

B. Investment in Mining Innovation to Support the Critical Minerals Strategy

Submitted by: The Greater Sudbury Chamber of Commerce. Co-Sponsored by North Bay & District Chamber of Commerce, Thunder Bay Chamber of Commerce and the Timmins Chamber of Commerce.

Issue

Mining is a capital-intensive industry. New technologies are currently in development that have the potential to reduce the initial capital burden on mining organizations. Supporting the adoption of innovative new technologies will accelerate their development, eventually reduce their costs, strengthen the industry and increase competitiveness. This will increase mining reserves and support the province in its effort to continue mining critical minerals that are in global demand.

Background

Mining is a competitive advantage for the province. According to the Ontario Mining Association, there are currently 40 mine sites operating in Ontario along with significant opportunity for exploration and future mine development⁶. Ontario's mineral production, including indirect and induced impacts, provides more than \$12 billion in Canadian GDP and creates 78,800 jobs⁷. The Ontario Mining Association also estimates that there are over 1,400 mining supply and service sector companies in Ontario⁸. Although "the number fluctuates with various commodity price changes, mining in Ontario produces revenues of around \$10 billion per year."⁹ The City of Toronto is the mining finance capital of the world, and Ontario's expertise in mineral production, mining supply and services, finance, and innovation are in global demand.

With the provincial government now focused on its critical minerals strategy, it is more important than ever that we continue to invest in mining innovation. The province has developed its first ever-critical minerals strategy to help generate investment, increase the provinces competitiveness in the global market and create jobs and opportunities in the mining sector.¹⁰ New technologies and high growth sectors such as information and communications technology, electronics, energy, aerospace and defense, health and life sciences, and transportation rely on critical minerals. Ontario is well positioned to become a global supplier, producer and manufacturer of choice for certain critical minerals, including but not limited to nickel, copper, cobalt and platinum group elements, however it requires a sustainable pipeline of attractive mining projects.

It is generally understood that the average new mine project will require an investment of \$1.0-2.0 billion depending on the depth of the ore body and the amount of development required. Furthermore, project execution will take several years before reaching first ore and generating any cash inflow to return on the investment. This poses not only a significant challenge for mining organizations with respect to developing an ore body that ultimately generates a net present value, but also for the province of Ontario to support its critical minerals strategy. New technology exists that has the potential to reduce the capital burden of mine development, attract a new generation of workers, reduce emissions and improve the operating efficiency of the mine once in production, however in some cases, this requires significant testing to mitigate risk before becoming widely accepted.

Generally, Ontario mining companies and the government contribute research and innovation funds on a 1:1 ratio. Matching investments are provided regardless of the type of project. With fewer resources available from industry, this skews investments towards cheaper and lower risk research projects, and away from the innovation and commercialization projects that are necessary to realize productivity gains in the sector. In

⁶ https://oma.on.ca/en/ontario-mining/facts_figures.aspx

⁷ <https://oma.on.ca/en/ontario-mining/EconomicContribution.aspx>

⁸ https://oma.on.ca/en/ontario-mining/facts_figures.aspx

⁹ <https://oma.on.ca/en/ontario-mining/EconomicContribution.aspx>

¹⁰ <https://news.ontario.ca/en/release/60622/ontario-developing-first-ever-critical-minerals-strategy>

order to attract funds and partnerships from global mining companies, the Government of Ontario needs to consider adjusting its funding ratios to provide incentives to support larger-scale, longer-term, visionary provincial mining innovation projects given that the ventures have a strong business case and a high return on investment.

For innovation to work, it must be adopted. Mining innovations need to be demonstrated and implemented as workable beyond the theoretical, but also show commercial viability. The lack of commercialization is one of the reasons why so little of the funding for mining research has impacted mine operations. The Research, Demonstration and Implementation (RD+I) approach to focus on practical applications, distinct from academic research, was developed by the Centre for Excellence in Mining Innovation (CEMI), and is aimed at addressing this very important issue. Mining service and supply firms also make significant contributions to the commercialization process and the provincial government has recently supported their efforts via selective funding. That said, mining organizations themselves are typically left to take on the risk associated with adoption. While new equipment or technology has been developed and tested to some extent, this does not guarantee that it will endure the harsh mining environment and meet production demands over the long term.

Perhaps, the best example of such technology is the development of battery electric mining equipment. Battery electric mining equipment has the potential to reduce the amount of capital required to build a new mine along with its future operating cost. The volume of rock excavation required for the mine ventilation system is reduced as a result of eliminating heat and emissions from traditional diesel equipment. While the cost of diesel fuel is exchanged for the cost of recharging batteries, the net operating cost of the mine is reduced given the size of the ventilation system is smaller, drawing less electricity to supply fresh air and keep the mine at temperature. The challenge with battery electric equipment starts with its initial cost. For example, the average battery electric underground loader is roughly three times the price of traditional diesel equipment given it is still in the early states of its development and far from mass-produced. Furthermore, while a number of mining organizations have chosen to trial one or two vehicles within their mine, they are not necessarily ready to change their entire mobile fleet. The benefit to current operations resides on other factors (health and safety, reduction in carbon footprint, attraction of an environmentally and health and safety conscious workforce) as opposed to the immediate financial benefits.¹¹ The financial opportunity exists more so in relation to new mine development, taking advantage of the reduction in capital for mine development. However, a significant risk remains for mining organizations when deciding to purchase and entire fleet of battery electric equipment, particularly loaders and haulage trucks that carry a larger volume of material on incline grade. This equipment has yet to prove it can reliably meet production demands over the longer term. A further step forward in adoption is required to work through remaining challenges and for mining organizations to gain confidence in product.

Several other technologies also have the potential to influence both current mining operations as well as new mine development such as continuous mining machines or tunnel-boring machines, which would transition mining from a batch process of drilling, blasting, mucking and hauling material to a continuous process where material is cut, then fed at smaller particle size up to surface. Ore sorting technologies are also under development that will allow for pre concentration of mill feed, reducing the amount of tailings produced and ultimately reducing processing costs. Autonomous mining equipment, or remote mining equipment, also serves to remove the worker from certain dangerous parts of the mining operations making it much safer and more productive given that the time required to move workers above and below surface is eliminated. The increase in safety may also attract a new generation of professionals to the mining industry. Technological advancement in mining will remove traditional barriers to underrepresented populations wanting to join the industry and allow them to benefit from well paying jobs offered by the industry.

In face of the current economic environment and competition from jurisdictions with lower wages,

¹¹ <https://electricautonomy.ca/2021/02/18/bevs-in-mining-non-financial-benefits/>

operating costs, and less stringent environmental regulations, Ontario has little choice but to innovate. New, expensive, and complex mining equipment technologies are being developed as a result of the depth of Ontario's significant identified mining resources and reserves, which are a challenge to exploit. The new technologies will result in a new paradigm of worker safety and productivity that will ensure that Ontario remains the leader in both mineral supply and mining technology supply and services. However, for innovation to work, it must be adopted. Investment needs to follow the entire process, starting with research, then development and last but not least, implementation.

Recommendations

The Ontario Chamber of Commerce urges the Government of Ontario to:

1. Increase the relative government-to-industry funding ratio for mining innovation and ensure that it supports the entire project lifecycle.
2. Engage the mining industry through OMA, the supply and service industries and groups such as MineConnect, and other cross-sector industries as well as First Nations and Indigenous communities in discussions that aim to support implementation and commercialization requirements.
3. Work closely with mining organizations to develop and implement new technologies such as battery electric vehicles that have the potential to improve mine project economics, increase mine reserves, and support the province in developing future mines to fulfill its critical minerals strategy.

Effective Date: April 30, 2022

Sunset Date: April 30, 2025