

Up for the challenge

With the skilled personnel crunch reaching new levels across the globe, where can mining consultants help? Dan Gleeson finds out



The mining sector is experiencing a ‘perfect storm’ when it comes to resourcing its mines and projects – expectations of soaring demand for its products, a lack of mining-focused graduates coming through the pipeline, an ageing workforce, and considerable competition from other industries in the fields required to accommodate the ‘future of mining’.

The consulting and engineering companies that serve miners are also coming to terms with this demand and supply dynamic, with anecdotal evidence of service suppliers unable to bid on new work because they cannot adequately resource it.

The opportunities for those companies with the right skills and scope are, therefore, plentiful. It is all a matter of fostering the right talent to take advantage of them.

IM spoke to five leading firms in the sector to get their take on this evolving market backdrop.

A full-service supplement

Stantec, with in-built consulting, engineering and project delivery expertise across the mining lifecycle, has seen the mining skills crunch up close, with Brian Mashford, Senior Vice President, Mining, Minerals and Metals, noticing a resultant change of tack from its mining company clients.

“The mining employment industry is very competitive right now,” he told **IM**. “Companies are outsourcing certain technical service groups – for both operations and projects – that were commonly resourced internally in the past.”

Mashford says he and his colleagues have seen clients retain a more specialised, core group of personnel for oversight and then hire Stantec to supplement their teams in both operations support capacity and for delivery of projects.

“There’s a major opportunity right now for mining consultants to augment staffing gaps in mining companies,” he added.

Having consultants with direct mining operations experience, as well as project delivery and contracting knowledge to support clients, Stantec is well prepared to fill these gaps, according to Mashford.

This has seen Stantec take on mine planning and design tasks for clients, as well as help with debottlenecking of materials handling or processing system operations.

“Our company has the expertise to help our clients with operations and projects from early conceptual studies through to execution of both sustaining and capital projects,” Mashford said.

“We differ from other consulting firms because we are truly ‘full service’. We support clients with community engagement, early stage drilling programs, permitting of a new mine, through to design of all mine systems and related infrastructure.

“The key to this is trusted relationships that span decades as a mine evolves and support needs change.”

Like other companies in the consulting and engineering sector, Stantec has been on hand to map out ‘net zero’ mining scenarios, as well as ensure mine operations align with the recently

WSP Golder recently carried out work for a well-known mining company, who asked the company to conduct concept-level studies of water usage across its global operations to identify water savings opportunities, particularly in locations where critical water shortages had been observed (Photo courtesy of WSP Golder)

incorporated Global Industry Standard on Tailings Management (GISTM) requirements.

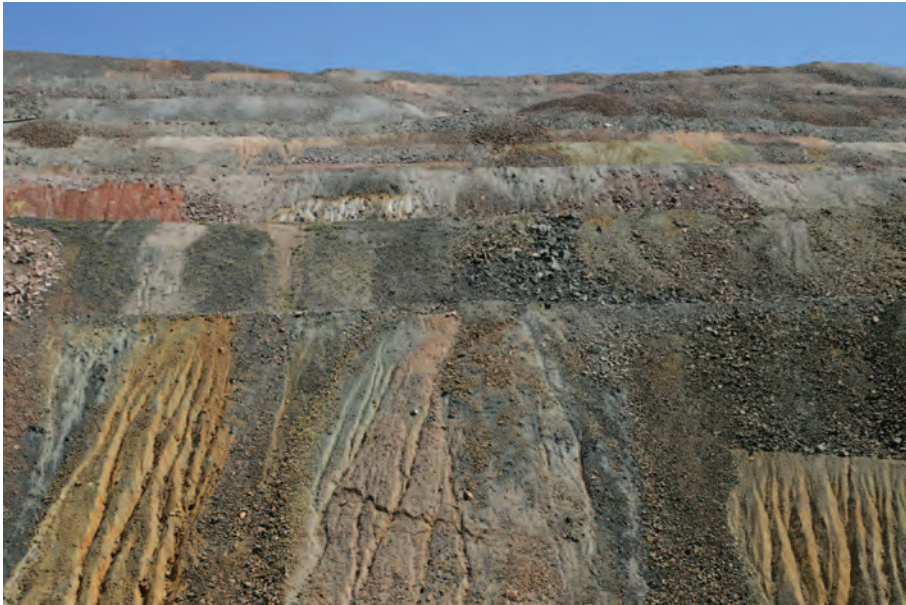
While net zero targets are a relatively recent phenomenon, Stantec’s decarbonisation expertise dates back several years.

For instance, it supported Galiano Inc (formerly Asanko Gold Inc) in a project aiming to quantify and report greenhouse gas (GHG) emissions and removals associated with the Asanko Gold Mine, a multi-pit mine on the Asankrangwa gold belt in Ghana, all the way back in 2019.

“Based on this study, the team produced recommendations to reduce GHG emissions, including energy efficiency and decarbonisation of the energy used, as well as the creation of a dedicated system of operating procedures for continued emissions monitoring,” Mashford said.

In this period of great change for the mining industry – where carbon reduction goals may be set, reviewed and updated based on stakeholder wishes as opposed to viable pathways – Stantec is looking to educate the market about net zero emissions and climate change policies wherever possible to ensure companies achieve their goals.

This will likely require a further need to



Stantec has been on hand to map out 'net zero' mining scenarios, as well as ensure mine operations align with the recently incorporated Global Industry Standard on Tailings Management requirements (Photo courtesy of Stantec)

incorporate innovative solutions, digitalisation and technology adoption from mining companies and their consultant and engineering partners, according to Mashford.

"This has most definitely led to us engaging with OEMs, working alongside them to adopt emerging technologies (such as battery-electric vehicles or autonomous fleets) into mine design and mine operations (supporting decarbonisation, safer workforce, optimisation of operations, etc)," he said.

Along these lines, the company started a collaboration with Auxilium Technology Group – a company specialising in modular tailings valorisation – earlier this year, which, Mashford says, has enabled Stantec to provide a broader range of tailings and carbon capture solutions to clients.

Auxilium, a start-up connected to the University of Arizona, has a process that, after initial cleaning of tailings, can use the material as a construction aggregate or insulating "geofom" to be sprayed or 3D printed to produce insulating blocks.

Mashford continued: "We are also selecting strategic partners to help clients evolve their roadmap to net zero. Alongside OEMs, we are identifying what technology and digital solutions clients need to support critical initiatives."

This includes investment in climate change counteraction, prioritising safety of the workforce, mitigating higher operating costs, creating standards for more robust management of tailings facilities, obtaining a social licence to operate, and other considerations.

Such work will put Stantec's clients in line for

market acknowledgement from end users – something Mashford sees as a future demand driver for its services.

"We are helping mining companies achieve and leverage smaller carbon footprints to attract market premiums, while helping them avoid penalties for high carbon emissions," he said. "We're seeing greater demand for carbon accounting and other services to deliver on mining's net zero commitments.

"I think mining companies will rely more on consultants to help achieve those commitments and, as third-party reviewers, to ensure their carbon emissions accounting and projections are accurate."

Turning a vision into reality

The combination of mining-focused Golder and the broader expertise of WSP has allowed **WSP Golder** to provide a true 'pit to port' offering to mining clients, according to Kevin Beauchamp, Global Director of Mining for the company.

The acquisition of the former by the latter means the combined company can address client challenges and growth plans in a more integrated and holistic way, calling on world-class expertise in infrastructure, energy,

buildings and transportation, he added.

"This has really enhanced our ability to support mining companies across the full value chain and opened up new opportunities for our people to expand their skills and take on new challenges," he said.

This is helping the company retain talent in such a competitive market, noting that in-demand experts in tailings, rock mechanics and mine engineering were benefitting from this.

"Our response has been to focus on technical excellence and career development within our teams," Beauchamp said, adding that knowledge sharing and cross-pollination of technical skills across practices were helping develop experts to cater to this demand.

In the example of tailings engineers, specifically, WSP Golder is adding more skills and capacity to its project management teams, freeing up its engineers to focus on engineering while also improving its project delivery process.

Another step has been developing a more robust approach to succession planning for the critical role of Engineer of Record (EOR) – a term commonly used in North America to determine the responsible person for design and construction phases of a project. The EOR is also now a designated role under the GISTM, providing responsibility and accountability for critical systems and processes essential to upholding the integrity of these facilities



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throughout their lifecycle.

Beauchamp explained: “We are creating deputy EORs to work alongside the EOR for training, succession and continuity purposes. In this way we are able to develop our people’s skill sets and experience to advance in their careers and fill future EOR roles.”

A focus on diversity and inclusion, and looking beyond groups traditionally employed in mining, has also allowed the company to build and retain its talent pool.

“One of our strengths is working collaboratively across regions and across disciplines which we’ve found really supports that inclusive culture,” Beauchamp said.

Like Stantec, WSP Golder’s holistic mining focus has led it to further helping its clients meet their ESG aspirations and commitments.

“WSP Golder is differentiated from most companies offering ESG advisory and planning services because we have the ability to follow projects through the engineering and construction aspects to realise the actual ESG benefits,” Beauchamp said. “There are very few companies that can provide both the advisory services clients require up-front, as well as the engineering and design where the savings and impacts are actually realised.”

This was recently displayed on a project the company carried out for a well-known mining company, who asked WSP Golder to conduct concept-level studies of water usage across its global operations to identify water savings opportunities, particularly in locations where critical water shortages had been observed.

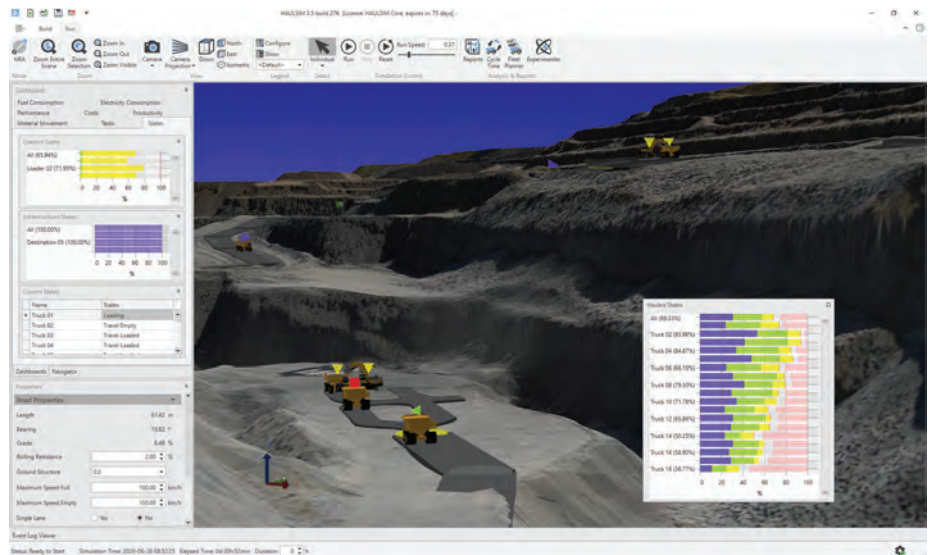
“Concept-level studies involved preliminary engineering and cost estimation; well beyond simply strategy and planning,” Beauchamp said. “Water savings opportunities were identified and prioritised, and many are now in the feasibility study stage, and are expected to continue into design and construction.”

The company has seen similar lifecycle requests when it comes to carbon savings, where clients have asked WSP Golder to assess opportunities for carbon reduction, moving from ideas and strategies into options analysis, engineering studies, design and, ultimately, construction of projects that result in actual carbon reductions on site.

“This is what our clients are asking for today: a seamless transition from planning to implementation to achieve their desired ESG outcomes,” Beauchamp said.

And WSP Golder and Beauchamp believe the company has a competitive advantage over some of its peers when it comes to decarbonisation work of this type.

“One opportunity for us, as WSP Golder, is to bring in our energy experts to help design and implement innovative approaches to a mine site’s



particular energy needs,” Beauchamp said. “No two sites are alike in terms of which solutions may be feasible or best suited to their location and particular requirements.

“This is the type of challenge our people thrive on: bringing our mining and energy experts together to partner with clients and look at a broad set of options of what a site, or a supply chain, could look like.”

This may include mine site pumped hydro or alternative re-use of end of life mine operations, on-site green hydrogen production, hydrogen or battery-powered haul trucks or trains, solar or wind farms for energy generation, tailings solutions that are more environmentally efficient, or other alternatives, according to Beauchamp.

“It’s an exciting time to be a part of the industry where there’s a shared willingness to look for new solutions and really move the needle on making the vision of sustainable mining a reality,” he concluded.

Retaining and building the talent

RPMGlobal, a company with both mining software and advisory services on its books, is continuing to expand its offering to provide sustainable, end-to-end mining solutions, too.

This is directly correlated to the company’s decision to establish a dedicated ESG mining team in 2021 within its advisory services division.

“This expansion of our advisory offering has allowed us to be involved with every part of the mining operation, with ESG requirements spanning the entire organisation and beyond project completion,” Philippe Baudry, Executive General Manager – Advisory Services, told *IM*.

RPM also recognises the constraints on talent seen across industry, in addition to the exceptionally high levels of hiring activity.

“This hiring activity comes from two directions: mining-dominated markets such as Western Australia, Canada and Africa; and sourcing experts in specific capabilities like ESG

RPMGlobal’s mine haulage simulation solution, HAULSIM, has recently been updated to model technologies aimed at reducing reliance on diesel as a source of energy – incorporating planning for trolley assist, hydrogen haulage and battery-electric options

and various engineering fields,” Baudry explained. “To make it even more complex, this trend was compounded by COVID border closures, resulting in an inability to access labour from other countries, which has yet to return to historical levels due to delays in visa processing, etc.”

The root cause, however, is the shortage of graduates globally in mining-related disciplines due to the negative perceptions associated with choosing mining as a career and the continued retirement of the baby boomer generation.

This dynamic is leading to mining companies – both junior and majors – raising pay for site-based work to unsustainable levels at the same time as reaching out for support from the consulting and engineering market, Baudry says.

To cope with such demands, Baudry says RPM is making a concerted effort to retain staff by understanding their needs, wants and aspirations and, where possible, providing them with such opportunities.

“As a global business with broad networks across the mining landscape, we can provide unique opportunities that smaller firms cannot,” he said. “This continues to be a focus and something we must keep improving on.”

And, like everyone else in this market, RPM continues to monitor salaries and adjust pay accordingly to remain aligned with the market and improve its competitive market position.

The company has not been opposed to acquiring expertise to sate significant demand growth from areas such as ESG, evidenced by the 2021 acquisitions of two pure-play mining ESG advisory services in Australia – Nitro and Blueprint Environmental Strategies.

“Our ability to bring together deep domain mining knowledge and pragmatic and practical mining-focused ESG advice to the market has significantly shifted our value proposition to miners and their financiers,” Baudry said of these acquisitions and the dedicated ESG mining team that followed shortly after.

This has seen the company take a fresh, engineering-led approach to rising industry challenges, such as mine decarbonisation opportunities and mine closure. All of which has been helped by its existing software solutions.

“For example, our advisory team completed a project investigating opportunities to reduce diesel usage, in line with the company’s commitment to reducing its carbon footprint and operating sustainably,” Baudry said. “By harnessing RPM’s software, including our Open Pit Metals Solution (OPMS) and HAULSIM, the team could model many haul routes in a wide range of mine layouts to quantify the impact of alternative haulage options.”

RPM’s mine haulage simulation solution, HAULSIM, has recently been updated to model technologies aimed at reducing reliance on diesel as a source of energy – incorporating planning for trolley assist, hydrogen haulage and battery-electric options. Adding the scheduling oversight of OPMS determines what is practically possible to achieve across one or multiple mining operations.

RPM is displaying these complementary skills in lender engineering support work for several commercial and export credit lending agencies working on development projects around the world.

“Our ability to bring together, as an integrated team, all facets of technical, environmental and social saves the client time and money during pre-financing and construction monitoring work,” Baudry said. “It also ensures that recommendations are not made in isolation from other vital aspects of a project during the critical development phase, as our team works together closely with a joint project manager across all capabilities.”

In recent years, RPM has been lending this expertise to the battery mineral and rare earth element processing value chain – a move driven by long-term repeat clients investing in the industry out of North Asia.

Growing its team of in-house processing expertise and associates to support the review of numerous projects in these sectors has seen the company also carry out work on behalf of some of the government-backed critical mineral funds in countries like Australia, USA and Canada.

RPM, for example, was the lender engineer for both technical and ESG aspects on the A\$1.2 billion (\$821 million) financing of Iluka’s Eneabba integrated rare earths refinery in early 2022.

Just some of the ways RPM’s advisory division



With the mining industry set to play a significant role in the transition to a low-carbon future, AFRY’s understanding of the whole value chain stands it in good stead to win more work, according to Janne Tikka

is looking to help clients navigate the evolving ESG backdrop in the mining space include:

- Development of carbon literacy, low energy mining and low carbon haulage courses;
- Providing planning tools for decarbonisation strategies;
- Helping customers quantify their current baseline and historical GHG emissions profile, energy usage and impacts across the entire portfolio of assets and processes; and
- Carrying out carbon monitoring, guided by Science-Based Targets, to support mining organisations in securing their policy and strategy for a low-carbon future.

AFRY’s core of understanding

With global mining companies having decreased the sizes of their project offices prior to the onset of COVID, and metal and minerals demand having shot up in the past year, **AFRY** is being called on more often to bulk up owners’ engineering teams, according to Janne Tikka, Head of Mining & Metals at AFRY.

The engineering-focused company has seen demand for all project management and project control-related tasks, site services as well as engineering disciplines, so on projects it is involved in, providing the Nordic-based company with many opportunities.

“AFRY has always been strong in owners’ engineering and local project services,” Tikka told **IM**. “This is obviously partly due to

continuous competence development within AFRY’s organisation, but also due to the approach for industrial investment projects in the Nordic countries.”

In the Nordic region, it is typical to carry out investment projects with integrated project team organisations consisting of members from both the client and various engineering supplier representatives, rather than contract the whole industrial investment to a separate company.

AFRY believes it will continue to differentiate itself from peers chasing such work due to its specific process technology competence across the entire mining and metallurgical industrial sectors.

“AFRY has a long history in working together with the global top technology suppliers within

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“In Colombia, our local talent, combined with the backup from about 1,500 global colleagues, helps us gear up for most challenges, while bringing integral solutions to our clients,” SRK’s Felipe Forero says



the mining industry sector as many of them have Nordic roots,” Tikka said.

Yet, as an independent engineering company, AFRY ensures it promotes all technologies – not just ones it has an existing relationship with.

“The client always gets the best technologically-selected process technology package,” Tikka clarified.

AFRY places increased emphasis on this technology selection since the production process will continue to play a decisive role in whether the investment creates value for owners, he added.

With the mining industry set to play a significant role in the transition to a low-carbon future – with minerals and metals providing essential building blocks in a wide variety of clean energy technologies – AFRY’s understanding of the whole value chain stands it in good stead to win more work, according to Tikka.

“Based on our depth of knowledge, we can help clients at every step and in any scale of a project,” he said.

“AFRY’s services within the mining sector already cover the whole lifecycle of the mining project: AFRY’s geologists, geophysicists and environmental experts are usually the first ones to get involved with a new deposit. AFRY has services for the environmental permitting and full scope feasibility studies with various accuracies.”

For large industrial investment projects, AFRY applies the engineering procurement and construction management (EPCM) method. One of the recent projects it is applying this method on is Horizonte Minerals’ Araguaia ferronickel project, in Brazil, an open-pit nickel laterite mining development that will deliver ore from several pits to a central rotary kiln electric furnace metallurgical processing facility.

Whereas, at operating mines, AFRY typically takes care of the local project services, including small assignments and possible bigger expansion projects.

“Toward the end of a mine’s life, AFRY can

carry out a closure plan and AFRY also has experts to carry out post-closure monitoring,” Tikka said.

Across this scope, AFRY believes the adoption of digitalisation and electrification tools will prove key in transforming the mining sector, quantifying where the opportunities are to decarbonise operations and move away from fossil-based fuels.

“We use our engineering ability to optimise technical processes across the lifetime of mining and metals operations to decrease emissions, reduce the CO₂ footprint and increase overall efficiency and sustainability,” Tikka said. “Understanding the interlinkages between process design and environmental performance is at our core.”

The Colombia consulting microcosm

In an emerging mining market like Colombia, the approaches to tackling industry skills shortages require longer-term investment starting at a grassroots level, according to Felipe Forero, Managing Director and Practice Leader at **SRK Consulting** (Colombia).

While the company has observed less technical competency and counterparts from the mining companies it maintains regular business with in Colombia – which, in turn, has led to outsourcing – the obvious gaps are often filled with overseas experts.

“This helps bridge some of the experience gaps, but there are important aspects being left out, such as local climatic, social and economic issues,” Forero told **IM**.

SRK is looking to address this by merging its international talent pool with highly capable local professionals in the country.

“In Colombia, our local talent, combined with the backup from about 1,500 global colleagues, helps us gear up for most challenges, while bringing integral solutions to our clients,” Forero said.

The company’s Colombia practice is currently strengthening capabilities in water resource

management and mine closure, for instance, supported by this global base of experts.

This builds on a recent merger with Dynami Geoconsulting, a Colombia-based company providing specialised services in geotechnical engineering, foundation design, mine waste management and hydrology. Dynami was established in 2015 by Forero and his colleague Diego Cobos to provide geotechnical design services for a small gold mine in Antioquia.

On an international basis, innovation and alternative approaches to data processing and interpretation will provide improved understanding and better solutions for the challenges faced by projects, according to Forero.

This is in action in Colombia, where the local SRK office, specialising in tailings management, is taking new approaches to designing solutions for the specific topographic and climatic conditions encountered in the country. This also extends to the handling of dry stack tailings.

Projects such as Buritica, owned by Zijin-Continental Gold, in the valley of the Cauca River in Antioquia, is a good example of this, having features such as steep slopes, high precipitation, etc that challenge conventional thinking, Forero said.


SRK and Dynami have participated in this project since the very early stages, during permitting, feasibility and design, and SRK is currently providing support and supervision during operation of the 3,000 t/d mine.

While the country gears up for larger-scale mining outside of coal – such as the ramp up of Buritica – SRK has been able to participate in aspects of the conception, design, construction and operation of several local projects.

“This has allowed our staff to integrate technical tailings management aspects with the always-important environmental and social components of the project by interacting with client stakeholders or third-party consultants specialised in these areas,” Forero said.

“This is observed not only for our practice in Colombia but in general for the global industry where projects, in order to succeed, need to allocate support from different countries and with different specialties and integrate them towards a common objective.”

Like mining projects on an international stage, Forero and SRK envisages carbon reduction and more sustainable practices as being embedded in its mining project and design work going forward.

“These new practices will be provided as alternatives to our clients in a staged manner as they sometimes involve larger investments,” he clarified. “From solar farms in large waste facilities, to enhanced water recovery, alternative wastewater treatment, and reduction of polymer-based geo-composites for earthworks, these are concepts that we are beginning to dive into.” 

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Major geopolitical forces are putting new pressures on the global mining industry at a time when the sector is reinventing itself to address the opportunities of a decarbonised economy, according to the Content Director of the world's largest resources industry event, *Resourcing Tomorrow*.

Andrew Thake said these issues will be key themes at this year's freshly re-branded *Mines and Money London 2022* conference. He said the event, now in its 20th year, is already attracting thousands of global investors and mining company delegates to a city known as a global mining investment hub.

"With mining as a key driver of GDP growth, everyone recognises the central role it will play in the global energy transition," Thake said.

"*Resourcing Tomorrow* will look at this energy transition, ESG, sustainability and the circular economy, and how geopolitical developments such as the war in Ukraine and COVID have led to a re-appraisal of mining supply chains.

"Exploration is once again front of mind with a realisation that there is not enough supply to meet the demand for a sustainable circular economy."

With an anticipated audience of 2,000 attendees, *Resourcing Tomorrow* runs from November 29 to December 1, 2022, at the Business Design Exhibition Centre in London.

The agenda will look to the future of mining and, through dialogue and debate, seek answers to how mining can:

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Mike Hill, Event Director at *Resourcing Tomorrow*, said: "With our new-look *Resourcing Tomorrow* agenda, we are anticipating an even larger participation for 2022. We have already sold 85% of exhibition floor space and anticipate 150 miners in attendance.

"Our forward-thinking agenda has helped us secure some stellar keynotes including Jakob Stausholm, Chief Executive, Rio Tinto; Mark Bristow, President & Chief Executive Officer, Barrick; Mikael Staffas, President & Chief Executive Officer, Boliden; Rohit Dhawan, President and Chief Executive Officer, International Council of Mining and Minerals, ICMM; and Elaine Dorward-King, Non-executive Director for Sibanye Stillwater, Kenmare Resources and NovaGold. As a result, we are on course for our biggest attendance since 2017."

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