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Mining in Africa's Copperbelt

Zambia and Democratic Republic of Congo

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Copperbelt Region

An Overview

A motor grader builds infrastructure in Katanga Province, DRC. Photo courtesy of DEM Group.

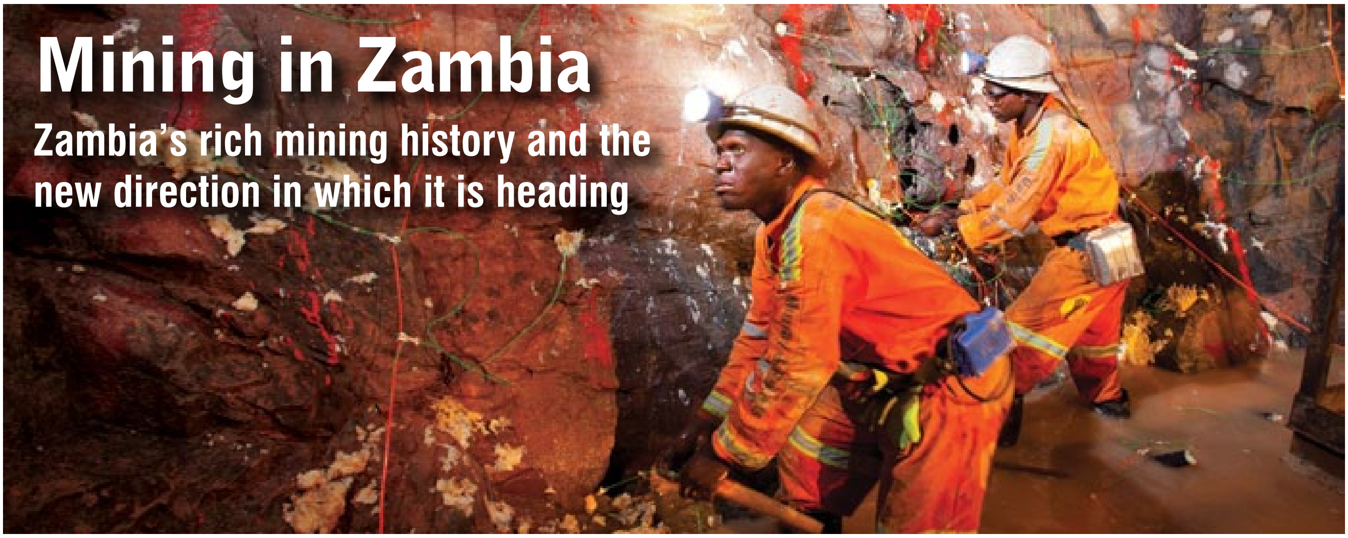
The area that has become known as the Copperbelt, and which stretches across Central Africa traversing Zambia and the province of Katanga in the Democratic Republic of Congo (DRC), was bought to the attention of the Western World by the celebrated American scout Frederick Burnham, who lead an expedition to the area in 1895. He reported to the British South African Co: "About 200 miles north of the Falls on the Incalla river, and twelve miles from the Kafukwe (now known as the Kafue River) and still on the high plateau is probably one of the greatest copper fields on the continent. The natives have worked this ore for ages, as can be seen by their old dumps, and they work it today. The field is very extensive, and reaches away to Katanga... The natives inhabiting this part of the country are skilled workmen, and have traded their handiwork with all comers, even as far afield as the Portuguese of the West Coast and the Arabs of the East. These natives, being miners and workers of copper and iron, and being permanently located in the ground, would give the very element needed in developing these fields."

The belt extends for about 280 miles and is 160 miles in width and is thought to contain one tenth of the world's copper deposits, mostly in Late Precambrian sedimentary deposits. Copper mining became the financial backbone of what was then the Belgium Congo (today DRC) and Northern Rhodesia (now Zambia) when the Copperbelt acquired its name.

After the painful and disrupting political vacillations following independence in each country, which saw the industry falter amidst mismanagement and a lack of investment, Zambia and DRC are now both once again listed amongst the world's top 10 leading copper producing countries. Production volumes are increasing rapidly and investors are piling in from Canada to China. Political stability in Zambia and in Katanga Province, the area of the DRC where the majority of copper is found, together with largely proactive and business friendly governments have renewed interest in the area which is currently home to a boom in investments.

Infrastructure and skill, however, lag behind the pace of industrial progress and massive efforts in both of these areas are required for these countries to reach their potential.

The following report examines the current state of the mining industry in these two countries that together form the Copperbelt and discusses the challenges of doing business in each.



Development shift boss checks the explosive timing prior to blasting. Photo courtesy of Murray & Roberts.

Zambia is a landlocked country with a total area of 752,614 km^2 bordered by eight other countries in sub-Saharan and central Africa. Over the last decade, the country has achieved an average annual growth rate of between 5% and 6%, with a drop in inflation from 20% to below 7%, making it one of the 10 fastest growing economies in sub-Saharan Africa in 2012.

Zambia is the largest copper producer in Africa and seventh largest globally and depends heavily on its mining industry, which is a major employer in a country with 13 million citizens. In 2012, Zambia's copper output, estimated at 800,000 mt/y, accounted for 4.8% of global copper production. However, these figures remain controversial as the Zambian authorities are in the process of establishing proper mechanisms in the monitoring and reporting of copper production in the country. Notwithstanding disputes over the reported figures, copper production in Zambia is estimated to reach 1.5 million mt/y by 2016. This means that the mining sector's contribution to GDP is projected to double to 20% over the medium term, to reach a value of $1.35 billion by the end of 2015. This increase will position Zambia among the world's top five copper producers, alongside Chile, China, Peru and the US.

Although copper remains the driving force of the economy, this is not the only commodity waiting to be unearthed in this relatively unexplored country. The Zambian government is waking up to the danger of the over-reliance on a single commodity, especially in light of the decline of the historically high copper prices since the first quarter of 2013. Fortunately, if well-managed and properly exploited, Zambia can weave a safety net from its vast mineral wealth that includes gold, diamonds, coal and a variety of industrial minerals. Zambia also contains an estimated 11 million mt of the highest-grade zinc and lead deposits in the world and is home to 20% of the world's emerald supply with the world's second largest deposit of emeralds and Africa's largest deposits of aquamarine and amethyst.

With only 58% of the country geologically mapped, there is considerable potential for many further discoveries in Zambia. Yet to live up to its potential and global expectations Zambia will need to address key problems, some of which stem from its unique legacy and others from the skills shortage and infrastructural deficit that are commonplace in sub-Saharan Africa. To understand the unique structure of the Zambian mining industry, one must first understand its rich mining history and the legacy of nationalization.

A Rich Mining History: From Nationalization to Privatization

In 1964 Northern Rhodesia became known as Zambia after attaining independence from British rule that had lasted for 70 years. In 1969, Zambia's first president, Kenneth Kaunda, announced the nationalization of Zambia's copper mines, which at the time were producing 700,000 mt/y and contributing over 50% of government revenue. By the 1990's the copper industry was producing a meager 200,000 mt/y.

At its production peak, Zambia was the second largest copper producer in the world. The steep decline in productivity, due to mismanagement and the collapse of the copper price in the 1970's, led to the country's steady economic decline. A study completed by Eunomix in March 2013 concludes that, without nationalization and with production levels steady at 700,000 mt/y, Zambia could have generated mineral rents of up to $65 billion between 1991 and 2010. Instead mineral rents only generated $15 billion over the same time, equating to a minimum opportunity cost of nationalization of $45 billion.

In 1990, Zambia held its first multi-party democratic election and with Frederick Chiluba elected as Zambia's second president, economic and political liberalization commenced. The liberalization of the economy and privatization of mining companies, including Zambia Consolidated Copper Mines (ZCCM), started to draw much needed foreign direct investment and was the lifeline that saved the Zambian economy from total collapse and bought Zambia into a new era from an economy 80% controlled by the state to one where the state only controls between 10% and 15% of economic activities.

Unfortunately economic decline was not the only repercussion of nationalization. Nyundo Armitage, senior environmental consultant for Golder Associates, said: "A lot of data was lost in the transition between nationalization and privatization of mines and this continues to be a challenging aspect for the mining companies here. However, we have witnessed many positive attempts to address this issue as the government has improved data management significantly. Our partnership with African Mining Consultants also affords us the availability of a much larger data pool."

The availability of accurate data in Zambia remains a problem and is one that the government is seeking to address. Christopher Yaluma, Minister of Mines Energy and Water Development, said: '"The first step of our government's five-year strategy includes confirming our mineral potential by mapping out both the zones that remain unexplored and the areas for which the data is outdated. Much of the current data is between 20 and 40 years old or was produced in bits and pieces by different companies. Our goal is to provide foreign investors with an updated database on every province's mining potential, which will also serve as a marketing tool to attract foreign interest. We hope to complete this data set in the next two years, which will then allow us to develop a long-term mining strategy."

Making the accurate and adequate data available may seem like a small first step, but it as significant undertaking and one that sends a clear message. Zambia's president, Michael Chilufya Sata, and the Zambian government are committed to continue to attract foreign investment into Zambia through creating an enabling environment that fosters growth. Zambia has set it sights, as stipulated in Zambia's National Vision 2030, to become 'a prosperous middle-income country by the year 2030 and to make significant strides toward eradicating poverty.' As Ashok Oza, managing director of specialized equipment supplier, Saro Agro Industrial, remarked: "Our economy is blossoming again and for the first time in 30 years, investments are flowing in. The mining industry is just one, but still a very appropriate example for the development that is taking place in Zambia. However, we still need more investors to enter the country in order to sustain and accelerate the growth of our industries and our economy."

The Zambian Economy and Diversifying away from the Copper-Bottomed Line

Although privatization initiatives and market liberalization have contributed significantly to Zambia's strong growth over the last decade, the fourfold increase in copper prices between 2001 and 2011 played a pivotal role. The rising demand for copper over the last decade was driven especially by China's strong growth, consuming 40% of the global copper output. While weaker demand in China over the short-term due to a relative slowdown in growth is raising some concerns about a further downward trend in copper prices, over the long-term, the demand for copper should continue drive up its value, as new applications are discovered and developing countries continue to grow.

Regardless of the positive copper price outlook, there is a clear risk involved when a country relies too heavily not only on a single sector, but also on a single commodity. In 2013, copper prices have been sinking toward the $6,000 /mt mark, down from around $8,000 /mt, which has renewed the Zambian government's drive to develop other sectors such as agriculture, construction and manufacturing. The economy's over-reliance on copper is not just risky, but for the economic growth to be sustainable after Zambia's copper reserves become depleted, diversification is required.

"In the past there were many operations involving copper but today, taking into account the fast pace of technology advancement, we see opportunities for the exploration of many other minerals," said Anthony Mwila, general manager of Orica Zambia, a supplier of Initiating Systems both for underground and surface operations.

Mukela Muyunda, CEO of ZCCM-IH agrees with this policy and ZCCM-IH, still a major player in the Zambian mining sector with shares in the majority of mines in Zambia recognizes its role in this diversification strategy and where diversification should start. “There is a need for diversification even within the mining sector which has been too concentrated on copper,” Muyunda said. “For the next few years, ZCCM’s concerns will be ensuring the gemstone sector is operating properly, manganese potential is exploited and several other commodities prosper. Coal mining is an important activity and if structured properly, it can work together with power generation.”

Blu Rock Mining Services is an exploration drilling company, that, in light of the risk of overreliance on the copper industry, it is also considering branching out from its core business. “Blu Rock is applying our knowledge to other projects in diversified areas. For example, we completed phase one of the hydropower project at Lunsemfwa, where Zambian owners are working in a joint venture with a Norwegian company. In addition, Blu Rock has also been invited to explore for rare earth minerals with the Zimbabwe-based Galileo Resources in the Isoka district in northern Zambia; however, accessing the area has proven to be a challenge,” said Kris Jedrzejczyk, managing director, Blu Rock Mining Services.

For now, the Zambian economy is synonymous with mining and the mining industry remains synonymous with copper. Generating approximately 75% of Zambia’s total export earnings and with numerous new and expansion projects on the Copperbelt, this will remain the case for sometime to come. However, Zambia’s vast mineral wealth must not be underestimated and the mining sector is being geared towards reaching new heights, or rather, greater depths.

Institutional and Regulatory Framework

Working towards enhanced transparency and an equitable distribution of wealth, while continuing to create a favorable investment climate. Political instability and corruption are widely held as the main deterrents for foreign investment in Africa. Looking at the Zambian case, the country ranks 94th out of 185 countries on the World Banks Ease of Doing Business rankings. Although this ranking may not seem very high, in the sub-Saharan African region where the average ranking is 140, Zambia stands out as a beacon of stability for investors, behind South Africa, Botswana and Namibia.

Since independence, Zambia has adopted Westminster-style multi-party democracy based on the rule of law and the principles of private property ownership. According to minister Christopher Yaluma: “For investors, political stability and predictability of policies are crucial and our goal is to make Zambia the most preferred mining destination in the region. In order to do so we are trying to be as transparent as possible about our policies and priorities.”

Creating a favorable investment climate

Since the privatization of ZCCM, the Zambian mining industry has welcomed foreign investment. Foreign investors are allowed to own 100% of any enterprise registered in Zambia, with both international and domestic investors having to adhere to the same general registration procedures and requirements. ZCCM-IH is now listed on the Paris, London, Euronext and Lusaka Stock Exchange, with 12.7% of shares held by private investors and 87.6% held by the government of Zambia. In the mining sector, however, ZCCM-IH still holds minority shares in the majority of the mines in Zambia including Mopani, Kansanshi, KCM and Chambishi and 100% of Ndola Lime Co. “ZCCM is now like a portfolio manager. We make sure we agree with the direction each majority shareholder takes and it must always be towards growth, because Zambia’s mining sector still has a lot of potential for that,” said Muyunda.

Since privatization, there has been no undue government interference in the mining industry and the major players agree that the government is trying its best to create an amenable business climate. Matt Pascall, director of operations at First Quantum Minerals, believes it is succeeding. “Zambia has been a very easy place to operate in and potential investors will find no easier place in Africa in which to do business,” Pascall said.

Local SME’s such as Rockmore Drilling are also benefitting from the encouraging investment climate. “Rockmore is still a relatively young company and although we would be interested in entering a new market, at the moment we are focused on becoming stronger on a local level in Zambia. The business climate in Zambia is quite favorable, making it easy for both local and foreign companies to do business here. The industry could develop very rapidly once foreign investors turn their attention towards Zambia,” said Lombe James, Rockmore’s managing director.

In 2006, the Zambian Development Agency (ZDA) was established to promote and facilitate investment in the country by streamlining business registration and licensing, which takes on average 17 days. Alwyn Burger, managing director of New Concept Mining, that supplies underground mining safety products, has recently experienced first hand the process of setting up a branch of the South African based company in Zambia. “The system and paperwork required to set up a business in Zambia can be somewhat time-consuming, but once you are compliant with all the regulations and processes it is smooth-sailing”, Burger said.

In addition to the establishment of the ZDA, the Private Sector Reform Program, that spans from 2009 to 2014, is another attempt from the Zambian government to enhance the business environment in Zambia by improving access to financial services, infrastructure, regional and international markets and increasing transparency of regulations. Attracting foreign investment remains a means to an end and Zambia has many social ends yet to be met.

Enhancing Transparency and an Equitable Distribution of Wealth

Of course, there is always a risk within extractive industries in developing countries that policies intended to lure foreign investment may eventually lead to a skewed wealth distribution whereby the local population does not enjoy the benefits of their country's mineral wealth. With 60% of the population still living below the poverty line, Zambia's impressive economic growth is not reflected in the greater socio-economic sphere. The fact that the poverty incidence in the Copperbelt is relatively low compared to rural areas (22% compared to more than 70%) explains why the government has been focused on creating a favorable environment for international mining companies operating in Zambia. The government, however, is adamant that Zambians can and should be benefiting more from their mining industry, as well as the related sectors such as manufacturing and infrastructure, and has introduced measures to aid in achieving this goal.

Mineral Royalties and Taxes

The current mining regime in Zambia is a royalty-tax system similar to that found in many mining jurisdictions across the world including neighboring DRC, Botswana and South Africa. With this approach, the government charges a royalty and then imposes the general tax regime. This includes Pay-As-You-Earn tax of 25%-35% and a standard VAT of 16%. Corporate income tax is at 35%, with an incentive of 30% for companies listed on the Lusaka Stock Exchange. Foreign companies are taxed only on profits derived from Zambian sources. There is currently no windfall tax and companies can write off 100% of investment against tax as depreciation from 25%. In April 2012, the Zambian government increased the rate of mineral royalties from 3% to 6% in an attempt to attain a more equitable distribution of wealth derived from mineral resources. This puts Zambia's mineral royalties on par with other mining regions such as Australia and much of Latin America.

The 2013 national budget proposes the introduction of a property transfer tax at 10% of the realized value on the sale or transfer of


Tony de Santis, COO of Blackthorn Resources.

a mining right. For the renewal of exploration licenses, COO of Blackthorn Resources, Tony de Santis explains the process and implications: "Companies must concede 50% of their ground each time they renew an exploration license, which means that you have to be well funded to carry out the necessary work to assess the property in the available time. With the relinquishment requirement, land is constantly becoming available. Zambia is a very open country that encourages new investment, so there are opportunities in Zambia for new exploration companies."

Statutory Instrument 55 (SI 55)

On July 1st 2013, the Zambian government implemented Statutory Instrument 55 (SI 55) with the aim of enhancing transparency and accountability and to ensure that accurate and reliable information on resources generated in Zambia is maintained and readily available. While it contributes to Zambia's attractiveness as a mining and investment destination, obtaining accurate data and figures also means that instances of tax evasion will decrease as the revenue pool increases. This entails that the Bank of Zambia establish a system of electronic reporting and monitoring that will capture data on the collection of revenue as well as import and export movements.

The new regulation also requires that foreign investors open and maintain local foreign currency denominated accounts, and essentially open their records to the Zambian authorities, which is not always a welcome practice among foreign investors. The new regulations apply to all transactions of a value of or exceeding $20,000 or the equivalent in any foreign currency for the importation and exportation of goods and services.

Paul Richards, head of corporate and investment banking at Stanbic Bank Zambia, agrees with the intentions of SI 55, but warns against the negative impact it may have on investors: "The thrust of SI [55] is honorable and aimed at ensuring that the pool of income of the country as a whole is increased. That will be accompanied by investment in infrastructure, healthcare and education. It does, however, present challenges, as it holds the risk of adding cost to business, particularly in the requirements of establishing Letters of Credit. Our clients see the letter of credit as a grudge purchase and banks are in the middle trying to find the most optimal and cost effective solutions for our clients."

Another hurdle in the Zambian mining sector and one that SI 55 seeks to address is that the reported copper production figures from the private and public sectors do not correspond with one another. With most of the private sector in agreement that this is a case of simple double counting, some producers are concerned that SI 55 is not addressing the right issue. Matt Pascall elaborates on the implications of SI 55 on Zambia's largest copper producer, First Quantum Minerals: "The introduction of SI 55 has increased First Quantum's operating costs by approximately 5%. Unfortunately, no benefit has accrued to the country with the extra expenditure benefitting the banking sector."

The Zambian government is, however, adamant that the implementation of SI 55 is by no means an attempt to reintroduce exchange controls and that Zambia will continue to create a favorable environment for foreign investors. While SI 55 stems from a noble idea, it has already undergone fundamental changes, even in designation as SI 33 previously and we should expect more amendments as the system continues to evolve.

Increasing Local Content

Coupled with increased monitoring of exports and imports, the Zambian Mining Local Content Initiative is another development aimed at reaping greater economic benefit for Zambian citizens from their minerals. Facilitated by the World Bank Group, the Zambian government and representatives from the mining, manufacturing and SME sectors, this initiative aims at the greater industrialization of the country, as locally manufactured products become a part of the mining supply chain.

One cannot disagree with the need to increase Zambian participation in the mining industry and furthermore, the vision for the local content initiative is also part of the diversification strategy to ensure sustainable economic growth and job creation beyond the mining sector. As Mukela Muyanda, CEO of ZCCM, said: "Local Content gives Zambians opportunities to participate in mining and other sectors. The way the Zambian economy has been structured as an importer of finished products makes it very fragile. If local content were strengthened, there would be a lot more factories within the country producing the products required by mining companies while also creating jobs."

Minister of Mines, Energy and Water Development, Christopher Yaluma, notes that even with the local content initiative, further regulatory steps will have to be taken in the near future to see that foreign investment inflows into Zambia are benefitting local businesses. "Despite several efforts by our government, we have not been as successful as we would have liked in increasing local participation in the mining industry due to different factors. We can establish a favorable legislative environment, but the local investors also need to take the next step. We would like to create a regulatory instrument encouraging or even requiring foreign investors to partner with local companies. There would ideally be two options, where a foreign company would either be required to provide a small percentage of its revenues to the local chiefdom or it would be asked to team up with a local partner. Our aim is to monitor the extent to which the Zambian people are being engaged by measuring either the growth in equity stakes or the development of local skills. It is crucial that foreign investors help develop the skills and competencies of the local population," Yaluma said.

The need for the regulation to increase the use of locally manufactured products in the Zambian mining industry is illustrated by local steel manufacturer Universal Mining and Chemistry Industries (UMCIL). UMCIL is a 100% Zambian owned steel company and Dr. Julius Kaoma, technical director, said: "Although UMCIL is based in Zambia, we operate regionally with 60% of our market located outside Zambia, including in South Africa, Zimbabwe, Mozambique, Malawi, Botswana, DRC, Rwanda, Burundi and Tanzania. Our market share in Zambia was initially only about 10% to 20%, but it is slowly increasing. The reason for our low market share was that many private mining companies had existing long-term contracts with traditional suppliers, so the market was difficult to break into."

Scaw Zambia is another local manufacturer that started supplying to the mining industry in the early 1960's when it was in need of local spares for wear-resistant materials such as manganese, steel and cast iron that were being imported at the time. Peter

Chisanga, director of marketing, sales and business development explained the current local demand and supply of such grinding materials: "Apart from Scaw, there are only a few Chinese companies manufacturing grinding balls in Zambia on a small scale. Currently, there is no one who can compare in terms of investment in the manufacturing of grinding media to what Scaw has done in this field. The demand for grinding balls from the mining industry is very high, even prior to taking into account the massive expansion that is set to happen in the sector over the next few years. Local manufacturing can only supply 40% of the local demand. The deficit is mainly being imported from South Africa, China and India."

Although the directives from the government are a definite way of increasing local content and local participation in the mining industry, Dr. Kaoma, said: "Zambians need to be involved in their own country's development. Foreign direct investment may provide us with a short-term boost in GDP growth, but once there is a crisis, the investors will pull out of the country. The Zambian private sector needs to get involved in the country's development and industrialization. The most important factor in developing the country is for Zambians to invest in themselves."


The phase 2 plant construction resulting in significant capacity increase. Photo courtesy of Ndola Lime.

Environmental Regulation

Although environmental regulation in Africa has been slow to catch up to the standards of the developed world, in Zambia it has gradually been increasing.

"The importance of the environment is not only high but it is continuously increasing. Many people believe that mining activities endanger the environment and, although they may have good arguments, our counter argument is that mining can be done in an environmentally sustainable way. Companies in Zambia tend to run in-house reports on the activities that may have an effect on the environment. This is a positive trend but the issue here is that in-house reports tend to raise suspicion. Through its global credibility, SGS provides a solution to this challenge and generates independent and detailed reports that do not leave room for unanswered questions. Even though we believe that the government will start looking towards environmental services, at the moment, the demand is driven entirely by the private sectors," said Kwabena Barning, managing director of SGS Inspection Services for Zambia and Malawi.

Northwold is a Zambian company specializing in precision instruments and testing equipment and the sole supplier for Mettler Toledo in Zambia. Selina Mayondi Simumba, partner and head of analytical services at Northwold said: "Although the regulations related to environmental sustainability are far from perfect, the government is in charge of undertaking spot checks and depending on the results, it may put on hold the operations of the companies that do not comply with the legally established waste regulations. At the moment, the Zambian government is rather more focused on air pollution rather than on waste discharged into the water, while there should be a balanced policy that deals effectively with both of these issues. The interest in water treatment is yet to reach its full potential not only in Zambia but also in Africa overall."

While listed producers are keeping up with international standards of environmental safety standards, the Zambian government, through the establishment of the Zambian Environmental Management Agency (ZEMA) in April 2011, aims to formalize environmental requirements through the creation of a statutory instrument for the Environmental Management Act no.12 of 2012. The instrument, which proposes licensing emissions to air, land and water is currently still in a draft phase.

Exploration and Production

Rich copper deposits and the minerals beyond

Photo courtesy of Blackthorne.

Zambia's unique geology and geographic position situated on the world's largest sediment-hosting stratiform copper area in the world. As such, the country hosts a wide spectrum of mineral resources, ranging from copper and cobalt to industrial minerals and potential energy resources such as coal. Zambia is also making great strides in the commercialization of its gemstone industry. The variety of resources indicates the many opportunities for further exploration.

Copper and Cobalt

Accounting for 46% of copper reserves of what is known as the Central African Copperbelt, the largest and highest grade copper deposit known in the world, copper production in Zambia is poised to boom over the next few years. The copper found in Zambia's Copperbelt region has an average grade of 2.7% copper. More than 1 billion mt of ore has already been mined in this region with further estimated reserves of at least two billion mt that have not yet been exploited.

The main geological features of the Copperbelt region, stretching from Katanga in the DRC to Zambia's North Western province, was explained by Victor Simposya, principle resource geologist and a partner at SRK Consulting, a specialist geo-consultancy company, headquartered in South Africa. "The Copperbelt is one big basin," Simposya said."It was all part of the Katangan sea where the copper was deposited as sediments which were being laid down in the sea and those sediments over time were hardened. There was a major tectonic push from the south during the Katangan Orogeny which resulted in the formation of the NW-SE trending Lufilian Arc, a series of folded sequences in which the copper deposits of the DRC and Zambia are found. The sediments were extensively folded, with faulting occurring at the crests of the anticlinal folds structures as the sediments were pushed hard against the Katangan craton located in the DRC. The differential hardness in the rocks resulted in the copper bearing rocks of the Roan Formation being squeezed through the fault ruptures and found on surface in contact with younger sedimentary rocks. The ruptures resulted in the changes in the generally flat surface topography to one of undulating hills at the positions of the ruptures with rocks of the Roan Formation at the center of these hills. Over time, the copper was then dissolved from those rocks, embedded in the water and reconstituted and laid down over a much larger area and in the surrounding younger rocks. This allowed for ease of remobiliza-

Roger Dixon, chairman, SRK Consulting (SA) with Victor Simposya, partner and principal geologist and Boniface Mwila, principal mining engineering consultant at SRK Consulting (SA).

tion of the copper minerals in these rocks, hence more near surface copper deposits are in most cases closer to the location of the faulted Roan Formation rocks. In Zambia the folding was at a smaller scale and minimal faulting occurred and the copper minerals are generally found in the original sediments of deposition. There is minimal near-surface remobilization of the copper minerals and the major ore bodies in Zambia have been extracted using underground mining methods."

Canadian based and Toronto listed First Quantum Minerals owns the Kansanshi mine, Africa's largest copper mine, 10 km north of Solwezi. "Kansanshi has 860 million mt with an oxide component which typically yields better grades than pure sulphides. When Kansanshi started, it was designed for about 110,000 mt/y copper and is now producing 260,000 mt/y. At the current expansion rate, production will rise to about 400,000 mt/y," said Matt Pascall.

The expansion plan for Kansanshi mine is just the start of First Quantum's vision for Zambia over the next two years, which is expected to be the main driver of growth in copper output. Further north at Kalumbila, First Quantum's Trident project is expected to be one of the biggest mining undertakings that Africa has seen to date. "The Trident project holds potential for three ore deposits. The current $2 billion project as approved will cover the development into production of the Sentinel copper and Enterprise nickel mines," said Pascall.

With a lower copper grade at Sentinel than at Kansanshi, First Quantum will have to mill approximately 60 million mt of hard ore annually at the Sentinel mine. "First Quantum would like to produce copper at a rate of 300,000 mt/y at Sentinel. Sentinel mine has a billion tons of copper ore at a grade 0.5%. At the current expansion rate, production will raise to about 400,000 mt/y. Sentinel will be an even bigger grassroots project and if more material is found, there is always the prospect of adding a third train to take it above that level," said Pascall.

A project of this magnitude may seem daunting, but First Quantum, drawing from their past experience and controversial exit on the other side of the border in the DRC, is confident that it will be able to bring the whole plant up to full production by the end of Q3 in 2014.

Another key player in Zambia's hope to reach a copper production level of 1.5 million mt/y is Konkola Copper Mines (KCM), a subsidiary of India based, London listed

Vedanta Resources. KCM operates two copper mines, Nchanga and Konkola, in the Copperbelt as well as the iron pyrite Nampundwe mine in Zambia's Central Province. When Vedanta stepped in as the majority shareholder of KCM in 2005, there was much to be done to address Konkola mine's unique set of challenges as one of the world's wettest mines and a mine that has changed ownership many times since nationalization in the early 1970's. Since Vedanta took the reigns, it has made investments of $2.7 billion in the Zambian mining industry. KCM is planning on increasing its copper production to 350,000 mt/y in the medium-term with the completion of the Konkola Deep Mining Project (KDMP) which aims to increase production from 2 million mt/y of copper ore, to 7.5 million mt/y, having recently completed the sinking of Africa's deepest shaft.

Inkazteca is a drilling company that has worked closely with KCM and Mopani copper mines and has first-hand experience with the challenges that Zambia's unique geology presents. "Inkazteca has worked on some of the largest Zambian mines, including the Konkola and Mopani copper mines. Our main focus areas include underground diamond drilling, surface mining and exploration, but our underground de-watering operations comprise the largest portion of our business. Our largest and most important project to date was at the KCM, where we drilled a 460-meter hole, crossing the ore body and the water intersection. This was a very unique drilling project, as Konkola is one of the wettest, if not the wettest, mine in the world. As a result of Zambia's unique geological characteristics, we have specialized in water control and de-watering, crossing wet grounds and simultaneously conducting exploration to find the ore body. Although our contract with KCM has now ended, we left a very good record. Currently, we are working underground in Nchanga conducting water control and improving recovery rates to 90% or 95% from a current rate of 40%. We aim to provide high quality products with recovery rates in the areas of 80% to 100%," said John Velasquez, director of Inkazteca.

Mopani Copper Mines, a joint venture between Glencore Xstrata and ZCCM-IH, operates two of Zambia's oldest copper mines, Mufilira and Nkana. Mopani currently produces around 120,000 mt/y of copper and will also contribute to Zambia's increased copper production through the sinking of the new Synclinorium shaft. Emmanuel Mutati, chairman of Mopani Copper Mines and recently appointed president of the Zambian Chamber of Mines, explained the two mines' potential: "The mines currently have 111 million mt of proven reserves, which would give us 20 more years of mining. The new $323 million Synclinorium shaft that is to be commissioned by mid-2015 will access another 119 million mt of copper and will add an additional 25 years of operations at Nkana. Mopani's exploration work proceeds continuously."

With exploration drilling slowing down globally over the last two years due to the global capital shortage, Australian based Blackthorn Resources is one of the few exploration companies to have started the process in Zambia within its Mumbwa license, of which Kitumba mine forms a part. "In February, we announced our updated mineral resource statement at Kitumba that entails a 0.5% copper grade cut-off, with copper reserves of 87 million mt at just below 1.2%. Within this there is a high-grade core of 30 million mt at 2%," said Tony de Santis, Blackthorn's COO.

Although Blackthorn has not started producing yet, De Santis is optimistic about the discovery and progress that has been made so far: "Kitumba is currently in a prefeasibility study phase and is only one of the prospects within the Mumbwa license, which is surrounded by four other licences, totalling 1,037 km^2. At Kitumba, we are comparing

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the economics of open-pit and underground mining. Underground is of interest because the very high copper-grades start at around 200 m. The prefeasibility study will be concluded by the end of July 2013, and subject to a positive outcome, Blackthorn Resources will consider moving into the next phase of feasibility, which will likely take at least another 12 months. Following feasibility, detailed design, engineering and permitting work would be required, with a best-case scenario being that construction could begin some time in 2015."

With production estimated to be at 170,000 mt/y, Barrick Gold's Lumwana mine is said to be one of the biggest copper mines in the North Western Province of Zambia. The Lumwana mine contains two main copper deposits whose combined reserves are close to 2.7 million mt, and has not been the golden opportunity that Barrick had hoped for when it acquired Equinox Minerals in 2011. With rising production costs and a decline in copper price, Barrick suffered a $3.8 billion write-off in 2012 against its $7.3 billion investment and decreased production in 2013 in order to cut costs.

The declining copper price poses a threat to copper producers across the board including KCM, as Jeyekumar Janakaraj, the company' CEO explained: "The copper price is very unpredictable and even when prices were as high as $7,000 /mt KCM was not profitable and we made a loss of $6 million in 2012. Sometimes the short-run looks tough as we are paying for our investments, but that is just part of the cycle and we have to find dynamic ways and means to stay alive. KCM is preparing for a copper price of $6,000 /mt and at that price we will be able to turn a decent profit."

There is, however, more to Zambia than just its vast copper potential and the cyclicality of mining and commodity prices is one of the main drivers behind the diversification strategy of the mining industry that Zambia seeks to achieve.

Gemstones

Zambian emeralds are among the world's highest quality and notorious for their deep green color. The Kagem mine, majority owned by London-listed Gemfields Resources, is the largest emerald mine in Zambia that covers 43 km^2 in Nrera.

Though largely unexploited, Zambia is home to the largest amethyst and aquamarine deposits in Africa. This sector offers valuable opportunities for exploration and is currently largely dominated by small-scale operators. As part of its diversification strategy, ZCCM-IH has acquired a 50% stake in the Mapatizya amethyst mine, which holds the world's largest amethyst deposit through Kariba Minerals, with the other 50% owned by Gemfields.

In April 2013, the Zambian Ministry of Mines, Energy and Water Development issued a directive that all emerald auctions be held within Zambia and no longer in traditional auction destinations such as Belgium and London. According to the government, this directive forms a part of the effort to increase transparency in the mining industry and also in gemstone trading. The announcement came as a surprise given Gemfields partnership with government owned ZCCM-IH in Kariba Minerals. "The key to selling gemstones on the global market is ensuring a stable supply at any time. On the contrary, the key to selling gemstones in Zambia is allowing for transparency. At the moment, Zambia is suffering from a lack of transparency and this is an important factor that creates distrust," said Sean Gilbertson, CEO of Gemfields.

There was some trepidation as to whether or not the ban to sell the precious stone outside of Zambia may stop Zambia competing with the likes of Brazil and Colombia. However, these fears appear to have been misplaced as Gemfields held their first auction in Lusaka from the 15 to 19 July 2013 and raised a record $31.5 million from its auction of high-quality emeralds. The average price per carat for emeralds saw a 26% increase to $54.00 per carat (ct) this year from $42.71/ct last year.

Industrial Minerals

Limestone and dolomite is abundant around Lusaka with even more deposits in the Southern, North Western, Northern and Luapula provinces. High-purity, low-MgO limestone is currently being mined in the Copperbelt in Ndola. Limestone is typically needed where there are oxide copper ores, which are generally found on the DRC side of the Lufilian Arc, the geological feature from which the Copperbelt's mineral wealth stems from.

Abraham Witika, CEO of Ndola Lime Co., a ZCCM-IH owned parastatal, describes the different demand for limestone coming from the two sides of the border on the same copper rift: "The copper mines in the DRC treat oxide ores, which require acid to extract and hence require lime. However, most of the Zambian copper mines treat sulphide ores, which in most cases do not require lime. Konkola copper mine treats oxide ores and hence requires lime while Mopani and Chambishi are using lime for cobalt production, and other mines such as Luanshya are also using our lime in limited

Abraham Witika, CEO of Ndola Lime Company.

amounts. Ndola Lime should be able to satisfy the local demand of about 400 mt/d of quicklime. The demand is coming from the DRC where we are aiming to sell approximately 100 mt/d and even our enhanced production capacity will not be able to meet the current and future demand in the DRC. The DRC currently imports lime from as far as Thailand, Indonesia and Turkey and is therefore is a good market for Ndola Lime to penetrate."

Rockmore Drilling, a specialized plastic drilling company, aims to become one of the major players in the limestone-drilling sector. Lombe James, managing director of Rockmore Drilling, sees more opportunities in this sector: "We have made significant investments in the limestone drilling area and our goal at the moment is to strengthen our positions there. At the moment we are also exploring business opportunities in various provinces in Zambia as there is a lot of demand that is not being met locally."

Other industrial minerals will play a pivotal role in the development of the manufacturing and agricultural sectors and the expansion of the mining industry in Zambia. The importance of access to accurate data will play a pivotal role in the development of the mining of industrial minerals, as Zambia boasts a wide range of minerals including feldspar, silica sands, talc, barite, phosphate and clays, in undetermined amounts.

Other Minerals

Gold mining in Zambia has only occurred on a very small scale and, since 1902, Zambia has produced just of 2 mt of gold. More than 300 occurrences of gold have been reported in Zambia and some of these are being re-evaluated.

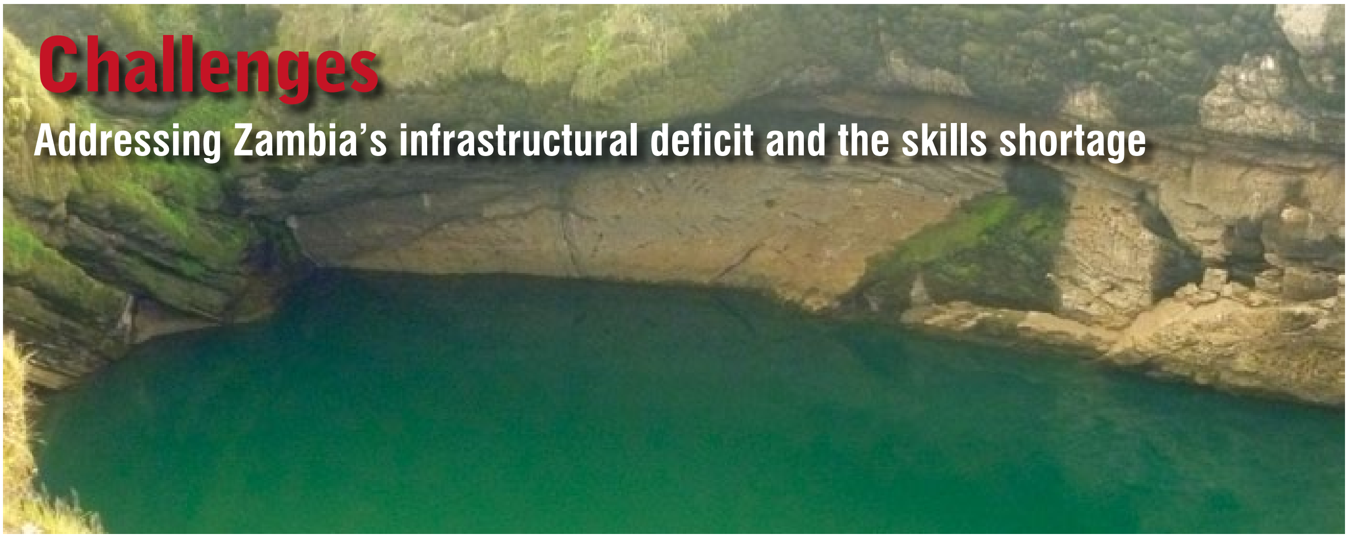
If Zambia's Manganese Corp. estimations can be quantified, the country may well be sitting on 15 million mt of high-quality manganese. Apart from Kaboko Mining and Zamanco Minerals, manganese in Zambia is mainly extracted by privately owned small-scale firms. In May, Kaboko Mining confirmed that its 6,000 mt stockpile at Mansa mine in the North Western Province contains 50% manganese.

While Zambia boasts large lead and zinc deposits, the Kabwe mine was closed in 1994 due to environmental issues. Currently Berkeley Mineral Resources owns the Kabwe mine with estimated ore bodies of 51 million mt with a combined grade of 4.01%.

Zambia's considerable coal reserves have been mined consistently since 1967. Although currently ranked as one of the Southern African region's smallest coal producers with a reported 281,000 mt/y of coal produced in 2011, the sector is poised to see significant growth, albeit from a low base. Maamba is Zambia's largest coal mine, owned by Nava Bharat and is planning to increase its production from 150,000 mt/y to 600,000 mt/y by 2014. While Zambia is not expected to become a world-leading coal producer, *Business Monitor International* estimates that coal production will increase to more than 2 million mt/y in 2017. This increase will also have a significant impact on Zambia's mining sector as a whole as Zambia seeks to address its electricity deficit issues over the next three years.

Challenges

Addressing Zambia's infrastructural deficit and the skills shortage



Water presents plenty of challenges, when drilling. With experienced team they can be overcome. Photo courtesy of Rockmore Drilling.

Despite Zambia's impressive growth trajectory, key challenges still need to be addressed in the country. Similarly to the rest of the region, the Zambian mining industry's main challenges continue to be the unstable and inadequate power supply, poor conditions of the roads and time-consuming logistics and a general skills shortage.

To realize the goal of reaching middle-income status by 2030, Zambia is dependent on sustained economic growth and diversification. Economic growth cannot be sustained if it is not combined with adequate infrastructure development. To this end, the Zambian government has announced its plans to issue another $750 million Eurobond after the success of the previous issue of which 90% of the bond proceeds will be invested into energy, road and rail.

Electricity

The biggest risk to Zambia's healthy mining sector outlook is the lack of sufficient power generation. Zambia's current generation capacity is around 1,800 MW of power, which is almost solely generated from hydropower through state-owned Zesco. However, maintenance and upgrading has brought the current available capacity down to 1,300 MW leading to a shortage of around 200 MW during peak times that has caused power outages and necessitates load shedding. "To operate this mine, KCM is extremely dependent on power stability, as power outages have flooded the mine on different occasions. In 2008, there was a national power blackout and KCM lost dewatered copper reserves of 18 million mt, going from having 20 million mt to 2 million mt in two days. Even after five years of pumping out water we only have 16 million mt of dewatered reserves, meaning that what was lost in three days could not be recovered in five years," said Janakaraj of KCM.

Up until 2005, Zambia was a regional electricity exporter, but when maintenance and rehabilitation commenced on many of its hydro power plants the country became a net importer. Zambia offers some of the region's lowest electricity tariffs, one of the main reasons, according to Zesco, why funding for generation capacity upgrades and new projects has been hard to come by. In June 2012, the Energy Regulation Board (ERB) announced plans to gradually raise electricity tariffs to provide additional funding to invest in improving Zambia's energy infrastructure. The ERB aims to stimulate investment in the sector by endorsing power sector investments prior to project implementation, which assures reasonable returns through an approved tariff.

The mining industry in Zambia is by far the biggest power consumer, responsible for around 55% of all power consumption. With only 22% of Zambia's total population currently enjoying access to electricity, and in-line with the drive to create a favorable investment climate, a number of new power projects are underway in Zambia. Minister Christopher Yaluma said: "We are well aware that the mining industry requires a power supply that is available 24 hours a day, 365 days a year, but unfortunately Zambia still has serious power generation constraints. For the past 20 to 30 years, no new power plants have been established in the country and we cannot continue to rely on infrastructure built in the 1980s. Since 2008, we have started working on several new power plants, but efforts need to be ongoing to meet the growing future demand."

For mining companies such as Ndola Lime, that have been reliant on heavy fuel oil and diesel for electricity generation, the costs are even higher. "The cost of production remains very high, as the two kilns currently in operation are on heavy fuel oil (HFO), costing five times more than coal. The effect of the recent significant increase in prices of heavy fuel oil and diesel is a corresponding increase in product prices. More than 50% of Ndola Lime operating costs is on HFO and diesel and we cannot operate without passing that cost on to our clients, meaning that we lose out to the competition that operate on coal. Ndola Lime's third kiln will be able to use coal and will increase our production level to more than a 1,000 mt/d, but most importantly, it will start bringing the cost of production down. To further reduce the cost of production, we have planned to convert the firing on the existing kilns from HFO to coal," said Abraham Witika, CEO of the Ndola Lime Company.

Zambia hopes to become a regional hub for hydro-electricity generation and is aiming to supply its surplus demand to its neighboring countries by as early as 2017. This will be achieved through various hydro-electricity expansion projects as well as smaller scale coal-fired plants, as minister Yaluma explains: "A number of noteworthy hydropower plants will be commencing in the next five years including the Kariba North Bank Extension project (360 MW) to be completed in 2013; the Itezhi-Tezhi Hydro Power Project (120 MW) to be completed in February 2015; the Kafue Gorge Lower Hydro Project (750 MW) to be completed in 2017; and the Kalungwishi plant (240 MW). In addition, the Batoka Gorge hydro-electricity project is expected to generate 800 MW for both Zambia and Zimbabwe for a total of 1,600 MW. Feasibility studies for Batoka Gorge have already been completed and it will soon be going into tendering. Our intention is to eventually export power to neighboring countries."

In terms of hydro-electricity potential, Zambia holds 28% of the water supply of the SADC region and the Zambian government is not alone in recognizing the opportunities that this presents. The Development Bank of South Africa (DBSA) has also been a part of the estimated $312 million hydro-expansion project and shows that there is confidence in Zambia's hydro-electricity potential from large investors. Moe Shaik, chief executive of Development Bank International said: "To help address the power supply shortage that Zambia faces, the DBSA has helped to finance Zambia's Kariba North Bank Extension Power Corporation hydro-power project in 2010, to give an additional 360 MW capacity to the existing Kariba North Bank power station. This Zesco transaction remains one of DBSA's greatest success stories in the SADC region."

Zambia has the potential to generate 6,000 MW of hydro-electricity and, to exploit the remaining 70% that has not yet been tapped into, the private sector, through Public Private Partnerships (PPP), will play a pivotal role in realizing the country's energy potential. With many prospective investors and projects in fruition, and if the momentum that Zambia is gaining in this arena can be sustained over the next few years, it is very likely that Zambia will achieve its ambitious generation goals.

Transportation and Logistics

Zambia's unique position of being bordered by eight countries means that it not only has access to a market equal to its population of almost 13 million, but to the entire region that is home to more than 170 million people. This unique and strategic location gives Zambia an enviable opportunity to become Africa's business hub if it is able to create and sustain an adequate transportation infrastructure.

Zambia's transportation system is dominated by road and rail with over 75% of traded goods being transported thus. However, the state of Zambia's road infrastructure is limiting and adding costs to doing business. With only 7,300 km of Zambia's 40,000 km road network being paved, it is no surprise that costs of frequent replacements of parts of transportation vehicles are extremely high.

Tom Mennie, marketing manager from Buks Haulage (BHL), a local transportation company, describes how they have dealt with this challenge: "BHL has suffered breakages that should never have occurred and tire costs have risen considerably. To counter this, we changed over to a Chinese fleet in 2012, which is landed cheaper and has much cheaper parts. While Africa has been used as a dumping ground for the bottom end of the market previously, there is a happy medium that BHL has found."

To reduce the cost of doing business, the Zambian government has already launched the Link Zambia 8000 project. The mere commitment to infrastructure regeneration that the projects symbolizes gives hope to companies that rely heavily on road transportation to serve the mining industry. Mark Timmerman from Bell Equipment Zambia said: "The government is making significant efforts to improve many of the roads and we are confident that they will improve significantly over the next few years."

The three-phased road development scheme, set to be completed by 2017, has the ambitious goal of constructing and rehabilitating 8,200 km of roads in Zambia to link all provincial capitals. Combined with the Pave Zambia 2000 program that will see the upgrading and repairing of 2000 km of roads, the Zambian government is already committed to invest $5.4 billion into Zambia's road infrastructure over the next few years.

Zambia's infrastructural deficit does not only impact producers, but has a number of implications for mining service and equipment providers in the country too. Holding adequate stock levels is a prerequisite for survival in an industry where reliable infrastructure is not a given. Ian King from the engineering solutions company Bearing Man Group (BMG) highlights that Zambia's unique challenges makes a vast difference between managing stock-levels in South Africa and in Zambia: "The average branch in South Africa normally keeps eight to 10 weeks of stock, while in Zambia we put in 24 to 28 weeks of stock because of the logistical lag of transporting equipment across borders and on less reliable roads. Sending stock to Zambia could have lead times anywhere between two weeks and two months. BMG's Zambian branch also has live access to our systems so that stock can be easily transferred between the countries and to ensure that stock levels and requirements are managed well in advance."

The opportunities that arise from the vast infrastructure expansion that is set to happen in Zambia should be used to Zambia's advantage. At the moment, Chinese companies have the ability to provide cheap credit for large infrastructure projects, which prohibits local competition in the tendering process.

China will keep funding infrastructure projects in exchange for access to Zambia's natural resources and currently accounts for up to 50% of the Zambian construction market.

To ameliorate this problem and to facilitate knowledge and skills transfer, countries in the region, including Zambia, are attempting to pass legislation that will require the foreign investors to partner with a local company in the development of infrastructure projects. UMCIL is one of the few examples of a 100% Zambian owned company that is directly benefitting from the infrastructure expansion process. UMCIL has plans to expand from 120,000 mt/y of steel products to 250,000 mt/y by 2015, after that aiming for 500,000 mt/y. "We are confident that there will be an increasing demand for our steel products as a result of the upcoming boom in infrastructure projects, including power stations and road construction, such as the government's Link Zambia 8,000 program. Hospitals and universities will also require construction steel. As there is a lack of scrap metal in Zambia, the only way to expand our business is to invest in the mining of iron ore. Establishing our steel plant in Zambia provides us with a geographical advantage. For example, Malawi used to import steel from South Africa at more than $3,000/mt and when they began importing from Zambia the price dropped to $1,200/mt. Similar situations can be seen in Zimbabwe, Mozambique and the DRC and this is where we see our competitive advantage", said Dr. Julius Kaomo, UMCIL's technical director.

Zambia's proximity to other developing mining countries makes it an ideal distribution hub and point of departure for the sub-Saharan and Central African region. Companies operating in Africa are seeing the natural path of progression that will follow establishment in Zambia, but are still wary of the infrastructural deficits. "Once the Zambian market is established, we will start looking at the DRC, Tanzania, Ghana and Zimbabwe with Zambia becoming the portal from which central Africa will be supplied. We are currently in the feasibility study for opening a factory in order to manufacture certain products [in Zambia] and that is looking promising. We cannot manufacture all of our products here since current logistical challenges and the instability of the power supply make it difficult. However, all of these are factors that can be addressed and overcome," said Burger of New Concept Mining Zambia.

Although infrastructure remains a deterrent to entry into the Zambian market, once a company has committed to operations in Zambia, dealing with logistical challenges becomes a second nature. Allan Wildlake, business development director for underground mining contracting company, Murray & Roberts, remarked: "An increasing number of mining suppliers are setting up businesses in Zambia, or bringing in equipment from South Africa. The logistical difficulties occur in the initial stages, such as during the setting up of the project, but thereafter Zambia`s logistical environment becomes routine. Significant infrastructural improvements have also taken place since the 2000s, which have mitigated the logistical challenges."


Allan Wildlake, business development director, Murray & Roberts.

Johan Lombaard, managing director of the transportation company Manica Zambia sees the development of the railway infrastructure as key to overcoming one of the country's biggest challenges, "Manica is significantly affected by the unfavorable state of the infrastructure in Zambia. This challenge has been thoroughly discussed over the recent years and this focus will surely see a positive outcome. While we believe that a lot has improved, we are also positive that the government will take further action in order to minimize the negative effects of the poor infrastructure on the business environment. Looking into the future, a national rail network could prove very effective for solving this problem."

While the regeneration of Zambia's road network remains a top priority, an efficient railway system in Zambia can be a game-changer in the region. The Zambia railway network has been operating on two systems; the Zambia Railways Ltd (ZRL) and the Tanzania-Zambia Railway System (TAZARA). Plans to rejuvenate the country's railway system were made clear when ZRL announced a new management board.

Progress, however, has been slow to follow and in many cases, mining companies choose to develop the road and rail infrastructure independently to ensure greater efficiency and timely completion. Tom Mennie, from BHL, said: "Kansanshi started producing in 2005 and when BHL began its contract with First Quantum in 2009, the road to the mine was in bad shape. In the next two years First Quantum spent millions of dollars fixing and widening the road. In 2012 the government appointed a contractor to take over the maintenance of the road and its current poor state is due to the inactivity of this company."

Being landlocked also means that Zambia is especially reliant on road networks to access the ports of its neighboring countries for imports as well as exports. With heavy road traffic on routes to the ports of Dar-Es-Salaam, Durban, Benguela, Beira and Maputo, the regional railway system is becoming increasingly important. London Mwafililwa, director of Shawonga Enterprises said: "All of our imports come through the Dar-Es-Salaam and Durban ports. The Durban Port can be more efficient than the port in Dar-Es-Salaam, as ships come into Durban with greater frequency. Many companies have access to quality products, but can have difficulties importing them in a timely and efficient manner."

Chris Ndhlovu, regional manager from Cathodex in Southern Africa that imports pioneering technologies for cathode plates into both Zambia and the DRC, explained that Zambia's logistical challenges do not end with the road and rail infrastructure, but that delays at the borders must also be taken into account. "The Dar-Es-Salaam port is mostly used for cargo being imported into the DRC. For cargo entering the Zambian market, the fastest route is to import via Walvis Bay, as the border crossings on that route are not yet very busy. When importing into the DRC, there are always long queues of 50 to 100 trucks at customs. The hope is that the Kasumbalesa border post that has recently become a one-stop border post will speed up the customs process. We have also received positive responses from the Congolese government in allowing clients to export their products to Cathodex for maintenance purposes. The alternative for our clients is to turn to South Africa or Germany, but since we are located about 200 km away, we have a huge competitive advantage," said Ndhlovu.

Although the movement of equipment and goods across borders is one of the industry's greatest challenges, it also presents new opportunities for logistics companies that are specializing in forwarding services. "Over the last few years in Zambia, Manica has managed to establish an efficient warehousing infrastructure and become an important player in the customs clearance area. Our business with KCM has provided us with many opportunities in Zambia and allowed us to quickly grow to our current level. Although Manica has not fully developed its forwarding capabilities in Zambia yet, we are setting our focus on this area which has a high contribution to our revenues," said Johan Lombaard, managing director of Manica Zambia.

Moving traffic and goods between Zambia and the DRC has been notoriously slow, with many freight-carriers spending days at the border posts. While the upgrading of the Kasumbalesa border post has improved the efficacy of transporting goods between the two countries, there is still room for improvement, as Anthony Mwila, general manager of Orica Zambia, pointed out: "The main difficulties that we face related to the border issues are the licensing requirements. Although we have noticed many inconsistencies regarding the licenses that we need to have and the ones that we are actually asked for on the border, we have seen improvements in this area and we believe that these types of difficulties should have smaller impacts in the future now that the Zambian and DRC governments are working together to overcome such issues. We used to transport our explosives with our own truck fleet but we have come to understand that this is not the most efficient solution for our business and we have adapted to the local environment by contracting independent transportation providers."

Addressing issues in transportation and logistics will drastically improve the attractiveness of Zambia as a regional hub for many companies who are maintaining different operations in surrounding countries. While the whole region will benefit from increased intra-African trade, Zambian stands to gain more than its neighbors due to its strategic location. The next five years should see the fruits of collaborative regional infrastructure development projects such as the North-South Corridor that will improve the road and rail system between Dar-Es-Salaam and the Copperbelt and between the Copperbelt and South Africa's southern ports. Such projects will not only aim to improve the physical transportation system, but also the regulatory environment by promoting intra-Africa trade between Tanzania, the DRC, Malawi, Botswana, Zimbabwe, Mozambique, South Africa and Zambia. If, in tandem, Zambia is able to establish its own transportation infrastructure, the country may soon be South Africa's biggest threat in becoming Africa's most prominent business hub.

Skills shortage

Across sub-Saharan Africa, the scarcity of skilled labor remains a great challenge and it is no different in Zambia. Zambia's labor force comprises of approximately 5 million people, however, with low education and skills levels, this number does not accurately reflect the talent pool, which is significantly smaller than that. As Nathan Chisimba, president of the Association of Zambian Mining Explorations Companies (AZMEC), pointed out: "One of the main challenges that the companies face here is the low level of skills of the Zambian workforce. Inefficiencies need to be corrected as soon as possible through an improved education and the determined involvement of the companies within the mining industry."


Energold portable series rig in steep forest Central Liberia. Photo courtesy of Energold.

Recruiting the right talent is especially competitive in the mining services sector that typically requires a higher level of skills. Jerson Rojas, managing director of Reliant Drilling, elaborates on the companies experience with recruiting the right skills set: "It is known that Africa is suffering from a shortage of skilled labor and Reliant's experience has been similar. There are a very limited number of well-educated or experienced employees and the larger corporations in the mining sector normally quickly recruit most of them. Reliant aims to be a step ahead and recruit students immediately when they graduate from their studies. These employees are normally hired for more technical job profiles and we invest six months in training them in order to ensure that they possess the rights skills and have the opportunity to integrate into our company as easily as possible. This model is also challenging, as there are only a few colleges in Zambia that incorporate mining studies into their programs."

To address the issue of inadequate training, some companies, like BHL, have resorted to sending employees for training outside of Zambia, as Elrick De Klerk explained: "Much of the training at BHL is now done through management by getting the right skills at the top and then doing the training through our own people. In 2013, BHL has started sending employees to South Africa for training. Our extra efforts are already producing results and the quality of service our fleet receives is 100% better in 2013 than in 2012."

The reverse strategy is one that is more commonly employed, with many companies opting to send skilled professionals from South Africa to train employees in Zambia. Ian King, director of sales and marketing for the Bearing Man Group, stressed the importance of developing local skills given Zambia's strategic importance in the region: "Zambia is of significant importance to BMG and we believe that it will grow significantly in the next few years. As it is BMG policy to employ local personnel, BMG specialist product managers and trainers are sent from South Africa to Zambia on a regular basis in order to enhance the skills of our employees. This is the fastest and most effective way for us to import the necessary knowledge and skills. BMG also has an online academy with more than 30 modules available to any and all BMG employees. Through BMG's academy, employees are not only provided with theory but also with the necessary technical, hands-on evaluation of their skills."

Adam Wildlake explained how Murray & Roberts is addressing the challenge of skills development in a similar way, especially when it comes to the implementation of new technologies that requires advanced technical expertise: "We bring specialist skills to the market, including shaft sinking and high-speed underground mining. We also bring our experience on large and unusual excavations that are required for shaft infrastructures, such as vertical dams, large underground pump stations or load-out stations for shafts. Throughout our work, we bring in as few expatriates as possible, aiming to develop the local skillset."

When it comes to Zambia's labor landscape, resilient service companies are not just finding creative ways to address the skills shortage, but as the services sector grows, gender inequalities are also coming to light. Though legislation is slow to catch up with the promotion of women in the workforce, companies like Pex Hydraulics are paving the way through their own labor enhancing initiatives. Bridgitte Chingaipe, country support manager for Pex Hydraulics, spoke about her own journey in the mining services industry: "I was the first woman that Pex Hydraulics employed in the field and it was certainly a challenge to work in a male-dominated environment. However, I always believed that if men could do it, women could as well. I brought the idea to Pex, but it took three years to bring more women into the company due to a prevailing belief that hydraulics and engineering was predominately a man's world."

As Zambia continues to battle with a lack of skills along with the rest of the region, the innovative ways in which private companies are addressing the gap is a proof that there is hope for progress. The skills shortage will take some years to be truly addressed, with the long overdue investment in better education and training only just beginning to enjoy the attention it deserves. While many may argue that this is a feature of the region that one has to deal with when doing business in Zambia, it only takes one country to raise the standards of its labor force to raise the standards for a region.


Reliant Drilling puts great value in employee training. Photo courtesy of Reliant Drilling.

Service Providers

Zambia as a hub

Women's role in the service sector is gradually growing. Photo courtesy of African Rainbow Minerals.

For all the challenges that are prevalent in Zambia, the service sector has managed to remain relatively strong. In this sector, service providers have to find unique ways to adapt to varying market conditions.

Agents and Distributors

Zambia is a net importer of goods with no manufacturing sector to speak of yet. This has led to a situation of distributors supplying the Zambian mining industry with a wide array of consumables but diminutive value added services. It is for this reason that equipment providers and distributors, who have been operating in Zambia for years, have come to differentiate themselves by providing the key producers in the mining industry with niche offerings that are tailored to the Zambian market and conditions. The decrease in copper prices has also affected the mining services and equipment providers. "The expectation is that equipment sales will remain rather flat next year, but we expect good growth thereafter as new mines emerge", said Deon Heyns, managing director of Barloworld Equipment Zambia.

The weaker prospect for 2013 adds to the pressure of establishing a well-trusted brand to be considered for future projects.

Barloworld Zambia is the sole agent for Caterpillar equipment in Zambia and has recently been awarded with a R1.1 billion contract to supply equipment to FQM that will last for 22 months. Deon Heyns explained what it entails to differentiate oneself as an equipment supplier in Zambia: "For each piece of machinery, Barloworld Equipment Zambia conducts a new product introduction. We know which parts every machine needs at each stage of its life cycle. We keep stock of fast-moving parts for all our machines in country, with major components held more often in South Africa. Barloworld customers also tend to keep certain fast-moving parts, especially if they provide their own servicing and maintenance. Parts are mainly sent by road, with air only used in emergencies as it is not cost-effective and some equipment is too big to be flown in. Ad-hoc requests from customers normally result in parts being sent from South Africa, which takes about two weeks."

Building on existing relationships with producers is key to ensure a steady workflow in a cyclical industry and service providers go to great lengths to demonstrate their commitment to producers in certain instances. The willingness to offer exclusivity has secured BIA its biggest contract to date at First Quantum's Kalumbila mine. "The project entails some of the biggest machines ever supplied into Africa and the biggest into Zambia. [All the equipment] for Kalumbila will arrive through the port of Durban before being sent by road into Kalumbila. The assembly has been phased to take just over two years because there is no logistical way that everything could arrive at once," said Damian Kilshaw, country manager for BIA Zambia.

As Zambia re-emerges as one of the world's copper giants, competition among the heavy weights of equipment suppliers is drastically increasing. Bell Equipment is also going beyond its regular model and investing heavily to showcase its capabilities in equipment supply in the Copperbelt. Mark Timmerman said: "Bell is currently building an inventory warehouse in Kitwe, which was showcased in Lusaka on April 4, 2013. The foundations of the warehouse are being built at the moment and we plan to have the facility fully operational in the next year. This facility will act as a one-stop shop for servicing machines, offering customer support, and training our in-house technicians. Rather than flying back and forth between South Africa we will be able to develop a more reliable base in Zambia. It also serves as a symbol of the significant capital we are investing in Zambia."

The trend for parts and equipment distributors to be able to offer full back-up and in-country servicing and maintenance is becoming a pre-requisite rather than an additional service. For this reason, distributors are placing an increased focus on establishing workshop facilities. As EC Mining's CEO, Tom Anderson-Slight said: "ECM's business is largely driven by quality services and being able to save our clients time. We offer full back up services on repairs and spares and we provide full stock-holding services to our clients."

Jai Mahavier from Truckmec, a local specialist machine and truck supplier, said: "Truckmec's working model relies on a continuous back up equipment availability. Truckmec also offers constant back up and maintenance solutions, which are not available through most of our competitors. All of our machinery is new and we count with excellent warranty conditions while we offer the support of our well-regarded engineering and technical team, which is based in-house."


Truckmec fleet on the side. Photo courtesy of Truckmec.

The value addition that Truckmec offers has secured the company contracts with many of the principle mining projects in Zambia.

Bridgitte Chingaipe, from Pex Hydraulics, commented on the impact of increased competition on companies specialized in supplying and servicing hydraulic components: "As a result of increased competition, Pex had to improve its service provision. Our technicians can conduct on-site faultfinding analysis on the machines, identify the problem, and even if we cannot fix it on-site, we can provide the necessary parts. We also provide in-house training for the key personnel that work on the machines. Pex stands for 'Parts Exchange,' and our business model is to have parts on the shelf in order to eliminate downtime. However, this is not easy in Zambia. If a unit breaks down, about 70% to 80% of the work can be done in Zambia, and for the rest we need to send it to South Africa. We try to help our clients, so that if they have rebuilt parts that they are not using, we can keep them on the shelf to eliminate downtime. We monitor our stock levels on a weekly basis, keeping minimum and maximum stock levels and ordering stock twice per month."

Another aspect that services companies need to consider is that introducing new technologies into the Zambian market may prove to be somewhat difficult. Between 2005 and 2007, the Finnish company Cathodex decided to expand beyond Finland, opening offices in Chile, Mexico and finally in Zambia. Chris Ndhlovu, regional manager of Cathodex, said: "Zambians had been manufacturing these products for 60 years and as a result it was initially a sensitive topic to introduce our foreign and more expensive technologies. Our edge strips and cathode plates also produced more copper than traditional plates. However, despite initial sensitivities, local customers soon realized the benefit that they could derive from using our technologies since we could reduce their costs by 60%. Once the initial barrier was overcome, Cathodex quickly established a strong name for itself in the local market."

Specialized Services: Drilling

Zambia's unique geological features and high level of competition means that the country is home to a number of highly specialized drilling companies. Kris Jedrzejczyk, from Blu Rock Mining Services, who has drilled for four different companies in Zambia since 2007 and operated 14 drilling rigs, said: "The amount of drilling [in Zambia] has reduced significantly and mining costs have risen, but our rates have remained the same. As a result, our profits have been

Mining in the Zambian Copperbelt is usually associated with high groundwater inflows Photo courtesy of SRK Consulting (SA).

squeezed. Many rigs in Zambia are currently at a standstill. The major projects have all been cutting back on exploration drilling recently, including Kalumbila and Kansanshi, as there is enough exploration data now to last them another 20 to 30 years. The main challenge of being an exploration drilling company is that there are certain phases when there is a lot of work and then a sudden slowdown."

To counter the contraction in the drilling market, companies are expanding their operations and expertise. "Reliant currently operates in Zambia and the DRC and is exploring potential opportunities in other countries. We have received an invitation to visit companies involved in sink and semi-metals in South Africa and Namibia and we are planning to enter into negotiations within the next few months. Although we have not had much experience with surface mines, we are also considering opportunities in that area in the near future," said Jerson Rojas, managing director of Reliant Drilling.

Drilling companies are not alone in the specialized services segment to feel the pinch of a decline in exploration drilling. "Recently, SGS has seen a 60% slowdown in the exploration market. The decrease has been mainly driven by the modest participation of the junior players who generally count on exploration activities which allows them to raise capital. However, there is a lot more within the mining industry such as process control and optimization of output. These areas are still growing and, although they are generally managed in-house, SGS continues to play an important role in this area. We are a significant player when it comes to certification and this business is another one that is on a high growth trajectory. Although, our focus has now shifted to the trade part of the business, SGS continues to innovate and offers new services related to environmental sustainability", said Kwabena Barning, managing director of SGS Zambia & Malawi and Mineral Services for Southern DRC.

Inkazteca currently operates 16 drilling rigs in the Copperbelt region. John Velasquez, director of Inkazteca, agrees that exploration drilling projects are becoming rare: "We have seen a slowdown in the drilling market in 2013. However, we have the advantage that most of our business comes from our work in the underground mines, which cannot stop producing. As a result, despite a slowdown in exploration, our business will continue as usual in the underground mines."

Despite the challenges and the cyclicality of industry, Zambian drilling companies are still committed to a region within which they see much promise. AAC Mining Executor is a contractor focused on specific development and production with principal projects at Mopani copper mine. AAC has also been involved in projects in the DRC since 2008 and has launched projects in India where the company established its presence two years ago. Javier Meléndez, logistics director at AAC, explained why drilling companies remain committed to the Zambian mining industry: "Zambia's mining sector has traditionally been strong and the opportunities that have arisen since the start of the privatization are immense. We believe that Zambia's democratically elected government understands the needs of the industry and is very much focused on improving the infrastructure in the country which will greatly benefit the mining industry in the medium term."

Conclusion

Though not as rich in its variety of mineral wealth as the neighboring DRC, Zambia offers what most mining destinations in the region lack in terms of stability and an equal commitment from both the private and public sector to grow the mining industry. Although Zambia is still recovering from the mismanagement of the mining industry during its nationalization period, current policy reforms are steering the country into a direction of growth. If Zambia can successfully diversify its economy away from its overreliance on copper mining, the economic risks to the country will decrease and other sectors will start to flourish, but this will be a lengthy process, highly dependent on the development of efficient infrastructure.

There is much being done to promote open dialogue between the government and the private sector and these measures have instilled confidence in international companies that are already present in the market. Zambia, as a politically stable sub-Saharan African country, will reap the full benefits of its mineral wealth as long as local partnerships and manufacturing are encouraged. As Roger Dixon, chairman and corporate consultant of SRK Consulting, concludes: "The Lufilian Arc remains a world-class ore body that has withstood everything that has been thrown at it and that is a very distinct advantage. It contains copper grades ranging from 1% to 15%. It all starts with the ore body and the rest can be managed."

Katanga, DRC's Green Pearl

An Overview

Tiger's open pit located in the proximity of Lubumbashi. Photo by Jolanta Ksiezniak, courtesy of Tiger Mines.

The DRC, the world's 11th largest country, home to 65 million people, should have been famous by now for its tremendous agricultural potential and its astonishing mineral reserves of $24 trillion. "Some merchant banks have rated the DRC as the fourth wealthiest nation in the world with regard to its natural resources. We expect the DRC's potential to be even higher, because of the country's immense diversity, from copper to diamonds, oil and coltan. The country also has significant energy potential on the Congo River." detailed Josh Foster, general manager of Bell Equipment DRC.

Instead, this Central African country usually holds the international headlines for such things as fights in the Kivus or the fact that it occupies the 183rd place out of 185 in World Bank's Ease of Doing Business Index with transparency and corruption still posing issues. The Extractive Industries Transparency Initiative (EITI) suspended DRC in April 2013 based on the country's central bank failing to account for $88 million paid to it over the last two years. Adding to this, the IMF suspended its $532 million loan program to DRC in December 2012, after the central government refused to disclose the terms of a 2011 mining deal involving the state and a controversial Israeli businessman, a move which cost the DRC $225 million.

It is not all doom and gloom however, as in September 2012 the DRC became the 17th country to join OHADA (Organization for the Harmonization of Business Law in Africa). This move will provide greatly improve DRC's business environment, providing a modern legal framework for joint ventures, as well as new and more appropriate forms of companies (SA and SARL) and corporate governance rules.

While mineral wealth is spread far and wide throughout the DRC, the most high-profile province of the country is Katanga, which has its capital in Lubumbashi, a city roughly 1,600 km from the troubled areas of the Kivus. According to the US Geological Survey, the DRC produced 580,000 tons of copper in 2012, a 60,000 ton increase over 2011, thus making the country the world's 8th largest producer of the base metal. The vast majority of that output came from Katanga, which has seen major improvements since 2006 under the guidance influential governor Moise Katumbi Chapwe. Local authorities' statistics show that the Province's annual budget went up from $21 million in 2006 to $658 million in 2013, while its industrial investment experienced growth from $5 billion to $20 billion during the same timeframe. This economic prosperity has also led to more than 5 million people moving in Katanga in recent years, looking for a better life. Boasting world-class copper and cobalt grades, the province is already home to top quality mining companies such as Freeport-McMoRan, GlencoreXstrata, MMG and Tiger Resources, among many others. Overall, despite infrastructure, energy, and mining code amendments woes, Katanga is moving solely in one direction: forward.

Josh Foster, general manager of Bell Equipment DRC.

Regulatory Framework

The process to amend Law 007/2002, more commonly known as DRC's Mining Code, is fully underway and this has been one of the mining industry's focal points of discussion over the past year. While negotiations are still ongoing, several of the government's amendment proposals have caused adverse reactions from private investors, while also leading to disparities across the DRC's political spectrum.

The first controversial suggestion is that of increasing state participation in mining ventures from 5% to 35%, with an additional 5% at every exploitation permit renewal. Additionally, the industry's income taxes would be standardized with those of the rest of the economy and would therefore go up from 30% to 35%. These measures would be complemented by yet another raise, this time of royalties, from 2% to 6% for non-ferrous metals, and from 2.5% to 6% for precious metals. Meanwhile, exploration permits' validities would be reduced from 15 years to only six, and would consequently put increased pressure on potential producers. Current tax incentives for the mining industry, such as the discounted 2% import tax during exploration and 5% import tax during exploitation, are also under scrutiny and it is uncertain whether the model, in its current form, will survive in the new Mining Code. Furthermore, the new Mining Code will have to incorporate the VAT as well, a tax which was adopted by the DRC only in January of 2012.

On April 5, 2013, DRC's Minister of Mines, Martin Kabwelulu, alongside the country's Minister of Finance, Augustin Matata Ponyo, issued an inter-ministerial decree banning exports of copper and cobalt concentrate, giving mining companies a 90 day moratorium to comply with the measure. The decree, envisaged to be an incentive for producers in the DRC to start beneficiating more copper in the country, had, however, several legal and practical flaws. Firstly, the changes that the decree aims to implement fall under the jurisdiction of the DRC's Parliament. Secondly, the lack of proper power supply across the DRC makes the beneficiation of copper unfeasible at the moment. The latter point was also cited by Katanga's governor, Moïse Katumbi, as the main reason for which he would not enforce the ban in DRC's main mining province. Given the decree's weaknesses, on July 4, 2013, the moratorium was extended until the end of the year and the current plans are to include the measure into the new mining code as well.

Emery Mukendi Wafwana & Associates (EMW&A) is a law-firm that has in-depth knowledge of the DRC's Mining Code. In 2000, the firm was chosen as the local consultant for the elaboration of the law and now, in 2013, it is once again taking part in processing the amendments. "There are three amendment proposals that we need to consider before elaborating the final draft of the new code: one from the government of the DRC, one from the civil society and one from the Chamber of Mines, an integral part of FEC (the Federation of Congolese Enterprises). Additionally, EMW&A can incorporate other amendments that have surfaced as being necessary during the past 10 years of mining code application. The new code will not be sent for parliamentary approval sooner than Q1 2014," said Edmond Diata, partner at EMW&A.

While the final form of the code is still engulfed in mystery, the need for dialogue is fundamental, as Moïse Katumbi, governor of Katanga, insists: "It is essential to have an agreement between the mining sector players, the chamber of commerce and the government: I am not going to accept this code otherwise. We run the risk of killing investment in the country and that cannot happen. It is my job as governor to create stability in my province and I cannot agree with something that will negatively impact the business sector."

Producing in Katanga

The relative calm before the storm

MCK, largest mining contractor in Katanga operating a project. Courtesy of MCK.

Consolidation best characterizes Katanga's copper production over the past 18 months. With power outages becoming increasingly severe during 2011 and 2012, companies embarked on a journey to secure the power needed to restore nameplate capacity productions. Furthermore, as more power gradually becomes available, through the refurbishing of old facilities and the construction of new ones, the majority of producers in Katanga are looking to expand big in the near-future.

Gécamines, DRC's state-owned mining company, under technocrat management since 2010, is trying to move away from just holding minority shares in Katanga's mining operations. At its height in the 1980s, Gécamines produced 500,000 mt/y of copper, but in 2012, the company only reported 35,000 mt. Big plans are in store however, with a target of 100,000 mt/y in 2015.

"2012 was the first year of Gécamines' 2012-2016 Strategic Development Plan. As part of the plan, Gécamines recommenced its exploration programs, which had been on hold for more than 20 years and to date, we have drilled 12,334 meters, increasing our total copper reserves to 4,851,000 mt. We've also begun to augment the capacity of our production units: the Kambove and Kolwezi's concetrators' capacities were increased by 600 and 1,000 mt/d during 2012. Additionally, we are constructing an HMS plant, which will be finalized in 2013. Gécamines is also putting increased emphasis on its auxiliary units and we have acquired new machinery in Katonto and Luena. On the power front, we have commenced a feasibility study for a 500 MW thermal power-plant in Luena that would solve our current energy deficit," said Kalej Nkand, CEO of Gécamines.

In 2013, Gécamines made its first ever move to acquire an asset outside of the DRC, partnering with Freeport and Lundin to acquire OM Group's refinery and sales business in Finland for $435 million. Additionally, Gécamines is gradually acquiring proprieties at home. "Our joint-venture policies have also changed as part of our Strategic Development Plan: CMSK Sprl is now 100% owned by Gécamines, and we have also fully recovered the large deposits at Deziwa from Somidec Sprl. Other notable decisions include asserting full ownership of the Mutoshi and Kasunta Lupoto projects, as well as the commencement, in July 2012, of an audit program for eight of our joint-ventures," said Nkand. Gécamines is also undergoing a thorough financial reform and in 2012, the company reduced its debt from $1.5 billion to $962 million. This move has also led to a restructuring of its workforce: "In 2012, we reduced the number of our employees by 730, and, looking forward, we have $130 million allocated for the next two years to efficiently reorganize ourselves on this front and to emerge leaner and better prepared," said Nkand.

Kalej Nkand, CEO of Gécamines.

Obtaining financing for its large-scale projects could prove to be problematic for Gécamines in the current economic climate, but so far the company is on track with its ambitious plans: "Gécamines' main objectives for 2013 are to produce 50,000 mt of copper as well as to successfully re-launch itself as a world-class independent mining operator. We are optimistic and confident that we will be able to accomplish our Strategic Development Plan's goals and produce more than 100,000 mt/y of copper starting in 2015," concluded Nkand.

Tenke Fungurume Mining (TFM), the DRC's largest single copper mine, is located 175 km northwest of Lubumbashi. Its ownership is divided between Freeport-McMoRan (which operates the mine and holds a 56% stake), Lundin Mining (24% equity stake), and Gécamines (20% stake). TFM's story dates back to 2006, but actual production at the site only started in March 2009. Exclusively a copper cathode and cobalt hydroxide operation, TFM produced 157,671 mt of cathode and 11,669 mt of hydroxide at a cash cost of $1.23/lb in 2012. The year 2013 will break record production values at the site, as H1 2013 saw TFM deliver 109,588 mt of cathode and 4,845 mt of hydroxide already, at an average copper grade of 4.5% per mt. These performances come as the result of the Phase II expansion of TFM, which now enables the operation to produce at a nameplate capacity of 195,000 mt/y of copper cathode and 15,000 mt/y of cobalt hydroxide. Meanwhile, on the power front, "TFM has invested more than $200 million in the refurbishment of four turbines at the Nseke hydro power station, which has the potential to produce 260 MW of electric energy," said Mike Ciricillo, president of Freeport-McMoRan Africa.

Despite legal woes, Eurasian Natural Resources Co. (ENRC) is continuing mining operations (at the Boss Mining, Camrose, and Frontier mines) at full speed: in 2012, it accounted for 35,000 mt of sealable copper content at a 3.14% average grade and 9,500 mt of sealable cobalt at an impressive average grade of 1.43%. 2013 has seen a tremendous increase of ENRC's production, due to its newly inaugurated 40,000 mt/y copper concentrate Frontier mine. In H1 2013, ENRC produced 37,000 mt of copper content at an average grade of 1.51% already, while also putting out 4,800 mt of cobalt content at an average grade of 1.47%. ENRC's smelting facilities are, however, located in Zambia, at the Chambishi facility, which was acquired by the company in 2010 for $300 million.

GlencoreXstrata, the world's fourth largest diversified mining company, is also present in the DRC. In May 2012, the Anglo-Swiss company increased its share in Mutanda Mining (MUMI) to 60% with a $480 million deal. However, the idea was to merge the 2,300 people strong MUMI operation with its neighboring Kansuki project, a move made official in July 2013, between Dan Gertler's Fleurette Group and GlencoreXstrata, now operating the integrated project with a 54.5% stake. Mutanda produced 87,000 mt of copper cathode and 8,500 mt of cobalt hydroxide in 2012. Expansions plans are in full swing and the new Mutanda/Kansuki project is expected to have an annual capacity of 200,000 mt/y of copper cathodes and 23,000 mt/y of cobalt hydroxide by the end of 2013. GlecoreXstrata also owns 75% of the Katanga Mining Co. and the company's KOV open pit mine and KTO underground mine produced 92,963 mt of copper metal and concentrate in 2012, at a grade of 4.12%. Power disruptions caused 1,609 hours of inactivity which led to the company increasing its output by only 2% in comparison to 2011. In March 2012, GlencoreXstrata signed a $283 million loan for a power project with SNEL which will see 450 MW being delivered to Katanga, Mutanda and Kinsuki by the end of 2015. The operations, which currently consume around 150 MW, should increase consumption to 400 MW, given future expansion plans (200,000 mt/y capacity for Mutanda/Kinsuki's and 310,000 mt/y for Katanga Mining). Results can be seen already, with Katanga Mining boasting 60,274 mt of copper metal and concentrate produced at a grade of 4.48% in H1 2013, a volume 40% higher than that of H1 2012.

Tiger recognized for its social responsibility programs in the DRC. Photo courtesy of Tiger Resources.

Minmetals Resources, a subsidiary of China Minmetals Corp. (CMC), acquired Anvil Mining in February 2012 for $1.3 billion. Today, Minmetals Resources' subsidiary, MMG, is effectively running operations at the Kinsevere site, which produced 36,048 mt of copper cathode in 2012. After solving power supply issues, MMG is currently running the site at its full nameplate capacity of 60,000 mt/y. Miles Naude, general manager of MMG DRC, talks about the importance of the project to the global mid-tier producer and the plans ahead. "DRC is central to MMG's African expansion strategy, and Kinsevere is the company's spearhead in the continent," Naude said. "The operation employs a total of 1,680 employees and contractors, 97% of which are DRC nationals. This is above the Department of Labor's local employment ratio requirement of 93.5%. The goal is to get our business into sustainable consistency and achieve our 5,000 mt/month nameplate capacity regularly, despite the limitations of grid power supply. MMG sold the 70% stake that it had in the Mutoshi project back to Gécamines, while receiving in return the exploration and mining rights for eight tenements in and around the Kinsevere operating asset. MMG strongly believes that the DRC and the Copperbelt represent tremendous opportunities and we want to expand our footprint here (in the DRC or Zambia)."

In 2011, Jinchuan Mining of China acquired Metorex for $1.36 billion, gaining the ownership of Ruashi Mining, a site on the outskirts of Lubumbashi. Cameron Clarke, general manager of Ruashi Mining, spoke about the project: "Our feed grade is about 3.25% and we produce 3,100 mt/month of copper cathodes; we also make between 260 and 320 mt/month of cobalt hydroxide, which accounts for between 15% and 25% of our overall revenue, depending on the feed. We are now back at the pre-power crisis production levels of 2011 because in 2012, we were producing 37% less than now as a result of power unreliability. Ruashi Mining's operating costs at the moment are just under $4,000 / mt."

Meanwhile, Tiger Resources of Australia is rapidly expanding its works at the SXEW plant for its flagship Kipoi project, in which the company owns a 60% stake (the other 40% belongs to Gécamines). Charles Brown, COO of Tiger Resources, spoke about Kipoi, which produced 35,000 mt of concentrate in 2012, but also about the company's other expansion plans: "We achieved record production in Q2 2013 at Kipoi and as we are digging deeper, the grades become higher. The concentrate is being sold abroad, mainly to Chambishi (Zambia) and China. The SXEW plant's construction is going ahead full-speed, and we will be producing copper cathode there starting Q2 of 2014. We acquired a 20% stake in Chrysalis Resources' in January 2013, giving us access to their Zambian copper projects and providing diversification from having assets in just one country. We also acquired another reconnaissance license in DRC, called La Patience, for which we will start drilling in the 2013 dry season. Our plans are to expand to a 50,000 mt/y operation in 2016."

Mawson West further consolidates the strong Australian presence in Katanga, through its two projects, Dikulushi (a former Anvil Mining asset) and Kapulo (a greenfield project located in the north of the company's tenements). Initially listed on the ASX, Mawson West decided to move on the TSX, where it managed to raise funds of over $120 million in 2011. "The Dikulushi ore-body is magnificent – typically 6% to 7% copper, and 200 g/mt silver. The strategy was to utilize the revenue from Dikulushi to assist with the remaining funding for Kapulo. Currently, open pit mining at Dikulushi has been completed, and we are now processing its stockpile which has generated good revenue. Dikulushi's next phase will be its extension work, circulating to the market that Mawson West is about to finalize an underground mining strategy utilizing existing infrastructure. For the next one to five years our strategy will be to extend Dikulushi via its underground facility and introduce satellite ore-bodies. The construction of Kapulo is over 50% complete with its construction risk diminishing; $70 million has currently been invested, with $50 million still available to spend. We generate our own power at both of our projects, 4 MW at Dikulushi and 6 MW at Kapulo. During 2013, the company has invested $10 million on exploration drilling, 65% to 70% of which has been expended at Kapulo, which will be commissioned in the second quarter of 2014," said Bruce McFadzean, managing director and CEO of Mawson West.

Indian players are also well represented in the DRC, with such companies as Somika and Rubamin, which were however among those affected by power supply issues in 2012. Last, but not least, one of the most promising companies in sight is Ivanhoe Mines, which holds ownership rights for the Kipushi (68% Ivanhoe, 32% Gécamines) and Kamoa (95% Ivanhoe owned through its subsidiary, African Minerals) projects. Kamoa is a newly discovered asset in the proximity of Kolwezi, and according to a January 2013 resource estimate, the project is the world's largest undeveloped high-grade copper discovery, with indicated resources of 739 million mt at an average copper grade of 2.67%, containing a total of 43.5 billion lb of copper. Kamoa's preliminary economic assessment estimates an initial annual production of 143,000 mt of copper, at a cash cost of $0.95/lb, which could sustain the mine's life for 61 years.

"Katanga still going strong"

Interview with Moïse Katumbi Chapwe, governor, Katanga province.

In 2006 you found the Province of Katanga with a budget of just $21 million and an industrial investment of $5 billion per year. Today, in 2013, the budget is $658 million and the investment is $20 billion per year. Given that Katanga does not receive substantial funds from the central government, how did you achieve this performance?

When I became governor of Katanga in 2006, the province was the third contributor to the DRC's GDP and after a year of my mandate, we were number one. Moreover, Katanga was contributing only $80 million to the national treasury whereas now we bring in $2.8 billion. We have also been actively fighting corruption: the monthly duty that we were receiving from customs in 2007 was $1.2 million while now it is $90 million. Some corruption is left but we are slowly and surely working to eradicate it. We are building roads, water infrastructure, electricity, and schools, all with the goal of improving people's lives. Now, results can be seen everywhere: life has changed in Lubumbashi, in Kolwezi, in Likasi. Sendwe Hospital in Lubumbashi has 2,500 beds today that are accessible to everyone, from all parts of the province, irrespective of their financial status. All these achievements would not have been possible without the trust that was built with the investors and our collaboration.

Katanga is supposed to receive back 40% of its contribution to the central government but, today, we get only about 3% of that; adding the 4% for the salaries still leaves us below 10%. The constitution in the DRC is very good, and according to it Katanga should receive 40% of its contribution in return, but that is not respected. Katanga is responsible for 80% of DRC's GDP.

Can you tell us more about the current situation of the mining industry in Katanga, and how you are dealing with the issue of power supply in the province?

In 2006, we were exporting 18,000 mt of copper cathode annually and now we are at over 650,000 mt/y; if we include concentrates, that number goes up to more than 1 million mt/y. I was criticized at the

time but I had a vision to create added value here: in two years' time, Katanga will be exporting 1.5 million mt/y of copper cathode a year.

The electricity issue is a result of the mistakes of past governments, which should have signed the Inga project earlier with our South African partners. However, I want to reassure everyone that things will change very soon in Katanga. We are currently working on the Luapula project, at the border between Katanga and Zambia, which will bring 1,400 MW of new capacity in Katanga in two years' time. We also have several mining companies working on five different power projects, such as Tenke Fungurume at the Nseke hydroelectric power plant. Moreover, Inga phase two is going to be completed in December so with all this power coming online, Grand Inga will serve more for power exports.

The dialogue to amend the 2002 Mining Code has started. What is your opinion regarding these amendments?

Changing the mining code is not good for the business community and we should keep the promises we made to these investors when they first came here. Perhaps new players can be subjected to these laws, but it is essential to have a dialogue and an agreement between the mining sector players, the chamber of commerce and the government: I am not going to accept this code otherwise. We run the risk of killing investment in the country and that cannot happen. It is my job as governor to create stability in my province, and if people lose their jobs as a result of this code, I will be responsible. I cannot agree with something that will negatively impact the business sector.

Infrastructure and education are essential for development. Which achievements are you the most proud of?

In 2006, there were 600,000 students in primary and secondary schools and now we have 3 million. We have to educate people, to give them a chance to do something once the resources disappear. With the help of mining companies, we are training technical people and rehabilitating schools across the province; the DRC needs a middle class. Road infrastructure is also essential: when the Belgians left Katanga there were only 450 km of roads in a province the size of France. In six years, we have built 1,400 km of asphalt road and rehabilitated 5,000 km of dirt road. A lot of the credit for this goes to the South African IDC (Industrial Development Corp.) because they financed a great deal of our development projects. They helped us at the right time because people had nothing to eat and we were importing 90% of our food, while now that number has dropped to 35%. I told mining companies to develop agriculture projects because food is a basic need. Without it, people will not be able to do anything and they will look towards their governor to find answers. As a leader, you have to understand the people and not forget them.

What is the vision that you have in mind for the future of the province of Katanga?

By now, the business community has understood what my priorities as Governor are, and it can trust me to ensure a stable and prosperous environment in Katanga. My vision is to diversify our economy, to develop agriculture, tourism, to not depend on mining alone. We need more people to come and explore opportunities here and we welcome all those that want to come to Katanga and start businesses here. For us, investors are like eggs: we need to take care of them and make sure that they do not break because if one egg breaks, the rest will go rotten as well.

Power in Katanga

The economy's Achilles' heel


Kansuki Bulk Emulsion Plant. Photo courtesy of AEL Mining Services.

Power is, without a doubt, the biggest challenge to the economy of Katanga. With the potential of generating 106,000 MW per year, the equivalent of 37% of Africa's power needs, the DRC presently produces only 2,100 MW annually. DRC's main hydropower plants include Inga I (351 MW), Inga II (1,424 MW), Mwadingusha, Nseke (260 MW), Nzilo (100 MW) and Koni (36 MW). Works for Inga III, a $12 billion, 4,800 MW capacity project, the first phase of the gargantuan 40,000 MW Grand Inga project, were announced to commence in 2015, coincidentally just one year before the elections of 2016. However, the project is far from becoming a reality just yet; three consortiums, including the Three Gorges Corp. of China, are still competing for Inga III, which would ultimately sell 2,500 MW of its production to South Africa. Meanwhile, an agreement between DRC's SNEL and Zambia's ZESCO was signed in May 2013 for the construction of a $3 billion, 1,400 MW hydropower plant in Luapula, at the border between the two countries. The capacity would come online in three years' time and would be split equally between the neighboring states. Other planned and noteworthy projects in Katanga include Busanga (240 MW) and Nzilo II (120 MW).

Inadequate power supply reliability has impacted several of Katanga's mining producers in 2012 and consequently, companies have taken matters into their own hands. Restoring production to nominal capacity had its costs however, as Miles Naude, general manager of MMG in the DRC, explained: "Since there is not enough energy to meet demand, companies can embark on two different routes. The first is to operate with whatever energy you can get from the grid, while the second entails the installation of your own power-generating facilities. In order to mitigate our reliance on existing power supply, and to keep production at high levels, MMG decided to install its own generators, for a total of 17 MW, which were commissioned and came into play in November 2012. Due to this strategic move, ever since December 2012, MMG has been able to produce copper cathode at our Kinsevere plant's nameplate capacity, which is 5,000 mt/month, 60,000 mt/y. However, the costs associated with the utilization of this extra power are significant."

A similar move was implemented by Ruashi Mining, which by September 2013, installed a total of 22 MW on its site, allowing the company to produce at nameplate capacity again. However, these solutions are temporary, as Clarke of Ruashi explains: "The extra power fills in the gaps from SNEL. This business model is not sustainable in the long-run, however, and we are collaborating with SNEL to refurbish some of the existent infrastructure. We need to move towards grid power that will grant us access to a cheaper, more stable solution."


Mathew Fredericks, head of mining for Aggreko EMEA.

Although without energy-intensive SXEW plants at the moment, Mawson West is also confronting high operational costs as a result of the unstable power infrastructure: "We generate our own electricity at both our projects, producing 4 MW power at Dikulushi, and 6 MW at Kapulo - not a massive power requirement having no big SXEW recovery processes. An SXEW would require 25 MW to 30 MW power. Our power production at $1.70 per liter is one of our highest costs. We are looking at an option at Kapulo of drawing power from Zambia, as Kapulo is only 40 km distance from a Zambia power source," said McFadzean.

These developments benefit companies like Aggreko, which specialize in providing temporary power generation solutions. Mathew Fredericks, head of mining for Aggreko EMEA, explains: "There is a huge demand for the supply of reliable, high-quality power for mine operators in DRC. Mining in DRC is booming yet there is insufficient power infrastructure in place to support this. We are developing our presence in-country to better support mining customers, while also being available to support other industries and local utilities when requirements arise."

All companies that are able to provide power generators are seeing opportunities across the market. Miguel Dos Santos Ferreira, area sale manager of BIA DRC, said: "The most important part of our business in DRC is currently represented by Cummins. The power and electricity issues facing the country call for the application of Cummins Power Generation, which BIA can sell to the private, commercial and mining sectors. We are working on a big project of power station for up to 16 MW."

Meanwhile, Clive Davenport, commercial manager of Chanic Equipments, is experiencing a similar situation with his product offering: "If you want to make easy money at the moment, just sell generators. Chanic sells the Gesan brand, which has been part of the Atlas Copco group for the last two years. Gesan builds the generators in Spain according to the specific requests of clients. For example, in the DRC there is no need for an engine preheater, but it is a good idea to have certain filters to deal with the low quality fuel here. We sell four containers of generators per year, which amounts to between 60 and 80 models."

Finally, Amaury Lescaux, general manager of Swedish Machinery and Trucks (SMT), Volvo's exclusive dealer in DRC, is also seeing its business obtaining increased profits on generators: "Volvo Penta's main strategic products in the DRC are its gensets, which beneficiate from enormous demand in the DRC, given the country's power supply issues."

Tiger Resources is also working with SNEL on assuring power supply for its SXEW, which will become operational in 2014. Charles Brown, COO of Tiger Resources, said: "The Shilatembo switching station will be refurbished and used as a take off point for the Kipoi supply. We agreed to replace all the copper conductors in a triangle between Likasi-Shilatembo, and Mwalingushi dam as well as the connection to Lubumbashi, for a total of around 240 km of overhead power lines. This will increase the network capacity by 25% and will decrease energy losses by 20 MW, which is roughly the electrical power SEK requires."

Often overlooked, the optimization of the existent power network could also make a big impact. Established in 1981, Panaco is one of the leading general electricity companies in Katanga, and the official distributor of brands such as Phillips and Schneider in the province. Samir El Masri, general manager of Panaco, talks about one of the company's in-house energy efficiency studies: "DRC consumers pay a monthly fixed rate for their electricity, so they are not concerned with saving energy. Panaco conducted a study on the use of energy-saving light bulbs, determining that their installation, which would cost $7 million, would save Lubumbashi 70 MW. The government is currently considering this project; the solution is to make consumers pay for their consumption, educate them about the cost of power."

Solving the power supply issue is essential to unleashing the full potential of Katanga's mining sector and the plans on paper so far look promising. The main question remains when are these plans are going to become reality? Ernest Gielink, operations director at MCK Trucks, one of the leading mining subcontractors in Katanga, calls for unity among players to overcome Katanga's number one challenge: "Access to power in the DRC is a two-part problem, which involves generation and distribution. However, distribution is difficult, as the power plants are located far from the operations. It does not help if every mine builds its own independent project. In order to create wealth for the country, a new or upgraded national grid needs to be built, which includes interlinking all of the independent projects. The off-take agreements are crucial, and we need to get everyone to work together and to approach it jointly."

Service Providers

Quality rather than Quantity

Bell machines operating at Ruashi Mine. Photo courtesy of Bell Equipment.

Those who knew DRC and ventured into the country early on, before 2006, when risks to doing business were considerably higher, had much to gain. Today, Katanga's service sector impresses through quality, rather than quantity and surprisingly, not many newcomers have set up shop in the past 18 months.

Geoquest is one of the companies that became familiar with DRC early on, in 2005, and helped guide several big companies into the country. Tobias Posel, director of Geoquest in DRC, explained: "An investor deciding to establish a company in the DRC must conduct sufficient prior research and think strategically about his or her approach. Investors can ask GeoQuest for advice on entering and succeeding in the country. It is not straightforward to conduct business in the DRC and networks are crucial."

A privately-owned geological service company, Geoquest mainly offers exploration and logistical services in Katanga, but is now looking to create a stronger presence in the market for environmental services, such as audits and environmental studies: "In Katanga, we offer solely exploration and logistical services, although we are able to pull in other services either through our Lusaka office or via other subcontractors. In our exploration segment, we help evaluate and develop the concessions of mining clients—we set up camps, provide technical teams and vehicles, and supervise sampling programs and drilling. We provide services up to feasibility level, including metallurgical consulting, surveying, environmental consulting, drilling, ore-body modeling and geophysics. In short, we are specialized in project management, managing subcontractors that were appointed by the clients or selected by GeoQuest. Our expertise lies in running large drilling programs, collecting data and shipping and analyzing samples. We also provide administrative, financial and logistical services. Now, we hope to create a stronger presence in the market for environmental services," said Posel.

Meanwhile, the equipment supplier market is somewhat crowded, with companies such as Bell Equipment, Congo Equipment (CAT, Metso crushers), BIA (Komatsu, Cummins, BOMAG), DEM (John Deere, Hitachi), SMT (Volvo), Chanic (Sany, Shantui), JAC Motors (JAC), and Zahira (TATA Motors) all competing for the ever-increasing Katangan mining market. However, with more Chinese mining companies coming to the DRC, the established equipment suppliers are seeing increased competition from their Asian counterparts.

Congo Equipment, which employs 650 people, is the exclusive provider of CAT machinery, and focuses exclusively on Katanga and on its mining sector to which it sold 180 machines in 2012. Peter Malley, general manager of Congo Equipment, spoke about the Chinese companies' presence in the market: "More Chinese mining companies on the ground means more Chinese equipment suppliers on the market, since they are very loyal to their own brands. In 2012, the Chinese had 12% of the equipment market share here and now they have 22%."

Beyond simply supplying machinery, equipment providers are placing increasingly high emphasis on the quality of after-sale services offered. Given the remote locations of mining sites throughout a province the size of France, and the costs associated with multi-million dollar trucks not working, that comes as no surprise.

Although relatively new to the market, Bell Equipment DRC has been on a growth fast-track in recent years, becoming a landmark business for Katanga's mining sector, offering support at sites such as Ruashi, Chemaf, and Mbendi Mines. Josh Foster, general manager of Bell DRC, said: "In Katanga Province, most of our business is mining-related, although we expect our infrastructure footprint to grow when the government ramps up its infrastructure program. Our head office in the DRC is located in Lubumbashi, and we have depots in Kolwezi, Bukavu and Kibali. Bell Equipment has always been a service focused business. When a unit is temporarily shut down due to an error, the greatest loss in value comes not from the cost of repair, but from the loss in production. Most of Bell's growth over the last few years has derived from increasing its support staff. Customers are looking for suppliers that will go the distance to solve their problems."

Working closely with companies such as Bell and Congo is MCK Trucks, Katanga's leading mining subcontractor, which employs almost 2,000 people, out of which only 44 expatriates. The company took a hit during the crisis of 2008 but has emerged leaner from the battle. "MCK Trucks' core focus is to act as a sub-contractor at local mining operations to conduct load and haul operations, and today we are present on sites across Katanga. To a lesser extent we also work on tailings dams, new plant developments or extensions," said Sam Opare, general manager, MCK Trucks.

Bernard Alberini, general country manager for DEM DRC, John Deere and Hitachi's official distributor in the country, shares Foster's attention to quality services: "Providing quality service to customers is essential because no matter how good the machinery is, within its lifetime, it will need overhauling and repairing; this, in turn, makes close and efficient after-sales support mandatory. We are aware of this fact and the network of service-points in the DRC is a strategic element for DEM Group's business growth. Our ability to provide good service strengthens our relationship with our clients but also with our OEM at the same time; consolidating this chain is essential to DEM Group."

Having recently opened a new facility in Lubumbashi, DEM DRC is increasing its staff and planning to open new outlets across the country. Active in the mining, agriculture and infrastructure markets, Alberini spoke about how these sectors are interlinked: "It is important to note that SDIAG DRC, a subsidiary of the SDAI holding group, has also been actively participating in the DRC government's huge efforts to promote agriculture mechanization in the country. To that end, we are promoting and selling agricultural tractors and implements across the DRC, on a large scale. In Katanga, the authorities are encouraging mining companies to invest in agriculture programs: the land is fertile and there are consistent water resources here, so the conditions are perfect. More farming would help the province become self-sufficient in terms of food. There are significant synergies between mining and agriculture in Katanga and a good example of that is the Agrimines exhibition that will be held in September in Lubumbashi, which will focus on the both these sectors and their interaction."

Tobias Posel, of Geoquest, added: "In fact, the governor has issued a local law obliging mining companies to run 500 hectare sized farms and produce mainly food (maize)."

With a history of more than two decades in the DRC, South African based AEL Min-

Francis Kasongo, managing director at AEL DRC.

ing Services, a producer and supplier of commercial explosives and blasting services, left the DRC during tumultuous times but returned firmly committed to the market in 2006. During the first phase of the expansion which saw it take over 90% of the market, AEL invested in several mobile manufacturing units throughout Katanga, its main region of focus, and today, the company is present in Dikulushi, Fungurume, Kakanda, Kinsevere, Kolwezi and Ruashi. Francis Kasongo, a native of Lubumbashi, the first Congolese managing director at AEL DRC, spoke about phase two of his company's expansion: "The second phase of our operations involves a bulk emulsion plant within the country. The Kansuki Bulk Emulsion Plant is presently in the commissioning phase, and we expect our first output from the plant in October 2013. The total plant capacity will be around 3,000 mt per month, which will exceed the needs of the province in terms of emulsion. This is an important milestone for the DRC as this is the first bulk emulsion plant built in the country and for AEL as we become a local producer."

In a country with a high perceived security risk, dealing with explosives was always going to be a delicate matter, but things are slowly changing: "What is different is the perception of explosives, which used to be seen as a security risk. People are becoming aware that it is also a key industry for the mining sector. In Kinshasa, we witnessed this change first hand; officials began to recognize that explosives were an essential part of the growth of the copper industry. The government is currently working on new regulations for the explosives industry, as the present laws date back to 1955 and do not take into consideration the latest technological developments. The regulations are shifting from a focus on security towards a focus on safety — for the local people, the surroundings and the company."

South African construction company Group Five entered the DRC in 2005. Paul De Gernier, general manager of Group Five in DRC, said: "The DRC is the most important mining hub for Group Five outside of South Africa, generating 40% of the total revenues that our business unit makes abroad. We have been involved with work in the Kolwezi area, but also at Kinsevere, Camrose, Kakanda; our most challenging project was Tenke-Fungurume however, because it was high-profile, fast-tracked and had many different contractors on site. Group Five's growth in the DRC has been especially good over the past two and a half years, and we have invested a lot of money here during this period: we have a 20,000 square meter facility that acts as a support center. Group Five is probably the biggest SMEIP (Structural, Mechanical, Electrical, Instrumentation and Piping) construction company in the DRC right now."

In logistics, companies such as Polytra, Malabar, and Bollore are among the leaders of the segment. A Belgian family owned-company, Polytra is a transport engineering and consulting international logistics company, and its DRC operations, which entail around 100 employees, are essential for the company's African presence. Geert Van Gansbeke, area manager Africa, Polytra, spoke about the market's slight concentrate export slowdown and how Polytra is coping with it: "Although copper exports increased during 2012, we have started to witness a general industry slowdown since June 2013. Exports of concentrate have decreased, as a result of a slowdown in global copper prices and the increase in local production costs. Significantly lower margins means that some companies no longer see exporting of some products as being economically viable. However, Polytra is continuing to make investments in the DRC and we have 40,000 square meters of land in development. The slowdown has not affected our business too drastically, so we are staying on track and continuing to make investments, both in the DRC and in other countries, with more products and greater diversification across clients and sectors. We are staying very positive, despite the slowdown during the last few months, because the medium to long-term growth prospective for the DRC is still very strong."

Over the past 18 months, established players such as Malabar Group have been dealing with increased competition that has put pressure on profit margins. Nonetheless, Malabar has managed to expand its geographical reach over the past year, opening new offices in Aru, Bukavu and

BIG PROVINCE BIG PROJECTS

2006-2013 KEY PROVINCIAL GOVERNMENT ACHIEVMENTS:

- Increase of provincial budget funds from 21 million USD in 2006 to 658 million USD in 2013, x 31 increase
- Increase of foreign industrial investment in Katanga from 5 billion USD in 2006 to 20 billion USD in 2013
- Increase of customs generated revenue in Katanga from 47 million USD in 2006 to 193 million USD in 2010
- 1,400 km of asphalted road and 5,000 km of dirt road built since 2007

INFRASTRUCTURE

- Lubumbashi
  - Rehabilitation of 90% of all roads in Lubumbashi
  - Completed rehabilitation of the Luano Airport runways
- Completed rehabilitation of the 100 km route between Lubumbashi and Kasumbalesa
- Kolwezi – rehabilitation and stabilization of roads throughout the city, which confronted itself with continuous erosions and floods
- Likasi – rehabilitation of roads in Likasi, which had one of the most degraded road networks in Katanga in 2007
- Rehabilitation of the Kolwezi-Likasi road
- Lualaba Region
  - Completed the Kolwezi – Kasaji road, which can now be done in 4 hours instead of 3 days
  - Kasaji – Sandoa / Dilolo – Kasaji / Dilolo – Sandoa segments are now operational
  - Ongoing construction of 710 meter long bridge, capable of sustaining 120 tons over the river of Lualaba, destined to facilitate heavy traffic to Kolwezi
- Haut Katanga region
  - Sakania – Kasumbalesa strategic road works:
    - Kasumbalesa – Mokambo has been completed,
    - Mokambo – Sakania still in the works
    - Kasumbales – Kilwa – Pweto refurbished completely
    - Lwambo – Mitwaba refurbished completely
  - Haut-Lomami region
    - Kamina – Kabongo / Kabondo Dianda – Kamina segments done
- Tanganika Region
  - Rehabilitation of Tanganika – Moba – Nyunzu – Kabongo – Bendera – Kabalo roads

POTABLE WATER SUPPLY (2007/2011)

- Likasi – 54% / 80% | Kolwezi – 43% / 53% | Kalemie – 37% / 56% | Lubumbashi – 57% / 70%

POWER SUPPLY

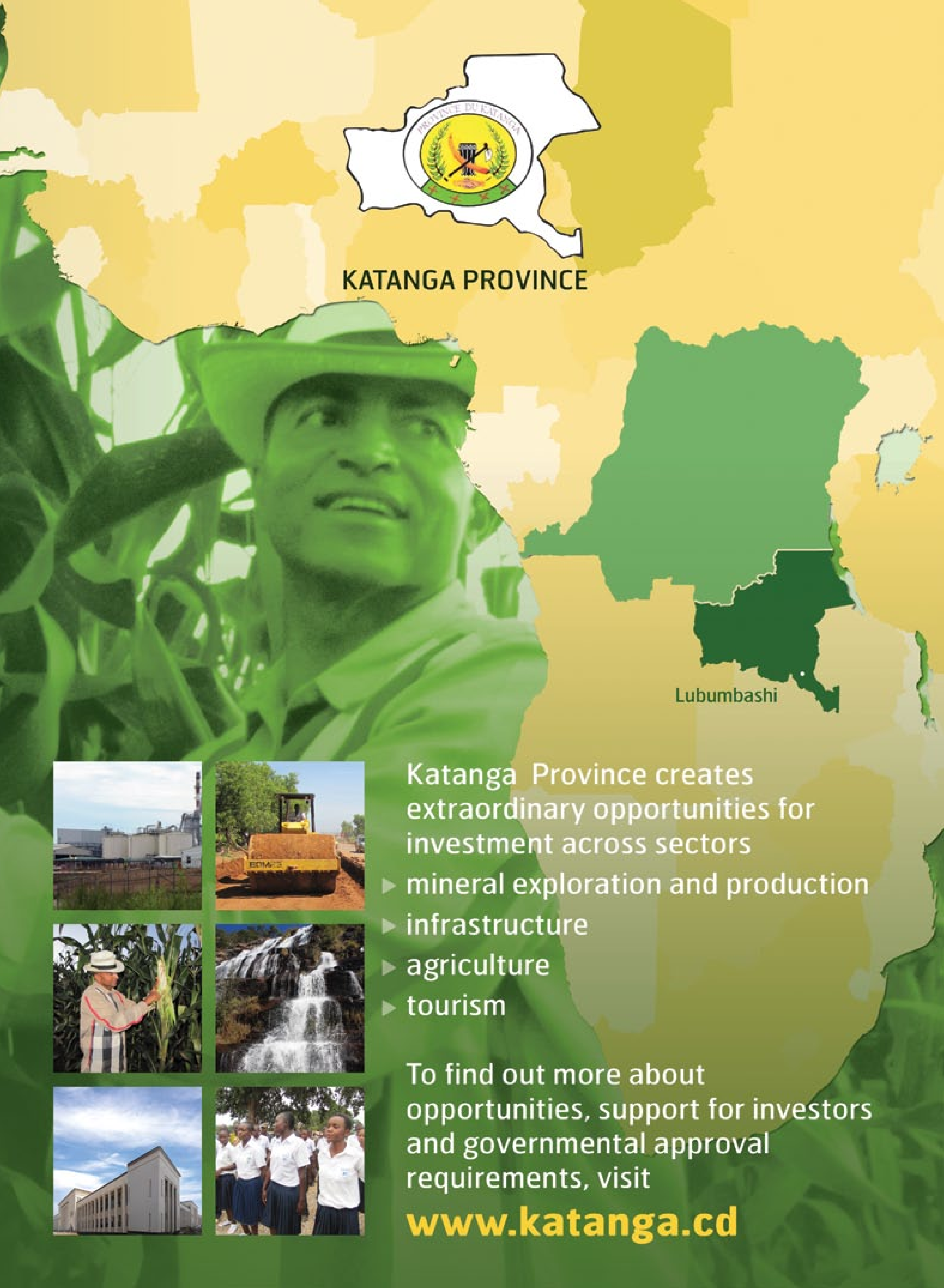
- Following measures have been taken:
  - Rehabilitation of existing power facilities / acquisition of new transformers / construction of new power redistribution facilities / acquisition of new cables / acquisition of numerous power generators for the territories without power access
  - Kasaji High Voltage power project in progress
  - Kapanga – hydroelectric dam project in progress

EDUCATION

- Katanga has managed to break records at national exams for 2 years in a row; the most successful students were awarded scholarships and their exam fees were paid by the local government
- All primary education rendered obligatory since 2007, by the decision of the Katangan Provincial Government
- In 2010, the Provincial Government took the decision to establish craft schools suited to the needs of each district of Katanga
- Contributions to rehabilitating schools throughout Katanga, among which: Kiwele High-School, Mwanga High-School (Kolwezi)
- Construction / Financial Support / Rehabilitation for the following universities: Superior Institute of Statistics (Kamina and Kabongo), Kasaji University, Mulungwishi University, Likasi University, Malemba University, Kamina University, Kolwezi University.

HEALTH

- Lubumbashi: Sendwe Hospital and University Clinics rehabilitation / Hospital construction in progress in Karavia neighborhood
- Likasi: DACO Hospital rehabilitation
- Kolwezi: Mwangeji Hospital rehabilitation
- Kamina: District Hospital rehabilitation
- Kalemie: Kalemie Hospital rehabilitation
- Construction of Kipushi Hospital, the first large-scale hospital of Haut-Katanga
- Construction of Kashobwe Hospital


PROVINCE DU KATANGA
KATANGA PROVINCE
Lubumbashi
Katanga Province creates extraordinary opportunities for investment across sectors
▸ mineral exploration and production
▸ infrastructure
▸ agriculture
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Ritchie Callaghan, managing director of Malabar Group.

Geert Van Gansbeke, area manager Africa, Polytra.

Kinshasa. Ritchie Callaghan, managing director of Malabar Group, talks about the evolution of the mining market: "What we are seeing is an increased formalization of the DRC market, a phenomenon that drives up the demand for correct, quality services. Listed mining companies have to conform to the regulations of the stock exchange and therefore want to deal with service providers that have the same correct approach; Malabar is perfectly in line with this philosophy."

At the high-tech end of the market, software solution and mining service provider CAE Mining has been covering countries such as the DRC and Zambia for many years, with the support of its established South African office. Damian McKay, president of CAE Mining, talks about the most relevant CAE Mining products and services in the DRC and Zambia: "The CAE Mining solutions that have proved most successful in these countries include CAE Sirovision (fast, accurate geotechnical face mapping), MSO (Mineable Shapes Optimiser) for Strategic Undergound Mine Planning and CAE Studio 5D Planner / EPS (Enhanced Production Scheduler) for mine design and scheduling. CAE Sirovision allows for minimal time mapping for potentially dangerous areas of the mine. The images can then be objectively analyzed in the safety of the office. This eliminates the amount of time spent by technicians mapping. Furthermore, it allows access to places which are sometimes difficult to reach. Geotechnical mapping with a focus on statistical analysis is made easier with this intuitive tool."

Training in Katanga: Teaching the man how to fish

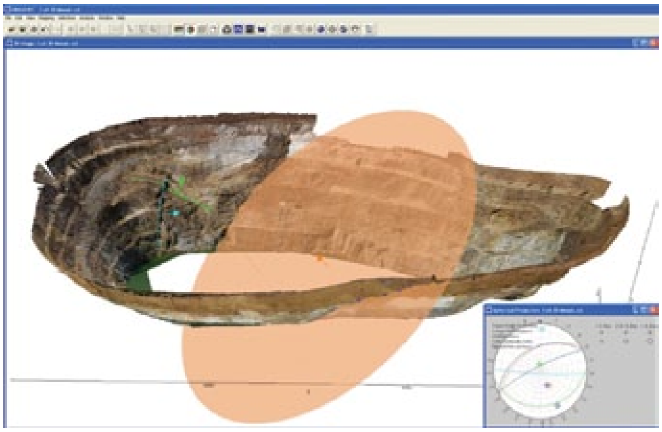
The Congolese desire to succeed and improve their lot is certainly there, but do these people have the educational means to achieve this? With the DRC having an adult literacy rate of only 66.8%, a short answer to that rather complex question would be "no."

CAE Mining offers complex solutions to mining companies and consequently, proper training is an essential issue. "The lack of available skilled labor has driven up labor costs in many parts of the world in recent years. More effective training of new operators is the most sustainable solution to this problem. CAE contributes approximately half of its revenue towards training over 100,000 people annually, and has formulated a comprehensive offering for training that includes self-paced eLearning, instructor-led classroom teaching, simulation and on-the-job training. This blended learning approach is a proven way of increasing knowledge retention, increasing engagement and reducing the time required to achieve defined competency standards. CAE has many years' experience delivering this best practice approach in aviation and military sectors, and has adapted this offering and tailored the approach for the needs of the mining industry. Mines in the DRC and Zambia typically employ over 3,000 staff, and any market volatility often leads to the immediate trimming of budgets and the labor force, so our customers in Africa are enthusiastic about adopting this type of technology and approach," said McKay.

Paul De Gernier, general manager of Group Five in the DRC, spoke about the enthusiasm of Congolese laborers and the ways in which his company is dealing with the expat quotas: "The DRC authorities are trying to encourage the employment of local skilled labor and even though the enthusiasm of the Congolese people is at high levels, their skill level is not. In order to improve that, this year, we started running our in-house training program. It is a three month course that can sustain 12 candidates at a time and out of the first batch of trainees, we will be retaining about 50% of them, which is a good rate. The program is destined for local labor, and it was advertised on national television and local newspapers; the outcome was great and we had several hundred people gathered at our gates, wanting to be part of it."

From strongly encouraged education-related CSR projects to below 10% expat ratio quotas, authorities are trying to improve the situation. In 2007, primary education was declared mandatory in the province by the local government and additionally, academic institutions across Katanga have been rehabilitated in Kamina, Kabongo, Kasaji, Mulungwishi, Likasi or Kolwezi. That being said, developing a new generation of better educated Katangans will take time and consequently, private sector players are taking it on themselves to steadily increase their training capacity so as to match the market demand for skilled labor.

One of the most elaborate training programs currently conducted is done by Bell Equipment. The company keeps an open mindset when it comes to recruiting their candidates: "In our view, Bell Equipment has the largest apprenticeship program in the DRC. In our apprenticeship program, we begin by hiring local Congolese for a six month period to act as 'mechanics assistants' to the on-site senior technical staff. During the six month assessment period, we do not assume any prior knowledge, evaluating the person on the basis of technical aptitude and attitude. Once they pass the initial assessment, they receive a permanent contract as a 'local mechanic,' continuing to assist the qualified technicians, which creates an environment for knowledge transfer. Once a year, our on-site technicians nominate their best local mechanics for the apprenticeship program. Our system has created a competitive atmosphere among local mechanics, who recognize that becoming internationally qualified is the end goal." said Josh Foster, general manager of Bell Equipment DRC. "The apprenticeship program lasts three to five years. In the first year, the apprentice continues to work on-site for nine months, and then undergoes a three month training program in South Africa; if the apprentice passes the exam at the end of the training, they become Bell 1 certified. The second year works in a similar manner, with the apprentice becoming Bell 2 certified at the end. During the third year, the apprentice receives an internal


A Sirovision generated 3D mosaic of an open pit showing digitally mapped structures.. Photo courtesy of CAE Mining.

trade test, with a set of tasks over a period of a few days. Unfortunately, because the professional body in South Africa does not yet recognize the DRC's screening system, they still require another two years of work experience to become internationally qualified," said Foster.

DEM DRC is increasing its workforce and with it, the scope of its training programs. Bernard Alberini, general country manager at DEM DRC, said: "We are implementing a series of basic mechanics e-learning courses for our trainees, in order for them to reach a minimum required level. Once they get to that level, they are sent abroad to John Deere training centers. A key advantage for our clients is the fact that our mechanics are trained on both the construction and agriculture range of John Deere products. Hitachi is also providing a similar training program in Amsterdam, in the Netherlands, as well as in South Africa and Japan. All these courses abroad are taught directly by the original manufacturers' trainers, which offers a guarantee of efficiency, if not excellence while performing on-site service. If successful at the end of their course-cycle, the trainees also receive a certification from the manufacturer itself."

Individual success stories are essential in motivating employees, showing them that advancing through the ranks is a real possibility. Opare and Gielink of MCK Trucks said: "We have two full-time Congolese project managers, who came through the ranks, starting as mining engineers. We have seen an improvement in the quality of the people working for us in the last five years. The future of our company lies with our local staff, not our expatriates. The current head of our mining division, for example, is Congolese. Our staff has seen that if they put in the effort, they will be moved up and promoted in the company."

Similar policies are in place at Aden Services, a company that is now expanding beyond camp management services into trading and procurement of PPE (personal protective equipment). Jean-Sylvere Duga, general director of ADEN Services DRC, explained: "Aden has about 20% expats and 80% Congolese in its workforce in the DRC at the moment. The talent is here, and all these people need are organizations that can push them to learn to better themselves. Our Kipushi camp manager is Congolese – he studied in South Africa, and after accumulating invaluable experience at our MMG project, he was given this important promotion. Having Congolese employees is a positive aspect not just for us but for our customers as well, who want to involve the local population as part of their CSR policies."

Specialized mining equipment is high-tech and very specific and in some cases, companies have had to start from scratch to develop the workforce able to attend their machines. This is the case of SMT, the official dealer for Volvo Construction

Agriculture is part of a community development program run by Aden Services. Photo courtesy of Aden Services.

Equipment, Volvo Trucks, and Volvo Penta in the DRC. Amaury Lescaux, general manager of SMT in DRC, said: "SMT DRC had a staff of only 28 in 2011 and we are now 80, with 18 hired in 2013 alone. We are trying to attract technical talent and get closer to our customer by providing specialized teams on site; that is the way we can develop trust with our clients and build a long-term good business relationship. Volvo products were introduced by us here, so we did not find any local base of technicians specialized in our equipment. One of SMT's goals is to develop more training capabilities in the DRC, so as to feed the demand for skilled engineers that we have."

However, perhaps there is no project more intriguing given its broad scope than that of Congo Equipment. Peter Malley, general manager of Congo Equipment in the DRC, explained: "While still in its incipient phases, an initiative that we are currently studying deals with the root cause of the skilled labor issue and the potential benefits of this program would impact the whole supply chain of the mining industry in Katanga. In a joint venture with some aid agencies and partners, Congo Equipment is looking at a way to upgrade the facilities and the training capabilities of a Technical Institute in Lubumbashi. We are closely collaborating with the institute because improving the education received by children between the ages of 12 and 16 is essential, since at this age both the desire to learn and the absorption of information are the highest. We hope to positively impact the education, strengthening individuals, offering them a more solid platform to build upon in the future."

With around 200 people employed over the last 18 months, the company is also currently expanding its training capabilities, moving away from expensive out-of-country programs: "Congo Equipment used to send people to Morocco and South Africa for training, for modules that would last between eight and 10 weeks. We would pay for expenses such as airfare and hotel accommodation and one single employee's training would cost us around $30,000. Furthermore, we would only be able to send around 40 people per year. Going back to the 200 people we recently hired, one can see that it was not economically viable to continue with out-of-country training. Now, Congo Equipment is planning on adding four trainers to its team and we are also rehabilitating and expanding the capacity of our training sites. Our goal would be to have the three facilities train a total of 30 trainees at any given time," said Malley.

There is a clear sense of mobilization to improve education in Katanga and with upgrades coming both from the private and the public sphere, a year's time should see dramatic improvements. Nonetheless, keeping in mind the sudden influx of population and that a proper education is not developed overnight, the province will still suffer from a lack of skilled labor in the near-future.

Katanga's Banking Sector – Increasingly diversified and strong

Katanga's banking sector has improved dramatically in recent years, helped by the DRC's good GDP expansion rates (6.9% in 2011, 7.2 % in 2012), but also by the boom that the mining industry has experienced in the province.

At the end of 2012, the 20 banks operating in the DRC had 1.2 million clients, a tremendous increase compared to the 80,000 clients of 2001. Players such as BCDC, Raw Bank, TMB, Standard Bank and Ecobank are extending their services to corporate clients but also to the increasing mass of retail customers. Didier Tilman, general manager of Katanga for Raw Bank, explains the reasons behind the growth of the retail market: "Retail banking has seen good development because about three years ago, the corporate sector made it mandatory for its employees to have a bank account. Just recently, the same rule was enforced for state functionaries. Now, these people have access to banking services such as personal loans, which were not available before. We are looking here at values between three and nine months salaries, that are repaid within 12 to 36 months and we have been experiencing very low non-performance rates to them."

In 1909, BCDC became the first bank to be established in the DRC, and now, after a long ownership transition period in the mid-2000s that saw the Forrest Family acquire a 68% stake in the organization, it is growing faster than ever. "The DRC entered a stabilization period after the 2006 elections and this, in turn, led to the revival of economic activities throughout the country; arguably, Katanga led the way of this growth through the development of its mining industry. BCDC took advantage of this overall evolution of the market – geographically, we are present everywhere, but we also understand the importance of Katanga seeing how 30% of our revenues derive from here. BCDC managed to double its revenues and assets over the past five years and it did this based on the experience it has in the DRC, on its local know-how and on the valuable clients it works with." said Thierry Lolivier, director of South Region for BCDC.

With a workforce of 500 employees and a balance sheet of $526 million at the end of 2012, the bank is steadily increasing its financing capabilities, while offering compliance advice to foreign mining companies: "BCDC is essentially a transactional and operational bank for mining companies, helping them with cash flow and cash management. We offer very solid services in terms of helping foreign companies understand and be compliant with DRC laws. Most mining companies import the majority of their equipment and then export a large part of their production so they need help in navigating the laws of the country in that respect. Many mining players come from Anglo-Saxon jurisdictions, which are governed by a system of laws that is quite different from the one here. The DRC's laws are rather based on the ones in continental Europe and so it takes time and will for these mining actors to adapt. BCDC can help them integrate faster. Overall, BCDC tries to add value to its customers by providing them the best services and advice in order to stay compliant," said Lolivier.

Raw Bank, on the other hand, is a young actor on the banking sector stage in the DRC, but ever since its foundation in 2002, the organization has expanded aggressively throughout the country, focusing on the mining sector and introducing new services and high-tech solutions to the market. "Raw Bank was established during a time when the banking industry in the DRC was facing a difficult environment. That proved to be good timing in the end because it allowed it to get established in the market. The focus of the company was to advance banking technological breakthroughs in the country and Raw Bank was the first to bring solutions such as SWIFT and ATMs, and rolling out first-class electronic banking. Overall, Raw Bank has 35 branches across the DRC, with its headquarters being in Kinshasa. The regional head office for Katanga is in Lubumbashi, where we have six retail branches. We want to make sure we are close to mining operations in the province and that is why Raw Bank was first to be present in Fungurume, Kakanda, Sakania and offering ATM services on site," said Didier Tilman, general manager of Katanga for Raw Bank.

Challenges still exist, however, with financing, as banks are not yet able to provide funding for multi-billion dollar projects:

"Raw Bank is number one in terms of total deposits in the DRC, with about $540 million out of the total $2.7 billion in the country. However, this amount of available funds also shows the limitations that local banks have when potentially financing multi-billion dollar mining projects," explained Tilman, whose words were echoed by those of Lolivier: "BCDC is not in the position to finance large mining projects that amount to hundreds of millions of dollars and in fact, the whole DRC banking system does not have the means to do this yet. Nonetheless, recent mining sector developments in Katanga have led to the creation of a social class that can afford a bank account and can benefit from its use."

Overall, however, the evolution of financial institutions is impressive and if the DRC will continue its period of political stability which drove inflation rates down from 15.4% in 2011 to 2.73% in 2012, then progress will continue.

Conclusion – The Sky's the Limit

Katanga's governor, Moïse Katumbi Chapwe, hopes for 1.5 million mt/y of copper to be produced in his province by the end of 2015. Given the expansion plans of TFM, GlencoreXstrata, ENRC, MMG, Tiger and many others, that hope may very well become reality. Infrastructure and power remain the usual suspects when it comes to growth inhibitors. Nonetheless, infrastructure has taken a noticeable turn for the better in recent years: "The Katangan government is making important strides to improve the infrastructure in the province. Roads are better, the airport is being refurbished, and almost the entire road to Kolwezi has been paved. The DRC Railway Co. (SNCC) has also obtained new locomotives, and tenders are ongoing for the delivery of new rails and the maintenance of the existing railway system. If things continue the way they are at the moment, the infrastructure will improve markedly during the next few years," said Geert Van Bansbeke, area manager Africa, Polytra.

Lurking in the shadows, the DRC's new Mining Code has caused unrest among producers already. However, with a proper dialogue mechanism in place between the government and the private sector and under the close scrutiny of powerful politicians such as Katanga's governor, it is unlikely that the new code will bring in any radical measures. With average operating costs between $3,500-4,000/mt, and with copper prices in September 2013 at $7,050, producers are still seeing plenty of profits coming their way in Katanga, a tremendously rich region that offers enough stability to work in. How profits will grow depends on power supply however; refurbishing old facilities will give producers only a short breath of fresh air and with many power intensive SXEW plants and expansions in sight, new power plants are needed. Grand Inga, Inga III and Luapula still seem far away and time will tell how fast authorities will solve this present pressing need. In the long run however, stable and plentiful grid-power will translate into unlimited expansion capacity and dramatically lower operating costs for the mining players.

Didier Tilman, general manager of Katanga for Raw Bank.

Foreign investors should not be fooled by appearances when it comes to security in Katanga: "The impact of the Mai Mai Bataka Katanga on mining operations has been very minimal. The DRC is such a large country, and although the security situation in the eastern DRC is very worrying, the Katanga province is overall a very stable place in which to operate," said Van Gansbeke, of Polytra.

De Gernier of Group Five agreed: ""People have preconceptions about the country and they do not realize how far Goma is from Katanga, how far away the problems are. We have made serious investments in the country and that in itself is proof that Group Five is committed to DRC."

It is hard to overestimate how fast things are developing in Katanga compared to mature jurisdictions around the world and perhaps present times represent more than just the development of a provincial mining industry. Kasongo, of AEL, concluded: "The DRC has great opportunities for our business, and I do believe that this is the time for the Democratic Republic of Congo. We are living a historical period for the country because the industry development that is currently happening will constitute the basis for the DRC's evolution in the future."