

Peru's mining industry

Gearing up for a new wave of investment

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Peru: An Overview

Currently in a transition period, Peru must unlock its vast pipeline of mining projects.



Antamina, located at 4,300 m above sea level, is Peru's largest copper and zinc producer. Photo courtesy of Antamina.

It has been nearly a year since Arequipa hosted its biggest Perumin convention ever, amidst an enthusiastic atmosphere full of optimism. There, President Humala described the expanding mining activity in the country as a transformational change for Peru, and not just a cyclical effect of high commodity prices.

For that transformational change to happen, Peru must continue to attract investment even when markets are down and big mining companies—many under new leadership—are cutting costs and thoroughly reviewing where to put their money next.

A combination of external and internal factors (the latter related to political problems and social conflicts) has indeed caused a slowdown in project development over the last months. Meaningful exceptions can be found in Chinalco's Toromocho, Hudbay Minerals' Constancia and Cerro Verde's large expansion, which are both advancing.

The long merger process between Glencore and Xstrata also created delays at Las Bambas, a large copper asset under construction, which Glencore finally agreed to sell in April to a Chinese consortium led by Hong-Kong listed MMG, an arm of Minmetals, for \$5.85 billion.

There are, however, signs that late 2015 and 2016 will see the mining industry experience a boost. Southern Copper's \$1 billion Tía María copper project should receive environmental impact assessment (EIA) approval before the end of this year. Then, a production decision for Quellaveco is expected from Anglo American in late 2015.

Slowly but steadily, Rio Tinto is advancing its La Granja copper project, considered to be the seventh largest undeveloped copper deposit in the world. Finally, Peru's

most controversial project, Yanacocha's Minas Conga, could restart activities as well, although that will depend heavily on the outcome of the regional elections to be held later this year. Yanacocha's main shareholders, Newmont and Buenaventura, may reduce Minas Conga's total capex from \$5 billion to \$4.5 billion.

Long-term vision

Investment in Peru's mining industry was a record-breaking \$9.5 billion in 2013. However, according to Alfredo Remy, mining industry leader at PwC, "Peru needs more projects beyond 2016. Our government indicates that the mining GDP will grow by 9.2% in 2014, but that is the result of the big projects that are already ongoing."

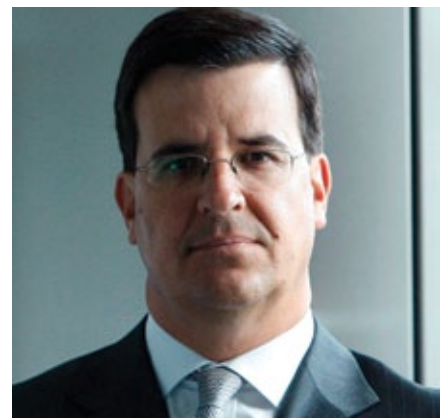
Peru's government has been expanding the value of the country's project portfolio to nearly \$60 billion. Many of these projects are still up in the air, however, and initial investment decisions cannot be taken for granted. At the peak of the conflict over Conga, Peruvian officials did not appreciate

Newmont's press release implying that the company would take its money somewhere else. Still, Peru must be aware that in today's globalized economy, competition is the name of the game. As Christian Laub, president of the Lima Stock Exchange, said: "We do not compete with ourselves, but with other countries. Mining companies have a budget for projects, and as a country we must be proactive to promote responsible mining."

What worries critics is not the short term: Peru should receive \$9 billion worth of investments in the mining industry this year, in spite of the market conditions. "In terms of investment, what is affected by low metal prices is exploration, and that is not a high portion of the total investment portfolio. When a project enters the construction phase, it cannot be stopped. Additionally, companies are executing investment projects to achieve cost reductions. These projects will not stop either," said Eva Arias, president of the Mining, Petroleum and Energy Society (SNMPE), the main industry association.



Alfredo Remy, mining industry leader at PwC.



Christian Laub, president, Lima Stock Exchange.

A cost equation

As elsewhere, Peru's mining companies are adjusting to the new scenario to make their business sustainable at current metal prices. Managing costs has become essential, and it is an area where Peru is well positioned, said Remy of PwC: "The country offers low production costs if compared to other countries in the region, in spite of inflation. That is partly due to our energy cost, which is 50% lower than Brazil's and 67% lower than Chile's."

For companies, adjustments have implied sacking a good amount of workers, cutting down exploration budgets and pushing providers for aggressive discounts. As the industry goes back to the basic fundamentals of the business, companies are also trying to present their costs differently, to avoid the distortions of low cash costs that translated into negative cash flows.

"We have learnt a lot during the last decade. We do not talk about the ounces produced, but about cash flow. We do not talk about how many projects we have or how many countries we are in, but about how much cash we are generating. We talk about the all-in cost and all-in sustaining cost and not about the cash cost, which is a concept that had many hidden or non-reported data," explained Ernesto Balarezo,



Ernesto Balarezo, executive VP Americas, Gold Fields.

executive vice-president for the Americas at Gold Fields.

Jorge A. Ganoza, president, CEO and co-founder of Fortuna Silver, further developed on this: "The cash cost leaves behind an important part of the expenditures that, if not invested, would cause the mine to close down, such as tailings dams, camp improvements or equipment. At the end of the day, everything is in the companies' financial reports, but certainly using the 'all-in cost' helps have a more fluid communication with shareholders. Having said that, it is not a perfect way to measure your capacity to generate cash flow."

Overcoming challenges

While 2013's fall in metal prices and uncertainty about future trends are probably the biggest culprits of the sector's slowdown, industry leaders surveyed also blame the current government for its lack of proactivity to push new projects forward. At a regional level, the anti-mining activism of the Cajamarca government has shown the weaknesses of a poorly managed decentralized political system.

Yet, with its array of challenges, the industry continues to see Peru as a key mining country. Diego Ortega, director of the La Granja project at Rio Tinto, emphasized that there are 14 ICMM members with projects or operations in the country. "That shows the level of confidence that investors have in Peru," he said.

Looking at the country's activity, it is hard to believe that mining is in decline in Peru, yet it is true that the sector is currently relying on past investment decisions and the uncertainty of this year's regional election and of the 2016 presidential poll is not helping. A new wave of investments in the billion-dollar range, including Tía María, Quellaveco and Conga, would certainly boost the industry's optimism in Peru for the long term, ensuring overall economic growth continues as well.



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Production and development

Windows of opportunity

Hudbay Minerals' \$1.7 billion Constancia project will start production later this year. Photo courtesy of Hudbay Minerals.

A good old-time cliché is that a time of crisis is also a time of opportunity; indeed, those who have been successful enough to move their projects forward over the last couple of years of slowdown have benefited from better power and equipment prices, at a time when the correlation between offer and demand is significantly different than in 2011. On one hand, economic growth in Peru (+5% in 2013) continues to attract new providers from all around the world in fields like engineering, construction and equipment. On the other, the next wave of mining mega projects is still to become reality, therefore all these providers are having to push prices down to win contracts.

"We hit a sweet spot in the whole process," said Cashel Meagher, vice-president of Hudbay Minerals' South American business unit. Hudbay is completing the construction of Constancia, a \$1.7 billion

copper project, expected to start production later this year and reach full capacity in 2015.

Constancia's construction decision was taken at a moment where many other projects were put on hold, but when suppliers (such as power generators) had already invested in new capacity to deal with foreseen upcoming demand. "The power generators anticipated many new projects, and that put us in the greatest negotiating position. We secured power for 10 years at a very good rate. We would not have been nearly so successful without the downturn of the last couple of years," Meagher added.

Copper in the spotlight

Due to this delay in new mega projects, Peru's copper production is increasing but is not yet taking off. Output in 2013 was

about 1.38 million mt, a 5.9% increase year-on-year but still far from the country's potential. Peru's main producers are Antamina with 461,000 mt from a single operation; Southern Copper with 308,000 mt; Cerro Verde, operated by Freeport McMoRan and participated by Sumitomo and Buenaventura, with 261,000 mt; and Antapaccay from Glencore (previously Xstrata) with 151,000 mt.

This year copper production will increase again, thanks mainly to the addition of Chinalco's Toromocho, a \$3.5 billion project that commissioned its 117,000 mt/d mill at the end of 2013, although it has suffered technical delays this year. Chinalco is also investing an extra \$1.3 billion to further expand capacity.

Another expansion worth mentioning is the ongoing \$4.6 billion investment at Cerro Verde, that will treble concentrating capacity from 120,000 mt/d to 360,000 and will push copper output to over half a million mt/y of the red metal, starting in 2016.

Much bigger than Constancia, that will add an average of 82,000 mt/y of copper for 22 years once it reaches full capacity, is the other big new project under construction: Las Bambas. Recently sold by Glencore to a Chinese consortium led by MMG in a transaction valued at \$5.85 billion, the operation itself represents a capital investment of \$5.2 billion.

The project, located in a remote location in the Apurímac region at over 4,000 meters above sea level, will have a 140,000 mt/d concentrating plant, and is expected to start production next year. Once in full capacity, it will produce 460,000 mt/y of copper annually during the first 10 years, for a total mine life of 18 years.



Peru produced 1.38 million mt of copper in 2013. Photo courtesy of Antamina.



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After these, the remaining projects are still to reach the construction phase. The most important ones are Southern Copper's Tía María, Anglo American's Quellaveco and Rio Tinto's La Granja, as well as Conga, a gold and copper project where Newmont and Buenaventura, partners at Yanacocha, already spent \$1.5 billion (out of the total \$5 billion capex) before the project was put on hold amid high civilian unrest in Cajamarca.

Tía María is a \$1 billion project that also got stuck in 2011 on sociopolitical and environmental grounds, this time in the Arequipa region. Expected to yield 120,000 mt/y, it is now awaiting EIA approval under a new design that includes a desalination plant. This is not Southern Copper's only project in the country: the Grupo México company also plans to expand its Toquepala operation to a concentrating capacity of 120,000 mt/d, while an expansion of the Ilo smelter and refinery is also in the pipeline.

With regard to Quellaveco, Anglo American has delayed a production decision until late 2015 for strategic reasons. Unofficially, the company is said to be evaluating bigger production volumes of 281,000 mt/y (instead of 215,000 mt/y) to achieve better economics. The company awarded the EPCM contract to Fluor this April, and is trying to keep the project as ready as possible, with investments on items such as a tunnel to divert the Asana river, and the construction of a 30 km road.

Cajamarca is also home to Rio Tinto's La Granja, one of the world's largest undeveloped copper deposits with 3.6 billion mt at 0.51% Cu, where the company projects an initial production of 100,000 mt/y of copper cathodes. "Production in cathodes adds value to the project and reduces the social impact, because we are talking of a leaching operation without the big requirements that concentrate transportation would have," said Diego Ortega, director of La Granja Project at Rio Tinto. The company aims at entering the feasibility phase next year.

Peru's portfolio of copper projects does not stop there. Other ventures in the pipeline include El Galeno in Cajamarca, owned by a Chinese consortium of Minmetals and Jiangxi Copper; Zafranal in Arequipa, a joint venture of AQM Copper, Teck and Mitsubishi Materials; Minsur's Mina Justa, a project with very favorable logistics close to the sea; and First Quantum's Haquira.

Haquira would be the next step for First Quantum in the Americas after the company puts into production the massive Cobre Panama project, acquired from Inmet. "Haquira could produce 230,000 mt/y copper. It is a mixed resource: we can produce some oxides, or cathodes from leaching oxides, and also the traditional sulphide production of copper in concentrates. We are allowing ourselves 2.5 years to complete the EIA, which should be done by the end of 2016. We are also in the tendering process of power supply for the project: power requirements could be as high as 200 MW," said Mike Parker, general manager of First Quantum Minerals in Peru.

The copper spectrum is not the majors' private reserve: there is also space for medium-sized companies. One such is Southern Peaks, a company backed by a private equity fund that has built its profile through the acquisition of non-core assets from other players. Its first mine was Quiruvilca, acquired from Pan American Silver; and last year it closed a deal with Trafigura to buy the Condestable copper mine. Between the two the company has assured production of 20,500 mt/y of copper, most of which from Condestable, as well as 13,500 oz/y of gold, 1.45 million oz/y of silver, 6,300 mt/y of zinc and 1,600 mt/y of lead.

Management at Southern Peaks, with previous experience at Volcan and Pan American Silver, has focused on increasing efficiency in both operations: "Condestable was a mine that was run for a trader, so production of concentrates was their primary fo-



Mike Parker, general manager, First Quantum.



Adolfo Vera, president & CEO, Southern Peaks Mining.

cus. We have turned it into a mine that is very careful about balancing both production and operating costs. In Peru, most of the copper is complex copper with pollutants; however the copper in Condestable is squeaky-clean. Trafigura maintains a long-term off-take agreement with us and we are very happy with the terms we have negotiated with them," said Adolfo Vera, president and CEO of Southern Peaks.

At Quiruvilca, a strong vein system that has been in production for over 100 years, Southern Peaks is looking at increasing mining production to have less idle plant capacity, and also at improving the metallurgy: "Quiruvilca produces probably as much gold as Condestable, but we only recover 15% of it," said Vera.

The company is also advancing the Ariana copper-zinc-gold project together with Pan American Silver; and it expects to go public soon, possibly with an IPO in the Lima Stock Exchange (BVL).

Gold

Once again, Peru saw its gold production decline in 2013: output was 6% down, from 5.19 to 4.87 million oz/y. Yanacocha, operated by Newmont, was the main cause for this decrease: the country's largest gold mine ended 2013 with just over 1 million oz produced. Paradoxically, Peru moved up the ranks of the world's largest gold producers, reaching the fifth spot, thanks to South Africa's sharper fall.

Buenaventura, Peru's largest precious metals company, produced 451,000 oz/y of gold from its direct operations, as well as its 43.65% share in Yanacocha, for a total of 895,000 oz/y. In order to improve profitability in the current pricing scenario, the company has stopped production in four of its mines, so it currently operates nine sites. Gold production guidance for 2014 is 848,000 oz/y (428,000 of which from Yanacocha). With regard to new proj-

ects, Tambomayo (gold-silver) is the most advanced one, and could have a feasibility study completed this year.

The other large producer in Peru, Barrick, also saw production decline in both of its units. Output at Alto Chicama was 606,000 oz/y compared to 754,000 oz/y in 2012; all-in sustaining costs were \$627 per oz in this operation. Meanwhile Pierina yielded 97,000 oz/y at all-in sustaining costs of \$1,349 per oz, figures that justify the initiation of closure activities in August last year.

After Buenaventura, Barrick and Newmont, Peru's gold segment is populated by medium-sized and small operations. The Madre de Dios region, home to a huge illegal mining activity, produced 10% of the country's gold in 2013, although the government has initiated a crackdown this year in mining towns such as Huepetuhe.

Medium-sized producers include a Peruvian group in charge of the Aruntani, Arasi and Anabi mines (for a total of 306,000 oz/y); Rio Alto Mining (211,000 oz/y); Consorcio Minero Horizonte (199,000 oz/y); Retamas (177,000 oz/y); Gold Fields (166,000 oz/y); and Poderosa (147,000 oz/y).

Rio Alto Mining, a company that fast-tracked the oxides phase of its La Arena deposit into production, is expanding its presence in the country through the announced acquisition of Sulliden Gold for \$275 million. Sulliden has been advancing the Shahuindo project, an expected 85,000 oz/y operation from early 2016, located just 30 km from Rio Alto's La Arena.

Weeks before the merger was announced, Rio Alto's president and CEO, Alex Black, emphasized that, having had a look at the whole region, Peru remained the best place to do mining in his opinion. "Peru is the number one country in South America to do business in mining, because



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it has a clear, prescribed method of advancing a project. If you look at the region, Brazil is tough; Chile is very expensive, for labor, power and water.”

Yet challenges remain. Gold Fields, for instance, continues to operate its Cerro Corona gold and copper mine in Cajamarca, but cannot do any exploration to expand reserves due to the social situation in the region. While looking at other project possibilities in the Americas, that include the reevaluation of the Chucapaca joint project with Buenaventura in Peru, the company is focusing on increasing efficiency at Cerro Corona. “Putting together reserves and resources we can talk of an additional mine life of 15 years approximately. Our aim is to optimize processes to increase gold and copper recovery. We are working to change the crushers, because the ore is getting harder as the pit goes deeper; and we are also introducing changes in the process, because the deeper the ore, the higher the energy consumption and the lower the mt/hour ratio,” explained Ernesto Balarezo, executive VP Americas at Gold Fields. On top of the gold, Cerro Corona also produced 31,400 mt of copper last year.

While gold production is expected to stay flat or increase by 1% this year according to the SNMPE, moving forward the project portfolio does not anticipate any new big volumes, beyond Conga. Projects in the pipeline are typically medium-sized. Minera IRL, for instance, is advancing its \$165-million Ollachea project, currently awaiting a construction permit, which is expected to produce 100,000 oz/y for the first 9 years of mine life.

Silver

Together with copper, silver is the metal that presents a healthy outlook in Peru. 2013 production was 118 million oz, a 5.5% increase, thanks mainly to bigger production volumes from Antamina, that reached 16.7 million oz/y. Peru’s main silver producer, Volcan, saw silver output decrease to 20.7 million oz/y, affected by a sharp fall in its Cerro de Pasco unit. Buenaventura registered an output of 18.9 million oz/y, helped by increased productivity at its Uchucchacua unit.

Peru is the world’s third’s largest silver producer. Future growth in silver will come both from sizeable silver production as a by-product at large copper mines, and from new primary silver operations. Inmaculada by Hochschild Mining is one of the latter. Expected to start production at the end of this year, the project should yield 6 million silver equivalent oz next year and 12.5 million oz/y by 2016.

“The market has not assimilated the impact that Inmaculada is going to have for the company. It will allow us to go from 20 million oz/y to 32 million oz/y; after that Crespo will push us to 35 million oz/y. Our market valuation does not include these, it is still based on our ongoing operations,” said Ignacio Bustamante, CEO of Hochschild.

Besides Inmaculada, another big development for Hochschild was the acquisition of International Minerals, who held a 40% stake in both Inmaculada and Pallancata, one of the company’s running mines. This way the firm gains 100% control over its Peruvian assets, which will push its Peruvian silver production to 13 million oz/y in 2014, compared to last year’s attributable 10.3 million oz/y.

Other primary silver producers in Peru include Pan American Silver, that expects to produce about 6 million oz this year from its Huarón and Morococha mines, and Fortuna Silver, who steadily produces 2 million oz/y of silver at Caylloma. Both companies have bigger operations in Mexico; Pan American also has mines in Bolivia and Argentina.



Votorantim Cajamarquilla's zinc refinery is the largest of its kind in Latin America. Photo courtesy of Votorantim.

Lead & Zinc

Peru is the third biggest producer of zinc and the fourth largest producer of lead worldwide. In zinc, the main players are Antamina (315,800 mt/y in 2013), Volcan (279,600 mt/y) and Milpo (225,000 mt/y). Volcan, a company that once produced 350,000 mt/y, is again affected by the sharp decrease of Cerro de Pasco. The company is evaluating a number of options to continue mining this historic site, affected by its proximity to the city, and lately by the decrease in metal prices.

Milpo, where Brazil-based Votorantim Metais has a controlling stake, runs three operations: El Porvenir, Atacocha, and Cerro Lindo. The company is integrating the first two units: "We are creating synergies, not necessarily to increase production but to operate at lower costs. This process has four steps: to integrate the supervision, to operate a single tailings dam, to have a single mineral lifting system, and to centralize production in a single plant by late 2015," explained Victor Gobitz, CEO of Milpo.

Meanwhile, the flagship Cerro Lindo operation is being expanded from 15,000 mt/d to 17,000-18,000 mt/d this year. Furthermore, the company plans to reopen its Chapi copper unit this year, shut down since 2012.



Victor Gobitz, CEO, Milpo.

On the value-added side, Votorantim is also present in the country with the Cajamarquilla zinc refinery, the largest of its kind in South America. The complex produced 326,000 mt of refined zinc in 2013, on top of other significant by-products, as explained by Votorantim - Cajamarquilla's general manager, Mauro Boletta: "Our main product is high-purity refined zinc, but we also have other by-products, such as lead-silver concentrate, and 540,000 mt of sulphuric acid. We also produce refined indium, a very valuable metal that sells at \$700 per kilogram, that we export mainly to Japan, where it is used in the manufacturing of flat screen tele-

visions; and we also have refined cadmium and a small amount of copper cement." With regard to the country's lead production, Volcan is the leading player with 67,400 mt/y, followed by Milpo and Buenaventura.

Other commodities

Peru is also the world's third largest tin producer, with the 23,700 mt/y from Minsur's San Rafael mine; and the world's fourth largest producer of molybdenum, where Southern Copper and Cerro Verde are the main players. The country is home to just one main iron producer, Chinese-owned Shougang (6.78 million mt of iron concentrate last year).

Finally Vale, in partnership with Mitsui and Mosaic, operates a 3.96 million mt/y phosphate operation on Peru's northern coast that the company plans to expand to 5.9 million mt/y.

The government's \$60 billion mining project portfolio may seem too optimistic, but the truth is, beyond localized sociopolitical conflicts that have delayed projects, Peru's geological richness and business-friendly environment seem to insure that the mining industry will continue to drive the country's economy for the years to come. Besides future projects, the country is already a leading player in many commodities.










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Exploration

Junior companies look at creative ways to survive the low cycle



Although budgets have been reduced, Peru's geological richness remains intact. Photo courtesy of Zincore Metals.

Worldwide exploration expenditures in non-ferrous metals fell 29% in 2013, according to SNL Metals Economics Group. In this global context, a fall in Peru was to be expected, but unlike in 2009, where the Andean country performed very well in the middle of the financial crisis and was the third recipient of exploration dollars worldwide, the country is now 7th in the ranking, after Russia.

This change has to do with lower investment in gold exploration, but also to a slower bureaucracy in Peru during the period 2012-13. "It would help to have a smoother and faster exploration permitting process. It is not practical to use up six to eight months to obtain a permit for 20 drill sites. If this continues, the risk money might look elsewhere," said John Mirko, president and CEO of Rokmaster Resources.

In a context where it has become incredibly tough to raise funds, some companies have decided that it is necessary to generate cash flow internally. Dynacor, for instance, has a 250 mt/d gold mill to process ore from third parties that generated net profits of \$9.1 million in 2013. That way the company could pursue its exploration efforts at Tumipampa, its main project.

"[At Tumipampa] we have found 12 veins out of 16 with high gold and copper grades that offer economic potential. We have also identified two other structures: a disseminated deposit near surface and a polymetallic skarn of 4.2km x 1.5km. Overall, the plan is to give priority to the vein structure, which we could put into production ourselves," explained Jean Martineau, president and CEO, Dynacor.

Lupaka Gold is another junior that plans to move into mining production at their Invicta asset. Lupaka's initial plan is to use contract mining and processing for a first phase of production of about 350 mt/d and 22-23,000 gold equivalent oz/y, after which the company would look at building its own plant and increase capacity to about 1,000 mt/d.

"Previous owners at Invicta spent \$15 million on the project. That includes all the exploration drilling as well as more than 1.2



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km of primary development. We believe we can achieve small-scale production at Invicta in less than 9 months and at a cost of approximately \$2 million. There are tunnels in place and the ore is developed, it is ready to go in," said Eric Edwards, president and CEO of Lupaka Gold.

Having cash flow from Invicta would allow the company to focus on its exploration assets. One of them is Josnitoro, a project optioned out to Lupaka by Hochschild Mining; however Lupaka's flagship exploration asset is Crucero, a project that already has a pit-constrained resource of about 2 million oz of gold at an average capped grade of over 1 g/mt gold.

Edwards, formerly CFO of Andean Resources, a company that Goldcorp acquired for \$3.4 billion, believes that the exploration business will regain its value sooner or later: "Crucero is economic with its current grade and number of ounces. However, it does not lend itself to starting up small. We believe that in 2-3 years Crucero could be at some multiple of its current size. In the current financial markets exploration is not given much value, but at some point it has to come back."

John Mirko of Rokmaster offers the following view about the current state of the market: "There are two types of investors: ones that prefer to focus on near-term production and others that prefer you keep drilling and finding more tonnage and grade. Exploration is a phenomenally exciting thing, because you never know exactly what you are going to discover. Worldwide there are 2,000 groups exploring and many drilling holes; not everybody hits anything at all, so staying alive while you do that is a real art."

Rokmaster's Pinaya copper gold project, located in Southern Peru, has a resource of 1.4 million gold equivalent oz (M+I) plus 867,000 oz in the inferred category. The company wants to replicate the success of Rio Alto Mining: "Our plan is to give inves-

tors exposure to both fast and manageable gold oxide production potential and exploration 'blue sky' on areas of the property that are brand new. We have made a new porphyry copper-silver discovery 12 km away from the main resource area. There is also room to expand the current resource area, especially one area to the south with very low-hanging fruit. Our initial drilling program will be fairly fast, about 3,000 meters," said Mirko.

Not just gold

A number of junior companies are trying to capitalize on Peru's copper investments.

Panoro Minerals, a company in which Hudbay Minerals has a 11.2% stake, is advancing its Cotabambas (Cu/Au/Ag) and Antilla (Cu/Mo) projects, both of which already have a resource. Meanwhile Indico Resources, led by Bob Baxter, who developed the Constancia project at Norsemont and sold it off to Hudbay, is now working on two other copper prospects, the main one being Ocaña.

"Ocaña can be brought into production in the near term. The project is 200 km north of Arequipa, in an area with a number of porphyry deposits like Zafranal. We think that there is an oxide layer over a potentially



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much larger sulphide body. Our main focus is on defining the oxide copper resource to develop a relatively small to mid size SX-EW to exploit it, with a capex of \$100 million," said Tim Bradshaw, country manager at Stonehouse, Indico's main shareholder.

Indico's president and CEO Bob Baxter remains confident about the future copper fundamentals: "People sensationalize the fact China is slowing down. In April, 25% of the copper came off the LME stocks because China bought it. China has not gone away. Also, the U.S. seriously needs to improve its infrastructure, and that will require a lot of copper. What people fail to realize is that the LME stocks of copper at any point in time are equal to less than a week's supply. If you look at analysts such as Scotia Capital, they forecast a price of \$3.50 by 2015 and \$4 by 2017."

There is also optimism about silver fundamentals: "Silver is much more than a precious metal: it is the greatest conductor of electricity, the greatest reflector of light and the greatest natural anti-bacterial agent on earth. I think that the potential of the silver price to go up is enormous," said Andrew Carter, president and CEO of Tinka Resources. The company, in the process of merging with Darwin Resources, already has an inferred resource of 32 million ounces of silver at the Colquipucro project, while it is also advancing its contiguous Ayawilca project, described by Carter as "one of the most exciting zinc finds in recent times."

Other industry leaders are looking at opportunities based on the increasing demand for commodities in Latin America itself. "There are 700 million people in Latin America, and many countries in the region have been growing at a rate of 3-5% annually for the last five years. I think Latin America is a great place to grow our business by selling our production locally. Seeing the growth of the construction business in Peru, there will certainly be a case for new pig iron plants," said Chris Gale, managing director of Latin Resources.

The company, based out of Australia, is developing its Guadalupito iron sands project, located near Chimbote and just 25 km north of Peru's main steel plant. With current data, Guadalupito would be a \$100 million investment that would yield 200,000 mt/y of iron ore, 150,000 mt/y of andalusite and some zircon, rutile and ilmenite. At this rhythm, the 1.2 billion mt resource would allow for a 100-year mine life.

Going further north along Peru's coast, a new phosphates district is developing. Leveraging on Vale's success at the Bayóvar



David Cass, president, Focus Ventures.

mine, Hochschild company Cementos Pacasmayo, together with Mitsubishi, are also developing a mine in the area.

Focus Ventures, a junior previously focused on copper, has changed strategy to become a niche player in phosphates, with projects in Peru and Colombia. The main prospect is Bayóvar 12 in northern Peru. "Our immediate goal, besides providing an initial resource as soon as possible, is to attract a strategic partner to help develop the project and provide technical expertise. Given the size of these operations and high capital costs the model seems to favor a split between 2-3 owners," explained Focus' president David Cass.

Another company looking for a joint venture partner is Zincore Metals at the Accha zinc oxide district (AZOD) project, where a pre-feasibility study was released last year. The company is considering two scenarios: investing in both a mining operation and a zinc refinery in Ilo, for a total capex of \$350 million; or alternatively, leaving the refinery for a later stage, which would reduce the initial capex to \$200 million.

"The advantage of having the refinery is that you can produce high-purity zinc at a low cost, and you avoid the need for an external smelter and refinery. Besides, you get a premium price for your zinc. Eventually, we would always want the refinery, but initially it could be better not to get so much debt and await some cash flow," said Jorge Benavides, president and CEO of Zincore Metals.

With mineral reserves of 10.5 million mt at 7.3% zinc plus lead, and a total resource of 34 million mt at 5.1% of zinc plus lead, Benavides insists that AZOD is one of the most important zinc projects in Peru and the world. On top of this, Zincore has an agreement with First Quantum, who owns 21.9% of Zincore and is funding the exploration activities in Zincore's copper assets, of which Dolores is the main target.

Communities and the State

Fulfilling Peru's mining potential requires institutional strength and community support.



Mining companies are trying to change the way they interact with local communities, giving a bigger role to the authorities. Photo shows pupils at La Arena school, funded by Rio Alto Mining.

Every month, the Ombudsman Office releases its report of social conflicts around Peru. Having a look at one of this year's editions, the mere size of the document (123 pages) gives a good indication of the scale of the problem in a country that is finding it hard to match rapidly growing levels of investment with well-rooted problems of poverty, lack of education and a huge infrastructure deficit. The document reported a total of 211 social conflicts as of March 2014; of the 134 that had an environmental cause, 99 were related to mining activities.

The number of social conflicts grew dramatically during the first years of the Alan García administration, from 80 conflicts in mid-2006 to over 270 in mid-2009. While the previous government should not be blamed for all of these, the current administration is trying to learn the lessons from that period. In the remote areas where mining activities take place, the public institutions are starting to have a presence, providing a better framework for the relationship between miners and communities.



Ricardo Morel, VP corporate affairs, Antamina.

"Peru offers a paradox: the country's richest activity, mining, takes place in poverty stricken areas, which generates divides and tension," explained Ricardo Morel, vice-president of corporate affairs at Antamina. "We are talking of remote areas where the state has never been, and where it now wants to be. The social management model implemented by the current government, a multi-actor roundtable

model, is bringing social conflicts down. It favors trust building, which is very important in a country where we all mistrust others. Before, the mining company had a leading role."

This is certainly some progress in social conflict management, considering the previous government would just send a "crisis group" from Lima hoping to solve a problem in a day or two, which was wishful thinking. However, the state's participation cannot be limited to these roundtables.

One key aspect is the management of the large tax revenues provided by mining. The days of the "voluntary contribution" of mining companies, that would run their own development projects together with local authorities, are now a thing of the past. In 2011, the fiscal regime changed, and the new model is trying to replicate what is considered normal in advanced economies: the state collects all taxes, and invests in the needed infrastructure; this way the mining company can dedicate itself to its core business, which is not running schools or hospitals.

"The voluntary contribution scheme had some positive effects, but it strengthened the bilateral relationship between companies and the communities, which was based on economic criteria. From a sus-

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tainability point of view, it was not the best idea," said Morel.

Yet the road to an efficient management of resources by the government is not an easy one. Starting with the legislation, the canon law that distributes 50% of income tax to the areas around the mining operation has its flaws, creating massive differences in income among different districts. Antamina is a good example of this: having a pipeline that takes the mineral from the mine to the port, the whole operation runs through 20 different districts, many of which just see a tiny portion of the money received by the San Marcos District (today one of Peru's richest) which is around PEN150 million (\$54 million) annually.

Another challenge is the lack of capacity at government levels to manage all this money and develop the projects the population needs. This year there will be regional elections in Peru, and besides the fear that outspoken anti-mining leaders such as Gregorio Santos in Cajamarca may be re-elected, the other problem is that many leaders, regardless of their pro or anti-mining stance, are generally ill-prepared to govern.

In the words of Rómulo Mucho, until very recently president of the Peruvian Institute of Mining Engineers (IIMP): "Very often people elect leaders that do not know how to invest and do not understand which services a city needs; and yet, they have big resources in the bank. In the best-case scenario, the regional governments have only invested 70% of their budget; in many cases they have only spent 30% of it. Moreover, when they do not invest, corruption kicks in.



Diego Ortega, director La Granja project, Rio Tinto.

Luckily, some regions have good presidents, such as Lima, Apurímac, Moquegua and Arequipa."

Redefining social relationships

Notwithstanding the increasing participation of the government, mining companies will always have to define well their strategy for social management. Looking at the long term, helping with education sounds like a wise move, in order to provide a better framework for this relationship. Rio Alto Mining, a mid-tier gold producer now in the process of merging with Sulliden Gold, has built a \$1.1 million school for nearly 400 pupils in its area of influence. The facility

has been transferred to the Ministry of Education already, although the company still contributes to the training of teachers.

"The mining industry works in the Andes, where the educational level is very low," said Alex Black, president and CEO of Rio Alto. "It is very difficult to deal with uneducated people, because they are easily influenced by certain members of the community. If you raise the level of education, there will be a very positive impact because people will have the ability to decide for themselves."

Educated people better understand the dynamics of mining; over the last years of high metal prices, communities only saw bonanza days, and probably got the wrong idea about mining cycles. Now the picture has changed significantly, with more modest prices that are seriously affecting the economics of many companies.

The CEO of one large mining producer in Peru admitted that "communities must be strategic partners of the mining company, but they do not see themselves as such. Very often they just try to cash in. Moving forward, the trend should be towards a more equilibrated, win-win relationship; otherwise we cannot operate. Some mining companies give whatever they need to give just to avoid production stoppages, but that is not sustainable."

Not only mining cycles make community relations more complicated; there is also the lack of consistency, industry-wide, when it comes to dealing with social issues. Relocation is an example of this. Over the last years, the construction of new mines has seen several relocation programs take place. The case of La Granja in Cajamarca is paradigmatic. "We are the third owner of this project after Cambior and BHP Billiton. Cambior did a resettlement in 2000, and then BHP Billiton did a social closure, which included returning land to the families that had been relocated. This way, you have families that resettled twice: first, to leave their homes, and secondly, to go back," explained Diego Ortega, director of La Granja project at Rio Tinto.

While some companies, including Rio Tinto, are following IFC guidelines for land acquisition and involuntary resettlement, the impression is that, as an industry, companies are not subject to a common set of rules. Each case is different and requires a tailored solution. In this context, what a particular company does today may affect the relationship of with communities in future projects.

One key executive, who leads a large engineering firm in Peru, recently warned that this lack of consistency across projects is a time bomb that risks exploding in the medium term. Whether that happens or not, certainly managing expectations will be key to ensuring the sustainability of the industry; otherwise we will continue seeing projects freeze or suffer big delays in the government's project portfolio, like has happened with Yanacocha's Conga, Southern Copper's Tía María and Bear Creek Mining's Santa Ana.

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More competition in engineering and construction

Peru has seen the arrival of many new players attracted by the market's growth.



Layher scaffolding systems in one of Barrick's mines. Photo courtesy of Layher.

Those willing to develop a project in Peru will find a vast array of choices to do the engineering work. Adding to the traditional big local outfits, such as Cesel, GMI and BISA, there are international firms that have established a presence locally (SNC-Lavalin, Amec, Hatch, Ausenco, Golder Associates, MWH). Other players serve the country from overseas, for instance JRI, as well as some of the largest EPCM companies. Finally, there are local firms that have gained visibility over the last years, like Anddes and Proesmin.

Such a spectrum of possibilities allows mining companies to obtain better deals: "In the 1990s, big mining investors came hand in

hand with their foreign consultants. Today, most major mining companies are aware that they can obtain high-quality engineering locally, with much more competitive pricing and a closer relationship for after-sales service," said Duilio Ayaipoma, managing director at Cesel, a local firm established in 1972 that counts with a staff of 1,300 people. "We are present across many areas of the mining cycle. We believe we have the country's largest environmental team, with 170 people. One aspect that will gain importance moving forward is desalination plants: for Cerro Lindo [Milpo] we designed all the water supply and electric systems. We have also been active in relocation programs; we have worked for 2.5 years for Chinalco, supervising the construction of the new city of Morococha," said Ayaipoma.

The learning curve for local companies was enriched by joint projects with large EPCM players. Walter Silva, president of Graña y Montero Ingeniería (GMI), related that in 2000, the company worked together with Fluor in several jobs at Yanacocha, and this represented a cultural shift. Experiences like this have helped Peruvian firms internationalize. GMI's first project in 3D was Hochschild's San José operation in Argentina. Cesel has also worked overseas since 2003, and is now completing four environmental projects for the Argentinean government.

Buenaventura Ingenieros (BISA) is a firm that has looked at international business development as a strategy to offset the deceleration of the Peruvian market: "We are in Argentina, where we have projects with clients such as Barrick and Hochschild. Additionally, we have done a conceptual study in Ecuador for Salazar Resources. Also, we have been supporting Tahoe Resources in the commissioning of their concentrator in Guatemala," said Carlos Alarco, general manager, BISA.

While local firms have learnt to compete internationally, international firms have increasingly trusted their Peruvian offices to local

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Duilio Ayaipoma, managing director, Cesel.



Carlos Alarco, general manager, BISA.

executives. “Peru has reached maturity in areas such as the management of engineering firms, where you increasingly see more Peruvian GMs. Yet, you can still find many foreign consultants in the industry that give their support on technical aspects,” said Alberto Coya, general manager of Ausenco, a global firm that has found in Peru its first EPCM project of over \$1 billion at Hudbay Minerals’ Constanca.

Peru is a polymetallic producer with a strong tradition in gold, copper, silver, lead and zinc; however there are other commodities where the country has less experience, and where other companies can lend a hand. Finland-based Pöyry, for instance, supported GMI on Shougang’s iron expansion project, thanks to the expertise in iron acquired in Brazil.

The multiplicity of actors creates a challenge. On one side, engineering is based on the quality of the people you can hire, and competition for resources is high. On the other, providers are having to push their prices down in order to win contracts, affecting margins and, potentially, quality.

“Mining companies are inviting up to 10 companies to bid for their projects. We have declined to participate in such processes where cost is the main deciding criteria, because when you save on engineering costs, you risk paying much more during the construction phase. In a couple of cases, we have been called to address the mistakes of smaller firms that did not have the adequate expertise,” said Enrique Valdivia, country manager of SNC-Lavalin.

Due to the fluctuations of the market, some companies are optimizing their existing resources rather than growing local offices in the countries where they develop projects. JRI, a Chilean firm, has had a Peruvian office for years, yet it is now looking at serving Peru using the skills of its 360-strong staff in Santiago. “Last year was not very dynamic, yet we could main-

tain our staff without massive layoffs like our competitors,” said Ricardo Glade, general manager of JRI. “Peru plays a strategic role in our business plan. The expertise that we have developed with Chile’s mining industry is totally transferrable to the Peruvian reality, considering our know-how in copper, iron and poly-metallic mining; and the similar challenges in both countries in areas such as the difficult geography, the handling of mining pulps and the optimization of water resources,” Glade added.

In Peru, JRI has been developing projects for the last 15 years. The company has a target of selling 1 million man-hours annually by 2020. “We continue planning our organic growth. There are not enough projects to justify 1 million man hours in mining engineering and design. We will probably try to do more EPCMs and EPCs, which are more labor intensive; and will probably diversify into other areas such as energy.”

Environment and water

Consulting firms with a strong focus on environmental and hydrological work are also present in the country. Golder Associates, MWH, ERM and Anddes are good examples. Although not exclusively dedicated to these fields (Golder also has significant expertise in construction supervision in Peru, for instance) these players rely on a highly specialized workforce, rather than huge headcounts.

“With the current legislation, mining companies must give financial guarantees in proportion to the expected mine closure expenditures. This is why it is at the conceptual stage where you can really impact on the final costs of the project. Then, during the operation, virtually 99% of the rock that enters a concentrating plant ends up in waste storage facilities. You need great planning to handle the big volumes of waste material, and also to manage the water layer on top of the waste deposits,” explains



Ricardo Glade, general manager, JRI.

Andrés Fernández Oliva, general manager of Golder in Peru.

Golder set up its local office in Peru in 1997; today it has 300 people in 3 offices, as well as a laboratory in Lima. During these years the company has developed a number of environmental impact studies (EIAs) for projects such as Las Bambas, Antapaccay, Tintaya, Fospac and La Granja. One of the emblematic projects for the company was the design of Antamina's tailings dam, one of the world's highest.

MWH also has about 300 people in Peru. Its mining leader, Angie Sakata, explains that mining companies are more



Ricardo Vega, president, OHL Group.

cost-conscious, yet, "the environmental and social aspects cannot be left behind. The designs need to have top engineering standards, and may be more costly in some instances, but not always. Our focus is to find high-quality solutions that meet the client's demands, without incurring in higher costs."

Another player in Peru is Anddes Asociados set up in 2011 by former Ausenco Vector people. The company has 170 employees in Peru, as well as an affiliated company in Argentina. Anddes has been expanding from the initial engineering, hydrology and geotechnical fields, and today

offers environmental services as well. "We have ample experience in the design and construction of civil works for mining operations. From our times at Vector, our team has probably designed 90% of all leaching pads in Peru. I am convinced we are the leading team in this specialty in the region, with experience in all sorts of terrain, altitude, weather and all types of metals," said Dennys Parra, general manager of Anddes.

Construction

As in engineering, Peru's construction industry hosts a wide array of local and international players. Peru's biggest construction firms include Graña y Montero, (who also has a contract mining joint venture company, Stracon GyM), Cosapi, Odebrecht of Brazil, San Martín Contratistas (now controlled by Mexican group ICA), JJC, ICCGSA and European firms such as Mota-Engil of Portugal and OHL of Spain.

OHL Construcción is one of the newest construction players in Peru's mining industry. The expertise of the OHL Group, present in 30 countries, was more related to other fields such as railways, hospitals and transport infrastructure. In Peru, OHL Construcción won its first contract in mining in 2012, and today the industry represents 60% of sales. The firm employs 4,000 peo-

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ple in Peru and has a sizeable presence in two of Peru's largest mining sites. Besides OHL Construcción, the group is also active in the mining industry through OHL Industrial, with projects in Chile and Peru.

Ricardo Vega, president of OHL Group in Peru, talked of the importance of supporting mining clients in the current markets: "In road concessions, the client can handle price variations. In mining, the price is fixed by the market. In this crisis, we have to be understanding. As long as quality and safety are not compromised, we need to see how we can adapt costs and provide new engineering solutions."

Pedro Romero, director of OHL Construcción, further explained the challenges specific to working in mining projects in Peru: "In one project we have 2,000 people at 4,000 meters above sea level. Setting up this camp was a formidable logistics challenge. From Lima, it takes less time to go to Madrid than to reach this site in Apurímac. Another peculiarity is the extreme attention to health and safety: in one of our projects we have reached 8 million man-hours without accidents. Finally, our commitment is not only with the mining client, but with the locals as well: we use as many services as possible from the local community."

The growth of the mining industry has also attracted medium-sized construction firms, such as Serpetbol of Bolivia and HL Ingenieros of Colombia, both of which have the triple certification. Serpetbol entered the market 11 years ago, serving initially the oil and gas segment, and is now migrating towards mining, where it has done work in Toromocho and Constanca.

"In Peru, you have many large construction firms and many small ones. We exploit our niche as a medium-sized company. As a strategy, we try to avoid contracts of over \$100 million or below \$6-7 million," explained Jorge Tabora, general manager of Serpetbol.

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Metal-mechanics

EPCM players and construction firms rely on a highly competitive metal-mechanics industry, now grouped under the Association of Metal-mechanic Private Companies (AEPME), launched earlier this year and chaired by Humberto Palma, also president of Haug.

"In 2013, our segment generated over \$1 billion in sales, used 200,000 mt of steel and employed 50,000 people directly and 200,000 indirectly all around the country. In 2014 we must reach similar figures," said Humberto Palma at the presentation of the new body.

The metal-mechanic industry achieved this growth mainly thanks to the mining industry, and has been capitalizing on its experience to accompany the growth of other industrial segments. "We have been entering other sectors, such as oil and gas, power, and general industry. However, at the end of the day, it is in mining where we see the largest volumes. Mining has allowed us to improve our processes and to invest in numerical control equipment," said Raúl Torres, general manager of Imecon, also members of AEPME.

This process of professionalization and modernization has allowed Peru's metal-mechanic players to go abroad. Haug, for instance, has worked in projects such as Moa Nickel in Cuba, Pueblo Viejo in Dominican Republic, Los Bronces in Chile and Pascua Lama in Argentina.

Fima, another big metal-mechanics company, has recently opened a plant in Arequipa: "We are betting on the growth of what is going to be southern Peru's mining cluster. There are companies setting up shops close to us in order to attend the mining segments in Peru, northern Chile and Bolivia," said Ernesto Velit, Fima's general manager.

Fima specializes in added-value products such as dynamic equipment, and is also a licensed contract manufacturer for Metso in Peru. The firm exports 25% of its production.

Edyce of Chile, one of the region's leading players in metallic structures, is present in Peru through its subsidiary Esmetal. Diego Aguirre, its general manager, reminded us that between 2 and 4% of the capex of a mining project goes to products from the metal-mechanics industry. While 2013 sales decreased after a record-breaking 2012, Aguirre said 2014 is looking strong. "We sold 65% of our annual capacity in the first two months of the year," he said.

Scaffolding and formwork

The strong focus on safety by the mining industry has meant that in construction and electromechanical works, the industry has incorporated modern scaffolding systems that were not necessarily widespread in Peru a few years ago. Companies like Layher, ULMA, PERI and Unispan have invested heavily to serve the needs of mining projects, as well as other infrastructure developments.

Layher, a German company present in 45 countries, arrived in Peru seven years ago. Today, it has over 8,000 mt of scaffolding in Peru with distribution centers in Lima, Arequipa and Piura.

"We are present on pretty much all fronts. For instance, in Cerro Verde, before the expansion, you have civil works where you need scaffolding. Then you have the installation of the crushers, mills, boilers, pipelines, electric systems, water treatment plants, etc. Each of these fronts may have over 1,000 workers. We can work with up to 8 big contractors simultaneously," explained Ronald Dacre, general manager of Layher Perú. "Our systems are generally about 15% lighter than those of the competition. The more efficient and productive the contractor manages to be, the better margins it will have at the end of a project," said Dacre.



Humberto Palma, president, Haug.



Ronald Dacre, general manager, Layher Perú.



Jean Pierre Saux, general manager, PERI.

ULMA Construction, a Spanish firm present in Peru since 2001, offers scaffolding as well as formwork systems. Luis Padilla del Águila, commercial director of ULMA, explained that the firm was a pioneer in its segment in Peru, and that the standards have evolved greatly in the last years. "Before, you would use wood support posts for the most part; we changed that trend with the metallic support posts. The use of certified scaffolding systems is very common now."

Rental seems to be the favored model by clients to obtain these systems. For Layher, two thirds of the sales come from rental,

while in ULMA rental represents 80%. Jean Pierre Saux, general manager of PERI, a German player that is also growing in this segment, explained that companies are starting to see the benefits of acquiring a portion of the systems they need. "I see changes in the market related to planning, know-how and internationalization. With regard to planning, it was published that a Peruvian construction company aimed at reaching sales of \$1.2 billion by 2018. That could generate investments in different areas, such as in assets like formwork and scaffolding systems. I always recommend our clients to buy a security stock, so

that they can respond to any eventuality," he said.

PERI started its Peruvian business in 2007 and the company has already worked for projects like Constancia, Cerro Verde, Toromocho, Antapaccay and Volcan's Alparmarca. "Mining projects are very important because they let us prove the technical advantages of our systems. In industrial scaffolding, we offer a highly flexible system, very safe, and with a very simple logic of installation, which increases productivity. This is important because the scaffolding system is just a temporary structure that facilitates the work that needs to be done," Saux concluded.

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Equipment

Peru is a key market for the leading brands worldwide



Overall, there are between 20,000 and 25,000 Cat machines operating in the country, according to Ferreyros, Peru's Caterpillar dealer since 1942. Photo courtesy of Ferreyros.

Attracted not just by Peru's mining project portfolio, but also by the potential of the construction business in a nation with an enormous infrastructure deficit, Peru is witnessing the arrival of new players across all lines of equipment.

Caterpillar remains the leading player. Overall, there are between 20,000 and 25,000 Cat machines operating in the country, according to Ferreyros, Peru's Cat-

terpillar dealer since 1942. The company has already sold about 50 units of the 797 mining truck, Caterpillar's largest model, and it has also incorporated the full product line from Bucyrus, that Caterpillar bought in 2011 for \$8.8 billion in its bigger M&A move ever.

"With Bucyrus, Caterpillar incorporated products such as the hydraulic shovels and the giant electric rope shovels. Only in

2013 we sold \$180 million worth of equipment from this line. While we see a trend towards larger machines, our role is to cover all equipment needs. In Peru there are over 800 Caterpillar trucks and production units working in open pit operations, as well as over 500 low-profile loaders in underground mining," said Gonzalo Díaz Pró, COO of Ferreyros.

Peru is also a great testing ground for new models. Indeed, one of the first 777G trucks used outside the U.S. went to Gold Fields' Cerro Corona mine in Cajamarca. "Peru offers very challenging conditions to any machine on account of the altitude, the quality of the fuel, the varied climatology and the difficult geography. As Ferreyros, we have 1,700 collaborators serving the mining industry, with a permanent presence in 30 mines and a network of 20 service centers," said Díaz Pró.

The issue of service is crucial in a country with remote mining sites. The dealers, besides having strong financial shoulders to manage large stocks, also need to invest

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Gonzalo Díaz Pró, COO, Ferreyros.



José Tomás Hevia, general manager, SKC Maquinarias.

heavily on technical people, who are then attractive recruits for mining companies, causing rotation. This is a particular challenge for companies with large volumes, such as Ferreyros and Komatsu-Mitsui Maquinarias, Komatsu's Peruvian dealer in which Komatsu and Cummins jointly have a 40% participation.

Komatsu has increased its share in Peru's large mining trucks segment, where it has won contracts in the last years for the Antamina expansion, Las Bambas, Antapaccay and Conga; in the latter case, the trucks were delivered before the project got stuck, and Newmont is now using them in other operations.

Other mining and construction brands present in the country include Volvo, which handles its truck sales directly and is represented by a dealer, SKC Maquinarias; Mercedes Benz represented by Divemotor; and Sany of China represented by Gildemeister.

Peru is the main market worldwide for the Volvo FMX truck. The other big player in this segment is Mercedes Benz with the Actros model. "The demand for trucks inside the mines has stayed flat in Peru, at about 2,500 units per year, between 2011 and 2013. This is due to the delays in mining projects. As Divemotor, we grew 43% in



José Antonio Heredia, manager of Divemotor's trucks division.

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Marc Blattner, general manager, TUMI Raise Boring.

2013 thanks to our Actros model, of which we sold 800 units," said José Antonio Heredia, manager of Divemotor's trucks division.

SKC Maquinarias, part of the Sigdo Koppers group, handles the distribution of Volvo construction equipment in both Chile and Peru. Its Peru general manager, José Tomás Hevia, explained that the challenge is to push for a more comprehensive after-sales service: "Volvo is a luxury line: it is the world's oldest brand in construction equipment and the quality is taken for granted. A fundamental aspect is the after sales support, so clients can get maximum productivity. It is not an easy subject in this



Komatsu trucks with Austin Engineering bodies at Las Bambas. Photo courtesy of Austin Engineering.

country, with important geographical obstacles." The company has four locations in Peru and 75-80 technical staff, as well as a deal with another distributor in central Peru for technical service.

SKC Maquinarias' main products in Peru are the loaders and excavators, as well as pavers and compactors. "We also have the haulers line that Volvo acquired from Terex, and the Volvo dumper truck which won an award as the best vehicle in its segment in 2012. It is a product that is not well known in Peru yet and that makes a difference in difficult terrain. In Chile it is increasingly popular," said Hevia.

While cheaper Chinese brands are now available in Peru (SKC is also introducing a Chinese brand, SDLG, part of the Volvo Group), Hevia believes that quality will continue to be the main driver in the mining industry. "Some companies have grown a lot in the last years, and perhaps they have not paid enough attention to efficiency. Today, miners and contractors are taking a closer look at the performance of their machines, and this is where Volvo offers a significant strength."

A number of Asian brands have made their move into the country. While some of them offer good quality machines, there is a challenge to fight the general public's perception about the quality of Chinese products. Gildemeister, another Chilean dealer operating in Peru, has started to introduce the Sany brand. The company sold over 25 Sany excavators in Peru last year, and has begun to sell Sany cranes this year. "This market still has an important prejudice against Chinese products, as it had before against Japanese and Korean products. Luckily we work with a brand that has safety as one of its core values," related Nigel Sargent, director of Gildemeister's machinery division. "The current situation is going to help us a lot: mining companies need to be more profitable and need their contractors to be more efficient. We have excellent products for these requirements, and contractors are no longer attached to one single brand. There's significant diversity, and this trend needs to continue," he said.

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Local manufacturing

While Peru is not a big manufacturing location, there are several mining-related companies that are happy to be the exception. After establishing a presence in Chile and Colombia, Australian company Austing Engineering decided to invest in a plant in Lima, thanks to a contract with Xstrata for 70 truck bodies for Las Bambas and Antapaccay. The com-



James Valenzuela, managing director, Resemin.

pany continues to use the Westech brand, a company it acquired in the U.S., as well as the JEC brand, well-known in Australia.

Besides the sale of new products, Austin Engineering sees good potential for service contracts, specifically in the areas of welding and line boring, due to the remoteness of Peruvian mines. According to Tim Mitchell, general manager of Austin Engineering in Peru, product adaptability is another advantage of having a local presence: "Our truck bodies are designed specifically to suit each operation, taking into consideration the density of the material, the capacity, the specific mine requirements or limitations and the cost. Each truck body is designed and optimized for weight because any dead weight affects payload and production. We utilize a world leading brand of structural and wear resistant steels to optimize the strength and durability of the trays."

In underground mining, Peru counts about 150 operations nationwide. It is of no surprise, then, that several players offer their locally-manufactured machines to the market, among them TUMI, a raise boring specialist; Resemin, a producer of underground jumbos; and Serminsa, a firm that owns the BEV (British Electric Vehicles) brand, and manufactures underground locomotives and other haulage equipment.

TUMI Raise Boring is actually a contractor that manufactures its own machines and related components. Its general manager Marc Blattner gave us more details about the SBM 400 SR, a machine used for production activities: "The SBM 400 SR is specifically designed for safety and speed. It is a hands-free raise-boring unit, not designed for ventilation raises but for slot raises. It comes completely integrated and does not need any lifting system. Also, it does not need a surveyor."

Blattner affirms that this machine is changing the way mining companies see raise boring: "Raise boring was considered as a secondary problem for mines. It was a

cost, a nuisance. Now, being part of the production process, we become strategic partners of clients."

The company has already sold two machines in New Mexico for Chevron, and in Peru it is working together with Milpo, where one machine is already working, to fabricate four more units. As a contractor, TUMI operates 13 machines, 11 of which in Peru, and it has 160 people in the field.

In terms of safety, Blattner said: "You have fingers, hands, feet, arms, all interacting with very heavy moving drill pipes. Raise boring is a safer technology than any other type of shaft excavating process, and we have made it even safer by reducing the interaction of heavy equipment and operator."

At the last Vegas convention, TUMI presented the SBM 800, which has 1.2 million pounds of thrust. "We are also in the design phase of the SBM 2000, which will have 5 million pounds of thrust. Mining is generally getting bigger, and raise boring is doing the same. The machines have outgrown their pipe so the next issue to solve is pipe designs," explained Blattner.

Resemin is another local manufacturer of equipment for underground mining. The company competes with Atlas Copco and Sandvik in the main categories of jumbos: face drilling rigs, bolting rigs and production long hole rigs. The aim is to provide strong machines with simple designs. "Our competitors give priority to high-tech systems and automation. We also incorporate these if they contribute to increase safety for the operators, but generally we avoid them because underground mining is the worst possible environment to use electronic devices due to humidity, corrosion, dust and high temperatures," said James Valenzuela, managing director of Resemin.

Resemin produced its first machine for Glencore's Yauliyacu mine in 2002, at a time of crisis for the mining industry. "Five months later we sold four additional machines for another Glencore-owned mine in Zambia. That was our first step into Africa."

Resemin currently exports about half of its jumbos. Worldwide the San José mine in Argentina, operated by Hochschild, is the operation that counts a larger number of Resemin machines. Moving forward, Valenzuela sees Mexico as the market with the highest potential, with 18 machines sold there since 2011. "We are already the third largest provider of jumbos worldwide, after companies that have over 100 years of history. The region offers notable growth opportunities: it is inevitable that big open-pit mines will eventually go underground," Valenzuela concluded.

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Adjusting to the new cost environment



Metallurgical tests are on the rise as mining companies try to increase efficiency. Photo: rod mill at Certimin's laboratory in Lima, courtesy of Certimin.

After an abrupt change of mining fundamentals in 2013, players across the whole value chain are adapting to a scenario where cost control plays a central role.

Drilling

Probably the segment most affected by the crisis over the last couple of years has been exploration. Geotec, one of the country's largest drillers with 60 machines, was work-

ing at a 30% capacity at the beginning of the year. "Most of our clients are big mining companies. The activity of juniors is very slow now: some companies are keeping their cash to weather the storm, rather than to start exploring. I do not remember such a long cycle: it started in mid-2012 and it has been nearly two years," said Óscar Ballón, president, Geotec. The company, affiliated to Layne Christensen of the U.S., is 90%

focused on diamond core drilling, RC and water wells taking the rest. It also has an industrial division that manufactures bits, pipes and drilling accessories. Geotec has extensive experience in challenging drilling programs. "In 2012 we had 15 machines drilling holes between 1,500 and 2,000 meters deep. We drilled one of Peru's deepest holes, at 2,224 meters."

Ballón also said that in Peru clients rarely sign contracts for more than a year, which impedes good planning. However the trend for longer contracts, where efficiencies can be achieved, may be a preferred option moving forwards. AK Drilling International, a contractor present in five countries in the region, has recently signed a four-year contract with a big miner in the Dominican Republic, while it has also sealed a 2 year contract in Peru.

Its general manager Jaime Villafane explained that, while miners looked for cheaper options in 2013, they are going back to the established drilling players this year: "Clients need high reliability, good standards in sample recovery and high levels of safety. While in 2013 we had less work, we did not have any accidents, and this is very important for clients. Other contractors, who are cheaper a priori, end up being more expensive: it is not the same to drill 10,000 meters in three months than in six months."

Villafane noted that exploration activity is picking up this year: "In Q1 2014, there were contracts out there for \$70 million in diamond drilling and \$16 million in RC in Peru. 2013 saw much lower levels of activity."

Laboratories

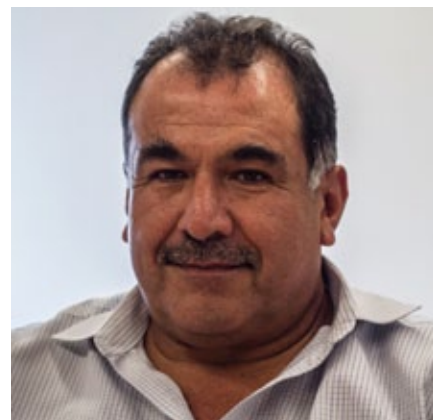
Companies specialized in geochemical analysis have also suffered the slowdown in exploration activities, yet the country's biggest laboratories have all seen an increased interest in metallurgical tests. Certimin, one of Peru's main labs with 6,000 m² in Lima and facilities in Arequipa and Juliaca, has recently invested in a mini flotation pilot plant.

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Óscar Ballón, president, Geotec.



Jaime Villafane, general manager, AK Drilling International.

“Since we work mainly in poly-metallic projects, we decided to acquire two flotation banks (24 cells). A 1,000 kg sample can be as representative of a larger one because it is easier to adjust and monitor the different variables. We can even use exploration samples to do metallurgical tests in the plant, which was impossible before this technology. This type of plant can be used both in the design of new projects and in the adjustment of existing operations. The technology has already been used by Brazilian companies to take production decisions at immense production plants,” explained Miguel Caillaux, director of Certimin.

On the exploration side, the company runs an on-site lab for Rio Alto at La Arena, and it has become Peru’s preferred player in phosphate projects. Besides the geochemical and metallurgical areas Certimin, previously a joint venture with CIMM of Chile but now 100% a Peruvian group, also offers environmental services.

The trend for a growing metallurgical tests business is confirmed by other players, such as Laboratorio Plenge, which has seen significant growth in the activity of its comminution lab, which includes technologies such as SAGDesign by Starkey and the JK Drop Weight test. “Since 30% of the energy consumed by the mining operation is used in comminution, comminution tests have become increasingly popular. Also, the new metal prices have expanded the demand for metallurgical optimization. With lower prices, it becomes more economic to improve the quality of the concentrate, slightly compromising the recovery. Similarly, cost increases in cyanidation have caused a demand for the optimization of reagents,” said Gustavo Plenge, general manager, Laboratorio Plenge.

Laboratorio Plenge can run tests with samples of 20-40 mt, and it also has a mini pilot plant with 24 flotation cells, with a capacity for samples ranging from 250 to 1,000



José Luis Alván, product manager minerals and industrial services, SGS.

kg/d. Gustavo Plenge further explained the advantages of these small scale tests: “This mini pilot plant is ideal to minimize costs. It is an excellent tool to run the geo-metallurgical programs to evaluate the different lithologies and alterations, that would require very expensive samples obtained from tunnels in conventional pilot plants.”

Global player SGS has also entered the metallurgical business in Peru in the last two years, with flotation and comminution tests, among others. “Still today, many metallurgical tests are done outside of Peru, so there is lot of room for growth locally. Metallurgical issues are always present in mines, because the ore changes throughout the life of the operation,” said José Luis Alván, product manager of minerals and industrial services at SGS.

SGS offers many other services for the mining industry. It is the leading player in geochemical analysis, with on-site labs in mines such as Huarón, Cerro Corona, Antapaccay and some of Buenaventura’s operations, typically with 3 year contracts, and it is also very strong in trading supervision, where it controls 50% of the mineral concentrate loads at the port of Callao. “We have a strong package of integrated services. In mining we can be present in exploration, in the studies phase, in construction, in production, in the trading process, in environmental work and during mine closure,” said Alván.

Blasting

The demand for explosives has been growing consistently since 2008 in Peru, and is estimated at 440,000 mt this year. EXSA, a Peruvian blasting solutions company, has been capitalizing on this growth, and has internationalized its operation, with offices in Panama and Colombia and exports to other countries in the region. It also acquired a Brazilian company, Britanite, in partnership with Enaex of Chile. After last year’s sales of \$186 million, the company



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expects to close 2014 with \$240 million in sales (excluding Brazil), a figure that would treble 2008's numbers.

"The main source of growth is the Peruvian market. In the last three years we have invested heavily to grow in open-pit mining. EXSA celebrates its 60 year anniversary this year and it has always been very strong in underground mining. Most of the latest projects, and those coming up in the future, are open pits. We have already gained a presence in Antamina, Yanacocha and Southern," said Gustavo Gómez Sánchez, commercial manager, EXSA.

Besides providing all the range of explosives and initiation systems, the company has expanded its services to take care of the blasting process, to help the mining company with permits and to manage storage facilities onsite, among others.

Another local manufacturer is Famesa, which last year had sales of \$170 million in Peru and \$20 million in Chile, where it has a local plant. Due to the mining boom in Peru, the share of exports has been falling to 40% in the past to 16% today. "Famesa started fabricating explosive accessories from the beginning of the company, 61 years ago. Unlike other companies, who import parts and assemble them, we fabricate the accessories from its essential components. 95%



Gustavo Gómez Sánchez, commercial manager, EXSA.

of our sales come from the mining industry; we are very strong in underground mining, which has an intensive use of blasting accessories," said Beppi Piero Bernard, general manager, Famesa.

Bernard emphasized the importance of a proper design of the explosive and the blasting process to have a controlled shock wave: "You achieve this with chemicals that vary their performance depending on the time of the day, the temperature or the altitude. You need to be an expert in the size of the particles and the chemical behavior of the substances you are mixing. This is a know-how you do not get from books: it's experience.

This is why we are very few blasting accessories manufacturers worldwide."

Besides the two big Peruvian players, international company Orica also has important supply deals with some of Peru's largest mines, including Toromochu, as well as regional contracts with Freeport McMoRan, Barrick and Xstrata (now Glencore). On top of blasting solutions, the company also offers a range of mining chemicals and ground support systems (distributed locally by another company, Prodimin). "We cover all the products associated to explosives, from conventional to electronic initiation systems. We have two emulsion plants in Peru, where we can fabricate all the range from basic emulsions to the latest highly energetic Orica products," said José Miguel Ríos, commercial lead Peru & Bolivia, Orica.

Process plant

The trend towards equipment 'gigantism' also has an impact in the process plant and the associated infrastructure. "In Toquepala, in the 1960s, the mills had a diameter of 10.5 feet. In Cujone, in the mid 1970s, mills had expanded to 16.5 feet. At Antamina we already were at diameters of 26 feet, and so on so forth. In our case, we are selling pipes with diameters over 50 inches, which were unthinkable just a few years ago," said

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Eduardo Carriquiry, general manager, MEPSA.

Eduardo Yrigoyen, general manager of Fast Pack, a piping specialist.

Originally Chilean, Fast Pack commercializes pipes and valves, while it also has its own fabrication unit of spools in Chile. The company has extensive experience in plants and pipelines, to transport either concentrates or water in desalination plant systems. "The bigger orders come at the beginning of the project, when plants are built. However the business for miners is large volumes. The rock is very abrasive and wears out the systems. There are no coatings that will protect them eternally; it is like processing sandpaper. Therefore, there is an interesting after-sales market," said Yrigoyen.

Metalúrgica Peruana (MEPSA), a foundry located in Lima that has been operating for 50 years, has witnessed the growing demand for steel grinding balls and wear parts. The company has a plant capacity of 60,000 mt/y in cast grinding balls and a further 12,000 mt/y in laminated balls, on top of 12,000 mt/y for wear parts.

"In Peru, if the projects already approved are executed, copper production should increase between 60 and 65% over the next two years. That should translate in similar increases in the demand for consumables in copper plants. Furthermore, in some of the operating mines, copper grades are falling and the rock is hardening as the exploitation goes deeper; this results in higher consumption of wear parts and grinding balls," explained Eduardo Carriquiry, general manager of MEPSA.

MEPSA has managed to diversify its client base and today Southern Copper, an initial investor in the company back in the 1960s, represents 20% of the company's \$75 million turnover (2013). Some of MEPSA's products also go to Chile's large copper mines.

The expectations for big copper growth in Peru have a multiplying effect on the value chain. A Peruvian group decided to invest



Enrique Sattler, general manager, Robocon.

in a new foundry called Fundición Chilca (FUCSA), located 60 km south of Lima. While the plant is working at a capacity of 12,000 mt/y, the demand is yet to realize its potential. "Initially, there were estimations that the demand for large iron parts and alloys for the mining market would be 45,000 mt/y by 2015, but we will not get there that rapidly. Today, the demand is 30,000 mt/y," explained Roberto Uceda, general manager, FUCSA.

An important player in plant equipment is Outotec, which has placed its products in operations such as Votorantim's Cajamarquilla refinery and Hudbay's Constancia copper mine. "The next wave of investments should have Tía María, Quellaveco, La Granja, and hopefully Galeno, Michiquillay and Conga in the medium term. What we expect, though, is that most of these projects will only be developed after the 2016 presidential election," said José A. Bautista, sales manager, Outotec.

Underground contractors

Underground mining is not only getting bigger, but it is also increasingly mechanized. In this context, contractors are acquiring new equipment and technologies in order to increase their clients' efficiency. General underground contractors include JRC, AESA and INCIMMET, while there are also niche players such as Robocon, a shotcrete specialist.

"A modern shotcrete system consists of a pre-mixed concrete with water, additives and reinforcement fibers, transported by low-profile mixers and applied with high pressure by machines that have remotely-controlled robotic arms. This requires an investment in equipment four times as big as in traditional technologies, but assures the safety of the workers, reduces the labor requirements by 50% and increases the speed of application tenfold," explained Enrique Sattler, general manager, Robocon.



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Robocon has grown from having 2 machines and 7 employees in 2005 to 70 machines and 550 people today. Last year it applied 16,000 cubic meters of shotcrete per month. Clients include Volcan across its different mines, and Pan American Silver, with which Robocon is integrating vertically towards the production of concrete, with its own plant and laboratory onsite, through a sister company called Concremin.

"We currently have 60-70% of the mining shotcrete market and there is high potential for growth, both in new underground projects and in operating mines that do not implement an integrated shotcrete system yet. Additionally there is a range of solutions for the production, transportation and storage of dry shotcrete in very deep mines, that need to improve efficiency by reducing the number of machines required and the response times," Sattler said.

Infrastructure and logistics

When it comes to transportation needs, Peru faces a number of challenges, from its difficult geography and lack of infrastructure, to the traditional informality of many transport companies, which results in unreliable and unsafe services. "In Peru, there must only be 5-6 formal transport companies, with audited financial results. 80% of the market is covered by informal companies, that perhaps only have one or two trucks," said Edgardo Llosa, general manager of Saturno, a relatively new player that has a fleet of 120 trucks, and has specialized in the transportation of mineral concentrates.

The lack of infrastructure seriously affects the economics of some projects. "It is unacceptable that it is more expensive to send a container from Pucallpa to Lima than from Lima to New York," lamented Ricardo Vega, president for Peru of OHL Group, a Spanish construction firm. "Peru must develop intensely its road and railroad infrastructure. Mining companies face enormous logistics challenges," affirmed Duilio Ayaipoma, managing director of Cesel, a Peruvian engineering firm.

The country only has two main rail connections from the Andes to the Pacific Coast. One is the central railway to Callao, used by Toromocho, among others. The other one is the southern line operated by PeruRail, where Cerro Verde is an important customer. Armando Pareja, general manager of PeruRail, pointed out that while railway transportation is more efficient than road transportation for long trips in both fuel consumption and personnel requirements, the railway business is not treated fairly by the government: "We cannot com-

pete with trucks at the same level. On top of paying for the railway maintenance, we need to pay a toll to the state of about \$400 for every car we move from Matarani or Mollendo to Cusco. Trucks do not have to pay that, and they do not cover the costs of road maintenance, which are expensive and are paid for by the state. Building a railway costs pretty much the same as building a road; yet, the maintenance for 1 km of road costs \$200,000 annually, as opposed to \$35,000 in the case of a railway."

Pareja said that 2015 and 2016 will be critical years for PeruRail; the company is following closely the projects that are coming into production, such as Constanca and Las Bambas, and others that will probably be developed later in its area such as Glencore's Corocochuayco and Pan Pacific Copper's Quechua. "If we get these contracts, PeruRail will reach another dimension," Pareja said.

A consequence of Peru's economic growth has been a saturation of the country's import/export infrastructure. "The main challenge is the bottleneck in Callao, where the traffic is terrible. 80% of the goods that enter Peru do so through this port. With the concessions of the ports of Paita, Matarani and now Pisco, there should be a decentralization," said Raúl Neyra, general manager of Fargo Line, a company part of the Ferreycorp holding that specializes in storage and logistics services for capital equipment importers.

Fargo Line handles all the heavy cargo by the holding, including the Caterpillar and Terex lines, but it also serves third party clients, where it can provide export services of mineral concentrate loads. Overall, mining represents about 50% of the company's business. "We have a capacity of 130,000 m2; other companies may have bigger surfaces, but our aim is to handle high-rotation equipment, which is what represents a logistics success," said Neyra.

Human resources

One of the industry's biggest woes is that, whenever a crisis hits, a number of professionals leave the industry and are no longer available when the markets are back. This was the cause of enormous pressure on the labor market in 2011-2012, at the peak of the last cycle. "Finding people is not difficult today. The problem in 2015-2016 is that, if all the projects that are floating around in the sky are developed, there will not be enough professionals to take care of them. It is not the same to develop a \$50,000 project as a \$500 million, or even \$5 billion project. That is where it gets tough,"



Bigger mining volumes require new logistics solutions. Photo courtesy of PeruRail.

said Uwe Moritz, until very recently general manager of Hatch in Peru.

Recruitment services companies acknowledge that there has been a slowdown in their segment in recent months, yet they anticipate a new phase of shortages of qualified professionals. According to Federico Schwalb, partner at Amrop, a recruitment services firm: "Even in these periods where demand is lower there is a shortage, which means that there is not sufficient production of professionals to sustain the industry in the future. This is an unsolved problem in the education sector."

Diana Rake, general manager of Downing Teal, another recruitment outfit, estimates that the industry will require 40,000 new workers between 2014 and 2016. Of these, 10% would be professionals and 20% would have technical training. Meanwhile Buenaventura Ingenieros, a local engineering firm, has also made its own forecast, according to which the country will need a further 7,000-8,000 engineers to develop the mining investments portfolio alone, on top of what would be needed for other projects in energy, oil and gas and infrastructure.

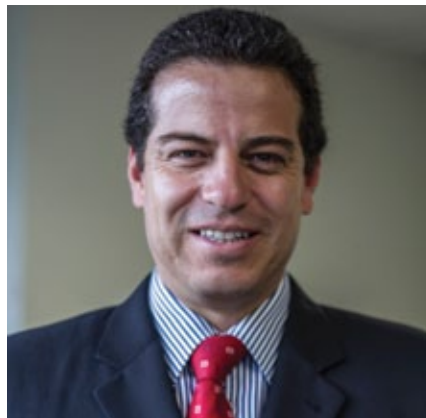
While head-hunters are always needed for key positions, human resources spe-

cialists can also help mining companies with the outsourcing of many processes and projects. Adecco, a global company whose core worldwide is the placement of temporary workers, arrived in Peru 15 years ago, but in 2007 it had to adapt to a new labor legislation. Now, the company is focused on outsourcing; this means it does not merely find workers for the clients, but provides a full service. "Outsourcing is our main business in Peru. We provide services that go from cleaning an office to installing a geo-membrane in a mine. An area where we are very strong is small civil works where the local communities are put in charge. In this respect we become a contractor that employs community people," explained Carlos San Román, country manager of Adecco.

Other services provided by Adecco include reforestation work and archeological projects. The company currently has just short of 1,000 people working with mining companies. "Six years ago mining companies did not think of us for this type of work, but today we are an important player, thanks to our specialized team. Both the industrial and mining outsourcing areas are managed by people with experience in these fields," said San Román.



Diana Rake, general manager, Downing Teal.



Carlos San Román, country manager, Adecco.



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