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Peru Mining 2018

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Photo courtesy of Austin

Stepping Out of the Political Shadow

Peru's recent instability is not stopping mining investment

As Peruvian families celebrated Christmas together last December, there was a certain level of trepidation as to what may happen in the new year. Alberto Fujimori's pardon by President Pedro Pablo Kuczynski (PPK) left many of Fujimori's critics in shock after months of political unrest that led to the impeachment process of PPK, which the president narrowly avoided. 2018 arrived with uncertainty but the status quo nervously returned. A new and, so far, stable cabinet has coincided with rising metal prices, increased metal export revenues and further speculation that a new wave of mining projects will begin construction. 2017 represented a year of hope that the mining industry was starting to turn following years of decline. 2018 seems to be confirming that the upcycle has finally arrived.

Víctor Gobitz, president of the Peruvian Institute of Mining Engineers (IIMP), has been generally positive about the situation following the political turmoil. "The political noise is not affecting the main vectors of the country's economy. With improved mineral prices, mining companies are embarking on expansions, brownfield explorations and improved productivity projects, and those are certainly going ahead. However, for new projects, the political uncertainty may have a bigger effect," he said.

Ricardo Labó, vice-minister of mines, is also optimistic that the recent political unrest will not have a direct impact on the mining sector. "Mining investors have a long-term view and look at the next five, 10 or 20 years. In Peru's long mining history, political and social situations have not had a major impact on investment. Although there were some concerns over the recent political instability, Peru's increase in investment speaks for itself."

Indeed, after three consecutive years of decline, total mining investment in Peru increased by 15.7% and reached US\$4.92 billion in 2017.

NEW YEAR, NEW PROJECTS?

The Ministry of Energy and Mines has defined five key objectives for 2018. These include making feasible the existing pipeline of projects, some of which have been pending for many years now. Speculation surrounding key potential investments continues to grow: there is expectation that projects like Mina Justa, Quellaveco, Pampa de Pongo and Corani will begin construction over the coming months, although the triggers are yet to be pulled. As an example, Anthony Hawkshaw, president and CEO of Bear Creek Mining, remained cautious regarding Corani's

"The political noise is not affecting the main vectors of the country's economy. With improved mineral prices, mining companies are embarking on expansions, brownfield explorations and improved productivity projects, and those are certainly going ahead."

**-Víctor Gobitz,
president,
Peruvian Institute of Mining
Engineers (IIMP)**



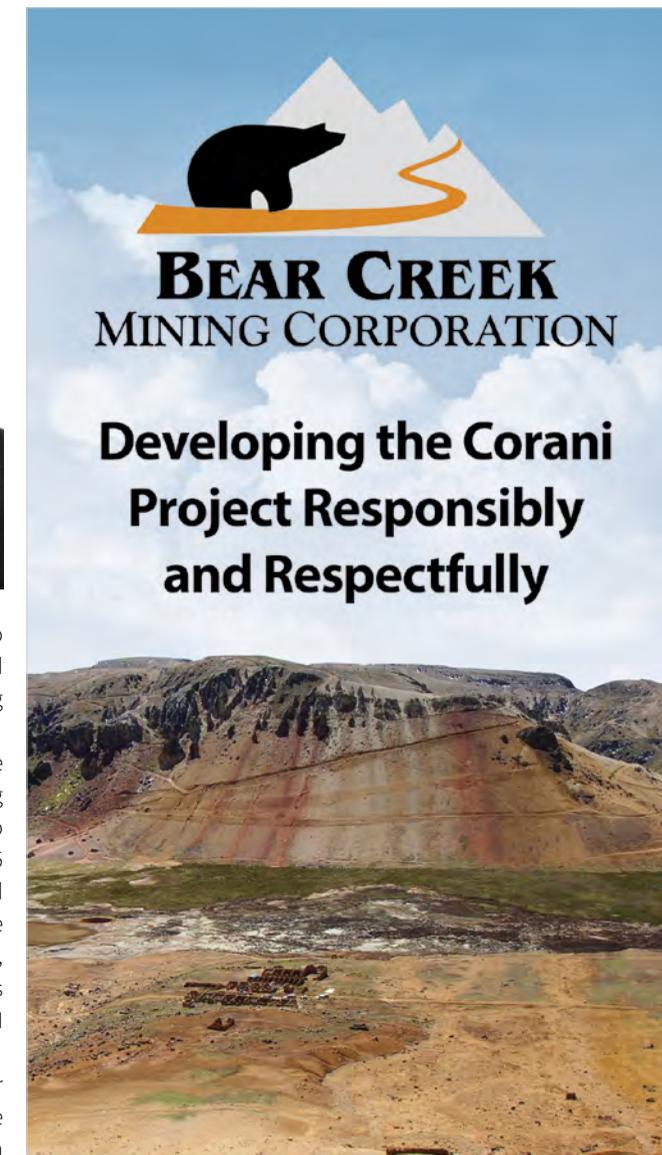
potential construction schedule: "There is only one chance to build a project correctly. It is wiser to spend additional time and investment now on engineering than to rush ahead. We are being deliberate, thorough and patient to minimize potential risks."

Corani, one of the largest undeveloped silver deposits in the world, has a significant zinc content. With the zinc price reaching an 11-year high, one would assume there would be pressure to act. However, the project requires a capital expenditure of US\$585 million, a large amount for a junior company, and Hawkshaw and Bear Creek's shareholders have seen a lot of failures over the years arise from rushing into construction. "When I was a lecturer, I used to tell my students: think first, write later. You can process much more when you are thinking rather than when acting and I believe this is the right approach for us," he concluded.

The main stars in Peru's project pipeline, however, are copper projects. While Anglo American has already invested a sizable amount on the early works for Quellaveco, a final construction decision is not expected there until the middle of the year. Likewise, Minsur should also give the go-ahead to its Mina Justa copper project, and Chinalco, after a very challenging ramp-up at Toromocho over the last years, should finally proceed with the mine's expansion.

UPCOMING ELECTIONS: THE SOCIAL ASPECT

Peru will be conducting regional and municipal elections on October 7th, and once again, mining will be on the agenda. While the changing of authorities may produce added hurdles in terms of bureaucracy and relationships, the sector has been generally positive on the potential outcomes of the ballot. Indeed, many believe that there has been a change in how communities and politicians perceive the mining industry, especially in regions where anti-mining sentiment has been high. Phil Dalke, vice-president and managing director of Tahoe Peru, said: "Our relationship with our communities can change depending on the different dynamics, however we strive to make our communities



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partners in our sustainability projects. We sense that many of our communities want more mining activity."

To ensure new mining projects can be developed in Peru, mining companies have adapted their engagement with the local populations and many are now doing more to build closer ties. Elsiario Antúnez de Mayolo, COO and general manager at Bear Creek, has made community relations a priority for the Corani project. "We have been developing skills and business ideas within the community to create long-term benefits. Mines are always temporary and cannot support the community forever, so it is important to guarantee the long-term future of the local populations," he said.

Meanwhile Luis Rivera, executive VP Americas at Gold Fields, the company running the Cerro Corona mine, declared: "We are used to working in Cajamarca. It is not the easiest environment, but since we started there has not been much opposition. We hope that, with the election, the political side of things will be more favorable to mining moving forward."

Jorge León Benavides, leader of the Peru delegation to PDAC at the Canada Peru Chamber of Commerce, shared similar hopes with regard to the upcoming election, particularly in Cajamarca:

"We have to be patient as there is only one chance to build a project correctly. It is wiser to spend additional time and investment now on engineering than to rush ahead. We are being very deliberate, thorough, and patient to minimize potential risks at Corani."

**-Anthony Hawkshaw,
president and CEO,
Bear Creek Mining**



"In Cajamarca, communities were told that they would receive support for agricultural development, but seven years after the suspension of Conga, that region continues to be one of the poorest areas in the country. Now, many people want mining investment to be back. The regional governor is an anti-mining and

anti-establishment activist, so whoever replaces him should bring positive change."

REVERSING THE INCREASE IN FATALITIES IN 2018

After a constant decline in fatalities for a number of years, this trend has recently begun to reverse in Peru. In 2015, there were 29 deaths in Peru's mining industry, but this has steadily increased over the past two years to 34 (2016) and 41 (2017). It is unclear whether a return to higher metal prices will have a positive or negative impact on safety records in 2018. This may be explained by companies hiring more people, in some cases very quickly, to embark on production expansions.

Víctor Gobitz of IIMP said: "In underground mining, the main risks are related to rock fall and ventilation. We are aware that most of the fatal accidents happen there, so we hope that with the better mineral prices mining companies will invest more resources to address these issues. Obviously, the more workers we have in the industry, the higher the risk, but it is a challenge that needs to be addressed in Peru."

Furthermore, Gustavo Gómez Sánchez, general manager at Exsa, a blasting solutions provider, highlighted that more action needs to be taken to manage safety during downcycles with more investment in training. Despite this, he said that safety awareness has increased a lot in the past few years.

The culture towards safety awareness is clearly a key pillar to dealing with the rising fatalities. Adolfo Vera, president and CEO at Southern Peaks Mining, believes that the fatality rate in mining is centred on the mining culture. "There has traditionally been an attitude that not wearing protective gear or entering into unsafe activities is a sign of bravery, but it is rather a sign of stupidity and we are changing that," he said.

Changing attitudes and the overall culture towards safety is therefore key to reducing fatalities in 2018. According to Greg Jackson, managing director of Byrncut Offshore, a large underground contractor: "Education, training, disciplined and quality execution of work and quality supervision will result in the most optimum safety conditions."

MOVING FORWARD

GDP growth in 2017 was only 2.5%, an insufficient figure for a country on its way to further development. Mining will continue to be the main driver of Peru's economy, and taking advantage of the high metal prices will be key to building momentum and unlocking a new wave of mining investment. As has been the case in the last two decades, mining projects may prove to be a significant catalyst for Peru to climb the ladder of economic development. The government expects a sizable 20% increase in capital expenditures in mining this year, and if the most immediate projects do see the light in time, 2019 will be an even better year for the industry. •



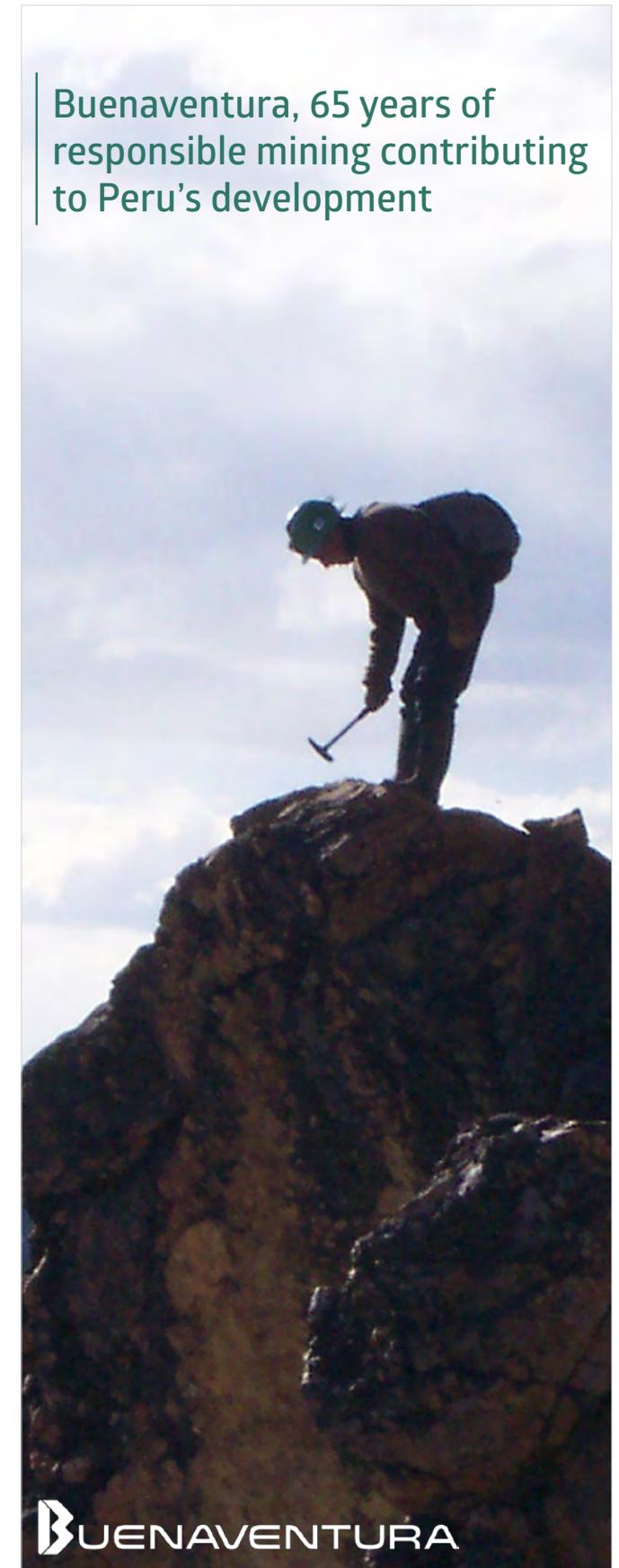
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Buenaventura, 65 years of responsible mining contributing to Peru's development



Closing The Gap With Chile

Peru strengthened its copper output last year, reaching 2.45 million tonnes

Since 2012, Peru has increased its copper production every year and 2017 was no different. After the spectacular increase of 2016, driven by the expansion of Cerro Verde and the addition of MMG's Las Bambas, output increased by a moderate 3.9% last year, with a total output of 2.45 million tonnes of fine copper. Cerro Verde is still the largest producer of copper with 501,800 mt/y, followed closely by Las Bambas, which achieved its first year of full production with 453,000 mt/y, a 37.5% increase from its 2016 figures. Peru's third giant copper unit is Antamina, which yielded 439,200 mt/y.

Other mines that produce more than 100,000 mt/y include Glencore's Antapaccay (206,500 mt/y), Chinalco's Toromocho (194,700), Southern Copper's two units (Cuajone at 161,100 mt/y and Toquepala at 145,000 mt/y) and Hudbay Minerals' Constanca (121,800 mt/y).

Overall, Peru's copper production continued to close the gap with Chile. The neighboring country saw its red metal output decrease slightly to 5.5 million mt/y. Record monthly production in Chile in December 2017 was not enough to compensate the effects of

the strikes at Escondida earlier last year. Following Chile and Peru, China is the third largest copper producer globally with output of approximately 1.9 million mt/y. The Peruvian government has set a goal of increasing copper production by 30% by 2021 to further cement Peru's position as the second largest producer of copper, globally.

With respect to zinc, Antamina regained top spot in production with a 69% increase in output, representing 442,500 mt/y of zinc. The spectacular change is probably explained by the erratic nature of the geology in skarn deposits, as well as a conscious decision by the company to boost zinc output and take advantage of the current high prices. Antamina's exceptional performance helped Peru's overall zinc production increase by more than 10%, to a total of 1.47 million mt/y.

Antamina is 33.75%-owned by Glencore, which also recently took a controlling stake in Volcan, Peru's second largest zinc producer with around 288,600 mt produced last year. Finally, Nexa Resources of Brazil (formerly Milpo-Votorantim Metais) produced 229,600 mt/y,

the majority of which came from Cerro Lindo, Peru's largest underground mine.

In other base metals, Peru's lead production decreased by 2.4% to 306,800 mt/y, and tin production also decreased by 5.3% (total output was 17,800 mt/y), while production of molybdenum increased to 28,100 mt/y. According to the United States Geological Survey (USGS), Peru ranks as the world's second largest zinc producer, the fourth largest lead producer and the fourth largest molybdenum producer globally.

Finally, iron ore production saw a 15% increase to 8.8 million mt/y, driven mainly by Shougang's ongoing expansion at Marcona, while a new player, Shouxin, produced 138,000 mt/y of iron ore through the reprocessing of Shougang's tailings, a process that also yielded some copper.

PRECIOUS METALS

Peru's gold production remained relatively stable and only recorded a 1.2% decrease year-on-year. Total output reached 4.86 million troy ounces, with Yanacocha contributing 535,700 oz. This still places the operation as the country's largest mine despite its continuous decline. The prediction for this year is around the half a million ounce mark and, after the approval of the Quecher Main project, its life should be extended until 2027. Quecher Main, a US\$250 million to US\$300 million venture, will add new output from oxides starting next year, with expected production of 200,000 oz/y between 2020 and 2025.

Yanacocha is a joint venture between Newmont, which operates the mine, and Buenaventura. On top of its share of production at Yanacocha (43.65% of the total, or 233,400 oz), Buenaventura also had an additional attributable production of 383,200 oz/y from the mines it operates, namely Tambomayo, Orcopampa, La Zanja and Tantauatay.

In addition, other international players had significant gold production as well. Barrick recorded 508,700 oz/y between its Lagunas Norte and Pierina operations; Tahoe Resources produced 275,000 oz at its

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"Cerro Corona was scheduled to shut down in 2023. That meant that, from 2018, we would have had to start closure activities, reducing our footprint and our workforce. We made it an urgency to extend the mine life."



**-Luis Rivera,
Executive VP Americas,
Gold Fields**

La Arena and Shahuindo mines; and Gold Fields produced 166,000 oz of gold at Cerro Corona, a medium-sized, highly-profitable mine in Cajamarca that also provides important copper volumes (gold equivalent production is 314,000 oz).

Gold Fields has recently added seven years of mine-life to Cerro Corona, and the mine is now expected to be running until 2030. Luis Rivera, executive vice-president of Gold Fields for the Americas, explained: "Mining is like a credit card; it has an expiration date. At the beginning of 2017, Cerro Corona was scheduled to shut down in 2023. That meant that, from 2018, we would have had to start closure

activities, reducing our footprint and our workforce. We made it an urgency to extend the mine life."

Considering the space limitations Cerro Corona faces in Cajamarca, achieving this took its share of engineering and creativity. Alberto Cárdenas, vice-president of operations at Gold Fields, commented: "The beauty of the solution is that we are not extending the superficial footprint. We are challenging the density of the tailings to accommodate more volume within the same facility. Also, at the end of the day, the pit is also an asset, so we are looking at placing some tailings within the pit after the operation."

Also in Cajamarca, Tahoe Resources continues to ramp up its operation at Shahuindo, where it is commissioning a crushing and agglomeration (C&A) plant to improve recoveries from the fines of the ore body (production of 79,000 oz in 2017 came from run-of-mine ore). Once the plant is commissioned, Tahoe will embark on the expansion of Shahuindo from 12,000 mt/d to 36,000 mt/d. "Our other Shahuindo projects such as resourcing water, constructing pads and building a transmission line are also key. Near-mine and satellite geological deposits in the north corridor of Shahuindo provide us potential targets to extend and maximize value at this operation," said Phil Dalke, vice-president and managing director of Tahoe Peru. Peruvian companies account for significant gold production as well. These include Poderosa (254,000 oz/y) and Horizonte (253,000 oz/y),

among others. With respect to Poderosa, the company is currently expanding its processing capacity, from the combined 1,400 mt/d between its Marañón and Santa María plants to 1,600 mt/d by the end of this year. One of the main items of the expansion in terms of the capex are the tailings dams, explained Marcelo Santillana, general manager of Poderosa: "With the investments in the Livias and Hualanga facilities, the tailings dams will now have a life of 22 years. Moreover, we filter the tailings, so we do not deal with pulp anymore."

Poderosa expects to produce 270,000 oz of gold this year and keeps on looking at formulas to optimize production and extend mine-life. Santillana continued: "We are developing a project to separate the sulphides from the silicates. This will improve the secondary recovery of the gold that is in the sulphides, and will add to our production from 2019 onwards. We are also looking at an additional project to recover gold from the tailings," he said.

Hochschild Mining, traditionally a primary silver producer, has been increasingly leaning towards gold production with the impulse of the Inmaculada mine. Hochschild produced 203,600 oz of gold in Peru last year, and 165,000 of those ounces came from this flagship asset.

Finally, silver production in Peru also decreased by 1.6%, totaling 138.4 million ounces. Buenaventura is the country's main silver producer with 23.3 million oz in 2017, a figure that does not include the additional 4 million oz coming from El Brocal, another company that it controls. The other main silver producers in the country are Antamina with 20.8 million oz/y; Volcan with 15.9 million oz/y; and Hochschild Mining with 15.9 million oz/y.

The latter company had production costs of around US\$12.5/oz silver equivalent last year, and those should increase slightly in 2018 to between US\$13/oz and US\$13.4/oz according to the corporate guidance. Part of this cost increase is the US\$30 million investment in the Pablo development at the Pallancata mine in Peru. "In 2017, Pallancata was working at 1,400 mt/d. Through

incremental expansions, we will reach 2,800 mt/d by Q3 2018, and production will stabilize at that rate," explained Ignacio Bustamante, CEO of Hochschild Mining.

"2017 was a great year for Pallancata as it was very profitable, with the development of the higher-grade Pablo Pisos areas. Although the grade will now fall with the development of the main body, the tonnage will increase and so will production, from 7.5 million oz/y to approximately 9.5 million oz/y," continued Bustamante, who added that the company's main focus is on developing its brownfield projects to fill up the spare capacity currently available at the Arcata, Pallancata and Ares plants.

Overall, Peru maintains a key position in precious metals mining and development. In 2017, it remained the world's sixth largest gold producer (and the largest in Latin America), while it was also the world's second largest silver producer, only after Mexico. •

"We are expanding capacity from 7,000 mt/d to between 9,500 mt/d and 10,000 mt/d. This will firmly rank Condestable as the second largest underground mine in Peru. We have stabilized the C1 cost of copper at US\$1.55/lb and, with the expansion it can be reduced to US\$1.25/lb."

**-Adolfo Vera,
president
and CEO,
Southern
Peaks Mining**



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"Exploration expenditures in Peru grew by 34% in 2017"

Ricardo Labó

Vice-minister of Mines,
Government of Peru



"Our goal is to increase Peru's share of the global exploration budget from 6% to 8% by 2021."

What projects do you expect to start in 2018?

After the bid for the world-class Michiquillay project, won by Southern, we expect Chinalco to announce Toromocho's expansion. By the second quarter of the year, Minsur could start building their Mina Justa copper mine. Anglo American's Quellaveco, Bear Creek's Corani and Jinzhao's Pampa de Pongo are expected to start this year as well, so we are anticipating the announcement of a new project every other month in 2018. In 2017, we saw an annual increase of 15% in total mining investment to US\$4.9 billion, and we are expecting a 20% increase in 2018.

What is the government doing to redirect the tax revenue from mining to the local communities?

50% of all income tax paid by companies is already redirected to the mining regions and local communities through the mining canon. There is a clear scheme to distribution and it is the responsibility of the local and regional governments to invest that money correctly. On top of this, this administration introduced the Social Advancement Fund last year, already worth 50 million soles, to prepare the social conditions in areas that have projects at the feasibility stage.

With mining fatalities increasing in 2016 and 2017, how can companies tackle this in 2018?

Safety is a culture. Every company should aim for zero incidents and accidents. In 2018, companies need to focus even more on this as metal prices increase. Standards should not be compromised with the current metal price climate. Most accidents are due to human error and companies need to make sure workers are never in their comfort zone.

How much can the government do promote infrastructural development in mining?

The Ministry of Transport and Communications has proposed a number of studies for building railways that includes linking Apurimac, home of Las Bambas, to the coast. All of the government's proposals for infrastructure will be focused on mines that are already in production. Mines are becoming less remote due to the natural development of the country and this lowers capital costs. In the past, companies would take responsibility for the entire capex but now they are collaborating with third parties to reduce costs.

What is the vision of this government for the mining sector?

We have a clear strategy through five objectives, which includes a new one for 2018. Our first is to promote new investment in exploration. Our goal is to increase Peru's share of the global exploration budget from 6% to 8% by 2021. The second is to facilitate the development of the industry's project pipeline. New projects this year will represent US\$10 billion to US\$12 billion investment over the next three to four years and overall there are US\$50 billion worth of projects in the pipeline. The third objective is to keep supporting projects that are in operation and are potentially going to expand. For example, our goal for copper is to increase production by 30% by 2021 and keep our position as the second largest copper producer in the world.

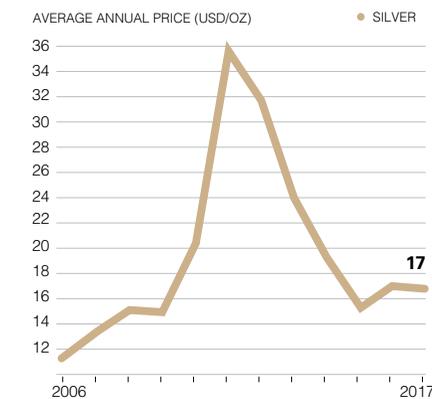
The fourth objective is to continue the implementation of our strategy on formalizing mining. In 2017, we formalized 5,000 miners and our goal by 2021 is to increase this to between 50,000 and 60,000. This will cover 90% of the miners that have registered for the formalization process. Finally, our new objective is the remediation of environmental legacies. We want to create one organization to look after the remediation process and we are benchmarking from other countries on how to do this. Furthermore, with the development of new technologies, there are now options to increase a mine's yield. For example, at the Shougang mining project in Ica, two Chinese companies through a vehicle called Shouxin are processing Shougang's tailings dam and they will produce 20,000 tonnes of copper this year, on top of additional iron ore.

What is the Ministry doing to streamline the permitting process for exploration?

In December 2017, we published a new regulation that will shorten the bureaucratic process in regards to environmental permitting. This will not have an effect on the environmental standards but will increase the efficiency in obtaining an exploration license. We are also increasing our direct contact with investors to attract more investment. Overall exploration expenditures in Peru increased by 34% in 2017 year-on-year, reaching US\$500 million.

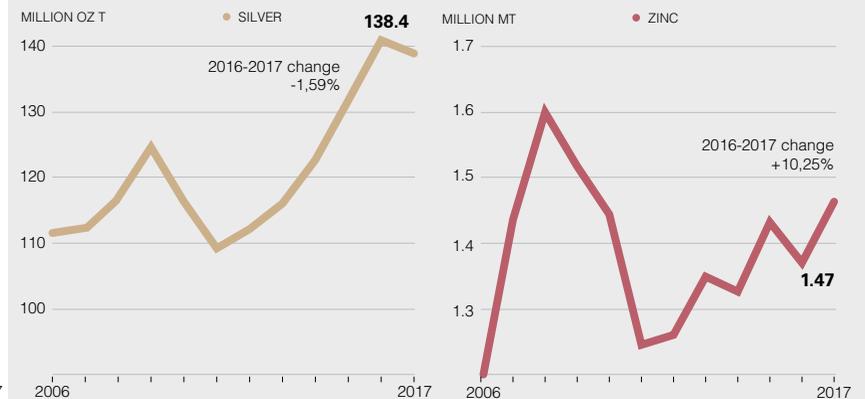
GOLD AND SILVER PRICE CHARTS

Sources: KITCO / GBR



PERU, A DIVERSIFIED METALS PRODUCER

Sources: Ministry Of Energy And Mines / GBR



ZINC PRICE (MONTHLY AVERAGE)

Average official LME price, Cash Buyer

Sources: LME / GBR

Year	Month	\$/MT	\$/LB
2017	August	2,981	1.35
	September	3,119	1.41
	October	3,273	1.48
	November	3,235	1.47
2018	December	3,192	1.45
	January	3,446	1.56

COPPER PRICE (MONTHLY AVERAGE)

Average official LME price, Cash Buyer

Sources: LME / GBR

Year	Month	\$/MT	\$/LB
2017	August	6,477	2.94
	September	6,582	2.99
	October	6,796	3.08
	November	6,825	3.10
2018	December	6,801	3.08
	January	7,079	3.21



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Gaining Momentum

Juniors are back to life and Peru offers enormous potential for them

Following the recovery of metal prices in 2017, financing for junior exploration companies has increased and with that, exploration in general. In Peru, one of the Ministry's key objectives for 2018 is to promote new investment in exploration and increase Peru's share of the global exploration budget from 6% to 8% by 2021. A key observation from the number of junior exploration companies in Peru is the vast geographical scope they are active in. Spanning all corners, from the tip of Peru near Lake Titicaca, to near Huaraz in the Andean mountains, and the Sechura desert near the Ecuadorian border, exploration companies are seizing the opportunity to explore Peru's untapped mineral richness.

COPPER

As Peru continues to cement itself as the second largest producer of copper in the world, a number of exploration projects gather pace across the country. Regulus Resources continues to focus on its AntaKori copper project in Cajamarca, northern Peru, located immediately next to the Tantauatay gold-silver mine owned by

Coimolache, a joint venture of Southern Copper and Buenaventura. Coimolache and Regulus have actually signed an agreement to carry out collaborative exploration in the area, which will certainly benefit the advancement of the AntaKori project.

AntaKori has a 43-101 resource of 295 million mt at 0.48% copper, 0.36 g/mt of gold and a little more than 10 g/mt of silver. Regulus' campaign for 2018 will be approximately 18,000 meters of drilling, and the company has already released the results of six holes. John Black, CEO of Regulus, said: "We have been very pleased with the results, particularly as the drilling was at the southern margin of the previously known mineralization. Although the grade was a little lower than the average, it represented a 400 meter extension to the previously drilled area and provides considerable growth to the project."

Regulus wants to use the current campaign to update the resource estimate, however John Black warned that it will take more time than that to realize AntaKori's full potential: "AntaKori is a very large project and we must be patient to fully capture the opportunity. Although it is difficult to predict what will happen with the price of gold, we do

"This year's drill program at Pinaya has two primary components: first, to see if we can extend the resource in a lateral sense, and secondly, to target some deeper areas that we believe may have potential."

**-Tom Peregoodoff,
president and
CEO,
Kaizen
Discovery**



know that copper will be in shortage for the foreseeable future and demand will keep increasing. A benefit of higher metal prices is that more capital is available and this will allow us to move the project along more quickly."

Meanwhile, in the south of the country, Kaizen Discovery has continued to focus on their Pinaya project, located in between Arequipa and Puno. Pinaya, previously explored by AM Gold and Rokmaster Resources, sits in the same belt as Glencore's Tintaya deposit and presents typical skarn and porphyry copper-gold mineralization. After some delays created by the Peruvian government's *consulta previa* process (prior consultation with the local communities), Kaizen's drill program this year will have two primary components, according to Kaizen's president and CEO, Tom Peregoodoff: to extend the resource laterally and to explore the potential of some deeper areas. For this, the company

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**Extensive Drilling in Progress
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AND 10.16 G/T AG

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David Kelley,
president and CEO,
Chakana Copper



Graham Carman,
president and CEO,
Tinka Resources

will use Typhoon, a proprietary technology of HPX, Kaizen's major shareholder. "Typhoon enables the user to penetrate much deeper into the ground. This is especially important in areas where you have resistive cover. In the case of Pinaya, a primary focus of application of Typhoon is to identify and understand any significant depth potential", said Peregoodoff. The company is also planning to drill one new target called Pedro 2000, which was identified through both existing geophysics and some ground mapping. The program has a total budget of US\$5 million, jointly funded

by Kaizen's partners, Itochu of Japan, who will be earning a 20% participation in the project.

Peru's dynamic junior sector and its positioning as the best upcoming destination for copper exploration has helped attract other companies in this space, including Camino Minerals, Pembroke Copper and Chakana Copper. Indeed, Chakana just started trading on the TSX-V end of January, and its main project is the Soledad project in Ancash, a property that the company is acquiring from Condor

Resources. Interestingly enough, Chakana is not targeting yet another large open-pit deposit at Soledad, but is focusing on defining the potential of its high-grade pipes instead. In the words of David Kelley, president and CEO of Chakana Copper: "The strategy of the previous operators was to find a porphyry deposit that is assumed to be related to the tourmaline breccia pipes. Our view is different. We think these high-grade breccia pipes can offer significant economic value because they are numerous, high-grade, vertically extensive from surface, and are relatively easy to explore."

According to Kelley, it should take Chakana two years to go through all the pipes, but this year they could have an initial resource estimate already, covering at least two of the pipes, while also work on the mineralogy and the initial metallurgical tests. He added: "Because Soledad does not have a large footprint, it does not present the environmental and social impacts of a huge low-grade deposit that take years to drill out. It is a very compact project in a good mining area. We can move along quickly, which is very important in a cyclical industry like mining."

SILVER, ZINC AND LEAD

After winning its arbitration process with the Peruvian government regarding the Santa Ana project, Bear Creek Mining has continued advancing with Corani, a very large silver deposit with significant base metal content. Potentially moving into construction over the next year, and with expected production of 12 million ounces of silver annually during the first six years of operation, Corani is one of those 'company makers' that do not come in production very often in the industry.

Of course such a large project brings significant risk associated to it. Through recent reengineering, the company has reduced the estimated capex of the project to a US\$585-million figure, which is still high for a junior company. Anthony Hawkshaw, president and CEO of Bear Creek, said that there is still space for optimization, in aspects such as treatment, processing and metallurgical recoveries: "There are areas to save money and initial engineering observations have identified possible capex reductions," he assured.

Bear Creek has recently updated its long-term pricing assumptions to US\$18/oz silver and US\$1.10/lb zinc. Under the company's economic studies, the payback at Corani would be three years, but with the current spot prices of zinc, it could be shorter than that. In terms of permitting, the company expects to receive its construction permit and complete the prior consultation process over the second quarter of 2018.

In the zinc space, Tinka Resources updated its NI 43-101 resource estimate for Ayawilca, its flagship project in the department of Pasco, central Peru, which provided a 130% increase in the zinc resource. The new resource consists of 42.7 million mt with 5.6 billion pounds of zinc content (2.5 million mt Zn) as well as some indium, silver and lead. In 2018, Tinka is set to complete a 15,000 meter drilling campaign and will target new areas, including Zone 3 and Chaucha, as well as an extension of Central, South and West Ayawilca. Graham Carman, president and CEO at Tinka Resources said: "This drilling campaign will aim to add more high-grade resources to our portfolio and further improve the economics of the project. In parallel, a detailed metallurgical study will occur in Q2 2018 and then we will complete our preliminary economic assessment (PEA) over the second half of the year."

Ayawilca also hosts a tin resource, which also increased in the latest 43-101 report of November 2017 for a total of 10.5 million mt containing 145 million lbs Sn. "The tin lies deeper so will probably not be mined from the start, yet we would like to include the tin in our upcoming PEA as the tin realization is very high in terms of grade. We will need to do more metallurgy and see what we can incorporate this year," Carman said.

Asked about a potential joint venture or an outright sale of the project to an established base metals miner, Carman replied: "Looking further into the future, we are planning to mine at Ayawilca ourselves. Initially, we will have to go through all the processes of de-risking the project but as we own 100% of it, we are in charge of our own destiny."

GOLD

With a number of juniors changing their strategy to also go into production, Lupaka have been focusing efforts on Invicta, a gold-copper polymetallic underground project. The company's plan is to start mine development, use a contract miner and then send the ore to a toll milling facility for processing, thereby generating cash flow for investors. Lupaka's financial position has recently improved with the sale of the Crucero project to GoldMining and the closing of a forward gold sales agreement providing US\$7 million in funding for the development of Invicta. Will Ansley, CEO of Lupaka Gold, gave more details about the company's plans: "We intend to operate at an initial 350 mt/d. We have an initial mine plan which outlines

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FERTILIZERS

Despite the poor forecast for global phosphate prices, the Sechura basin has become a hotbed for juniors due to its strategic location next to the ocean, its mineral richness that includes highly reactive phosphate rock, and a very large mine already in operation, initially developed by Vale and recently acquired by Mosaic.

One of the juniors in the area is Focus Ventures with the Bayovar 12 project. The company carried out recent beneficiation tests through Jacobs Engineering Group that showed a minimum of 30% P2O5 content in their rock. With these results, Focus Ventures has been able to sign MOUs with two phosphate rock merchants based in Switzerland, defining specific export destinations for the traditional phosphate fertilizer industry.

The shorter-term view for Focus, however, is different. Its president, Gordon Tainton, has been looking at different methods to add value to the Bayovar 12 product given the low global phosphate prices: “From the phosphate rock at Bayovar 12, we believe there could be a genuine opportunity to produce elemental phosphorus (P4). P4 is one of the main materials used to make the Roundup weed killer. We investigated the North American and European markets and found out that all P4 demand for North America, Eastern and Western Europe is covered by imports from China and North Vietnam,” explained Tainton.

He added that a second added value for the product can be achieved by coating the phosphate rock with a special polymer, which will further enhance the nutrient release in the soil profile and crop. Meanwhile GrowMax Resources’ asset, the Bayovar property, is also located in the same region in northern Peru. The company’s initial proposal was to develop a potassium



Stephen Keith,
president and CEO,
GrowMax Resources

chloride operation out of potash brine. Further studies have concluded that the asset was better suited to become a sulphate of potash (SOP) project. Furthermore, the company discovered approximately 500 million tonnes of fairly high-grade near-surface phosphate.

For this year, GrowMax is focused on generating cash-flow and has decided to invest its time and resources in the development of specialty fertilizer assets in Latin America. Stephen Keith, president and CEO of GrowMax, sees huge potential in the region with Peru’s agricultural exports looking to double by 2021. The SOP project, however, needs to improve its numbers: “The initial results of the EPC study were not as good as we were predicting; the after-tax IRR was not so attractive. The capex was set at US\$20 million for a 5,000 mt/y SOP operation. We are now optimizing the project with the view of taking a production decision during 2018, while we are in discussions with potential partners to develop or finance the project.”

With respect to the phosphate deposit, Keith referred to it as an “unbelievable asset” with a great location on the coast, next to Mosaic’s Miski Mayo operation. “However,” Keith continued, “global phosphate prices have not been in our favor. I believe this will be a critical project for global phosphates but it would not be prudent to build it at present.” With the world’s population increasing and the decreasing availability of arable land, it will probably be a question of time until supply and demand dynamics for phosphate push its price upwards. When that happens, Peru will be in a perfect position to further develop its resources in the Sechura basin. •

Engineering and Construction

Providers eagerly await the transition from the studies and the early works to the execution of multi-billion dollar projects

During the downcycle, engineering and construction firms had to downsize and alter their approach that had brought much reward during the boom years. In order to survive, firms created synergies between different offices across the Americas, focused more on operations, diversified into new sub-sectors and modified their cost approach to be competitive in the marketplace. As investment returns, engineering companies need to expand again, but the question that remains is by how much.

MINERS IN A RUSH TO ACT?

Paul Murphy, manager for South America at Mining Plus, an Australian consultancy, has seen the Peruvian market stabilise this year: “From 2013 through 2016, we observed many companies cutting back on greenfield and brownfield investment, rather electing to simply optimize their current operations. Throughout 2017, there was a distinct change with bigger greenfield and brownfield study scopes (Exploration, PEA, PFS and FS) returning to the market.”

As a result of these developments Mining Plus, which has built

its office in Peru around a strong base of QPs in exploration, will undertake an aggressive expansion in 2018 with the aim of doubling their team. When discussing whether he believed companies would rush to drill this year, Murphy said: “The mining cycle is driven by fear and greed. Companies have been fearful and conservative for the past three or four years, and now the sentiment is changing very quickly to one where they are fearful, but in a completely different way. Fearful that if they do not act immediately, they will miss out on this coming cycle of higher commodity prices.”

Meanwhile Alfredo Remy, regional director for Advisory and Business Improvement at Hatch, believes that the cycle of commodity prices is moving in the right direction: “We have good expectations that it will help the industry become more dynamic.”

OPERATIONS SPECIALISTS

During the downcycle, certain consultancy firms transitioned from being a provider of EPCM or capex projects to become specialists in opex, due to the lack of new mining projects being developed



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worldwide. With tight budgets, mining players needed to debottleneck their operations and incorporate efficiency improvements to sustain their business models. Pierre Montauban, country manager at Hatch, believes that his company discovered a niche in operations, specifically operational readiness, and wants to continue expanding in this sector before competition increases. "For the expansion of Antamina, the ramp up only took three months, much faster than the average time. Las Bambas was more complicated but still only took five months, which is world-class for an operation of that size," he related.

With 95% of the Peruvian business in mining, Hatch Peru has become well known across the wider organization for its work in operational readiness, specifically in the early phase between the conceptual, pre-feasibility and feasibility stages. While the new cycle may present good opportunities for project engineering, Montauban commented that Hatch will continue to develop its operational expertise moving forward.

PUBLIC WORKS ON HOLD

The Lava Jato corruption scandal has caused many public projects to be delayed in Peru, therefore the enhancement of mining activities has been welcomed by engineering firms that work both in the private and public sector. Stantec has finalized the merger with MWH and this has brought synergies between MWH's water management expertise and Stantec's underground mining capability. During 2017, Stantec was hopeful for certain government contracts, but projects like *Agua*

"For the expansion of Antamina, the ramp up only took three months, much faster than the average time. Las Bambas was more complicated but still only took five months, which is world-class for an operation of that size."

**-Pierre Montauban,
country manager,
Hatch**



para todos (Water for Everyone) did not proceed on the grounds of political instability.

During the downcycle, the former MWH put a strong emphasis on diversification. Looking forward, Alberto Coya, country manager at Stantec, is still interested in water, power and public sector projects in Peru. However, mining currently represents 85% of the company's project portfolio, with a vast majority of those assignments being in brownfield operations.

SYNERGY AND M&A

Synergy became a key concept in the downturn as companies and offices brought together their diverse range of expertise in a bid to not only survive, but grow. Companies merged, and regional offices began



**Martín Fernández,
mining manager LATAM,
OHL**



**Marc Blattner,
general manager,
Tumi Raise Boring**

to collaborate more. Hatch not only pushed for synergy between its Chile and Peru offices, but also acquired Indisa in Colombia. With each office having a specialty, they are working in collaboration to maximize their growth potential as efficiently as possible. A company that has entered the South American market aggressively is WSP, with three important acquisitions: Schlumberger Water Services, Poch (Chile) and ConCol (Colombia). When discussing synergy, Andrés Fernández, country manager for WSP, said: "Schlumberger's consultancy expertise on one side, and Poch and ConCol's engineering background on the other, greatly complement each other."

THE IMPORTANCE OF WATER

Water has been a constant topic of conversation in Peru due to its scarcity in certain mining areas and the country's climatic variations. Moreover, there are now greater demands from the different

stakeholders to improve water management. Fernández of WSP has seen a changing attitude: "There is now an increased awareness of the importance of water, not only in mining operations but also for the surrounding communities and the regional governments. Peru now has a new detailed accounting system, called the Water Balance, which calculates how much water mines receive, how much they use, how they use it, and how much is recirculated and recycled." The issue of water scarcity is likely to become more prevalent throughout the 21st century. Water management firms are constantly aiming to innovate their service line, not only to be more cost efficient and productive, but also to be environmentally friendly. WSP, that mainly works in water management services in hydrology and hydrogeology, recently patented a technology of directional drilling for pit dewatering. "This process has reduced the amount of drilling needed as well the number of pumping stations required. By

maintaining a drier pit, you reduce the number of explosives needed, you increase efficiency and you reduce maintenance costs," assured Fernández.

Alberto Coya of Stantec also commented on the mining companies' efforts to prevent disasters related to tailings dams: "There have been a number of cross-examination studies by companies in the industry, especially related to tailings facilities. Policies and standards have not changed that much since the Samarco disaster, however companies are much more vigilant in monitoring these standards and ensuring that there are no mistakes during engineering, construction, operation and closing."

CONTRACTORS-IN-WAITING

A number of contractors diversified their portfolio of services during the crisis, whilst also focusing on increasing their number of *opex* projects to provide a steady cash flow. OHL, which arrived in the mining sector in 2012, has expanded its range of action. "In the past, the market probably saw OHL as a company focused on earthmoving, but we can do much more than that. For example, we are currently executing three tailings dams' contracts, none of which are for earthmoving," said Martín Fernández, mining manager Latin America at OHL.

Ricardo Vega, president of OHL, highlighted that mining generated 77% of OHL's construction revenue in Peru. As an example of OHL's capabilities in value-added services, the company recently completed an EPC

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project for the crushing, agglomeration and transportation facility for Tahoe Resources' Shahuindo project, in Cajamarca. "This is a state-of-the-art plant and, thanks to OHL's procurement capabilities, we can adapt the crushing systems, the conveyor belts and the grasshoppers to the needs of the client. It is a tailor-made solution," said Vega.

In 2018, OHL will continue working at the Shahuindo, Antamina and Las Bambas projects, whilst also undertaking early works at Quellaveco. One of the company's goals for 2018 is to enter the underground mining segment as well. "We have very strong expertise in tunnelling for civil works, but we have never applied that expertise to an underground mining operation," said Fernández.

The issue for large contractors looking to enter the underground space is that most mines in Peru so far are in the small to medium size range. The country's largest underground operation is Cerro Lindo, with a daily processing capacity of 20,000 mt/d. The expected large underground projects will probably come from ageing open pits, like Yanacocha, for instance.

Even so, contractors are already taking position because potential contracts in this space will be very significant due to the volumes involved. Byrnegut, for instance, has already set a foot in the country through its partnership with San Martín. The Australian company's business plan is to target underground mines that will require production faces of five meters by five meters.

Greg Jackson, managing director of Byrnegut Offshore, emphasized that the use of the latest technology is key when you are dealing

with such large equipment underground: "Byrnegut invests heavily in innovation and developing practical solutions. Examples include real-time 3D scanning technology to measure shotcrete thickness and minimize wastage, mechanical fan hanging devices to improve safety, modern ejector trucks and R&D in alternative underground truck technology."

UNDERGROUND SPECIALISTS

Peru has a rich history in underground mining, which has brought necessary technological innovations to an ever-changing underground mining landscape. Robocon, one of the key contractors offering rock support through shotcrete application, is currently focused on narrower tunnel development, as per its clients' demands. "Typically, our clients have faces of four by four meters, but now they want to advance in tunnels of three by three meters [...] Through Tecnomecánica, our technological arm, we are developing new machines in collaboration with other manufacturers in Peru and abroad that already have some technologies for narrow-vein operations," said Enrique Sattler, managing director at Robocon. Robocon has been working for Volcan (now Glencore) since 2005 and for Pan American Silver's Huarón and Morococha mines since 2012. When discussing Robocon's most recent activity, Sattler commented: "We started operations in Tambomayo and Uchucchacua for Buenaventura, and we began working in Yanacocha in 2017, in collaboration with AESA. Our most recent client is Sociedad Minera Austria Duvaz, where we are transitioning from a dry shotcrete operation to a mechanized, wet shotcrete operation in narrow tunnels."

Sattler stated that further milestones for this year will include Robocon's development of its own scalers and the widening of its service portfolio to provide a more comprehensive ground support solution to clients.

Finally, Tumi Raise Boring has increased its involvement in production drilling thanks to the development of the SBM 400 SR machine. While raise boring has traditionally been used for ventilation needs, Marc Blattner explained the usage of the SR machine: "What we do is a burn hole: a hole in the center of the blast zone, which provides a cavity for the blast area to collapse into. The SR model is not only an upgrade of our traditional raise boring machine, but it is actually a new method of production which did not exist before."

In 2017, Tumi grew from 11 to 15 crews, three of which are dedicated to production activities, and is also expanding into Chile, where the company expects to grab boxhole contracts with Codelco at El Teniente. As a company that engineers and develops its own machines, increased mining activity worldwide may result in more revenues coming from the outright sale of equipment to miners. "We will see Tumi's growth coming not just from contracting, but also selling machines into the Peruvian market, which so far we have tried not to do. It seems that the mines are going back to the mentality of the 1970s and they want to buy their own equipment again. We are flexible enough to offer ourselves to run the equipment with a contract or provide all the maintenance, and also to train our clients' operators if required," said Blattner.

A World of Innovation

Technology players keep incorporating new concepts to improve productivity and safety

The mining industry is constantly evolving. If the last downcycle was fertile ground to look for new ideas that would bring more efficiency to production processes, the current upswing in commodity prices may offer the perfect opportunity to properly test these new technologies. At the end of the day, there is more cash available in the market and final users may be a bit more flexible with their budgets to give the latest gadgets a try.

For the global original equipment manufacturers (OEMs), innovation is a long-term pillar with a clear strategy. Epiroc, the newly-created company that is inheriting Atlas Copco's mining business, has defined four areas of interest for innovation: electrification and the use of battery-powered equipment; automation related to the possibility of having remote operations; interoperability, with all machines compiling big data that will allow for fast decision-making; and technologies for rock excavation, with the idea of potentially replacing drill-and-blast methods with continuous mining techniques.

Ángel Tobar, general manager for the Andean region at Epiroc, developed on the advantages that battery-powered equipment can bring to mines, especially as underground operations move deeper and health, safety and environment (HSE) regulations worldwide become more stringent: "At this moment, the initial cost of a battery-powered machine is higher, but if you look at the total cost of operation, you can obtain significant savings in areas such as mine ventilation, by having smaller tunnel sections, and also you would avoid the operational delays related to fumes underground," he explained.

While these machines require a certain level of electrical infrastructure in the mines, Tobar also explained that they are offering transitional solutions as well, with swing units that will allow for a second battery to be charged while the first one is in operation. In any case, Tobar advocated for the standardization of battery-charging technologies: "Chargers should be used in a similar way to cell phones, regardless

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of the brand. That would save many costs in terms of the infrastructure, and would give mining companies the flexibility to change the equipment to improve efficiency over the life of the mine."

Atlas Copco chose Peru for the global launch of the battery-powered Scooptram ST7 at Southern Peaks' Condestable copper mine. Now, under the Epiroc brand, this machine is running its first tests in altitude conditions at Nexa Resources' Atacocha operation. Besides the Scooptram, Epiroc already has battery-powered Dumpers, Boomers and Simbas for production drilling.

NEW PROJECT OPPORTUNITIES

The expected development of several mining projects in 2018 and 2019 with a combined capex of several billion dollars presents enormous opportunities for equipment manufacturers, especially those involved in construction activities, like Volvo Peru. The company offers the FMX trucks, widely used in earthmoving activities, as well as the whole range of its Volvo Construction Equipment line, a business previously handled by a

"A battery-powered machine can bring significant savings in areas such as mine ventilation, by having smaller tunnel sections and avoiding the operational delays related to fumes underground."

**-Ángel Tobar,
general manager,
Epiroc**



distributor, which the company decided to take over directly in 2016. Besides, in 2014, Volvo acquired the mining truck business of Terex and, from April 2018, these units will be sold under the Volvo brand for the 45 to 100 short ton range. "2017 was very positive as we sold to key customers that already had Volvo trucks but not Volvo construction equipment. In 2018, we expect a positive continuation of this trend with a favorable mining environment and the commencement of new projects, like Quellaveco. Even in underground mines where we do not have a strong influence, we are selling our product range to the communities that rent

equipment to the mines," affirmed Enrique Ramírez, VCE business director at Volvo Peru.

The development of new projects will have an effect on expanding the different equipment fleets across the board, offering opportunities as well for companies specialized in equipment components, like Austin. Previously known as Austin Engineering, the company has a long track record in the design and manufacturing of truck bodies and buckets. Austin is the only player with local manufacturing capacity in Peru for these items, and has more than 130 truck bodies operating in different mines around the country.

In order to fight aggressive competition from OEMs, that try to bundle their mining trucks with their own trays, Austin has focused on its engineering advantage and high levels of specialization. Its latest product is the JEC LD tray, that fuses the best of Austin's JEC and Westech designs.

Tim Mitchell, VP business development South America at Austin, gave more details about this product: "There is a lot of engineering behind the steel. We have optimized the JEC LD by reducing the tray weight, which has a significant effect on the payload. Over the long run, the difference in productivity is huge, and can result in production increases in the millions of tonnes."

The JEC LD is already working in Colombia and Peru in operations including Cerro Verde, Southern Copper, Constanca and Shougang.

UNDERGROUND EXPANSIONS

The improvement of the market has clearly been felt across the underground spectrum. Indeed, higher base metal prices have drastically improved the economics of many mines, encouraging operators to engage in more dynamic budgeting after years of

severe cuts in investment. Normet, a Finnish company specialized in underground equipment, had good results in 2017, according to Franklin Pease, its general manager in Peru: "We started to see many companies renewing their fleets and activating the investment programs they had put on hold during the crisis."

Normet is mostly known in Peru for its Alpha 20 shotcrete sprayers and its Tornado shotcrete mixers, but the company offers a wider portfolio of solutions that go hand-in-hand with the mechanization of underground mining. Peru's latest safety regulations oblige operators to mechanize certain processes, such as scaling or certain jobs at height, where Normet's range of equipment can be of help. Pease affirmed that innovation and mechanization have certain limitations, especially in narrow-vein operations: "When you have small tunnel sections, you do not have all the equipment you need to mechanize the operations. Narrow-vein mining is a very small percentage of the total underground mining in the world, but we need to adapt to the different needs of the market [...] Changes will happen sooner or later: as an example, most mines will mechanize the charging of the explosives, because you will reduce the amount of explosives needed."

The lack of mechanization in narrow-vein operations opened up a business niche that the very large OEMs probably did not find to be large enough for them. Yet, it is a significant market worldwide. Resemin, a Peruvian manufacturer of underground equipment, has specialized in exactly this segment, and is capitalizing on its innovation efforts to achieve dramatic growth rates (50% in 2017) as the mining market picks up. Resemin produced 92 units last year and the company has expectations to reach the 150-unit/year mark soon. For this, however, the company will have to set up additional manufacturing capacity, as its 9,000-square meter plant in Lima is already working at full speed. "Our most successful product lines are the roof bolters and the Muki," related James Valenzuela, CEO and chairman of Resemin. "There is now greater demand for equipment for smaller tunnels of three meters by three meters, this is why the Muki is constantly described as a game-changer. We are the market leader in narrow-vein machines and the Muki is the complete solution for that sort of environment because it has four applications: drilling, scaling, roof bolting and cut-and-fill mining. It can quadruple productivity compared to a manual drill."

"The new safety regulations now require for certain tasks to be mechanized, like the scaling process or certain jobs at height. We have a number of platforms with different configurations for those needs."

**-Franklin Pease,
general manager,
Normet**



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Another important milestone for Resemin's corporate growth was its purchase of Schopf, a Stuttgart-based manufacturer of underground loaders. With this acquisition Resemin received all the technology and engineering capability of Schopf as well as the brand, and now the company will begin manufacturing Schopf loaders in Peru, initially the 3.5 mt payload model and will progressively move up the product range to the 18 mt payload loaders. Valenzuela emphasized that now Resemin has the full offering: "We have a complete line of products for underground mining, and the loader market is three times the size of the market for drilling rigs. It is an enormous growth opportunity for us."

PLANT SOLUTIONS

Companies involved in the processing facilities are also gearing up towards the new wave of projects, as well as the service and maintenance contracts associated with an increasing installed capacity. Eaton, a company specialized in electrical and industrial solutions, opened up a service center in Arequipa in 2016 with the idea of serving projects along southern Peru's copper belt, and last year it already provided maintenance to 10 medium voltage units for Cerro Verde. In terms of greenfield projects, Eaton provided the installed base in medium and low voltage distribution for the expansion of Cerro Verde, and the company is now

working on the mine's new truck shop, while it would like to win new contracts from the upcoming copper projects.

Franco Bulnes, country manager of Eaton, emphasized the need to anticipate the new projects' needs and provide attractive solutions early on: "We are already supporting the design of water capture solutions and energy quality for Quellaveco. For the client it is key to have different options available before a final decision is made. The end user always wants more performance, more reliability and more safety, whereas the EPCM contractor may favor the easier solution to install and implement," he said.

Martin Engineering, a company providing solutions for bulk material handling, also works closely with global OEMs and EPCM contractors to try to secure corporate sales for the new projects. Martin offers different solutions such as cleaners for conveyor belts, air cannons to aid the flow of the bulk material and industrial vibration solutions. Javier Schmal, managing director for Latin America at Martin Engineering, provided more details: "Anywhere you have to handle a large amount of bulk material is a risky environment. Our solutions reduce the need for people to be close to the conveyors, hoppers or crushers, so we play a key role in safety. Also, we ensure that the product goes from point A to point B without any spillage or waste. Besides productivity, that also prevents the need for more cleaning or maintenance activities."

"With the acquisition of Schopf, we now have a complete line of products for underground mining, and the loader market is three times the size of the market for drilling rigs. This year we are starting to manufacture Schopf loaders in Peru."

-James Valenzuela, CEO and chairman, Resemin



One of Martin Engineering's flagship products is the CleanScrape solution for conveyor belts, a belt cleaner that does not require any servicing or adjustment until the end of its wear life. "Often, with cleaning systems you need to constantly make adjustments, which is not ideal," related Schmal. "Beyond productivity, this minimizes the exposure of technicians to the risks presented by large equipment."

Currently, Martin Engineering has solutions working at different large mines, including Southern Copper's units, Cerro Verde, Las Bambas and Miski Mayo.

Mining Services

Price is still a big driver but the technical side of proposals is increasingly important

During the hard times, providers' margins were pushed to the limits. The price was among competing suppliers, desperate to keep their contracts, allowed mining companies to stay competitive but the urge to save costs also created other problems related to quality and service. Luckily enough, the industry is now producing minerals at a comfortable price range and increased profitability. While that should not translate into cost overruns, the relationship between miners and providers should be one of mutual benefit that looks at a long-term sustainability for both parties.

Exploration was probably the segment that suffered the most, because the level of activity was drastically reduced or, in some cases, stopped altogether. Jorge Granda, general manager of AK Drilling International, a contractor with a fleet of 25 machines in Peru and operations in seven countries, explained that the low volumes of work available and high pressure on drilling rates made the downturn a difficult period to adapt to: "During the crisis, the procurement specialists within the mining companies were empowered to take many decisions about which contractors to use. Seeing the drilling service as a commodity means that you will only pay attention to the final price, and this is shooting yourself in the foot." Granda said that, more recently, clients have realized that price cannot be the only driver. Geotec, another drilling contractor, has also seen a positive trend in the market, and indeed the company doubled its sales in 2017. Recent drilling campaigns by the larger mining operators are prompting contractors to invest in automation and new technologies related to safety, said Geotec's general manager, Miguel Ángel Arenas:

"We increasingly saw clients ready to pay more for safety and new technology. In Las Bambas, we incorporated seven hands-free rod handlers, so the whole drilling campaign was hands-free. This year we have won a contract to introduce intelligent machines for rod handling in underground mining. It is the first hands-free diamond drilling campaign for underground mining in Peru." Arenas highlighted that some mining companies are willing to engage in long-term drilling contracts, like the three-year assignment Geotec has at Yanacocha,

because they know the drilling rates will increase very soon. Asked about the investment required to incorporate the hands-free rod handlers, he explained: "If you include the training required, a hands-free rod handler for a surface drilling rig can cost US\$450,000, while a brand-new drilling machine costs US\$600,000. Not all clients are willing to pay substantially more for their drilling, but for us this amount needs to be seen as a long-term investment where we are also improving productivity, efficiency, and safety."

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"A positive development is that the clients have realized that price cannot be the only driver. You can adjust your costs up to a certain limit, but you cannot really let that affect your workers because drilling is a specialized service."

**-Jorge Granda,
general manager,
AK Drilling International**



Granda of AK Drilling affirmed that the introduction of these new technologies, however, should not be seen as a 'one-size-fits-all'. "At AK Drilling we were one of the first contractors to use these technologies for an oil and gas project in Colombia. In the oil and gas industry, you spend months on the platform, and each pipe weighs half a tonne. In mining exploration, the rods weigh 35 kilograms, and you are on a platform for just a couple of weeks. In mining, you need an agile setup and competitive costs [...] At the end of the day, it is the end user who needs to decide what is best for each particular project."

NEW BLASTING TECHNOLOGIES

If 2017 could be seen as light at the end of the tunnel for exploration-related companies, the blasting market remained tight with the arrival of new competitors and a continued focus on cost reductions and productivity. For Exsa, one of Peru's main rock fragmentation companies, innovation was instrumental to assure the company its strong positioning in the open pit segment, where it has a 45% participation. Through the introduction of the Quantex technology, clients obtained cost reductions of 30% in the blasting process and 80% reductions in CO2 emissions, according to Gustavo Gómez Sánchez, the firm's general manager.

Gómez Sánchez highlighted that the second half of 2017 allowed for an increase of work volumes but that the higher price of ammonium nitrate presented some challenges as well. Moving forward, Exsa will continue expanding its scope, offering specialized blasting services for construction and non-production activities, and leveraging its brand-new initiation systems plant in Peru: "This is the only new plant built in the region for more than 20 years, so the gulf in technology is vast. We will reduce our environmental footprint, as the plant will not use lead and is far more efficient. We are specializing in non-electric detonators, detonating cords, boosters, shock tubes, PETN and we are in the process of manufacturing end products as well," he said. Innovation is also a key pillar for Orica, a global giant in the explosives market that participates in Peru's mining industry through blasting solutions and the provision of cyanide for gold mines. The company is introducing a wireless detonation system called Webgen that consists of a wireless primer and supporting equipment. Webgen is already being used in underground mines in Canada and Australia, and it should be tested in Peru this year.

Gustavo Costa, general manager of Orica in Peru, provided more details: "As there is no need for wiring, Webgen allows our customer



"Our new initiation systems plant is the only new plant built in the region for more than 20 years. We will reduce our environmental footprint, as the plant will not use lead and is far more efficient, being 100% automated."

**-Gustavo Gómez Sánchez,
general manager,
Exsa**

to have fewer people exposed to risks and for less time. Moreover, we are capable of significantly reducing the blasting time cycle, which translates into millions of dollars in savings [...] For example, in mines that usually have thunderstorms, the wireless process will allow work to carry on for longer and will reduce the stoppage time."

CHEMICAL SUPPLIES

Like rock fragmentation companies, providers of chemicals are also moving away from the mere supply of products to offer higher-value solutions and consultancy support. Quimtia, a company with a footprint in the wider region but whose mining practice is mostly focused in Peru, has seen specialties increasingly overshadowing the more traditional business of commodity trades, where the company provides copper sulfate, sodium cyanide and activated carbon.

It was on the environmental front that Quimtia started its diversification: "Due to the numerous gold and silver mines that have to deal with cyanide contamination in discharge streams, there was a strong opportunity to implement related solutions in the Peruvian market," said Eduardo Galdo, sales manager of mining at Quimtia. "We started to treat this type of discharge, eliminating cyanide, removing other contaminations like extra metals, regulating the PH and reaching standards that the law required. These environmental solutions took our portfolio to another level."

Today, advanced oxidation technology, like the hydrogen peroxide used for cyanide destruction, contributes to 30% of Quimtia's business, while other niche products used to improve recoveries in both leaching and flotation processes already make up

20% of revenue. Moving forward, these two segments (environmental care and metallurgical recoveries) should continue to grow for Quimtia, said Galdo: "We are working with Nalco to develop their WaterShed business in Peru. This technology increases water recovery while improving deposits and increasing the life of a tailings dam. We believe that it is now the perfect opportunity to implement it, as tailing dams reach full capacity."

Ixom, a company created from the divestment of Orica's chemicals division in 2015, is also increasingly focusing on regular supply relationships for mining clients rather than spot commodity trades. The company's mining business grew by 30% last year, triggered by contracts in water treatment and flotation with large copper producers.

Claudia Marchini, country manager of Ixom, declared: "Our chemicals business was mainly based on commodities, which allowed us to start relationships with large customers and increase our volumes in the past. After that, the fall of copper and other mineral prices represented an opportunity for us to offer specialty chemicals for mineral processing."

Ixom covers several business areas across the mining industry food chain, including the developing of emulsifiers for explosives, and it has a plant in Chile where it produces flotation agents. Marchini gave more details about the importance of creating tailored products for the different mines: "We have specific products and applications to improve productivity in oxides or sulfides of copper, zinc, lead and precious metals. In copper concentration, we develop customized collectors according to each specific ore mineralogy," she concluded.

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"As mineral prices increase, Peru will be in the spotlight this year"

Carla Martínez and Jorge León Benavides

CM: General Manager,

JLB: Leader of Peruvian delegation to PDAC

Canada Peru Chamber of Commerce



"We believe this will be the start of a new mining boom. Now it is the time for Peru to attract the big fish in the mining industry worldwide"

What are going to be the highlights of your participation in PDAC 2018?

CM: The delegation to PDAC is one of our key initiatives every year. This year the group consists of nearly 200 people. Our main activities include the Peru booth inauguration, the CEO luncheon, the Peru Day and the networking cocktail. During the Peru Day, speakers will include Vice-president Martín Vizcarra, who is also Peru's ambassador to Canada; Minister of Energy and Mines, Ángela Grossheim, who has important announcements to make; Minister of the Economy, Claudia Cooper; and Julio Velarde of Peru's Central Bank. The aim is to show global mining companies and investors the new strategy to attract investment to Peru in areas such as environmental, social and tax issues.

How is the government tackling the bureaucratic delays that have affected exploration in Peru over the last years?

JLB: Until recently, our exploration regulation was too complex and not very favorable for exploration. For instance, any money you spent on exploration did not count as part of the company's investment. The current vice-minister understands very well the dynamics of mining investment and has promoted a regulation to expedite processes for exploration, which is excellent news for investors.

How is total mining investment picking up in Peru?

JLB: For 2018, we expect investments of US\$5.7 billion in Peru. Only with the projects that have been approved so far, we have US\$40 billion worth of investment between now and 2021. For

that to happen we will need to overcome some social issues. While Quellaveco seems to be advancing rapidly, there are projects like Tía María where there is a need for a stronger relationship with the local communities.

As mineral prices increase, Peru will be in the spotlight this year. It is not just about individual deposits; investors also look at countries that offer upside potential in the long run, countries that offer legal and economic stability. This is something that Peru has proved to have over the last two decades. Investors look at countries with investment grade and those that are open to the markets –Peru has free-trade agreements with 75% of the world. With all these conditions in place, we have high expectations for the mining industry this year as we believe this will be the start of a new mining boom. Now it is the time for Peru to attract the big fish in the mining industry worldwide.

How does the industry handle the environment and what is your opinion of the formalization process?

JLB: In 2014, Peru hosted the COP20 and, as part of this, the country aligned very well with the world's environmental standards. The problem we have is illegal mining in Madre de Dios where people expose themselves to mercury and terribly harm the environment. With the formalization process, for the first time in Peru's history we have 5,000 artisanal miners that have joined the legal system. This is not so many if compared to the total numbers, but it is a great first step by this government. In the past, other governments just looked away. •



GLOBAL BUSINESS REPORTS

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If you wish to be interviewed for the report, please contact Lina Jafari (ljafari@gbreports.com)

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