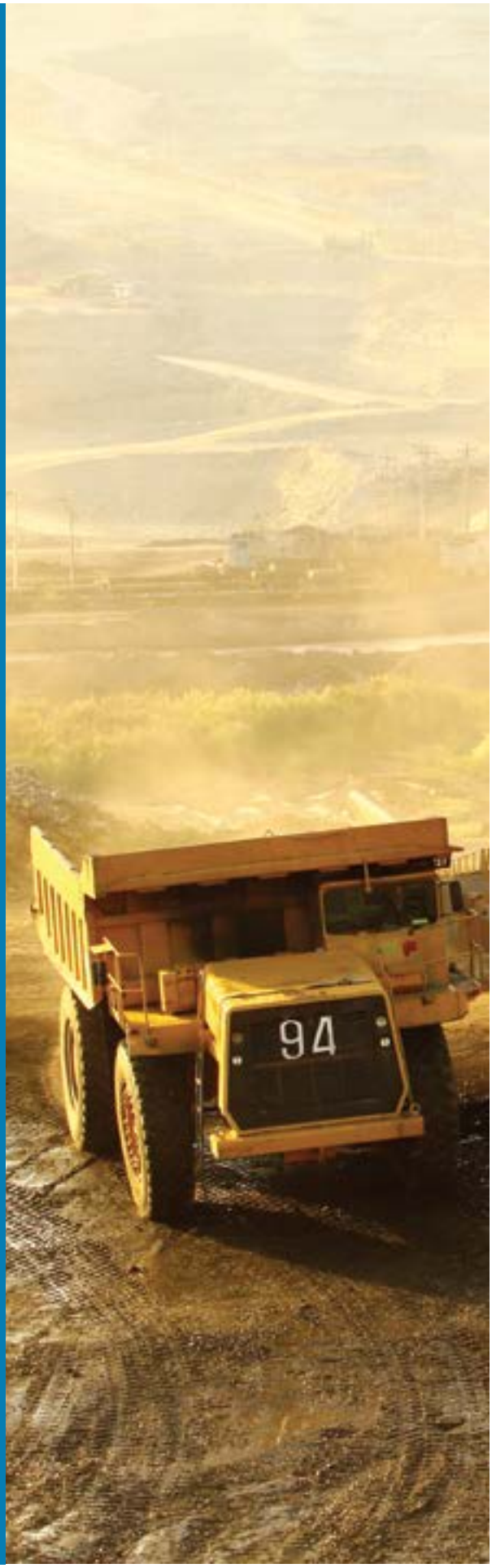
Foresight

Smart Policy Series



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INCENTIVIZING LOW CARBON PATHWAYS FOR MINING

INCENTIVIZING LOW-CARBON PATHWAYS FOR MINING

Mining plays a significant role in the Canadian economy. In 2017, the minerals sector directly and indirectly accounted for 634,000 jobs[1] throughout the country in urban, rural and remote regions. Despite changing needs of economies, a majority of products we use in everyday life today require minerals and metals (think smartphones, laptops, batteries, cars). This demand will continue to be significant for Canada's mining sector for many years to come.

WHAT'S THE LINK BETWEEN CLEAN TECHNOLOGY & MINING?

Perception of mining is paradoxical, top of mind when it comes to discussing the gold rush era and environmental degradation from extractive processes but not necessarily connecting such a traditional industry with modern technology. Despite this, there are two pathways for this sector to transform and modernize its practices by embracing cleantech in its operations and continue to responsibly extract minerals to play a role in the next wave of innovation to power green economies.

First, growing awareness of sustainability, particularly in response to environmental and social impact concerns, provides an opportunity for the mining sector to adjust its practices and image. On sites, large amounts of energy and water are used for extraction and processing and a significant amount of waste is produced at the end of the mining life cycle. Cleantech solutions exist to effectively optimize inputs to operationalize a mine as well as products and services that reduce the footprint of energy, water and waste at mining sites and facilities. Mining companies adhering to environmental management and policy, are and should be, large customers for cleantech solutions.

Secondly, governments are mandating a renewable energy generation mix and carbon reduction on a national and global scale to meet UNFCCC climate targets. To achieve this, more technology is required, specifically clean energy generation technology such as solar and wind turbines. As it happens, Canada is home to a number of raw minerals that are used to build[2] these type of products. For example in order to build wind turbines and deliver electricity, the raw materials needed are steel, concrete, and metals such as copper and aluminum. For solar PV technologies, seven metals are required; cadmium; gallium; germanium; indium; selenium; silver; and tellurium all of which are by-products of base-metal and gold production. Nickel, cobalt, and graphite can also be used for advanced batteries for electric vehicles. There is opportunity for Canada to position itself as a responsible and ethical supplier of these products to the cleantech sector.

ARE REGULATIONS & STANDARDS PROMOTING GOOD PRACTICE??

On paper, yes. According to a Mining Association of Canada's recent publication,[3] the domestic mining industry is making significant progress in its environmental performance by participating in an array of sustainability programs and initiatives.

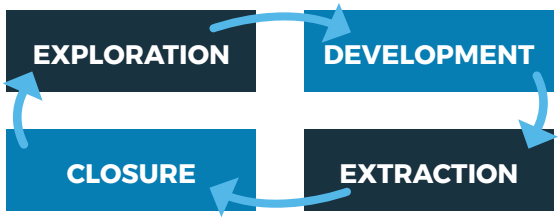
1 nrcan.gc.ca/mining-materials/facts/minerals-economy/20529#Employment
2 nrcan.gc.ca/mining-materials/publications/19447
3 mining.ca/sites/default/files/documents/Facts-and-Figures-2017.pdf

A number of these programs are influencing Canadian mining operations. For instance, finance institutions such as the World Bank and IFC adopted the Equator Principles to help them to determine, assess and manage environmental and social risk in project finance. In future, it will be interesting to see if these institutions will include assessing climate and water risk as part of their process, particularly as these stressors become more pertinent to mining operations.

Responsible business practices on carbon, water and transparency are often guided by non-profit and standard body initiatives such as the United Nations Global Compact, the Extractive Industries Transparency Initiative, Carbon Disclosure Project, Water Disclosure Project, ISO 14001 certification and other sustainability programs which companies can choose to voluntarily sign up to and demonstrate leadership. Across Canada, we see that companies are engaged in domestic stewardship programs, including The Sustainable Mining Initiative [4] an industry standard created by the Mining Association of Canada.

WHAT CLEAN TECHNOLOGY PRODUCTS EXIST TO TRANSFORM THE MINING LIFE CYCLE?

There are different phases of the mining life cycle, all of which present opportunities to introduce cleantech into their processes to minimize environmental impact.



Exploration

Airborne Geophysics [5] has been identified as one of the emerging technologies capable of finding potential mineral deposits under cover and at depth. Examples include electromagnetic applications as well as the use of drones in geophysical surveying. The benefit of this technology is reduced cost and time of exploration in remote and covered greenfields areas, as well as longer term environmental impact by reducing extractive exploration effort to find deposits.

Development

The Province British Columbia is home to the Digital Technology Supercluster,[6] a new model of innovation across Canadian provinces that promise to fund and support new technology to benefit the Canadian economy. Building on the legacy of mining in BC and strengthening the innovation ecosystem, one of the flagship projects is called the Earth Data Store, a single source of geographic data for the resource sector. It combines existing data sources including topography, climate, permits, and drilling results with a groundbreaking earth digital twin that will image 85% of the world's land every day to within half a metre of precision. Natural resource companies, government agencies, and community stakeholders will leverage the store to expedite and enhance resource development projects.

Extraction

MineSense,[7] a company headquartered in Vancouver made the 2018 Global Cleantech 100 for their IoT and sensor solutions. Their technology provides real-time, sensor based ore data and sorting solutions for large scale mines.

4 mining.ca/towards-sustainable-mining/tsm-progress-report/company-performance
5 min-guide.eu//content/airborne-geophysics-mineral-exploration
6 digitalsupercluster.ca/
7 minesense.com/

The mineral sensing platform creates value by providing precise, accurate, real-time grade control and ore routing decisions at the point of extraction for maximum resource conversion and metal recovery, reducing the CO2 emissions and the consumption of energy, water and reagents during the whole mining process.

Closure

An award winning project called SunMine,[8] based in Kimberley BC, is paving the way for how to deal with a fully reclaimed mine concentrator site, previously operated on by Teck Resources. The municipality of Kimberley worked with a mix of partners to convert the site into a large-scale commercial solar power station called SunMine. The project is the Province's largest solar field and Canada's largest solar tracking facility. The energy produced on-site contributes directly to the province's energy grid.

SPOTLIGHT ON MINING WASTE: TAILINGS MANAGEMENT IN BRITISH COLUMBIA

Tailings are waste rock or other material that overlies an ore or mineral body and is displaced during mining without being processed. It presents an environmental threat if its from a non-ferrous metal industry, which is likely to contain heavy metals. Through the extraction and subsequent mineral processing, metals and metal compounds tend to become chemically more available, which can result in the generation of acid or alkaline drainage. Managing this is very important as it can have significant negative impact on water and soil as result of heavy metal drainage. For example, in 2014, there was a tailing pond incident at the Mount Polley mine in the Cariboo region of BC, an open pit gold and copper mine owned by Imperial Metals. The tailing pond (in a dam structure) of copper and gold mining waste, otherwise known as tailings, breached, spilling billions of litres of contaminated matter into nearby Lakes.

Major mines require authorizations from both federal and provincial agencies[9] to have licence to operate, although they can vary from project to project. These include Environmental assessment (EA) certificates, issued under the Environmental Assessment Act (Environmental Assessment Office), permits issued under the Mines Act (Ministry of Energy, Mines and Petroleum Resources) and waste discharge permits issued under the Environmental Management Act (Ministry of Environment and Climate Change Strategy). Other permitting processes are necessary if mining activity is linked with water use, forestry and fisheries. Most mining dams in British Columbia are regulated under Part 10 of the Health, Safety and Reclamation Code for Mines in British Columbia (the Code),[10] as established under the Mines Act.[11]). In 2017 the Mining Association of Canada updated their Tailings Management Protocol[12] as part of their Sustainable Mining Initiative to share best practice and management tools with companies in the sector.

Recognizing there are huge estimated liability costs, associated with the management of mine wastes in Canada and the US, in excess of $50 billion.[13] The government of Canada is examining options to reprocess and repurpose mine wastes to reduce environmental impacts and recover valuable by productions such as critical and strategic metals.

8 sunmine.ca/about.html

9 mines.nrs.gov.bc.ca/authorizations

10 www2.gov.bc.ca/gov/content/industry/mineral-exploration-mining/health-safety/health-safety-and-reclamation-code-for-mines-in-british-columbia

11 bclaws.ca/civix/document/id/complete/statreg/96293_01

12 mining.ca/tailings-management

13 nrcan.gc.ca/mining-materials/green-mining/18288