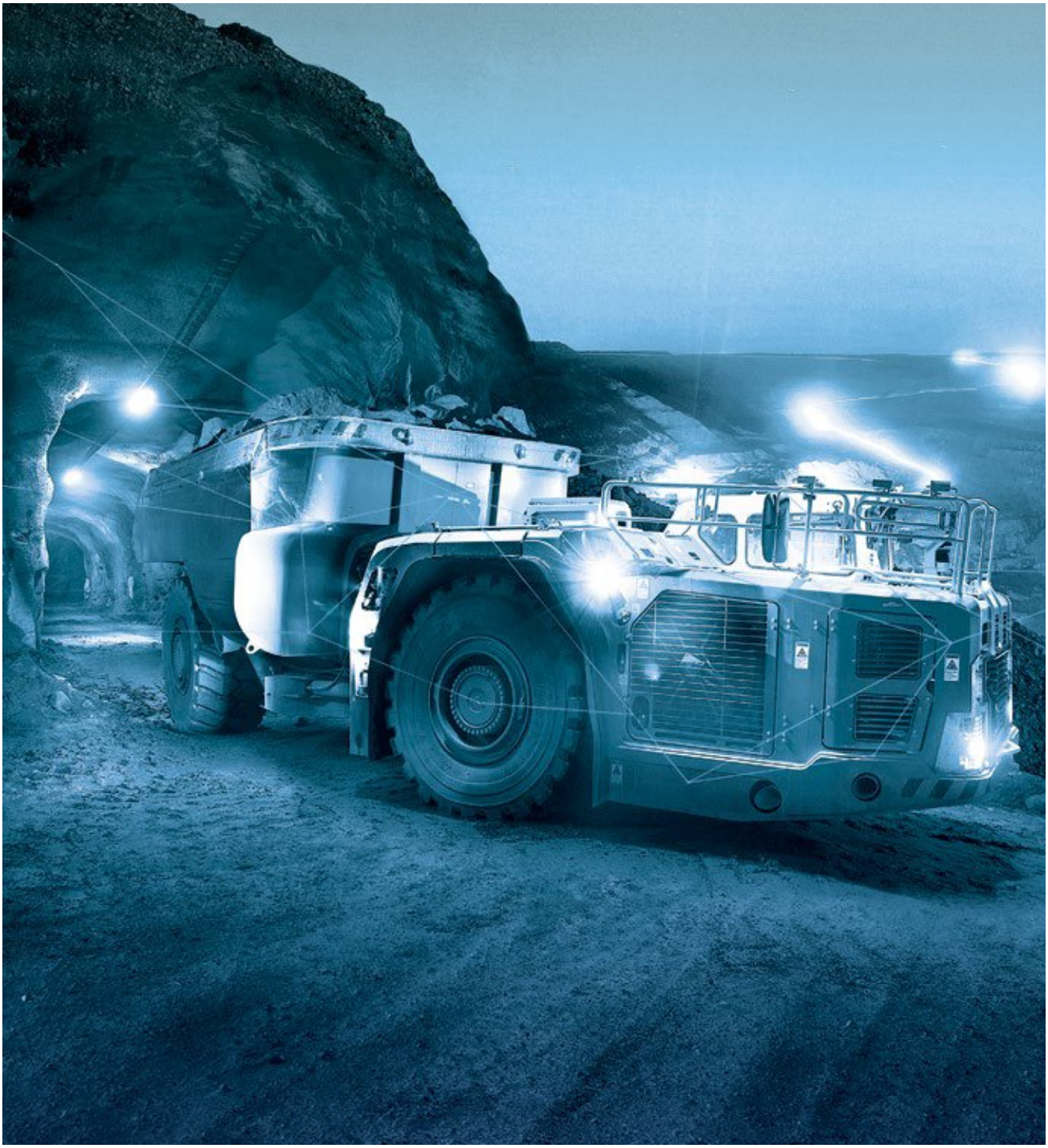

GLOBAL BUSINESS REPORTS

MINING IN ONTARIO AND TORONTO'S GLOBAL REACH 2022

Pre-Release Edition

Introduction to Mining in Ontario

M&A heats up in Canada's mining powerhouse

Canadian miners have often led the way globally when it comes to mining technologies, protocols, community relations and sustainability. Currently, with a necessary and renewed focus on ESG, the whole mining value chain, from investors to service providers, is re-thinking the way the sector conducts its business and operations. With eyes set on electrification and green energy, this report – a pre-release edition of Global Business Reports' annual Mining in Ontario and Toronto's Global Reach publication – will provide insights regarding challenges and opportunities as we move into a transition economy.

With mining sitting at the core of the planet's future, there has never been a more important time for a focus on the sector and to put the industry's best face forward by highlighting the positive impact it has on all businesses across the globe.

Despite the global challenges faced over the last 19 months, the Ontario mining sector has remained incredibly active with many exciting transactions taking place. Perhaps the most notable is the merger of Agnico Eagle and Kirkland Lake Gold. Once this merger is complete, the company will have approximately US$2.3 billion of available liquidity, with a mineral reserve base of 48 million ounces of gold. With a large exploration and development pipeline, Agnico Eagle Mines is primed for continued and sustainable growth.

"Over the past 18 months, we have witnessed the return of the generalist investor to the sector."

Dean McPherson, Head, Business Development – Global Mining, Toronto Stock Exchange and TSX Venture Exchange

The Ring of Fire has come back into the spotlight with a thrilling bidding process for Noront Resources between industry giant BHP Billiton and Wyloo Metals, which is now one of Australia's largest private companies, owned by Tattarang. By the end of October, BHP had raised its all-cash offer by 36% to C$0.75 per share, 7% higher than Wyloo's previous offer. Companies are recognizing the value of having enough resources to supply the increasing demand for battery metals and having a source of nickel in North America.

Toronto's financial markets have witnessed mining take a prominent place in the TSX30 – a ranking of the top 30 performers on Toronto Stock Exchange over a three-year period based on dividend-adjusted share price appreciation. TSXV to TSX graduation rates have also risen in 2021, and the Agnico/Kirkland and Noront deals could be the first in a wave of M&A activity necessary to consolidate projects.

Mining finance firms including PearTree Securities, Triple Flag Precious Metals, Haywood Securities, Stifel GMP, IBK Capital and Roth Canada have had their hands full with transactions, continuously finding innovative ways for Canadian mining companies to access larger pools of capital. Meanwhile, an environmentally conscious investor profile is on the rise.

Technology and innovation continue to develop, often with radical divides. Many companies are still trying to fully adopt Industry 4.0 digitization processes, while others are already implementing Level 4 automation protocols. This has led to an industry sector that will need to leapfrog into the future, skipping several steps, to reach lowered carbon emission targets and increased productivity. Capex costs remain an issue for many, but a general awareness that the mine of the future is rapidly turning into the mine of the present has taken hold. ■

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Greg Rickford

Minister of Northern Development, Mines, Natural Resources, Forestry and Indigenous Affairs, Government of Ontario

Which commodities and projects are you most excited about in Ontario?

Ontario is rich in gold, nickel, copper, zinc, platinum group metals (PGMs), silver, cobalt, uranium, and other industrial metals. Our government moved quickly to get many projects across critical milestones, including critical minerals projects and infrastructure. We are also promoting processing in Ontario to add significant value to our growing critical minerals supply chain. We are actively looking at the feasibility of lithium processing in Thunder Bay and our government is investing C$5 million in the first cobalt facility in North America.

I am excited about numerous areas continuing to see significant gold exploration and activity, such as Timmins, Kirkland Lake, Wawa, Red Lake and the Kenora mining district. There is a new centre of gravity emerging for mining in northwestern Ontario, particularly for gold opportunities. In Uchi Lake, Rainy River and Wawa, there is also an evolving area for mining rare earth elements and other minerals. We are also incredibly excited and optimistic about the copper, nickel and platinum deposits in the Lake Superior region, the Greenstone Belt, and the Ring of Fire.

Can you comment on the ongoing technological advancements in the sector?

Ontario has always been globally competitive in mineral exploration and development spending. Sudbury, North Bay and Timmins, which I would nickname the 'Ontario Triad', are all top destinations for the mining services supply sector. These mineral sector hubs are inventing and testing world-leading technologies that help keep workers safe and reduce capital costs for the mines of the future. I also announced our intention to develop a Critical Minerals Strategy that will support cutting edge technologies and ensure we capture the growing global market for strategic minerals.

Ontario is recognized as having one of the top ten ranked geological databases in the world, according to the 2020 Fraser Institute Mining survey. We remain committed to incentivizing innovation through opportunities such as the Ontario Junior Exploration Program. This program committed C$5 million dollars over two years to help junior exploration companies find the mines of the future. We also built out the Aboriginal Participation Fund and revitalized the Northern Ontario Heritage Fund to ensure mining supply and service companies have government support. Innovation and technology are the heart and soul of what our government is investing in. For too long, certain mining deposits were not seen as market friendly. Now, we are seeing far greater interest in these deposits due to the high level of sophistication of the technology available.

How are you addressing the gap in skilled labour and what kinds of collaborations are emerging with Indigenous communities in this area?

One of the most attractive features of mining is that it is the largest employer of Indigenous peoples in Canada and Ontario. Ontario is now offering expanded resource revenue sharing agreements with Indigenous communities proximal to mining, forestry or aggregate developments. Our government has also made significant investments in training programs for Indigenous people. This includes C$3.6 million from through the Ministry of Labor, Training and Skills Development to help 150 Indigenous people receive training to start careers at the Greenstone mine. We have also supported initiatives for employment opportunities on major energy infrastructure projects, such as the Wataynikaneyap power transmission project. This will serve the interests in the Greenstone Belt and translate to a transferable skill set for Indigenous workers. Trained workers will have other exciting opportunities as more critical energy infrastructure and mining projects start construction.

What initiatives is the government pushing to unlock the Ring of Fire's exploration potential?

We are focused on supporting and implementing policies that benefit isolated and remote First Nation communities in the region. We are supporting legacy infrastructure, including First Nations led all-season road projects, to create a 'Corridor to Prosperity.' These projects will unlock unprecedented access to health and social services, broadband connectivity, and clean alternatives to diesel-generated electricity for Northern First Nation communities. These projects, if approved, would support the development of the Northern Road Link that will connect these projects to the area known as the Ring of Fire.

The private sector is recognizing that this opportunity could finally become a reality. Noront continues to experience significant interest from the private sector, which is a positive sign. Wyloo and BHP have been making very attractive bids for Noront. The price points of these offers in the marketplace suggest that there is a lot more confidence in this project than ever before.

Production and Development in Ontario

Optimizing precious metals deposits

With 40 mine sites currently operating in Ontario, the value of mineral production in the province amounted to C$10.7 billion in 2019. Gold remains the precious metal in the spotlight, with Ontario being the largest Canadian producer, as well as of platinum group metals (PGMs). The province is the second largest Canadian producer of copper, and a large producer of structural materials and salt. It is one of the safest mining jurisdictions world-wide, with a 96% improvement in lost time injury frequency over the last three decades.

Rising gold prices in 2020 brought renewed enthusiasm to producers, with the precious metal peaking at US$2,076/oz in August 2020. Although gold has suffered compared to other commodities in 2021, a yearly average around the US$1,800/oz mark means the industry is generating record free cash flow.

Alamos Gold achieved its best hole drilled at Island Gold in June 2021. Combined with the development of the Lynn Lake project, Alamos is aiming to ramp up its Canadian production base to around 600,000 ounces of gold per annum by 2025— making Alamos one of the largest gold producers in the country. "It would also mean that 80% of our production would be coming out of Canada, as opposed to internationally," said John McCluskey, president and CEO of Alamos Gold.

"Since 2015, Alamos has spent close to C$2 billion on acquisitions in Canada, and on these projects we have spent between C$300 and C$400 million in capital to improve them, while creating thousands of jobs."

John McCluskey, President & CEO, Alamos Gold

The company's Young-Davidson project, located 60 km west of Kirkland Lake, remains one of Canada's largest underground mines and is projected to have a strong free cash flow growth moving forward.

Majors continue investing in Ontario, with Vale focusing in the Sudbury Basin, working with Glencore to develop the Nickel Rim South to access ore at Vale's Victor mine. The Nickel Rim South mine remains the largest operation in Sudbury, with nickel and copper as its main metals.

Vale's Creighton mine continues breaking records, not only by retaining first place as the deepest nickel mine in Canada, but also by having hosted the deepest underground concert at 7,200 feet below surface for International Music Day.

Ontario has also attracted the attention of foreign majors and mid-tiers looking to expand in North America. Melbourne-based BHP, the world's largest mining company by market capitalization, moved its nickel and copper HQ to Toronto in 2021.

Another Australian mining producer, Evolution Mining, acquired Newmont Goldcorp's Red Lake Gold Complex in November 2019. Since then, the company has focused on

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EAGLE RIVER MINE

- Steadily increasing production profile (2020: 90,278 ounces 2021: 92,000 – 105,000 ounces)
- High grade operations (13.4 g/t reserve grade)
- Stable jurisdictions (Ontario and Quebec, Canada)
- Excellent exploration potential

KIENA MINE

- Pre-commercial production of 5,511 ounces ramping up as planned – commenced in Q3 2021
- Full commercial production expected in Q2 2022
- Excellent exploration potential (property size 65 square kilometres)
- PFS demonstrated a 98% IRR

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WESDOME

"In May 2021, we closed the C$342 million Battle North acquisition, which consolidates our ground position and also provides us with the additional milling capacity to fulfil our strategy for Red Lake."

Jake Klein, Executive Chairman, Evolution Mining

"Wesdome Gold Mines is on a growth path to becoming an all-Canadian mid-tier producer. The potential for resource and reserve expansion at Kiena is tremendous."

Duncan Middlemiss, President & CEO, Wesdome Gold Mines

consolidating the district with the C$342 million acquisition of Battle North in Q2 2021. Evolution has added milling capacity for Red Lake and is planning to mill around 2 million tonnes to produce about 350,000 ounces of low-cost gold annually, revealed Jake Klein, executive chairman of Evolution Mining.

Wesdome Gold Mines ranked 10th on the TSX30 list in 2021, and is the only mining company to feature in all three editions of the annual list of the best performers on the exchange. Year to date production at the Eagle River Complex in Ontario reached 76,773 ounces by Q3 2021, and the company's production profile is set to grow after the successful restart of its Kiena mine in Québec. On October 14th, 2021, the company announced that the first 5,511 ounces of gold had been mined at Kiena, with the project set to ramp up in 2022. "Wesdome Gold Mines is on a growth path to becoming an all-Canadian mid-tier producer. The potential for resource and reserve expansion at Kiena is tremendous," said Duncan Middlemiss, president and CEO, Wesdome Gold Mines.

New Gold holds the gold-silver Rainy River mine in Ontario and the New Afton gold-copper mine in British Columbia. It is currently focused on optimising free cash-flow and profitability on the former. Rainy River will be transitioning from open-pit to underground operations, to start mining in 2022. New Gold CEO, Renaud Adams, approved of Kirkland Lake Gold and Agnico Eagle merging so as to solidify a united Canadian mining approach. He said: "We need to be very clever and open minded because the industry will need to go through some sort of consolidation to continue to be efficient and perform."

Island Gold's reserve and resource base has grown substantially since 2016, doubling to 3.7 million ounces by 2019 and forming the basis for the Phase III Expansion. The deposit continues to grow with another million ounces of high-grade reserves and resources added in 2020 and the best hole drilled to date in 2021.

ALAMOS GOLD INC.

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"We need to be very clever and open minded because the industry will need to go through some sort of consolidation to continue to be efficient and perform."

Renaud Adams, President & CEO, New Gold

"A year ago, there were less than 50 people in Magino, yet today there are over 500 people on site. In Magino, we released some of the best drill holes ever drilled on a property earlier this year."

Peter Dougherty, President & CEO, Argonaut Gold

A New Wave on Ontario Gold Mines

Ontario is set to increase its gold output in the years to come on the back of three major projects, each of which promises to be a game-changer for the operating companies. The most significant project in Ontario's development pipeline is IAMGOLD's Côté Gold project located between Sudbury and Timmins, which commenced construction in 2020 and is expected to move into production in 2023. The mine will produce nearly 500,000 oz yearly for the first five or six years at an AISC of US$600/oz, with the average production guideline across the full 18-year LOM closer to 300,000 oz/year.

Argonaut Gold has built its production profile through mines in Mexico and Nevada. However, the company's Magino development project is the real jewel in Argonaut's crown, which is currently under construction and due to move into production in 2023. "A year ago, there were less than 50 people in Magino, yet today there are over 500 people on site," revealed Peter Dougherty, Argonaut's president and CEO, adding: "In Magino, we released some of the best drill holes ever drilled on a property earlier this year."

Magino is located close to Alamos Gold's Island Gold mine, and both projects share a deep vein system with mineralization become richer at depth, offering Argonaut a tantalizing opportunity to increase resources through exploration and mine development following the Alamos Gold model which has proved so successful.

Set about 275 km northeast of Thunder Bay, a new mine is being developed by Equinox Gold and Orion Mine Finance Group in a 60/40 partnership. The Greenstone Gold mine will be one of the largest in the country with capex forecast at US$1.23 billion. On October 27th, 2021, Equinox announced groundbreaking for full-scale construction at the project, which is expected to produce more than 5 million oz of gold, with 400,000 oz per annum for the first five years, and a mine life of 14 years, is due to start commercial production in 2024.

The Greenstone project area includes the once operational Hardrock, MacLeod-Cockshutt and Mosher underground mines, which were active from the 1930s to the 1970s, and produced over two million ounces of gold. Greg Rickford, Ontario's Minister of Northern Development, Mines, Natural Resources, Forestry and Indigenous Affairs, stated: "Greenstone Mine will be an economic driver for Northwestern Ontario and the latest in a series of recent success stories in Ontario's mining sector— successes that our government is proud to support. This project will bring well-paying jobs and prosperity to northern and Indigenous communities in the region." ■

Mining Finance and Investment

The money that orchestrates global mining

Many consider that we are currently experiencing the largest economic transition of our times. Largely triggered by the Covid-19 pandemic, international governments have been printing money at historically unconventional speeds. "The debasement of currencies is unprecedented. Everyone should expect their wallets to continue to buy much less over the next few years," said Rob McEwen, chairman and chief owner of McEwen Mining.

The relevance of the mining sector seems to only recently be understood by the general population. With an urgent need for clean energy and electrification, the ability to mitigate global warming relies on the mining industry's capacity to provide the materials required for the transition. The TSX has seen a rebound within the mining space with the return of generalist investors. More than ever before, investors are looking at ESG reporting as a pivotal element in their decision-making process. "We are continuing to make it easier for global investors to participate in our market; with complete transparency and confidence they are accessing the best companies in the global mining sector," said Dean McPherson, head, business development – global mining, Toronto Stock Exchange and TSX Venture Exchange.

"We believed that there was real opportunity for additional stream and royalty financing to service the funding needs of mining companies, particularly where larger cheques and technical and commercial know-how represent significant barriers to entry."

Shaun Usmar,
Founder & CEO,
Triple Flag Precious Metals

Challenges faced by mining companies are often related to the sector's negative reputation. Opposite to China's centrally planned economy, the Western world relies on capital markets for its economic development. Speculation and an inaccurate self-image leads to numerous companies in the mining sector feeling they are significantly undervalued in the market. New reporting standards and ESG platforms are allowing them to bridge the communication gap between their positive impact and pools of capital. "Mining has always, and will continue to be, integral to the advancement of civilization," added McPherson.

In the past twenty years, Roth Capital's sustainability team has completed nearly US$30 billion in transactions. "This has not been a recent opportunistic shift, this is a team of long-believers in solar, water and electric vehicles," said Braden Fletcher, president of Roth Canada.

With 14 mining companies on 2021's TSX30 ranking, a renewed interest in the sector seems to be taking place. There are currently record levels of companies looking to graduate from the TSX to the TSX-V, with the time spent on the latter diminishing. Companies graduating from the TSXV

to TSX made up 56% of new TSX mining listings up until August 2021, a 13% increase from 2020.

Shifting to the big board is often seen as a major accomplishment, adding to companies' reputations and making them eligible for index inclusion, which has a tendency to add to demand. "However it is not a panacea or guarantee of liquidity or premium valuations," said Fletcher, who explained that company fundamentals remain the most important focus for investors: "Selecting a listing venue should be about accessing the deepest pool of capital possible – which is why we see so many Canadian listed companies pursuing a dual list in the US," he added.

Triple Flag Precious Metals joined the TSX in May 2021, raising over C$250 million in its IPO. Having realized that traditional financing opportunities are often limited for the mining sector, Triple Flag has focused on idea generation, supplementing or exchanging traditional financing methods with cater-made solutions. The stigma that private investments could never compete with large, public royalty companies is now in the past. "We believed that there was real opportunity for additional stream and royalty financing to service the funding needs of mining companies, particularly where larger cheques and technical and commercial know-how represent significant barriers to entry," said Shaun Usmar, founder, CEO and director of Triple Flag.

Streaming agreements emerged around 2004 and involve an up-front payment to an operator in exchange for having a percentage of fixed-price metal purchasing rights in the future. This benefits operators by retaining equity, and investors by securing access. "Streaming is becoming widely accepted as it is extremely patient to the mine building process and can be complementary to other forms of financing," added Usmar.

Michael White, President & CEO, IBK Capital

Denis Frawley, Partner, Ormston List Frawley LLP

When it comes to the relative dearth of mining M&A activity over the last couple of years, despite high metals prices, Adam Schatzker reflected: "In the last bull market, M&A was a predominant theme, but many mistakes were made which came to the forefront as prices came down and capital costs escalated significantly. However, as we transition towards a greener future, M&A will become more of a necessity to develop projects."

PearTree Securities has witnessed growing applications to its platform due to M&A activity. "This year we structured and financed an offering with subscription receipts as well as off of a shelf prospectus," said Lisa Davis, PearTree's CEO. The sector approaches this new cycle with lessons learned and a renewed energy to do whatever it takes to supply the globe with what it needs to survive.

Focused on large returns with smaller sized companies, Research Capital Corp. takes interest in projects in low-risk jurisdictions with a strong ESG focus. As leading underwriters for small and mid-cap issuers, as well as one of the largest private investment banks in Canada, Research Capital placed added value on countries that handled the Covid-19 pandemic well. Adam Schatzker, managing director, mining research at Research Capital, elaborated on the firm's relationship with Canada Nickel, which has the aim of having a net zero CO2 and SO2 output: "The geology of the project and Ontario's very low CO2 footprint for its electricity generation makes it theoretically possible for Canada Nickel to produce nickel with basically no environmental footprint from a CO2 and SO2 perspective," he said.

TSX-V and OTCQX listed precious metals royalty and streaming company Star Royalties has an 85% gold-focused portfolio. Star generated the first carbon-negative gold royalty platform with Green Star Royalties, which will position the company to be carbon negative by 2023. "It will promote our first-mover advantage and better position us for improved equity and debt cost of capital to fund our precious metals deals," said Alex Pernin, CEO and director of Star Royalties.

Earlier this year, Star Royalties announced a new royalty acquired on carbon offset credits with Elizabeth Metis Settlement (EMS Forest Project) in Alberta. "The project is a pure-green, ESG-focused investment where we are literary investing in allowing a forest to grow to generate carbon credits. The business model is massively scalable and there is no shortage of opportunities," said Pernin.

Alex Pernin, CEO, Star Royalties Ltd.

Egizio Bianchini, Vice Chairman, Head of Metals & Mining, Stifel GMP

A stronger focus on engaging with indigenous communities is also part of the ESG shift. "Models have emerged that allow First Nations to share in the opportunity and wealth created by resource projects through ownership stakes and by leveraging projects to improve infrastructure and economic capacity" said Denis Frawley, partner at Toronto-based law firm, Ormston List Frawley LLP.

AurCrest Gold announced the formation of Big Tree Carbon Corp, a shared initiative between the company and the First People of the Great Boreal Forest in April 2021. As First Nations-owned companies, they aim to generate carbon credits by preserving boreal forests. Michael White, president and CEO of IBK Capital explained: "The revenue for this activity globally could exceed hundreds of billions of dollars per year and represent the largest transfer of wealth in history from those that pollute to those that ensure the preservation of our planet's biosphere."

The Canadian Federal Government has also recognized the importance of investing in the sector, and has a renewed focus on policy. The 2019 Canadian Minerals and Metals Plan (CMMP) aims to address recurring challenges in the sector through cooperation. A C$40 million investment to fund the Mining Innovation Commercialization Accelerator (MICA) is also a reflection of the importance of innovation and collaboration across sectors. ■

Chris Hodgson

President,
Ontario Mining
Association (OMA)

"ESG is pivotal to mining because we have clear rules that we abide by, and have long been focused on environmental sustainability and building respectful partnerships with host communities and indigenous populations."

What have been OMA's key highlights over the last year?

OMA is excited to be celebrating our 100th anniversary in May next year. We also have our first female chair, which is another milestone worthy of celebration. Safety remains paramount to the industry, and Ontario is one of the safest jurisdictions in the world for mining. We achieved a 96% improvement in lost time injury frequency over 30 years.

How have you seen ESG progress in Ontario's mining industry?

The rise of the green economy and digitization rests on the mining industry's success, and we need to ensure the cycle is complete by producing essential minerals and metals in an environmentally friendly manner. In Ontario, our electrical grid is essentially carbon-free, giving us a considerable advantage on GHG emissions. The whole supply chain must be green to achieve green inputs in operations and our association has been focused on delivering on Target Zero+ goals: that is, mining with zero harm to workers, zero carbon and zero waste, while improving productivity.

What is being done to mitigate the risk of skilled labour shortage?

The OMA created the "This Is Mining" campaign to educate millennials on the importance of mining. We encourage readers to listen to This Is Mining: The Podcast, to get a flavour of the campaign. Companies will compete for talent, but collaboration is key to get this type of messaging out and to address the upcoming shortage in labour. The average weekly wage in Ontario mining is 70% higher than the average industrial wage in the province, so that is one thing that should help us attract skilled labour. But we need to do more collectively to reach into the school system and promote careers in mining to women, since they are underrepresented in the industry.

Pierre Julien

President,
Canadian Institute
of Mining, Metallurgy
and Petroleum (CIM)

"In my experience, the real foundation of problem solving initiatives happens in the corridors outside of presentation rooms and through informal meetings between individuals at conferences."

What are the main themes CIM sees impacting Canada's mining industry in 2021 and 2022?

There are a number of high profile issues such as decarbonization, water consumption, diversity, inclusion and digitization that are impacting the industry. There has been a huge uptick in mining projects and activity across a number of different commodities. This has resulted in a surging demand for people, not only at the mine operations level, but also at project development and execution levels. During the last super cycle, the demand for talent was filled by a number of retired professionals coming back to plug the gap. However, many of these individuals are now too old. Furthermore, we have seen a continuous decrease in university enrolments and graduates in mineral extraction and mineral resource programs.

How can the mining industry attract a more diverse workforce?

The sector is still perceived in a negative light, as an old, dirty, low-tech industry. In reality, the mining industry builds, deploys and operates some of the most advanced and sophisticated technologies and machines on the planet; but this message is not reaching society. The lack of diversity relates to the negative perception of the industry. We have to relay a positive message to society from an early stage, even at school level. Industry organizations and government need to collaboratively do something grander to explain the importance and opportunities modern mining presents. I believe that we should ramp up mining education opportunities in communities that already have exposure to the industry, which can play an important part in attracting talent in the areas that need it most. Although ESG has gained more significance in recent years, especially from an investment perspective, gradual technological advancements have allowed the industry to reduce pollutants by 98% since the 1970s.

Toronto's Global Reach

Companies headquartered in the city with operations abroad

With 47% of global public mining companies listed on the TSX and TSX-V as of June 2021, mining companies from around the world turn to Ontario, the global mining hub. Many of the mining companies headquartered in Toronto, both producers and juniors, operate projects in countries outside of Canada. A renewed focus in helping companies gain access to international pools of capital has been pushed forth by the market itself, as well as by various incentives, such as flow-through shares, which allow non-Canadian and institutional investors to play a role within the sector. PearTree Securities has become the largest source of flow-through capital in the country, with over US$2 billion raised for exploration and development. The flow-through model relies on philanthropists buying shares to donate to a charity of choice. The non-profits then sell on those shares to Canadian or international investors or institutions. "Since buyers are purchasing the shares stripped of their Canadian tax value, there is an opportunity for a larger universe of global investors to acquire equity at discounted prices," said Lisa Davis, PearTree's CEO.

"Since buyers are purchasing the shares stripped of their Canadian tax value, there is an opportunity for a larger universe of global investors to acquire equity at discounted prices."

Lisa Davis,
CEO,
PearTree Securities

For Canadian residents, cash-donation tax costs can be reduced from an average of C$0.50 cents on the dollar to about C$0.10 cents after tax. "They are getting both a donation tax credit and the tax

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"In light of the enormity of the global monetary stimulation by governments worldwide in response to COVID-19, one definitely should have some exposure to gold."

Rob McEwen,
Chairman & Chief Owner,
McEwen Mining

benefits of a flow-through share subscription," added Davis.

Making use of the flow-through model, Red Pine Exploration entered an agreement with Haywood Securities for a private placement financing to secure the consolidation of its Wawa Gold project. "Shares in the offering qualified as standard flow-through and charity flow-through shares. […] The premium on charity flow-through is quite significant at approximately 35%," said Quentin Yarie, president and CEO of the company.

To calculate tax credits, one must take into account the 100% federal flow-through deduction, plus a 15% tax credit, in addition to a 5% Ontario Focused Flow-Through Share Tax Credit (OFFTS) for eligible individuals. According to the Ontario government: "The amount of the OFFTS tax credit in a tax year will reduce the balance in an individual's cumulative federal Canadian Exploration Expense pool in the year following the tax credit claim."

With over US$15 billion in financing activity in 2020, US-based Roth Capital Partners is a leading underwriter focused on companies with a market cap of under US$1 billion. Roth has taken an interest in working with Canadian mining companies since "mining makes up roughly 15% of the aggregate Canadian public markets and because of the relevance of the sector in the transition economy. Its goal is to help companies access new pools of capital. "US capital markets are somewhere between 20 and 35 times the size of Canadian capital markets. SIFMA's 2020 year-end review or their 2021 factbook says that US capital markets are roughly US$44 trillion, whereas Canada's are US$2.5 trillion," said Braden Fletcher, president of Roth Canada.

With a leadership in best practices within the sector, countries from around the world often look to Canada for pathways in innovation, technology, sustainability and community relations. Many service providers, such as AMC Consultants, which is originally Australian, view Canada as a key market. AMC started with an office in B.C. in 2007 and then Toronto in 2011. More than an eighth of over 8,000 projects they have worked on are in Canada. "Ontario specifically is of great significance to the company, as it has a rich mineral endowment making it an attractive location for investment by Canadian as well as international mining companies," said Francis McCann, general manager, Toronto, AMC Consultants.

TSX-listed Mandalay Resources has the world's second highest-grade gold mine, Chesterfield, in Victoria, Australia, with all-in sustaining costs of about US$1,000 per ounce. The project sits beside Kirkland Lake's Fosterville, the gold mine with highest grades globally. Mandalay is currently not interested in a dual listing with the ASX due to the cost and added layers of challenges when reporting. "Toronto provides companies with access to industry funds, networks and communications with mining-focused institutions that are not available elsewhere easily," said Dominic Duffy, president and CEO of Mandalay Resources.

"The TSX uses NI 43-101 for mineral resource and ore reserves reporting while the ASX uses the JORC code. The TSX also requires quarterly financial results, while the ASX requires quarterly reports without a lot of financial detail," said Jake Klein, executive chairman of Evolution Mining.

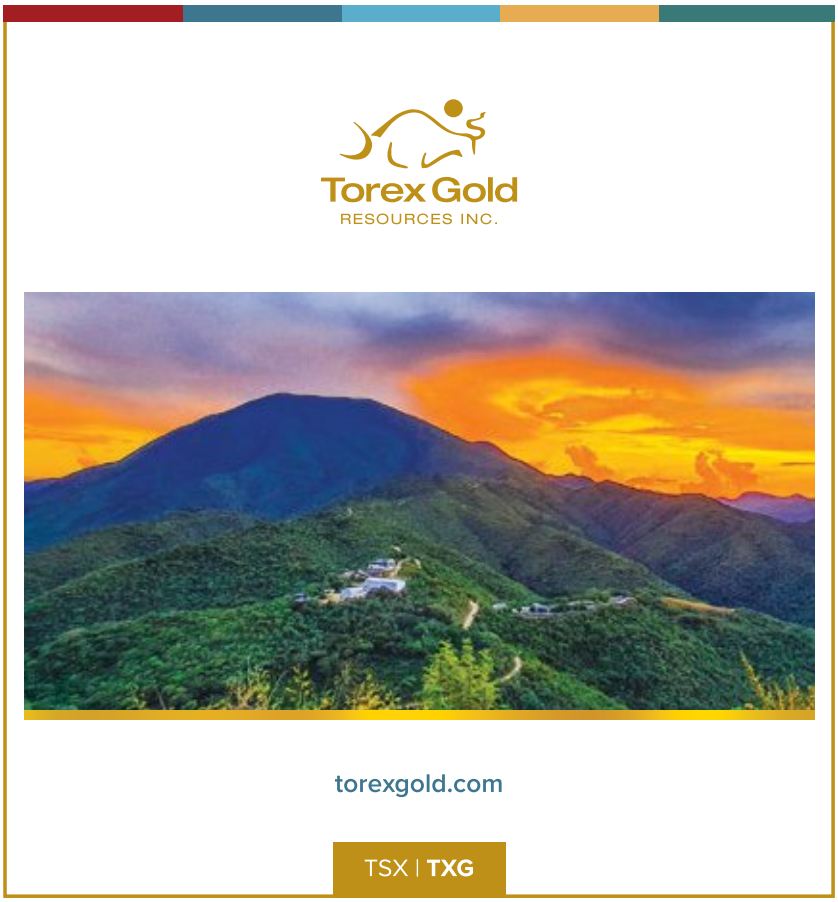


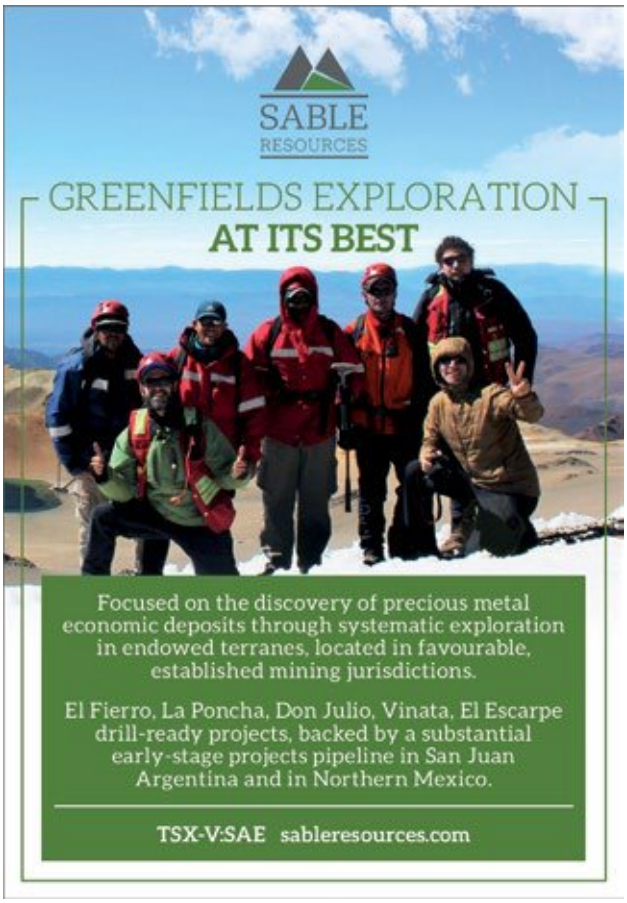
Photo courtesy of Steppe Gold

TSX-listed Steppe Gold operates the ATO gold mine in Mongolia, and the company has created a joint venture with the provincial government to unlock the Uudam Khundii (UK) project – the first time the Mongolian government has invested in a gold company with its new sovereign funds. Eventually, Steppe wishes to enter a dual listing with the Mongolian Stock Exchange (MSE). "Since our first gold pour, all of our gold has been sold domestically through the central banks. This allows us to have a rapid sale cycle while increasing the government's reserves," said Aneel Waraich, Steppe Gold's EVP.

When it comes to skilled labor and equipment, having China as a neighbor comes in handy for Steppe Gold. "The technologies are brought in from China and are very competitively priced and are then implemented using local talent," added Waraich.

The Mongolian government wishes to increase primary source production and is supportive of the sector. Majors have taken notice, such as Rio Tinto, which is operating and developing the Oyu Tolgoi copper and gold mine – one of the largest mining projects in the world. Although underground expansions have been delayed due to capex issues, the project aims to produce over 500,000 tonnes of copper per year once completed.

It is clear that mining companies from around the globe look to Ontario as a source of know-how, stability, technological leadership and sustainability. It is a location where capital pools can be accessed and innovation is developed. However, regardless of a project's geographical positioning, all companies are currently facing the reality of inflation following nearly two years of the Covid pandemic. Some instances revolve around day to day expenses, but the majors involved in mass scale operations have experienced some of the toughest effects. "The major inflation challenges the industry has been facing in the short term relate to companies that are engaged in massive capital projects. You see projects that have been inflated by up to 40%," said Renaud Adams, CEO, New Gold.



Eyes on Mexico

McEwen Mining has chosen to headquarter in Ontario, where it owns the Fox Complex, besides its operations in Nevada, Mexico and Argentina. A historically gold-focused company, McEwen has recently decided to create McEwen Copper to move the Los Azules project in Argentina from Preliminary Economic Assessment (PEA) to Pre-feasibility Study (PFS) within the next two and a half years. The aim is to take the new company public within the next year. "The left leaning political rhetoric in Chile and Peru has recently improved Argentina's profile as a destination for foreign investment in mining projects," said Rob McEwen, chairman and chief owner, McEwen Mining.

Los Azules' PEA was generated with a US$3/lb copper price, producing 415 million lbs of copper concentrate at a US$1.14/lb cost for the initial 13 years, with a lower, but still profitable rate for the 23 years following. "Los Azules is equivalent to a gold deposit of greater than 70 million ounces and with a gold equiva-

"I expect that every nation that has a major resource-based economy will soon start to look at royalty rates on mining so that the country of operation can benefit more. The key for mining companies to stay ahead is to build a mining operation that works on lower prices."

Doug Ramshaw, President, Minera Alamos

"We want to diversify through value derived from M&A, to grow beyond a single asset to become a million to a million and a half-ounce producer."

Jody Kuzenko, President & CEO, Torex Gold

"Sable Resources looks at projects with a geological potential to lead to discovery that will capture the attention of large and mid-tier companies."

Ruben Padilla, President & CEO, Sable Resources

lent production of just under 1 million oz and a cost equivalent of US$500/oz," added McEwen.

Companies such as Torex Gold and Minera Alamos have corporate headquarters in Toronto and operations in Mexico. President Andrés Manuel López Obrador's (AMLO) moratorium on new exploration claims has made the mining community slightly tentative about the country's future for the sector. However, Minera Alamos has managed to permit, build and move its Santana mine into production in 2021, despite Covid and weather-induced delays.

Doug Ramshaw, president at Minera Alamos, spoke of the advantages of operating in Mexico, including a 1-year permitting process and operating costs that allowed the Company to build Santana for US$10 million. Regarding the challenges that Mexico presents, Ramshaw explained that the country has a 20,000-claim backlog. "The biggest change we have seen under the AMLO government has been the rise of union strengths," he said.

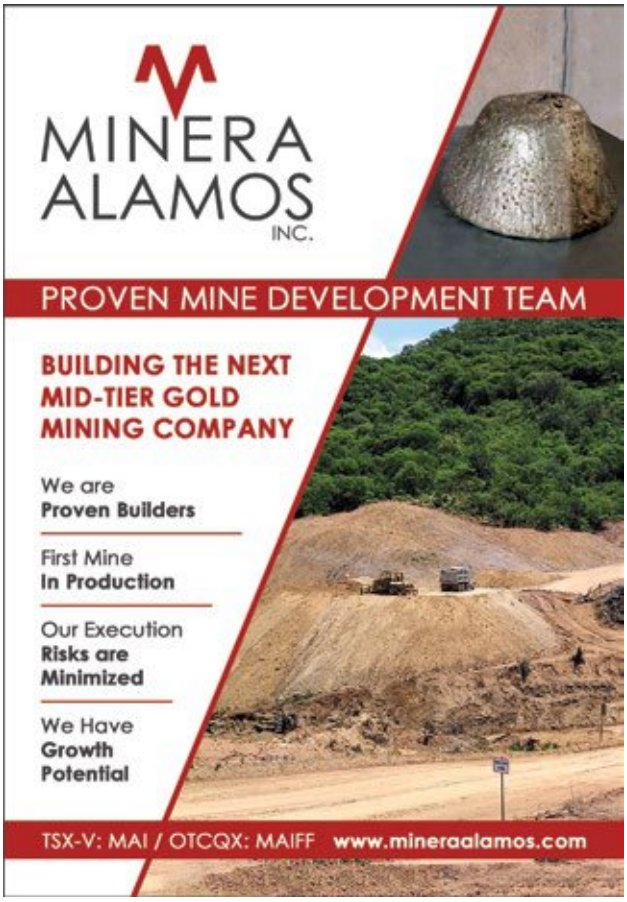
Despite the current political challenges in Mexico, Torex Gold believes some of AMLO's policies align with its goals of having environmentally responsible mining and ending poverty. However, the Mexican president has also put in a bill for constitutional reform that would hand the state greater control of electricity supply, which many expect will cause energy prices to increase if it goes through. "There are some supply mix, pricing and availability concerns associated with the current administration's proposed energy reform, which we are currently analyzing," said Jody Kuzenko, president and CEO of Torex Gold.

The third mine in Minera Alamos' pipeline, La Fortuna, is the most power intensive of the Company's projects as it is a milling operation rather than a heap leach. Although not an immediate concern, as Santana and Cerro de Oro are due to move into production before La Fortuna, Ramshaw spoke of potential cost increases: "For us, inflationary cost pressures in Mexico are to some extent mitigated by local currency weakness, roughly 70% of our operating costs are in Mexican pesos."

"Torex Gold wishes to diversify through M&A to grow beyond a single asset to become a million to a million and a half-ounce producer," said Kuzenko.

The company became debt-free Q1 2021 and had US$345 million in available liquidity. Its core focus is currently delivering a feasibility study for Media Luna in Q1 2022, advancing permitting, and completing the 83,000-meter infill drill program this year. The gold, copper and silver project aims to generate an expected average annual gold equivalent production of approximately 350,000 ounces over 10 years once it reaches production. Optimizing and extending El Limón Guajes (ELG) is also a target to reach consistent cash flow and production to transition from ELG to Media Luna in 2024.

Sable Resources' projects in Latin America are advancing with a healthy balance sheet of over C$28 million in cash and investments as of Q3 2021. "We are financing the work at both El Fierro and La Poncha and our JV partner South32 is financing Don Julio. On the other hand, Los Pumas, 21 km south of Don Julio, is a grassroots discovery," said Ruben Padilla, president and CEO, Sable Resources. ■



Junior Exploration

Hunting for Ontario's next precious metals mines

The Covid-19 pandemic exacerbated challenges historically faced by the junior sector. Many projects experienced delays and limited access to services, parts and equipment. The need for speedier permitting to build new mines remains a challenge, but demand for new projects is on the rise and the relevance of the sector has never been stronger. "We are witnessing high levels of exploration activities in Red Lake, Timmins, Wawa and other greenstone areas, led by juniors, seniors and mid-tiers," said Michael White, president and CEO of IBK Capital.

When it comes to services, such as drilling or laboratory results, explorers have faced costly delays and a shortage of skilled labor. Assay delays caused junior mining companies to mount extreme balancing acts in order to sustain on-going news flow for investors. In some instances, companies sent assays to three different laboratories hoping for speedier turnarounds. Periods of twelve or more weeks were not unheard of. "The problem really begins to hit home on projects where there is no visible mineralization, which means geologists need the assays from previous holes to guide the next set of holes," said Adam Schatzker, managing director for mining research at Research Capital Corp.

Without timely results, drill programs can be rushed, at times reducing the quality of the work, and in turn negatively impacting companies' financials and market valuation. "Laboratories are overwhelmed and were unprepared for the large volume of work this year. We have been affected by that in North America, and it has impacted the timing of our resource update," said Gary O'Connor, CEO of Moneta Gold.

Another reason for delays was due to pandemic social distancing requirements, which limited staff.

It is paramount that the investment community, as well as junior management, take the necessary steps to ensure proper surveys, mapping and equipment to move projects forward through these challenging times. Investors' keen interest in drill results to better comprehend mineral content can place undue pressure on explorers who are trying to preserve stakeholder value and capital investment. Mutual patience is the only way forward - junior companies must take all precautions and measures to provide the most accurate in-

Photo courtesy of Conquest Resources Ltd.

"Goldshore Resources will conduct exploration activities to develop the project to a stage where a major will buy the project to build a mine."

Brett Richards,
CEO,
Goldshore Resources

formation possible, and investors need to understand the incredible pressures and delays currently witnessed by the sector if the wish to avoid dilution.

Access to capital and permitting are two historical challenges the junior sector has faced. However, companies like PearTree Securities experienced larger flow-through financings in the past year. The company's CEO, Lisa Davis, said: "Four transactions this year were all over C$50 million, with one – OSK – at C$70 million. I think we are likely to continue to see the trend accelerating value creation in the junior market."

Despite the added interest, Denis Frawley, partner at Ormston List Frawley LLP, spoke of the urgent need to streamline the process to take a project from exploration to production: "We have to find more efficient and timely processes that still protect the environment and address the needs of affected communities and stakeholders."

Gold Juniors To Feed Depleting Resources

As commodity prices rise and enthusiasm ripples across the sector, M&A activity is expected to increase. New discoveries need to be developed and producers will be looking to replace depleting reserves. "World-class mining companies now have to focus on incremental growth in and around existing mine camps," said IBK Capital's White.

White predicts a rise in M&A activity through the consolidation of each area as companies look to 'buy the district'.

With a gold and iron ore history dating back to 1897, the Sault Ste. Marie region in the municipality of Wawa, Ontario, became a steel empire. Today Wawa no longer relies on iron ore, but rather focuses on gold, diamonds and other minerals. Built around those initial gold mines, Red Pine Exploration has now obtained a 100% interest in the Wawa gold project, located in the Michipicoten greenstone belt. Red Pine spent C$14.2 million out of a C$20 million raise in March 2021 to consolidate its 100% interest in the operation. "We attained new shareholders along with the financing raise and the additional interest transaction was quite accretive for our shareholder base," said Quentin Yarie, president and CEO of Red Pine Exploration.

Red Pine Exploration intends to expand its current 700,000-ounce inferred and indicated resource, to what Yarie believes could become 2 million ounces of inferred and indicated resources. With a 15,000-meter drill program to be completed in 2021, and more to follow in 2022, the company is still looking to acquire and explore further in the area. Red Pine has purchased a 100% interest in additional mining claims in the McMurray Township. "I believe we are watching the development of a gold camp not dissimilar to the Timmins gold camp," said Yarie.

Located about 110 km to the northeast of Red Lake, First Mining's Springpole asset is one of the largest undeveloped gold projects in Canada. A PFS was completed Q1 2021 showing a production output of more than 300,000 ounces per year at the lowest quartile all-in sustaining costs. Optimizing the treatment plant for tailings and waste rock has been a focus, while producing first drafts for an EA to be submitted Q1 2023. Dan Wilton, First Mining's CEO, revealed they are open to partnerships, but have not yet decided if they will develop the asset themselves.

In December 2020, First Mining also consolidated the land package around the Cam-

eron project, a 1 million ounce resource located 80 km from Kenora city. "We have signed an exploration agreement with the AWZ 37 community and this has been a great partnership thus far," said Wilton.

Recently re-branded Moneta Gold, previously Moneta Porcupine Mines, added a new underground discovery with open pit resources at Westaway Q4 2021 and recently acquired the Garrison project. "This increased our mineral resources to 8.4 million ounces, of which 4.4 million ounces are indicated, 4 million are inferred, and 2.8 million ounces are underground, while 5.6 million are open pit," said Gary O'Connor, CEO of Moneta Gold.

Moneta's share price has performed incredibly well following a 2021 resource update and deal with O3 Mining, an Osisko Group company.

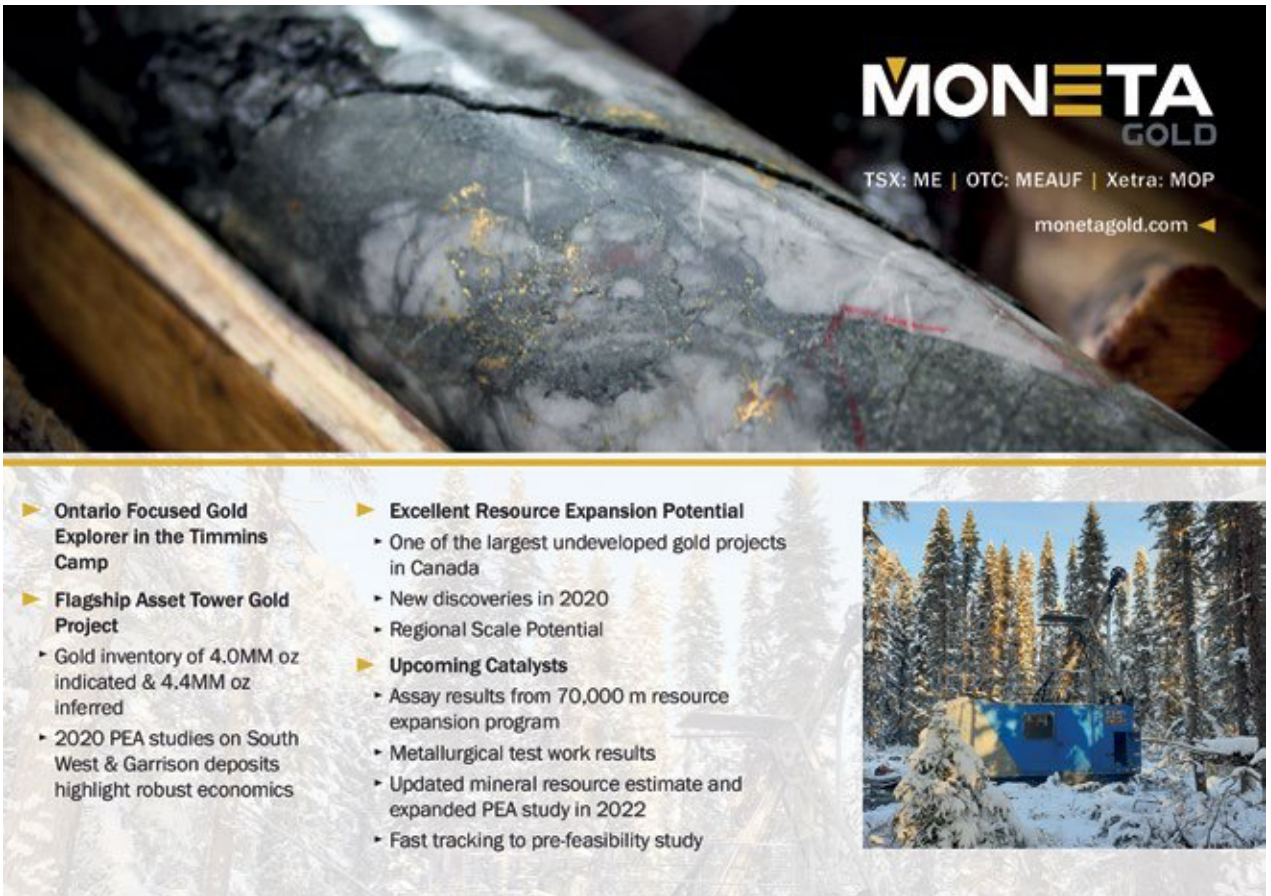
With gold prices on the rise and a positive outlook for the precious metal, Goldshore Resources decided to take over the Moss Lake gold project, which sits in Kashabowie within 1 km of Highway 11, and 130 km west of Thunder Bay. "We believe that gold is going to trade between US$1,800 and US$2,200 for the foreseeable future, and the project works in this gold trading range. There has been a PEA completed, which, when sensitized to today's numbers such as US$1,750 gold, relates to more than a US$1 billion NPV on the historical resource we acquired, " said Brett Richards, CEO and Director at Goldshore Resources.

In order to acquire the asset, Goldshore resources sourced C$25 million in Sudbury seed financing, with C$15 million as hard dollars and C$10 million as flow-through receipts into Sierra Madre. "We were doing a reverse takeover on Goldshore into Sierra Madre and changed the name to Goldshore Resources. Everything was submitted to the TXS for approval, and we were admitted for trading on June 4, 2021," added Richards.

Goldshore Resources aims to ramp up to four rigs by Q4 2021, and hold about C$11 million in the bank to push its operations forward for the next nine months. It was admitted into the TSXV and is currently on the OTC pink and also hopes to be approved for the OTCQB and the Frankfurt Stock Exchange.

"Moneta Gold has the largest land position in the eastern portion of the Timmins camp and has already identified 4.0M ounces of gold indicated and 4.4M ounces of gold inferred."

Gary O'Connor,
CEO & Chief Geologist,
Moneta Gold



"As copper grades get lower in Chile and companies face water scarcity issues coupled with social and economic challenges, copper supply will not be able to keep up with the increased demand due to electrification."

Tom Obradovic, President & CEO, Conquest Resources

"The Feasibility Study results for the Marathon project demonstrated a 30% IRR, a C$1.07 billion NPV and a 2.3-year payback at a US$1,725 palladium and a US$3.20/lb copper price."

Kerry Knoll, Executive Chairman, Generation Mining

Copper and Nickel on the Rise

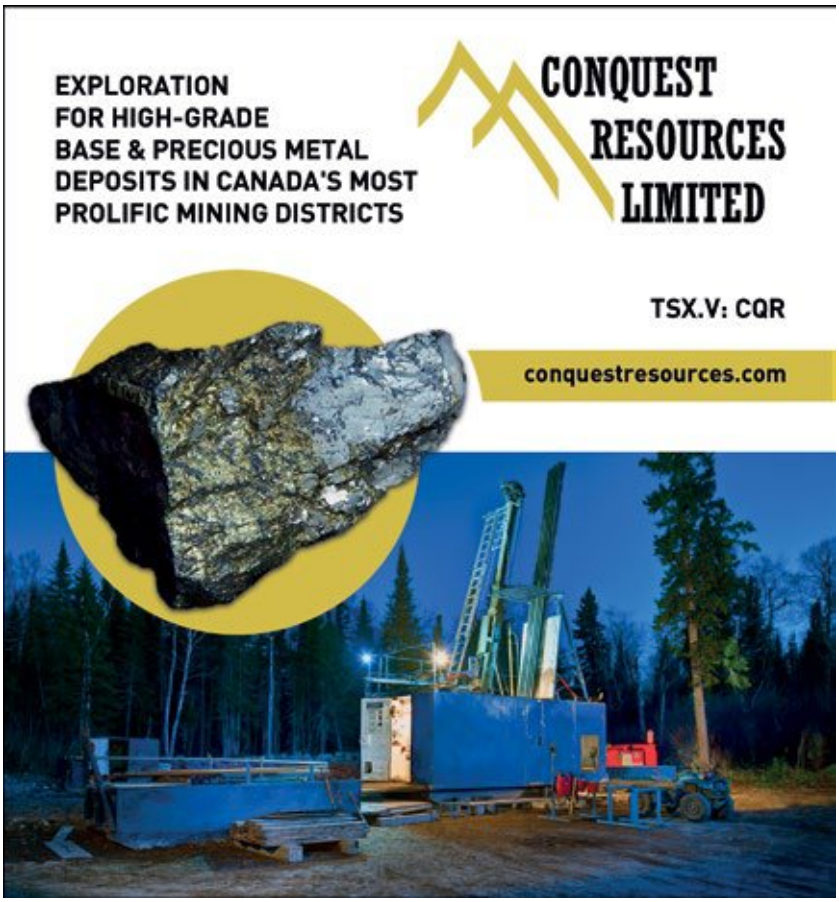
With the transition to green energy and electrification, copper and nickel are in the spotlight. Conquest Resources' key exploration target is high-grade massive sulphide copper. Tom Obradovich, president and CEO of the company, came across the Copperfields Mine, which resembled a Sudbury-style deposit, and has focused on the unusual mineralization found in the Temagami magnetic anomaly ever since. "I have been accumulating land in the area for approximately 20 years under my private company and the last piece I needed was owned by Conquest Resources, so it was agreed with John Kearney, the director of Conquest, to merge both companies," said Obradovich.

The company now controls over 350 sq. km in the area. There is evidence to sustain that the Temagami magnetic anomaly could indeed be related to Sudbury's Igneous complex, where the world's second largest nickel camp was formed. Sudbury aged rocks were found following a 2.2 km drill hole, at 19,189 meters deep into the anomaly. "Inventus, a company we are associated with, recently made some significant discoveries in the Rathburn area and found nickel, cobalt and gold deposits in and around the area east of us and west of Sudbury," added Obradovich.

With Kirkland Lake Gold investing US$1.3 million for exploration, Conquest Resources has raised over US$5 million through an IPO to continue operations.

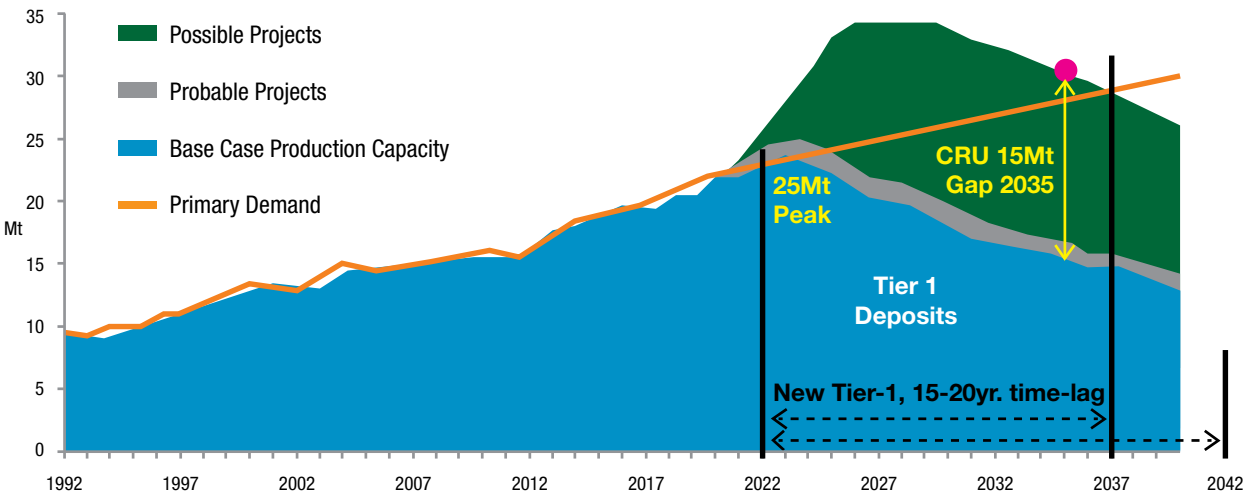
Magna Mining raised C$7 million concurrent with their reverse takeover (RTO) public transaction to develop their Shakespeare deposit and surrounding land package. The past producing Ni-Cu-PGM project is in one of the most recognized nickel mining districts in the world, about 70 km south west of Sudbury. Around C$2 million have been allocated for a 9,000-meter drill program predominantly around the project's gap zone. In September 2021, Magna announced success at the PGM nickel-copper deposit, which is 5 km from the Shakespeare deposit. Magna has launched a C$3 million charity flow-through with PearTree Securities to fully fund its 2022 exploration targets. "One of the options we are looking at is the restart of the toll milling operation used at decade ago when the project went into production, which would be a very low-cost, fairly near-term potential cash flow generator. We hope to have some resolution on that sometime in Q1 of 2022," said Jason Jessup, Magna Mining's CEO.

Before the rise of base metals in 2021, palladium had been the star of 2019 and 2020, experiencing an astounding price move from US$966/oz in February 2018 to US$2,800/oz in February 2020. While the price has hovered around a very healthy

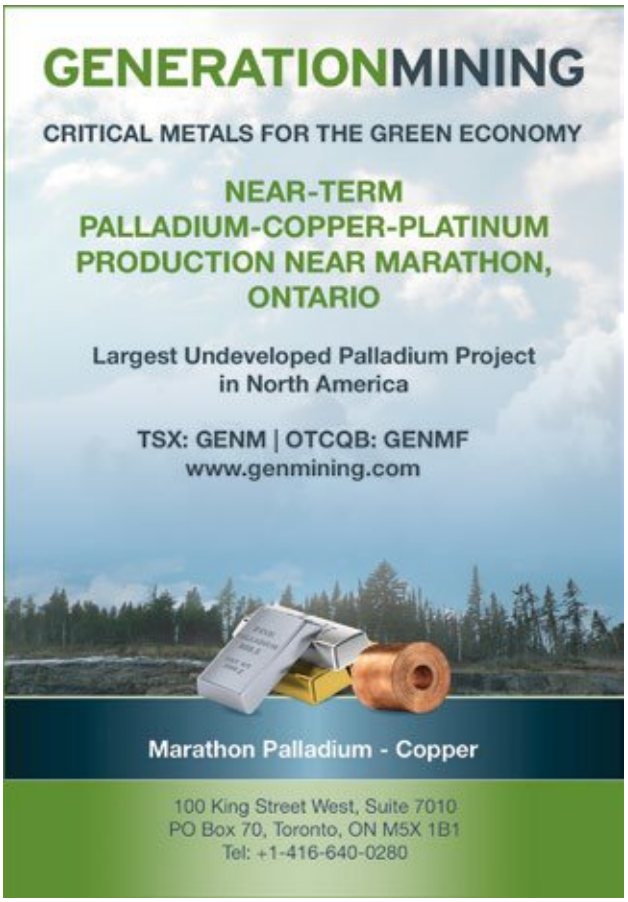


Future Copper Supply Projections

Global copper production and primary demand



Source: Wood Mackenzie



US$2,000/oz mark for most of 2021, palladium's shine has been dimmed to some extent when viewed in comparison to copper.

Palladium is used as a catalytic reactor within the motoring industry sector and the metal is now being used in fuel cells to power vehicles. Both palladium and platinum are coveted as a part of gasoline engine auto catalysts that lower carbon emissions. With the former metal being in a current supply deficit, and rising demand to meet carbon emission standards in Europe, China and India, palladium is bound to rise again. Certainly the rise of electric vehicles will impact catalytic convertor demand, but palladium is projected to play a role in the shift away from hydrocarbons. Renewable-sourced hydrogen used to produce electricity via fuel cells is now in the spotlight as a possible way forward and will require (palladium group metal) PGM catalysts.

Generation Mining completed a FS in Q1 2021 for its Marathon palladium-copper project in northwestern Ontario, with attractive results for both metals. "Results demonstrated a 30% Internal Rate of Return (IRR), a C$1.07 billion NPV and a 2.3-year payback at a US$1,725 palladium and US$3.20 copper price," said Kerry Knoll, executive chairman of Generation Mining.

The Marathon mine requires an initial capex of C$665 million to be built, and with palladium and copper trading well above the metrics used in the company's feasibility study, there should be appetite for financing the project. The Marathon airport is located within the project's property and the Trans-Canada Highway goes traverses it. A C$1 billion investment by the Ontario government to build a northern power line in the province also means that the power line goes right over the Marathon project. "This allows us to make use of the grid which only has a 4% carbon footprint," added Knoll. ■

Transition Metals: ESG and the Green Energy Revolution

The move to combat climate change gathers pace

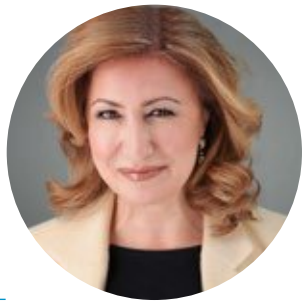
The transition towards electrification and the 'green-revolution' is one born out of necessity. The impact of climate change has rippled across the world, with U.N. Secretary-General António Guterres speaking of a "code red for humanity" following a report generated by scientists at the Intergovernmental Panel on Climate Change (IPCC). Only the most optimistic out of five proposed future scenarios presents a world that meets the Paris Agreement's goal of keeping global warming capped at around 1.5 degrees Celsius.

Each of the five scenarios in the report detail varying degrees of irreversible human impact on Earth. An urgent lowering of carbon emissions is required and electrification and the green energy revolution have been presented as the means to achieve this. Energy research and consultancy firm Wood Mackenzie forecasts that to limit global warming to 2 degrees Celsius by 2030, the following mining development will be necessary: 20 new lithium mines the size of Greenbushes in Australia (the largest in the world); 10 new cobalt mines the size of Mutanda in DRC; 22 new nickel operations the size of Ambatovy in Madagascar.

For development on this scale to become even remotely feasible, greater acceptance of mining is paramount. In turn, mining companies are placing an emphasis on net zero emissions targets.

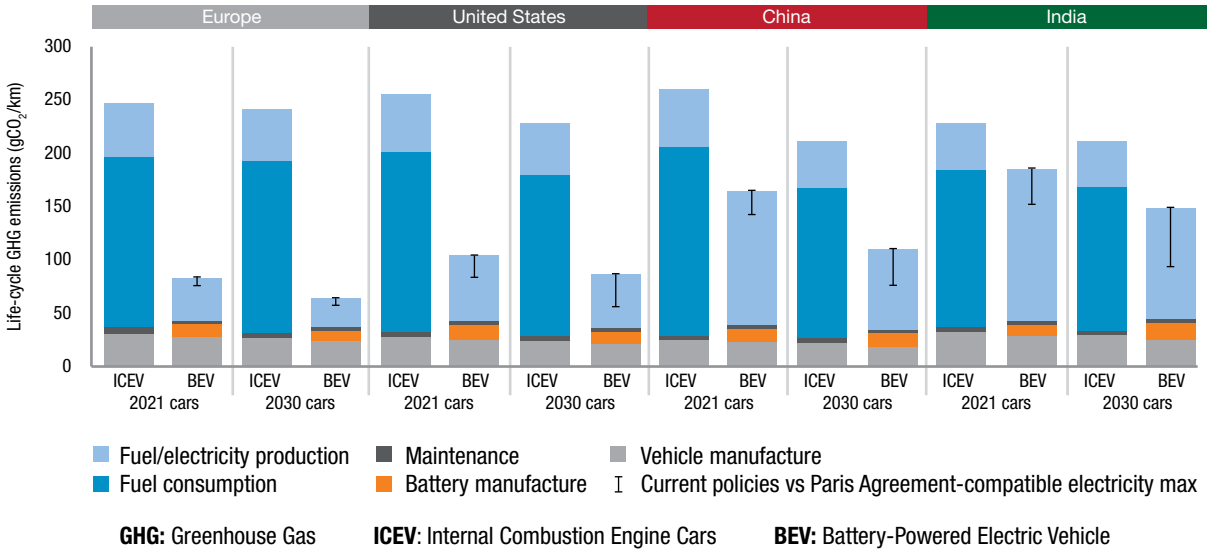
"Reporting should not be an expensive output. It should be quantitative, qualitative, substantiated, and easily dissected. The data sets should communicate the company's pitfalls and guide it towards improvements."

Laurie M. Clark,
CEO,
ONYEN



"We have made the commitment to reduce our carbon footprint by 30% by 2030 and to have net zero emissions by 2050. […] Buying carbon credits to achieve this goal is our least preferred option. Instead, we expect to reduce our footprint by accessing renewable power, since 70% of our emissions are through energy consumption," said Jake Klein, executive chairman of Evolution Mining.

Life-cycle GHG Emissions of ICEVs vs BEVs



Source: International Council on Clean Transporation White Papers (ICCT)

Many remain skeptical of the ambitious zero emissions target. "Becoming a fully electric-powered society will likely not occur by 2050," said Egizio Bianchini, head of metals and mining investment banking at Stifel GMP. "The world cannot overcome its addiction to hydrocarbons unless dramatic action is taken," he added.

A reliance on renewable energy does not mean that our carbon footprint can yet be reduced to zero. "There is more energy in a barrel of oil than in ten solar panel fields, and to manufacture solar panels, more carbon is created in the atmosphere than for the making of one barrel of oil. Producing the metals required for EVs will also lead to increased greenhouse gases. It is unrealistic and naive to assume that we will somehow eradicate fossil fuels," stated Tom Obradovich, president and CEO of Conquest Resources. "What can be done, however, is to manage the exhaust of fossil fuels using better technologies to recover carbon from the exhaust fumes", he added.

Solar and wind power are often presented as key solutions to shifting the pendulum, given that fossil fuels still control most of the world's energy mix. However, neither of these renewable sources is yet feasible to power large-scale operations. Further challenges are revealed when reliance on uncontrollable natural phenomena, such as wind, forces renewable energy companies to have fossil fuel power plants as backups waiting to be utilized. With the technology, innovation and resources we have today, the blueprint for a net zero carbon world by 2050 is not yet clear. Nonetheless, a change is necessary and demand will only increase. "A key driver for the market is the global green energy revolution which promotes electric and battery-powered vehicles. There is a solid demand for copper, nickel, battery metals and we see a healthy pipeline of projects," said Paul Healy, president of the Americas at Redpath Mining.

Abraham Drost, CEO, Clean Air Metals

Though emissions are eliminated throughout use, vehicles must be charged, often times relying on fossil fuel-based power sources to do so. "When people talk about net zero and zero carbon emissions, I do not think anybody really knows what that means since a footprint of some sort will always exist. One can only really mitigate," said Trent Mell, president and CEO of Electra Battery Materials (previously First Cobalt).

To properly measure the impact that electrification and green energy has on the world, an umbrella vision approach must be taken. "The starting point here is reducing carbon emissions, but we need to mature our approach being cognizant of the inputs into the solutions. The lifecycle of these products needs to be a part of the equation such as the concept of the circular economy. We cannot have an automotive company making electric vehicles, yet sourcing nickel, which has the highest GHG footprint to produce the metal. You cannot make a solution that has a dirty process. We will need to move along the maturity curve to truly reach a net benefit for the world," said Ryan McEachern, managing director of MSTA Canada.

Abraham Drost, CEO and director of Clean Air Metals spoke of Norway paving the way in the long-term green energy realm while still relying heavily on hydrocarbons. "We cannot all go back to living on the farm and growing vegetables…. Although people are willing to sacrifice to some extent for the planet, lifestyle demands will not change as they become more green energy intensive," he added.

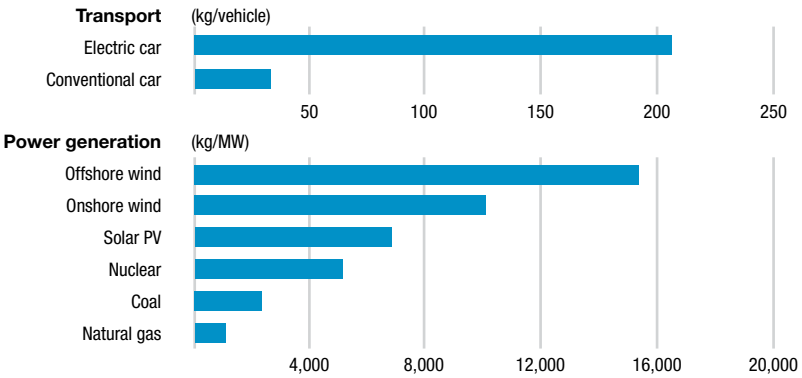
In Ontario, mining companies can often connect to the provincial power grid accessing low cost electric power through hydro. "In Ontario, our electrical grid is essentially carbon-free, giving us a considerable advantage on GHG emissions. The whole supply chain must be green to achieve green inputs in operations and our association has been focused on delivering on Target Zero+ goals: that is, mining with zero harm to workers, zero carbon, and zero waste, while improving productivity," said Chris Hodgson, president of the Ontario Mining Association (OMA).

Roth Canada's Braden Fletcher believes the International Energy Agency's (IEA) 19% growth in energy demand by 2040 forecast cannot be solely based on renewables. "Nuclear is going to be a necessity. Global stockpiles are in decline, and that should be positive for uranium."

Maestro Digital Mine has supported clients reduce energy and GHG through energy savings produced by directing ventilation air to required areas and reducing it in areas without workers or operating equipment. "This can reduce ventilation demand by 20-50%," said Michael Gribbons, president, CEO and co-founder.

The Shift to a More Mineral-intensive Energy System

Minerals used in selected energy technologies



Source: International Energy Agency (IEA)

Leading the Charge

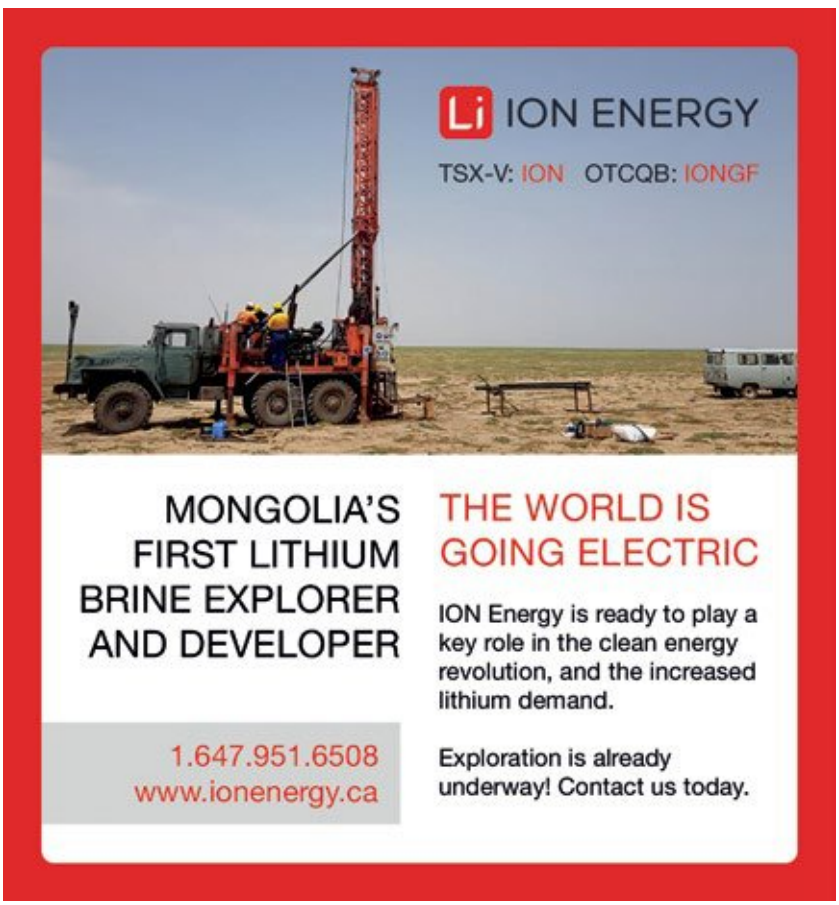
The International Council on Clean Transportation (ICCT) has made a research study on BEV emissions over time in Europe, the US, China and India, and concluded that "the life-cycle emissions over the lifetime of BEVs registered today are lower than comparable gasoline cars". Medium-sized vehicles expected to be registered in 2030, paired with the increase of renewable sources, have an even wider emmissions gap. When used with 100% renewable energy sources, an 81% GHG emission reduction is observed comparatively to gasoline.

"Our macro view is that we will see continued and significant lithium demand from the Chinese market in the near term, which will increase substantially in the mid to long term as the EV movement gathers pace."

Ali Haji,
CEO,
ION Energy

The study took various types of power into account — diesel, gasoline, biofuels, hydrogen, natural gas and electricity— and concluded that out of internal combustion engine vehicles (ICEVs), encompassing hybrid electric vehicles (HEVs), plug-in hybrid electric vehicles (PHEVs), battery electric vehicles (BEVs), and fuel cell electric vehicles (FCEVs), only BEVs and FCEVs have the capacity for deep decarbonization when it comes to passenger vehicles. A 15 to 18 year life cycle was considered, however, the report did not take into account emissions stemming from mining in order to produce the materials to manufacture the vehicles.

The IEA released a 2021 report stating electric cars will require six times the amount of mineral input compared to a fuel-based car, and an off-shore wind power plant would require thirteen times the mineral resources than a gas-fired power plant of the same size. Though coal production currently accounts for more than ten times the revenue of energy transition minerals, these numbers are projected to reverse by 2040.



Demand for lithium by this time is meant to increase by forty-two times relative to 2020, graphite by twenty-five, cobalt by twenty-one, nickel by nineteen and rare earths by seven times. "The metal mining industry is increasing its capacity just over 1% every year, but we will require seven times greater growth in years to come," said Doug Morrison, president and CEO at the Centre of Excellence in Mining Innovation (CEMI).

China currently holds a clear stronghold on transition mineral processing. "Roughly half of the world's lithium is produced in Australia with the remainder produced in China and South America. Much of the world's feedstock is then shipped to China to undergo conversion into chemicals. It is then transported to other markets, such as Japan and South Korea, to produce the active materials that go into batteries made for a variety of end uses," said Trevor Walker, CEO of Frontier Lithium.

Toronto-based ION Energy has been exploring at its flagship Baavhai Uul lithium project in Mongolia, located close to the Chinese border. Ali Haji, ION's CEO, spoke of the dynamics of global lithium demand today, with China accounting for 75% of the world's giga-factories, which means they are producing the vast majority of batteries that are used worldwide. Meanwhile, Chinese automotive manufacturers such as BYD are selling more EVs per capita than anywhere else in the world. "Our macro view is that we will see continued and significant lithium demand from the Chinese market in the near term, which will increase substantially in the mid to long term as the EV movement gathers pace."

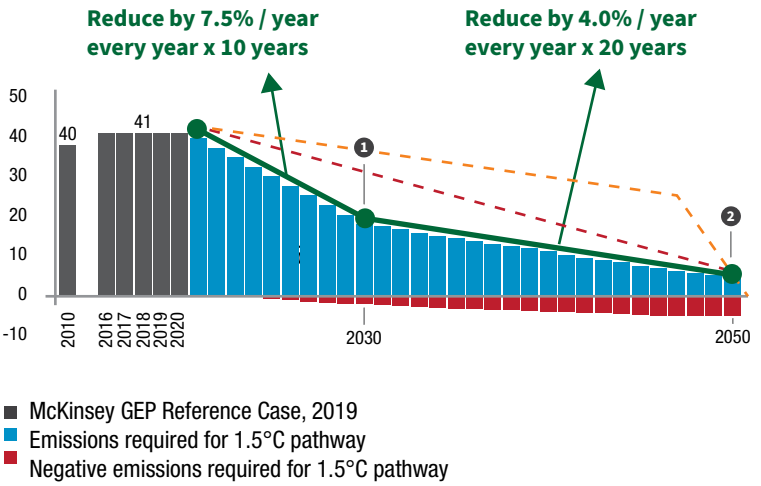
Haji expanded on the benefits of the strategic location of the Baavhai Uul project: "ION Energy is looking to bring on a resource in Asia which will allow Asian manufacturers to obtain the necessary lithium for battery manufacturing within their own continent, as opposed to importing from Australia or Latam."

Electra Battery Materials' target is to become the only one-stop-shop in North

A Paced Transition to a 1.5°C Pathway has four requirements

1. 50-55% net emissions reduction by 2030 vs 2010 levels
2. Net-zero emissions by 2050
3. 570 $GtCO_2$ cumulative carbon budget
4. Steep mitigation of non-CO_2 greenhouse gases (not addressed in this exhibit)

Cumulative global CO_2 emissions, current and historial, metric gigatons of CO_2 ($GtCO_2$) per year



Source: McKinsey, CEMI

"When people talk about net zero and zero carbon emissions, I do not think anybody really knows what that means since a footprint of some sort will always exist. One can only really mitigate."

Trent Mell, President & CEO, Electra Battery Materials

"Of importance to us is the ability to produce a high quality, consistent lithium chemical sustainably, which means we can do so economically and in a manner that minimizes environmental impacts."

Trevor Walker, President & CEO, Frontier Lithium

America to bridge the gap in the value chain. The company currently produces 25,000 tonnes of battery-grade cobalt sulphate per year. "If we do this, we will start to attract the precursor cathode manufacturers in Finland and China. In 2022, we will be commissioning and making our way into production," revealed Trent Mell.

Part of the journey towards an impactful ESG process will be to properly delineate the parameters required for reporting, that take full life-cycles into account. "There is no harmonization and clearly ample room for subjectivity in judgment, particularly where the standards are still trying to come together," said Shaun Usmar, CEO of Triple Flag Precious Metals Corp.

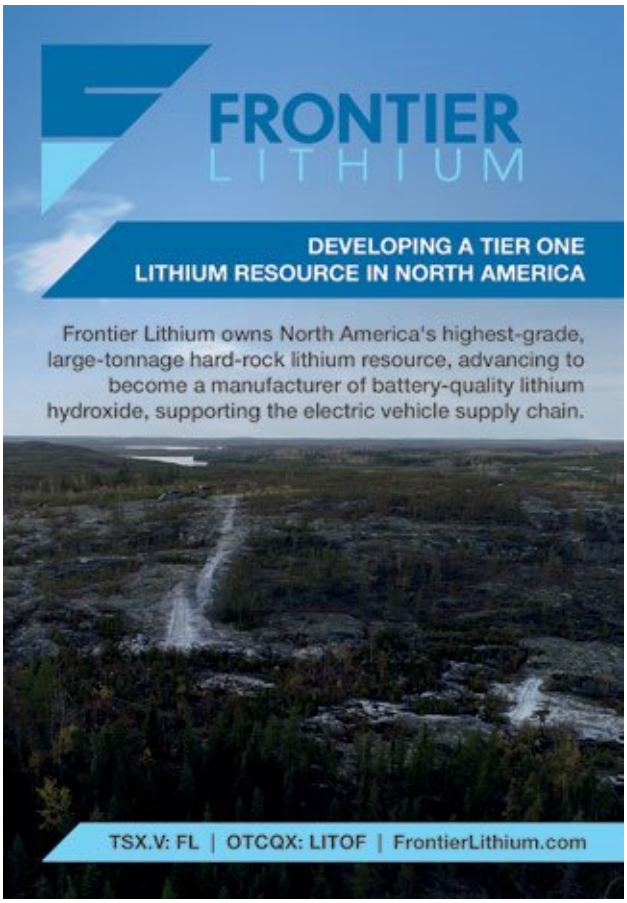
"All mining companies, regardless of their size, release big statements of ESG targets without providing the data and evidence to support it, also known as 'green washing'. These statements are not quantified," said Laurie M. Clark, founder, director and principal of Onyen. "Reporting should not be an expensive output. It should be quantitative, qualitative, substantiated, and easily dissected. The data sets should communicate the company's pitfalls and guide it towards improvements," she added.

Companies such as ONYEN, Digbee and MINVIRO are focused on improving the industry's ESG reporting standards to showcase the positive impact the sector has in communities, development and connectivity. "The willingness to submit to an external, impartial assessment and being transparent by publicly disclosing the underlying scores and data, warts and all, demonstrates a mature, secure leadership team that has a genuine commitment to ESG," said Jamie Strauss, CEO of Digbee.

The irony of a world that often seems to stand against mining is that most of it is completely reliant on the industry. "Companies like Patagonia and Terrex refuse to sell their products to extraction companies, even though the equipment they use to make their clothes are certainly not made of bamboo and plastic, and rely on metals at every stage of manufacturing. Their communication channels will also rely on mined products. This anti-mining corporate attitude is ill-placed and false. Mining takes up less space than Walmart parking lots around the world," said Tom Obradovich, president and CEO of Conquest Resources.

Though uncertainty still lies ahead in terms of true impact, most agree that taking collective steps towards the chosen direction of electrification and green energy is a necessary start. "Being aligned with global standards is much more relevant than worrying whether one should adopt one or another standard," added Digbee's Jamie Strauss. "If we achieve our goals during the next few years, this industry will not be at the bottom of the S&P 500, and that has a direct impact on valuation," he added.

Minviro helps companies mitigate environmental impact by applying the life cycle assessment (LCA) approach. Minviro supported First Cobalt in this way, comparing peers with cobalt refineries in China to quantify impact. It is currently helping Australian Pilbara lower its CO2 density per kg. Minviro also aims to release its MineBIT tool in 2022: "This will allow clients to design their supply chain based on their LCA. This is very important because we



are seeing a lot of regulations trying to make sure that batteries and EVs have minimal impacts, and sourcing your materials from one supplier or another can really make a difference," said Robert Pell, founder and CEO, Minviro.

New Age Metals' flagship River Valley Palladium property, sitting at about 100 km northeast of the Sudbury metallurgical complex, all road accessible, is now a multi-million ounce primary palladium resource. With a PEA completed in 2019, it aims to have a FS completed within five years to move into production. "Tesla has already bought into a mine in Nevada, something you normally do not see — where automakers come down and actually get into the development and mining of lithium," said Harry Barr, New Age Metals' chairman and CEO, who views Canada as a key destination for lithium projects, given the proximity to manufacturers.

How efficiently companies report their ESG is still often dictated by internal business protocols and criteria. As the sector gains insights and support to understand international standards, such as the GHG protocol, and translates them into actionable steps, ESG reporting standards will continuously improve. "To benchmark best practices and fast track the whole process of ESG reporting and disclosure, we launched ESG 101, an information portal for issuers, and entered into an agreement with IHS Markit to create an ESG Reporting Repository, a portal focused on providing centralized and streamlined data to investors," said Dean McPherson, head of business development global mining at Toronto Stock Exchange and TSX Venture Exchange.

"The predominant theme we are seeing is getting value from data. In the same way ESG has made a key appearance, there is a real trend towards analytics."

Chris Novak, CEO, Centric Mining Systems

Moving forward, attention will need to be paid to types of emissions and what scope they fall under. Much focus tends to be placed on Scope 1 and 2, with Scope 3 easily forgotten, but often making up the largest share of carbon footprint. "People still leave the tap on when they are brushing their teeth. Reduce the length of your shower and install water efficient shower heads. Turn lights off when you leave a room. Reduce the temperature on the thermostat a couple of degrees and put a sweater on instead – do you really need to be wearing a t-shirt in your house in Northern Ontario when it's -30°C outside?," said Mary-Jane Piggott, North America regional manager of mining environmental group, Klohn Crippen Berger. ■

Technological Advancements & Innovation

'Innovation for mining' is a term used by the Centre of Excellence in Mining Innovation (CEMI) to reference the urgent need for inter-sector collaboration to find solutions to meet the mining sector's global demands and lower production costs to make projects viable. "All the plans in other sectors of the economy come to nothing if the mining industry cannot provide the volume of raw materials they require to innovate," stated Doug Morrison, CEMI's president and CEO.

Adopting renewable energy and electric vehicles needs to be made possible, not only for majors, but for the whole value chain. In order for this to happen, financials have to evolve. "More expensive copper and nickel makes electric cars more expensive, which is not going to drive the transition to an electric economy," Morrison added.

The Canadian government has invested C$40 million into CEMI to fund the Mining Innovation Commercialization Accelerator (MICA). The multi-disciplinary network will be developing clean tech, robotics and automation, which will help extend mine life, shorten the time needed to bring projects into production, and increase safety and efficiency. NORCAT launched an open innovation platform to share challenges faced by the sector to a larger global technology network. "Our initial program with Vale was successful so it was expanded to include other mining companies[…] We work so they can develop and test their proof of concept in our underground operating mine, to expedite the process and facilitate a potential transaction," said Don Duval, CEO of NORCAT.

The sector is rapidly understanding the value of having an opportunity to trial-run efforts in an operational mine to then reach clients with fully tested opportunities. As relatively new players on the turf, SK Godelius recently opened its office at NORCAT's Underground Centre. "NORCAT has played an essential role in supporting us to expand our business to Northern Ontario. We are proud to say that we have been awarded a project related to automation and robotics by Vale in the Sudbury area, and NORCAT is coordinating the relationship between us and Vale," said Fernando Bracco, CEO and founder of SK Godelius.

"One of our major value propositions entails what we call 'disruption by elimination' by developing mine hardened multi-variable measurement and devices that eliminate complex PLCs, cabinets, engineering services and wiring."

Michael Gribbons, President, CEO & Co-Founder, Maestro Digital Mine

Using the Underground Centre to de-risk projects and new technologies is a huge selling point for NORCAT. "Battery electric vehicle (BEV) equipment providers are using the NORCAT Underground Centre to develop, test, and / or demonstrate how their emerging technologies are poised to transform the global mining industry," said Duval.

The speed at which innovation and new technologies are emerging also poses a challenge for the mining industry, given that by the time a new product or service becomes de-risked — to a certain extent, technology has already evolved and new possibilities reach the market. "Do you wait, or do you draw a line in the sand and learn, knowing that you could update at a later stage?" reflected Ryan McEachern, managing director of MSTA Canada. "Back in 2015, we identified an adoption issue," said McEachern: "First to be second still rules the day."

De-risking solutions play an important part in the design of an environmentally friendly mine. "Technological advancements in the ability to simulate various mining methods and processing options from a carbon footprint and water consumption per-

Paul Healy, President – Americas, Redpath Mining

Peter Corcoran, Managing Director & VP Sales Area Canada, Sandvik

Doug Morrison, President & CEO, Centre for Excellence in Mining Innovation (CEMI)

spective are allowing the industry to properly account for the cost of water and carbon in project economics. This allows for better decisions to be taken that are better for the environment and for the bottom line," explained Pierre Julien, president of the Canadian Institute of Mining, Metallurgy and Petroleum (CIM).

Recently acquired by Datamine, Centric Mining Systems uses data, highly integrated workflows and analytics to support clients' operations. It aims to empower decision-makers so that they have all the necessary information to make choices that lead them into the mines of the future. Chris Novak, Centric's CEO, gave the example of Perseus Mining: "In a short period of time we proved to Perseus, that you could have a better run business using data-driven decision-making processes. With that success under our belt, we moved to the next two sites, increased the amount of information being collected, and integrated the head office in Perth into that information management framework".

The Covid-19 pandemic made the need for digital networks amply clear. "A recent focus of ours has been working on products that provide real-time information so that decision-makers can lead operations with accuracy and make well-informed rapid choices. This has only been accelerated by Covid-19, as operations moved remotely which amplified this requirement," said Paul Healy, president – Americas at Redpath Mining.

"One of the largest stumbling blocks to Industry 4.0 adoption has been connectivity underground. Many technologies still require some kind of prior infrastructure in place for their products to work;" said Raffi Jabrayan, VP business development and commercial sales, Exyn Technologies.

Maestro Digital Mine, which is celebrating ten years operating in underground mining environments, saw a 56% increase of Industrial Internet of Things (IIoT) devices and software products in 2020, with further growth in 2021. Maestro believes in "disruption by elimination" and "developing mine hardened multi-variable measurement and devices that eliminate complex PLCs, cabinets, engineering services and wiring," according to Michael Gribbons, Maestro Digital Mine's president, CEO and co-founder. Automation and robotics appear to be necessary frontiers to meet the demands of the future, however some remain skeptical of these being all-encompassing solutions. "AMC's experience and data collected has shown that many operations that 'go digital' and / or 'automated' do not see the improvements in production that are often cited as the justification for the capital injection required to introduce such systems," observed Francis McCann, general manager – Toronto, AMC Consultants.

McCann reminds mining companies that if their process is inefficient with traditional technology, "digitalization and automation are not a magic bullet to resolve productivity issues – it is important to identify and resolve the root issues prior to defining and undertaking the digital transformation journey."

For those who are ready to take steps into Industry 4.0, many are looking to innovate with high or full levels of automation. "Level 4 Autonomy is one of our key differentiators," said Nader Elm, CEO and co-founder of Exyn Technologies, regarding his company's Exyn Aero drone technologies. "What that means is that truly all the intelligence is on-board the vehicle itself. In addition to enabling breakthrough capabilities it reduces the load of actually operating the robots," he added.

Peter Corcoran, vice president at Sandvik Mining and Rock Solutions, Canada, shared his thoughts on how mines can transition towards automation. "Automation might not be the full mine to begin with; people can start with a smaller automation project, like a single loader, to learn, and then take incremental steps towards greater automation. The whole sector will become more attractive because mining will have a clean and technically advanced focus," he said.

Whether it be via drone or otherwise, companies are consistently innovating to process information as quickly as possible. Safesight Exploration's SafeScanner technology can be mounted directly under drones to collect and transform data. "Actionable information emerges minutes after the pilot ends the flight, rather than taking it to surface and processing it for hours or days," said Mike Campigotto, president of SafeSight Exploration.

Northern Survey Supply (NSS) has partnered with Exyn Technologies regarding their GPS-denied, autonomous, aerial, robot systems. "A personal milestone will be to continue educating people on our technology, promote its adoption, and have more people embedded in technology overall," said Bruno Lalonde, president of NSS.

One of the key processes for the sector to learn from big data collected, is turning it into actionable material quickly. "The predominant theme we are seeing is getting value from data. In the same way ESG has made a key appearance, there is a real trend towards analytics," revealed Centric Mining System's Chris Novak.

Gus Minor, chief innovation officer of Sofvie, chose to transition from a tech background into the mining sector to address safety protocols using data collected from the front-lines. With a personal history of family loss due to mining accidents, Minor believes that "complacency creates a lot of the hazards when we become very used to the environments that we work in. The mining workplace can be a very safe one, but when we start to let

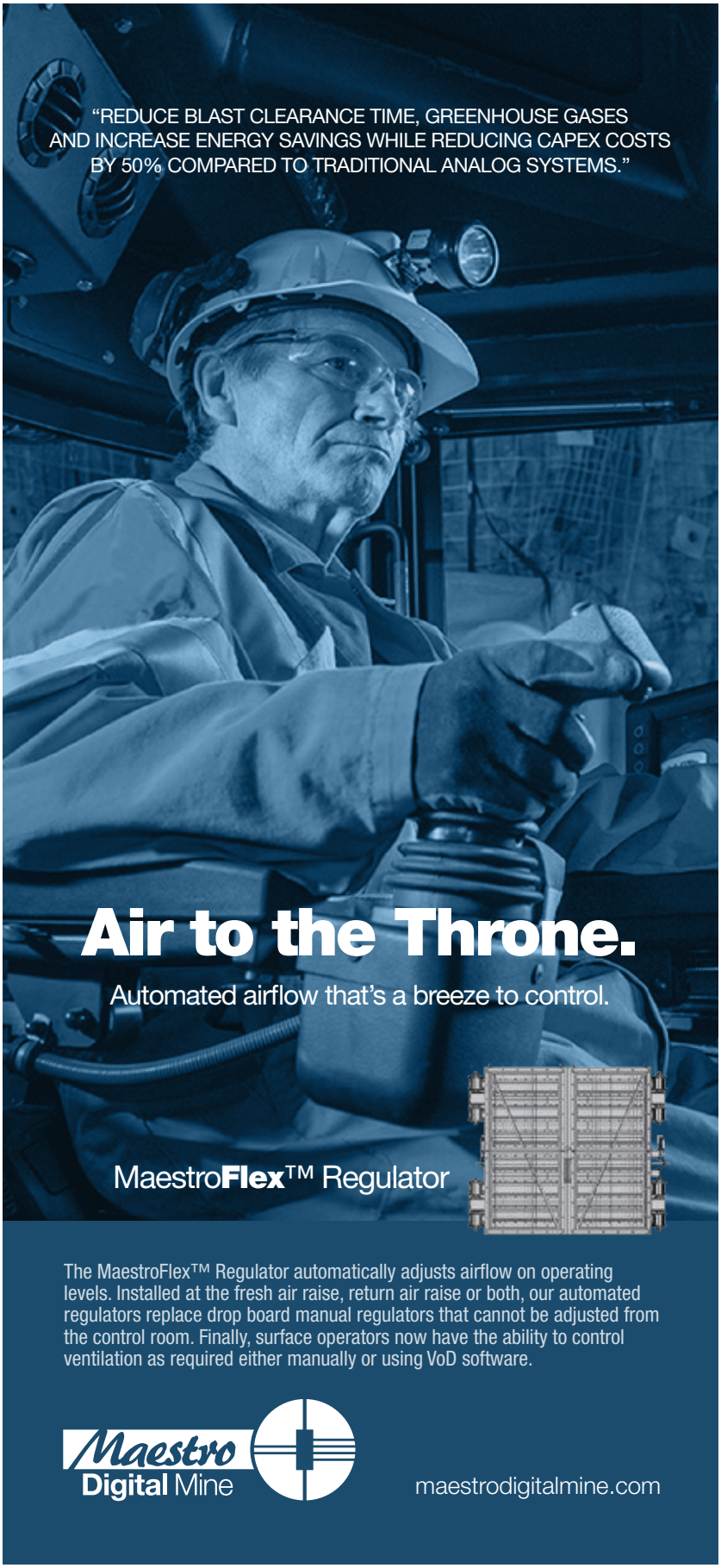
things slide when they should be picked up or put away, next thing you know, there is a trip and a fall."

Sofvie's software creates baselines and analysis trends to share information, from workers to the CEO, and foster positive reinforcement for achieving daily goals. "Shifting away from blame culture is a game changer in the industry. We focus on making the workers successful," added Minor.

Ionic Technology Group holds seven companies encompassing automation, mechatronics, engineering, technology and refinery ventilation. Ionic is developing touchless interfaces through Synaptic Technologies, which are in demand especially due to the pandemic. "The system will be able to scan ID or health cards, and screening questions can be answered by swiping with gestures, without the need for the individual to ever touch a pen or screen. Thermal cameras can also be integrated with the technology to check temperatures, eliminating the need for several devices," said Christina Visser, CEO, Ionic Technology Group.

Beyond automation, SK Godelius has seen unstructured robotics, generally pertaining to processes that cannot be programmed in advance, gain enormous traction. SK Godelius is currently bridging human and artificial intelligence delivering solutions that are both autonomous and teleoperated. "Our company's specialty is to create, develop, manufacture, integrate, implant, and operate engineering solutions related to automation, teleoperation, robotization and the connectivity of large machines, vehicles, robots and processes in open-pit and underground mining," explained founder and CEO, Fernando Bracco.

A key challenge faced when operating in the robotics field is that of interoperability, but SK Godelius view this as a necessary step for the industry. Through its NORCAT partnership, it is designing an automated and robotic solution for the loading of Vale's sulphuric acid trains. The key objective is to diminish operational risks when loading trains, removing workers' exposure to concentrated acids. "The solution involves, amongst other things, the automated opening of hatches and valves of the wagons of transportation trains through artificial vision, robotics and teleoperation technologies," added Bracco. ■



Services

The nuts, bolts & technology driving mining operations

The global supply chain was deeply affected by the Covid-19 pandemic. Images of excavators and dredgers trying to liberate the Ever Given container ship in the Suez Canal, March 2021, sum up the kind of challenges that service providers have had to deal with in the past 19 months. As mining projects were delayed and uncertainty became the currency of the day, demand for equipment also decreased, while maintenance was top of mind. "To be successful in business, you need to be flexible and able to adapt, and I believe that some challenges that arose from the pandemic have made companies adapt for the better," reflected Marla Tremblay, executive director of MineConnect.

Delays in sourcing parts and receiving deliveries and replacements held up projects.

"Complacency creates a lot of the hazards when we become very used to the environments that we work in."

Gus Minor,
Chief Innovation Officer,
Sofvie

"Today, it is still a challenge getting parts in a reasonable time frame as supply is delayed. Where possible, we will substitute parts, but that is not always practical. It is inefficient to start assembly without having all the parts, but to meet deadlines, we sometimes have no choice," said Christina Visser, CEO of Ionic Technology Group.

Photo courtesy of NORCAT

Adaptation and quick innovation have been key for the service sector to meet clients' needs, with several companies now experiencing more demand than ever before. Epiroc Canada received record orders in 2021, with a heightened interest in components and mid-life services. With a recently opened Reman Centre in Sudbury, where there is a parts exchange program, Epiroc also developed a recycling strategy to recycle everything possible from each core. "We are at less than 2% waste now and are still working on reducing that," said Andre Bertrand, business line manager – parts and services, Epiroc Canada.

The Reman Program guarantees the availability of specific components for clients' projects at all times— a major selling point, given current delays.

Epiroc is increasingly involved with the ramping up of Batteries as a Service (BaaS) "Taking ownership of the batteries, having the full warranty and lifecycle ownership, BaaS allows us to now sell power instead of product," added Bertrand.

Founded in 2019, x-Glo North America supplies lighting solutions to underground mining and tunneling operations. Partnered with FiComm Technologies, it has developed a customizable Visual Alert Control System (VACS) so clients can integrate x-Glo LED strip lights for traffic control and to change colour in an emergency. Competing against standard lighting supplies, x-Glow has been able to secure a 6.4 km tunneling project in April 2020 and another 4.9 km project in Toronto. "Covid-19 impacted the workforce's sense of smell, so

visual alerts are crucial when operating an underground mine and communicating emergencies," said Don Bertrand, general sales manager at x-Glo North America.

When it comes to mineral resource estimations, companies like SRK and AMC have continuously focused on de-risking projects. The industry has relied on 70-year old tools for modeling, but with decreasing profit margins, there has been a rise in stochastic resource models. This is predominantly by majors. "Technical teams can estimate the tonnage and grade using drill hole data, integrated with the geology and statistics," said Oy Leuangthong, corporate consultant (geostatistics) at SRK.

SRK recently created a machine-learning approach that uses qualitative and quantitative date for mineral resource classification. "This should make data integration easier and faster to repeat, given there are often multiple updates of a mineral resource model, and also allow it to be an auditable process," Leuangthong added.

AMC described its Hill of Value services as follows: "These are developed to model anything that can be described, overlay all the results, and provide our clients with a comprehensive and complete evaluation. This allows our clients to make informed decisions to de-risk projects and create value for their stakeholders," said Francis McCann, general manager, Toronto, AMC Consultants.

This process leads into their Predictive GeoMetallurgy service, which generates a dynamic 3D block model. This allows clients to understand the ore body to improve their design and recovery while minimizing costs and volatility. AMC's Smart Data database completes the largest independently validated collection of hard-rock mine performance data sets in the world. This forms a basis of the company's expansive capacity to advise and help clients. ■

Don Duval, CEO, NORCAT

Marla Tremblay, Executive Director, MineConnect

Ryan McEachern, Managing Director, MSTA

Community Building and Reconciliation

"The industry needs to do a better job of showing what it does well. There is a communication and trust deficit between communities and the perception of what mining companies are doing," opined Ryan McEachern, managing director of MSTA Canada.

The social contract is no longer about ticking a box in order to move projects forward, but rather a chance to re-build trust, exemplify the positive impact that mining companies can have on communities, and integrate a once fractured society. Consultations to develop the Corridor to Prosperity have been streamlined by having First Nations communities as proponents for the cause. Environmental assessments are scheduled to take at least until Q4 2023, at which point the road can begin to be built. Coutt's best estimate is to have a fully permitted road in 2026.

Ontario is home to 133 First Nations communities, representing 23% of all Indigenous peoples in the country. The province has more remote communities than any other region in Canada, with 30 First Nations only accessible by air or ice road for large parts of the year. Sudbury, Thunder Bay, Sault Ste Marie, Timmins, Ottawa and Toronto have large Indigenous populations living off-reserve. Indigenous people make up 3% of the Canadian total population and account for 6% of the country's mining labour force. "Ontario is now offering expanded resource revenue sharing agreements with Indigenous communities proximal to either mining, forestry or aggregate developments," said Greg Rickford, Ontario's Minister of Northern Development, Mines, Natural Resources, Forestry and Indigenous Affairs.

"The concept of economic reconciliation is real. This is a palpable opportunity for Canada to do something important and well in the region."

Alan Coutts,
President & CEO,
Noront Resources

The Ministry's Aboriginal Participation Fund (APF) supporting consultation, education and relationship-building has been built-out, while the Ministry of Labour, Training and Skills Development has invested C3.5 million to help 150 indigenous people receive training to join the Greenstone mine. "We have also supported initiatives for employment opportunities on major energy infrastructure projects, such as the Wataynikaneyap Power Transmission project. This project will serve the interests of the Greenstone Belt and translate to a transferable skill set for Indigenous workers," added Minister Rickford.

Mining companies are increasingly realizing that incorporating indigenous communities, not only into their field operations, but also into their boards, fosters long-term collaborations and de-risks projects for the future. "Originally, in our dealings with the province and Minister Rickford, Noront was the proponent of these road projects. Over time, given that First Nations communities have the traditional territory and land use, a better model emerged in which the First Nations themselves would lead the road development and permitting," said Alan Coutts, president and CEO, Noront Resources. ■

20 YEARS GBR

This publication is a pre-release edition of GBR's full series of reports on Mining in Ontario and Toronto's Global Reach, that will be published in Q1 2022.

If you wish to be interviewed for the report, please contact Margarita Todorova (mtodorova@gbreports.com) and/or Elisa Iannacone (elisa@gbreports.com)

www.gbreports.com

Mining in Ontario and Toronto's Global Reach 2022
Pre-Release Edition

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