. Launched in 2017 by some of the former founders of IAMGOLD, Compass Gold took one of the last parcels of exploration land in Mali, a package of 1,000 km^2.

Nigeria: The newest frontier

"If Thor's Segilola mine was located anywhere else in the world, it would have been developed 10 or 15 years ago, but the current postcode prevented the asset from being developed," said Osam Iyahen, senior director of natural resources at the Africa Finance Corporation.

Developed by TSX-listed Thor Explorations, Segiola is Nigeria's most advanced gold project and Nigeria's attesting proof that the country could be the next mining destination. Today, mining contributes 0.6% to the national GDP, but the country is looking to increase this figure to 5% by 2025.

The current administration set aside US$80 million for exploration studies and current survey data has identified 44 minerals in the country. Nigeria is offering generous incentives, such as a three-years tax holiday for explorers, 100% allowance on foreign capital, and duty-free shipments on mining equipment. On the other hand, it has also enshrined a Community Development Agreement (CDA) in its regulation, while driving forward a downstream policy to reduce imports. In the downstream sector, the industry is already showing great resourcefulness. Kogi Iron, an Australian listed company, made a successful iron ore discovery at Agbaja, but has decided since to integrate the ore deposit into a steel producing facility, the first of its kind in the country.

The oil industry has nurtured the development of a robust infrastructure, as well as a competitive services sector, which are important assets for the mining industry. Nigeria's Mining Minister Arc. Olamilekan Adegbite said Nigeria has another winning quality: "If mining costs in well-established jurisdictions can amount to about US$270/oz, in Nigeria this number goes as low as US$80/oz. I truly believe Nigeria is the next frontier for mining:"

Senegal: Reclaiming attention to a prolific border

The Senegal-Mali-Shear-Zone (SMSZ) is scattered with world-class mines, including Sabodala and Massawa, Fekola, Luolo-Gounkoto, Sadiola, and Yatela on both sides of its border. Their analogous geologies mean that the two competing neighbours are judged by investors based on their perceived sovereign risk. The stark contrast between Senegal's reputed stability and its neighbour's instability plays to the advantage of Senegal.

Resolute Mining, for example, has been expanding its foothold in Senegal through the takeover of Toro Gold last year, which adds to Resolute's greenfield Mako gold mine in eastern Senegal. Another recent transaction was the acquisition of the Massawa mine by Teranga Gold, now merged with Endeavour.

New exploration targets confirm the mineralization across the identified trends. Chesser Resources is developing Diamba Sud, 7 km to the east of Barrick's Luolo-Guonkoto. Oriole Resources is developing its Senala project (former Delefin license), west of IAMGOLD's 2.5 million-ounce Boto gold project. IAMGOLD already signed an US$8 million agreement to obtain up to 70% ownership of Senala.

Senegal has been going through a profound economic transformation, accelerated since 2014 through the government's Plan Sénégal Emergent (PSE), a US$20 billion investment pushed by President Macky Sall to catapult economic development. Mining is a big part of Senegal's growth strategy. The New Mining Code of 2016 increased social, environmental and fiscal obligations for mining titleholders, including requiring contributions to a local development fund.

Ivory Coast: The up-and-coming jurisdiction that has investors excited

Ivory Coast's rich terrain, blessed with the largest share of the famed Birimian Greenstone belt, was broadly inaccessible to miners prior to 2012, when a gruelling military crisis that had lasted a decade finally ended. Since when, Ivory Coast has become one of the fastest-growing economies in the world.

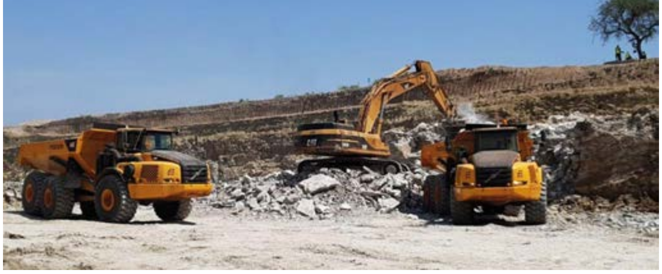
Ivory Coast reached record gold production last year, boosting its annual output by 35% after Persues's Sissingué mine came into production. On the exploration side, the country has not ceased to reward juniors with impressive finds: Tietto Minerals, one of the first entering the country in 2014, is developing a deposit of at least 3.01 million oz. Iron Ridge Resources came later to the country, but it quickly became one of the largest tenure holders.

Mako Gold's JV project with Perseus, the Napié project, also shows the characteristics of a large deposit, believed to be in the range of 2 to 3 million oz by the managing director, Peter Ledwidge. Meanwhile, Roxgold's Séguéla, currently at 900,000 oz of resource in the preliminary study, has chances to turn into a multi-million oz mine.

Combining the great geographical positioning of countries like Ghana with the untapped mineral resources of Burkina Faso or Mali, and with a transparent online available cadastre system and a growing services sector prepared for the influx of new investors, Ivory Coast is unrivalled in terms of its opportunities. The outcome of recent elections re-opened questions over the country's stability, as well as causing delays to permit applications in the short term, but the country remains well positioned for future growth.

Service and Equipment Providers

Covid-19, a litmus test



Overburden removal. Photo courtesy of PW Nigeria.

While mining companies were deemed essential businesses and largely continued operations through the pandemic, the providers sector was cruelly divided into two categories: indispensable and dispensable. On the one end, logistics companies became critical in ensuring supply chain continuity, but consultancies and contractors were left with a distressed clientele that either renegotiated fees fiercely, delayed payments, or cancelled their obligations altogether. Federico De Simone, director of De Simone Group in Ivory Coast, said with cautious optimism: “2020 has been a taxing year in terms of project development and construction within our company, but we expect a sustained growth in 2021.”

Ama Nketiah, regional manager of Knight Piésold (KP) Ghana, a consultancy specialized in geotechnical and environmental services, observed her clients’ hesitance in advancing projects or making any major decisions: “Our clients were cautious due to the possibility of an outbreak shutting down their operations. Also, the logistical nightmare of getting people to site delayed the commencement of certain projects.”

This slowdown made it difficult to maintain stable balance sheets, particularly for equipment and parts suppliers who need to import their products. “To keep the cycle going, we need steady cash flows, but since we buy in US$, the conversion is unfavorable, leaving us with very small margins and with very little to reinvest into the business,” said Peter Quarm, director at Dutylex, a lubricants solutions provider based in Accra.

In Ghana, the Cedi has been losing value over the years, making imports expensive. Borrowing rates in Ghana are much higher compared to the US or Europe: “While interest rates in the US hover around 0%, the interest rates for equipment financing are between 8.5% and 13% in Ghana. This makes us uncompetitive to foreign contractors who are able to source cheaper funds,” shared Joseph Titus Glover, CEO of Quantum LC.

The anxiety around a shortage of supply also created a trend towards stockpiling. Mincon, an Irish-based engineering company specialized in developing and manufacturing hard-rock drilling tools, noted a growth in revenues over the months of the pandemic: “Many of our clients increased their replenishment orders for consumables and equipment to avoid running short in case of lockdowns or disruptions to shipping,” said Martin van Gemert, managing director, Mincon West Africa.

The Copperbelt and Angola

Rollercoaster year: 2020

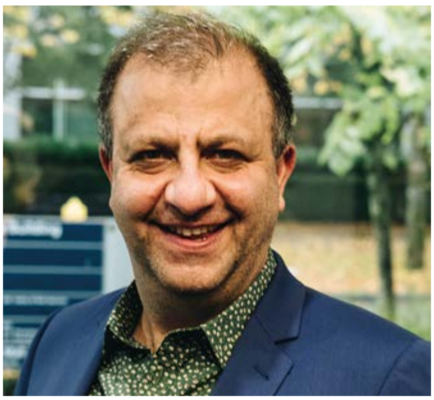
Mines in Africa are increasingly adopting new technologies, such as tooth detection systems. Photo courtesy of Motion Metrics.

Home to the world's largest cobalt producer and Africa's top-two copper producers, the Copperbelt region attracted a total of US$2.3 billion in investment during 2019. Meanwhile, Central Africa attracted US$8.7 billion of investment overall and maintained a GDP growth rate of 3.8%. The region's dependence on natural resources has contributed greatly to this rise, but is also a main cause of the fragility of its economies as it increases vulnerability to external shocks. While all the countries in the region witnessed growth acceleration from 2018-2019, real GDP growth in the DRC, however, decreased by 1.5%, primarily due to the uncertainties of a political transition, drops in copper and cobalt prices, as well as the Ebola outbreak, and GDP is expected to contract by a further 3.9% in 2020 and 3.4% in 2021, according to the African Development Bank (AfDB), as the Covid-19 pandemic takes its toll on the economy, resulting in further uncertainty in a continent already grappling with widespread economic and geopolitical instability.

However, Central Africa maintains favourable prospects for medium-term economic growth, according to the AfDB. Its economies have benefited from serious efforts at diversification and reform, including Cameroon attempting decentralization, DRC aggressively enforcing transparency initiatives, and the Central African Republic undertaking a full overhaul of its alluvial mining sector. However, this was during a pre-Covid global economy. Today, the region witnesses a growth rate of -4.3% for 2020, as global lockdowns and travel restrictions take their toll.

Both the mining industry and those that support it suffered, most notably logistics. "Some problems were faced in March and April with South Africa, from where we receive major import flows, when their lockdown and road closures were imposed. Quarantine in Zambia has also been a challenge for our drivers on this corridor," explained Rodolphe Kembukuswa, general manager in Southern DRC of Bolloré Logistics, a leading transport and logistics provider. "Forwarding out of China and India was impacted, as sailing from February until July was forbidden which caused major project delays."

Due to port and refinery closures in addition to supply chain disruptions, demand for African commodities from China decreased, especially for copper. Even though copper was the worst performing metal in Q1 of 2020, it has had the strongest rebound since; from 2.8 US$/lb in January 2020 to 3.59 US$/lb in January 2021. Demand for copper will increase in the upcoming years as electric vehicles (EVs) are on the rise, which require four times more copper than a conventional car. The Copperbelt region has



Shahram Tafazoli, Founder and CEO, Motion Metrics.

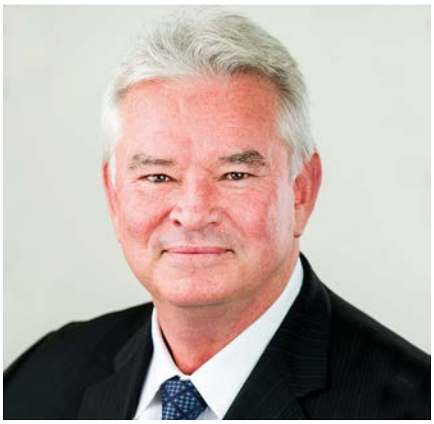
already started attracting attention, especially the DRC as a producer of both copper and cobalt.

Meanwhile, mines in Africa are rapidly modernizing and equalling world-class industry standards offering ample scope for service providers. “I believe that technology is fairly independent of geography. Infrastructure is needed to develop complex technologies, but not to implement them. For instance, some of the poorest countries in the world have adopted some of the most sophisticated wireless technologies. A mine in Africa is just as likely to demand autonomous trucks as one in Australia or Canada,” said Shahram Tafazoli, founder and CEO of Motion Metrics, a Canadian technology company that applies AI and computer vision to improve mine safety and energy efficiency.

The Democratic Republic of Congo (DRC): Africa’s copper champion tackles a pandemic

The DRC is no stranger to disease outbreaks and perhaps because of this, managed to ensure one of the least impacted mining industries. “The mining industry, which contributes 40% to the DRC’s GDP, was somewhat immune to the pandemic relative to other industries,” confirmed Yannick Mbiya, regional director at Trust Merchant Bank in the DRC. “Mining companies took the necessary measures to be able to continue production safely and global commodity prices have remained broadly supportive.”

DRC mining revenues were not heavily impacted and projects such as the long-anticipated Kamoa-Kakula mine – to be one of the largest copper mines in the world once completed – are ahead of schedule. The country’s experience with Ebola allowed it to react faster, according to Marie-Claire Yaya, CEO of ITM Holding Africa, an international human resources solutions company: “The two outbreaks present significant similarities. The measures that were initially put in place to counter Ebola, mainly handwashing and social distancing, played an important role in the fight against Covid-19. The DRC’s contact tracing program also ranks highly relative to other African countries and is adopted from Ebola.”



Nigel Ferguson, Managing Director, AVZ Minerals.

Contrary to other copper producing countries, copper production in the DRC increased in 2020 by 12% year-on-year from January to November to 1.456 million mt, according to the Central Bank of Congo. Demand for copper from EV sales is forecast to increase to 4 million mt/y by 2035, according to Wood Mackenzie, and, consequently, DRC’s copper production is forecasted to increase to over 1.6 million mt/y over the next five years.

The daunting challenge of huge potential

The DRC is struggling to foster a climate of confidence for investors, especially following the passage of the controversial mining code last year, which mining companies continue to protest. “The mining code is problematic due to the immense number of taxes it imposes. The over-taxation in the industry diverts investment from the country, especially the super tax on critical minerals,” explained Nigel Ferguson, managing director of AVZ Minerals, a junior Australian mining company with a majority share in the Manono lithium project, located 500 km due north of Lubumbashi.

The code’s amendments follow the recurring African trend of enhancing government control over minerals and rebalancing mining revenues in favour of the State. Protested changes include royalty fees, that increased from 2.5% to 3.5% for precious metals and from 2% to 3.5% for non-ferrous and base metals, as well as a new 10% royalty on minerals deemed by the State to be strategic, including copper, coltan and cobalt. A super profit tax was also introduced, due when the commodity price increases by 25% relative to that quoted in the feasibility study, paid in addition to the 30% net profit tax. Another key change has been the reduction of exploitation licenses from 30 to 25 years, as well as increased restrictions on the free disposal of funds by mining companies.

Coupled with the subcontracting law adopted in 2017, which stipulates that activities can only be subcontracted to Congolese-owned companies, investors in the DRC have become wary of regulatory changes. “The recent change in the subcontracting law stipulating that any subcontractor operating in-country must have a Congolese majority ownership of at least 51% was a challenge we had to overcome,” confirmed

Richard Van Den Barg, director of T3 Projects, a South African construction contractor operating in the Copperbelt.

On the other hand, Noel Mabuma, CEO of Congo Equipment, the official CAT distributor in the DRC, offers a different perspective: "These reforms led to the entrance of more Congolese subcontractors to the market. They are still small and medium players, since running big projects requires skill and experience. It will promote SMEs with Congolese capital and grant more jobs to nationals."

The Congolese government must also resolve the infrastructural deficit that has plagued the nation for decades and continues to dampen economic development significantly. The flawed nature of the Sicomines minerals-for-infrastructure pact with China must be addressed, as it has failed to live up to expectations since 2007, so that it serves as a warning to other emerging economies to ensure benefits are of guaranteed value before exchanging their main source of wealth.

The DRC has yet to utilise its full hydropower potential. According to the USAID, the country uses only 2.5% of its hydroelectric potential. Hydropower offers a great alternative to power mines considering its lower cost and environmentally friendly


Construction of 1km power canal at Kibali. Photo courtesy of IOB.

nature. International development banks, such as the AfDb, have helped develop projects such as the Lungunfi II hydropower plant. Barrick already benefits from hydroelectricity at its Kibali gold mine, as it invested US$207 million to build three hydroelectric plants, including the Azambi project developed in 2018, which reduced the mine's overall energy cost by 75% and allowed it to save fuel-related costs amounting to US$19.2 million per year. "The project is an 11 MW run-of-river hydroelectric scheme located on the Kibali river in the North-Eastern district of the DRC. It produces approximately 64 GWh of renewable, cost-effective and reliable electricity each year to power the remote mine and local community," explained Vishal Haripersad regional manager of Knight Piesold in Africa, who executed the project for Barrick. "The projects identified in the DRC for hydropower are often mega projects such as dams. However, you can harness the power of rivers to provide a clean source of energy to the mines and provide power to surrounding communities."

The government has yet to address the current power shortages, malfunctioning roads, and failing rail networks. On the other hand, mining companies also face challenges posed by artisanal miners in the DRC. The Congolese state is tolerating artisanal mining so to reduce unemployment and community distress. However, the activity results in high rates of accidents and fatalities, has a negative environmental impact and often interferes with formal mines. "The local community exercises small scale mining and it may see the arrival of big mining companies as a threat. This is an area where the government could better intervene to protect local communities and ensure they reap the benefits of formal mining in the region," explained Feni Matsando Samuel, CEO of Inter Oriental Builders, an indigenous contractor.

Formalization of artisanal mining activities offers a more viable solution than suspension of operations, as the industry is vital for world supply and for the DRC's attempt at inclusive growth and development, but the power of the government to control it is limited.

Zambia: Damsel in distress

Meanwhile Zambia, the world's seventh largest copper producer is drowning in debt to finance infrastructural projects under the government's Seventh National Development Plan (7NDP). The nation's overreliance on non-concessional external borrowing since 2014 allowed public debt to reach 80% of

GDP by the end of 2019, compared to 35% in 2014. "Unfortunately, Zambia became Africa's first bond default during the Covid pandemic, as it continues to struggle with a debt amounting to US$12 billion," highlighted Patrick Dikima, territory manager of Orica in Zambia. "Production recently increased amid the default, relative to last year, expected to reach 820,000 tonnes at the end of 2020, which is a positive and surprising outcome considering that Zambia missed its international interest payments."

Despite the problems in the DRC, which increased royalty fees and taxation, Zambia is struggling to recover its status as Africa's leading copper producer, which it lost to the DRC in 2013, as regulatory uncertainties plague the sector. From January to September of 2020, Zambia produced 646,111 mt, a year-on-year increase of 9.45%, compared to the DRC's 1.186 million mt in the same period. Between 2001 and 2016, changes in mining regulations led to the re-drafting of eight national mining contracts. The Fraser Institute's Annual Survey of Mining Companies ranked Zambia as one of the least attractive jurisdictions for mining investment in the world, with a score of 60.83 for 2020, ranked 51st out of 77 global mining jurisdictions. The introduction of a new controversial tax regime and the lack of trust between the government and mining companies will likely decrease its score further for 2020.

According to Sokwani Chilembo, CEO of the Chamber of Mines in Zambia: "The provision of indirect stimulus through targeted reliefs, especially on the double taxation elements on the non-deductibility of mineral royalty tax, would secure approximately US$2 billion investment into the industry, half of which could finance the expansion of First Quantum Minerals' Kansanshi mine, and the other to finance EMR Capital's Lubambe mine expansion, a 10 million mt copper asset expected to produce 160,000 mt/y."

Concern over regulatory inconsistencies has eroded investor confidence, exemplified by the government's feud with Vedanta Resources in 2019, when it seized control of Konkola Copper Mines (KCM), Africa's largest integrated copper producer, on the grounds of an alleged breach of environmental and financial regulations. President Edgar Lungu's government also threatened to strip Glencore of its copper mining license after it announced closure of its Mopani copper mines due to logistical challenges and falling metal prices in April 2020 as a result of the pandemic. As mine closure is illegal, the closure decision defied the government. The feud escalated further when Mopani's CEO was detained at Lusaka airport.

"The position the government has taken with KCM could be seen or labelled as expropriatory in nature as KCM's liquidation was petitioned by ZCCM-IH on the ground that KCM was not paying dividends," elaborated Bwalya Musonda, partner at Bowmans Law, the South African law firm with offices across the continent. "These incidents will continue to spark fear that foreign investments cannot be protected in Zambia, which should not be the case."

A 'them and us' narrative defines current Zambian mining culture, as President Lungu's administration is pressuring foreign miners in an attempt to increase the government's stake to a majority in Zambian mines. "Under our new strategic plan goals, we address the minority stake that we have had for years and that we wish to increase over all our assets if the opportunity arises," confirmed Mabvuto Chipata, CEO of ZCCM-IH, the state mining investment company.

The mines where the government wishes to increase its stake are yet to be identified, however Glencore's Mopani Copper Mines tops the list, where ZCCM-IH owns a minority 10%. Mopani was forecast to produce between 50,000 and 70,000 mt of copper in 2020, however, it witnessed disruption in production as a result of the outbreak of Covid-19 and the resulting fall in copper prices. As a result of the feud with the government and operational bottlenecks, Glencore is negotiating the sale of its 73.1% stake in Mopani to the Zambian government.

Foreign investors in Zambia are wary of expanding current mines or initiating new operations and exploration due to the current tax framework, the government's attitude toward foreign players in the sector, and an upcoming election scheduled for August 2021 that carries its own risks of further regulatory changes. Zambia is, however, well positioned to supply battery metals as one of the most prolific copper and cobalt producers. What it lacks is the corresponding legal, environmental and financial conditions to further encourage the growth of the mining sector.

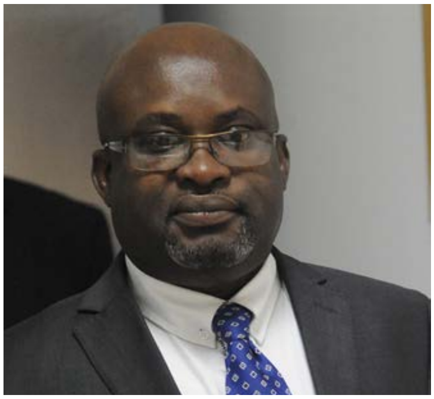
Diversification: Beyond copper

Even though copper takes central stage in the Zambian mining industry, the country has vast reserves of gemstones such as tourmaline and aquamarine, but emeralds are the country's crown jewel, as Zambia accounts for 20% of global emerald supply as a result of their high-quality. The Kagem emerald mine in northern Zambia is the world's single largest producer of emeralds, majority-owned by Gemfields (75%).

Gold is also attracting attention in Zambia. Evans Kanche, managing director of the Association of Zambian Mineral Exploration Companies, elaborated: "Significant findings of alluvial gold in the north-western province have led to the metal being viewed as strategic by the government and efforts to promote its exploration and production are being undertaken. Legislation is to be put in place to facilitate the rise of the gold mining industry."

ZCCM-IH is attempting to harness the nation's gold potential by forging partnerships with players in the value chain. A partnership ZCCM-IH signed with Karma Mining Services and Rural Development, for example, will develop a gold processing and trading operation in Zambia through their subsidiary Consolidated Gold Company Zambia (CGCZ), initially by sourcing most of the gold ore from artisanal and small-scale gold miners. ZCCM-IH also signed a US$2.5 million deal with US-based mining services firm Array Metals in May of 2020. Array Metals, holding a 35% interest in the JV, will work with CGCZ on the construction of a gold wash plant and mining machinery to mine and process gold. The project aims to produce 3 mt of gold within the next two years.

Zambia also possesses one of the highest-grade zinc deposits in the world. 20 km north of Lusaka is the Star Zinc mine, which has been intermittently mined for decades and is currently majority owned by AIM-listed Galileo Resources. Star Zinc is likely to supply up to 60,000 mt/y to Jubilee's Kabwe zinc refinery after obtaining a small-scale mining permit in Q2 of 2021.



Dr. Benedito Paulo Manuel, Director General, Sociedade Mineira de Catoca.

Nonetheless, the mining sector in Zambia is hampered due to disruptions caused by power cuts. Addressing the electricity deficit is pivotal to the nation's economic growth and will facilitate diversification as it feeds into all other sectors of the economy. Diversifying the energy mix is the first step towards a more reliable nation-wide power supply, as Zambia's hydropower is highly susceptible to the effects of climate change.

Angola: Diamonds face a rough year

The world's fifth largest diamond producer, Angola, expects GDP to contract by 4.1% in 2020, according to the Economist Intelligence Unit (EIU), as it suffers under the dual shock of the effects of Covid-19 and the fall in oil prices. The Angolan diamond mining industry, which President João Lourenço is determined to protect, has also experienced a difficult year as the diamond market struggled to find demand as an industry that thrives on face-to-face interactions. Anglo American's De Beers cut 2020 production by a fifth, Dominion Mines filed for insolvency protection and Catoca, operator of the fourth largest diamond mine in the world, shut down its mining processing factory. "From March to September, the global diamond market was stagnant, therefore a management mode was implemented in order to survive the pandemic while profits fell. Production plans for 2020 decreased by about 30%; only vital investments were kept," highlighted Dr. Benedito Paulo Manuel, director general of Sociedade Mineira de Catoca.