



The Mining Story 2024

CANADIAN MINING INDUSTRY FACTS AND FIGURES

Contents

1	Executive Summary
5	Message from the CEO
6	SECTION 1 The Canadian Mining Industry: Contribution to the Economy
20	SECTION 2 The Activities: Production, Processing and Transportation
32	SECTION 3 The Money: Reserves, Prices, Financing, Exploration, Investment and Fiscal Policy
47	SECTION 4 The People: Safety, Employment and Costs
58	SECTION 5 Clean Technologies, Climate Change and Innovation
70	SECTION 6 The World: International Market Activities and Developments
81	Annexes Annex 1: Producing Mines in Canada, 2022 Annex 2: Canadian Production of Leading Minerals by Province and Territory, 2022 Annex 3: Canada's World Role as a Producer of Certain Important Minerals, 2022 Annex 4: Mineral Production of Canada, 2012-2022 Annex 5: Canadian Reserves of Selected Major Metals, 1978-2022 Annex 6: Employment and Annual Compensations in the Canadian Mining, Smelting and Refining Industries, 2009-2022 Annex 7: Total Compensation Per Job, by Select Canadian Industrial Sector, 2009-2022 Annex 8: Value of Domestic Exports of Minerals and Mineral Products, by Commodity and Country of Destination, 2022 Annex 9: Value of Imports of Mineral and Metal Products, by Commodity and Country of Import, 2022

Executive Summary

Minerals and metals are the backbone of our society and economy, contributing to the creation of everyday essentials like computers, smartphones, cars, and the places we call home. They play a vital role in shaping the modern conveniences we rely on. But minerals and metals are not just important to today's world; they will also enable the transition to a low-carbon future. Electricity networks, electric vehicles, wind energy, photovoltaic solar cells, and battery storage all require mined materials.

Customers buying mining products from Canada can have every confidence that they were mined responsibly, to the world's highest standards, and with fewer greenhouse gas emissions than anywhere else in the world.

The current state of **mining and the Canadian economy** is strong. In 2022, mining, quarrying and oil and gas extraction made up 7.8% of Canada's gross domestic product (GDP). The sector made up a larger portion of Canada's economy than finance, construction, transportation or retail trade.

The mining sector consists of extraction, mining services, primary metal/mineral manufacturing and downstream metal/mineral manufacturing. Each of these areas saw substantial increases in contribution to Canada's GDP in 2022.

- Extraction contributed \$45 billion to GDP, an increase of 21% from 2021.
- Mining services contributed \$10.1 billion to GDP, an increase of 50% from 2021.
- Primary metal/mineral manufacturing contributed \$23 billion to GDP, an increase of 13% from 2021.
- Downstream metal/mineral manufacturing contributed \$30.4 billion to GDP, an increase of 23% from 2021.

There were more than 200 operational mines in Canada in 2022 – producing diamonds, gold, coal for steel, potash, iron ore and other critical components for the global economy.

Canada produces more than 60 minerals and metals through its **mining activities**. The total value of Canadian mineral production in 2022 was \$74.6 billion, up from \$58.6 billion in 2021. This growth was led by the increase in production values for nonmetals and coal. The total value of mineral and metal production has quadrupled since 2000.

Canada is among the top producers of metals and non-metallic minerals in the world. It is the top producer of potash, second largest producer of niobium and uranium, and third largest producer of precious diamonds and palladium (by metal content).

In addition to extracting minerals from the ground, Canadian mining companies also process minerals by smelting and refining. As the industry changes, the quantity and value of refined metal production in Canada has become irregular due to the depletion of reserves and greater dependence on imported concentrates.

Rail, road and marine infrastructures are critical to the flow of mined and refined products to both domestic and international markets. The mining industry is the largest industrial customer group of Canada's transportation sector and a major user of Canada's ports.

In Canada, freight rail is primarily handled by two Class I railways. Communities and businesses are often captive to a single railway serving their location. Railways use this power to set prices, including fuel surcharges, which have increased 24% since 2010, while fuel costs have decreased 17%.

Canada must support mineral production by building infrastructure – transportation, energy and communication. New infrastructure will help Canada's extraction, processing and manufacturing industries by providing the resources that the industry needs, reliably and at a reasonable cost.

The **people** of mining are diverse: they come from all corners of the country and all educational backgrounds. The mining industry directly employed 420,000 people in 2022 and indirectly employed another 274,000 for a total of 694,000 people. This represents one in 30 employees in the Canadian labour force. The minerals industry is an important employer of Indigenous peoples, providing jobs to 11,300 people in 2020.

The mining industry is justifiably proud of its safety record. Rates of injury have declined substantially since 2011.

The mining industry supports a successful, safe, highly-paid, and technically adept workforce.

Mining is critical to **the environment**. Climate change is the critical issue facing the globe over the next century. Minerals and metals will help the world transition to a low-carbon future. Electricity networks that provide clean energy, electric vehicles, wind energy, photovoltaic solar cells, and battery storage all require mined materials. Clean technologies trade the use of fossil fuels for materially intensive construction.

Canada fulfills the need for critical minerals using less carbon intensity than most competing mining jurisdictions. We have one of the world's cleanest electricity grids, with 82% of power from renewable or non-emitting sources. As a result, Canadian mineral products have among the lowest carbon intensity in the world.

The economy of the future needs minerals and metals from Canada. To provide the resources that are required, Canada must create a more efficient investment and regulatory environment. Given the increasing demand for critical minerals to achieve global carbon reduction, we need to bring new mines into production in the years ahead. This will require a regulatory regime that does not create barriers in mine development, but actively encourages them to proceed.

Canada's mining sector is a leader **in the world**. Canada's mineral exports increased to \$153 billion in 2022, making up 21% of Canada's total merchandise exports. The bulk of Canada's exports, 57% in 2022, were to the United States. The United Kingdom (9.2% in 2022) and the European Union (7.8%) were also significant export destinations.

Investment in mining flows in both directions: Canadian mining companies hold assets in 96 countries and have increased direct investment abroad to \$106.1 billion. Foreign direct investment in Canada has also reached new highs: in 2022, it was \$65 billion, which made up 5.1% of Canada's inbound foreign direct investment.

Free trade, investment and taxation agreements help facilitate the trade of mining products and investment flows. They reduce barriers for investment, enhance transparency and advance cooperation. Investment agreements, complete with dispute resolution mechanisms, provide mining investors with greater certainty over the investments that companies make in foreign jurisdictions. Part of maintaining Canada's global leadership requires ensuring that Canadian mining and supply sectors have access to modern and comprehensive trade and investment vehicles to meet the world where they do business.

Continued growth in the mining sector is critical for both the Canadian economy and the environment. A strong mining industry means safe, well paid jobs for hundreds of thousands of people, and the production of the minerals and metals with high environmental and high labour standards. Canada's trading partners and allies will increasingly rely on us to for a secure and stable supply of minerals and metals, and it is the responsibility of government and industry to work together to deliver the mined materials required for the green economy of the future.



Customer interest in Canada's metals and minerals is high due in large part to our clean energy grid, strong regulatory system and leadership in the environment, in social responsibility and corporate governance.

-Pierre Gratton, CEO
Mining Association of Canada

Message from our CEO

I am pleased to share with you *The Mining Story 2024*, the Mining Association of Canada's annual roundup of statistics on the current state of the industry.

Mining is a critically important part of Canada's economy. The industry employs people from coast to coast to coast in mineral extraction, smelting, fabrication and manufacturing. In 2022, the mineral industry was directly responsible for 420,000 jobs. A further 274,000 people were employed indirectly, through jobs providing equipment, technology and services to the sector. Proportionally, the mining industry is the largest private sector employer of Indigenous peoples.

Today, our sector is being called upon to help address the greatest crisis of our time, climate change. Minerals and metals play an essential role in the energy transition: without mining there are no electric vehicles, no wind farms, solar panels or nuclear energy, and no transmission lines. The International Energy Agency expects that demand for clean energy will require at least 71% more critical minerals than are currently produced.

Customer interest in Canada's metals and minerals is high due in large part to our clean energy grid, strong regulatory system and leadership in the environment, in social responsibility and corporate governance. Companies buying mining products from Canada can have every confidence that they were mined responsibly, to the world's highest standards, and with fewer greenhouse gas emissions than anywhere else in the world.

To meet the increased global demand for minerals and metals, the mining industry needs a highly skilled and diverse workforce. This is an area of struggle for our sector, which continues to be predominantly white and male. While we have made progress in Indigenous inclusion, women, individuals of diverse racial, ethnocultural, national backgrounds, sexual orientations, and gender identities continue to be underrepresented. Long-term social and demographic challenges mean that the sector will need a robust response to ensure continued growth. Fortunately, industry strategies, including through Towards Sustainable Mining, and buttressed with strong government support, are being implemented to take on these challenges more aggressively than ever before.

There were over 200 operating mines in Canada in 2022, producing everything from diamonds to coal to iron ore. Spending on exploration has recently increased to \$4.1 billion, targeting precious and base metals, including those identified as "critical minerals" by Canada. Taking resources from initial discovery to production in a timely manner is critical to ensuring Canada's role in global value chains for batteries and other green economy staples.

At present, from initial discovery to first production, the average mining project in Canada takes more than 17 years, a massive impediment to our ability to be the mining powerhouse the world needs. Reducing the time it takes for a project to be approved in Canada is essential.

Along with these issues, the report describes our industry's successes, challenges and opportunities for growth. I hope you enjoy reading it and find it a useful resource.

Yours,
Pierre Gratton

SECTION 1

The Canadian Mining Industry: Contribution to the Economy

Minerals and metals are ubiquitous in all aspects of our lives – they are the building blocks of the computers and smartphones we rely on, of the vehicles and public transit that get us places, and of the buildings where we live and work. No sector is as inextricably linked to humanity’s evolution as mining. Indeed, entire ages are named after mining’s products. Today, the mining industry is being called upon to help address the greatest crisis of our time — climate change — because of the essential role many minerals and metals play in the energy transition. Without mining, there are no electric vehicles, no wind farms, solar panels or nuclear energy, and no transmission lines.

Mining is also one of Canada’s most important industries and a major job creator in communities across the country.

CANADIAN MINING INDUSTRY ECONOMIC OUTLOOK

Canada’s Gross Domestic Product (GDP) was \$2.8 trillion in 2022¹.

Mining, quarrying and oil and gas extraction contributed 7.8% of this value as shown in Figure 1. In 2022, the sector made up a larger portion of Canada’s GDP than finance, construction, transportation, or retail trade.

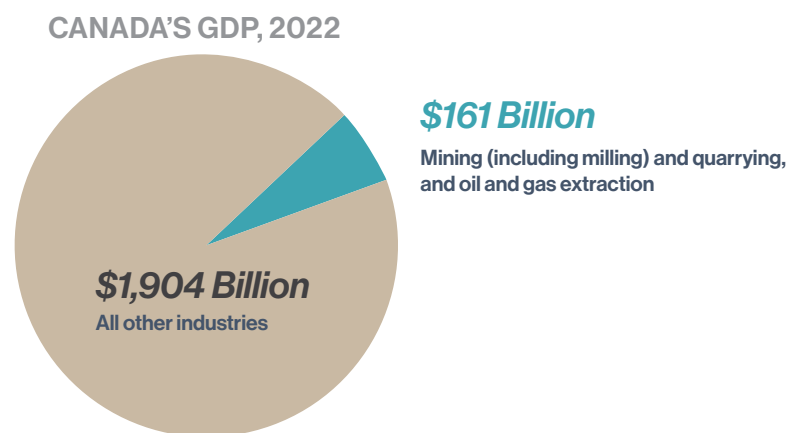


Figure 1: The Contribution of Mining, Quarrying and Oil and Gas Extraction to Canada’s GDP in 2022²

¹ From Gross domestic product, expenditure-based, Canada, quarterly, Statistics Canada Table 36-10-0104-01.

² From Canada’s Real Gross Domestic Product by Industry, Statistics Canada, Table 36-10-0434-01. In this figure, GDP is presented in basic prices in 2012 constant dollars. GDP is the total monetary value of all goods and services produced in Canada, and constant 2012 dollars are used by Statistics Canada to measure the economic growth of various industries with the effect of price variations removed. Because the GDP values are deflated to 2012 dollars, the total value of GDP varies from the nominal value in current dollars.



Mining's contribution to Canada's GDP has remained relatively stable through the changes in the economy of the past decade and the upheavals of the Covid era: the sector has consistently accounted for between 7.2 and 8.2 percent of Canada's Gross Domestic Product (GDP) since 2011 as shown in Figure 2.

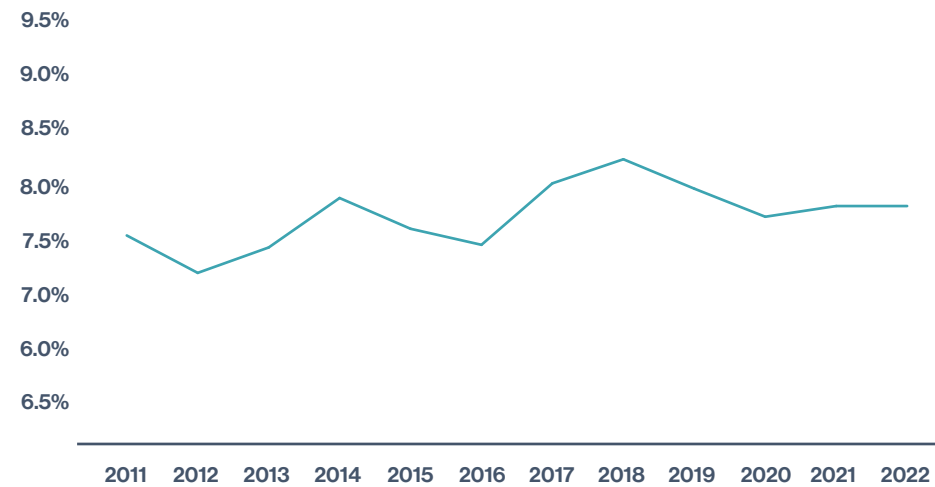


Figure 2: Contribution of Mining, Quarrying and Oil and Gas Extraction to Canada's GDP Since 2011³

Excluding oil and gas, mining's contribution to GDP can be separated into four components: extraction, services, primary manufacturing, and downstream manufacturing. The gross value added for each category is shown in Figure 3.

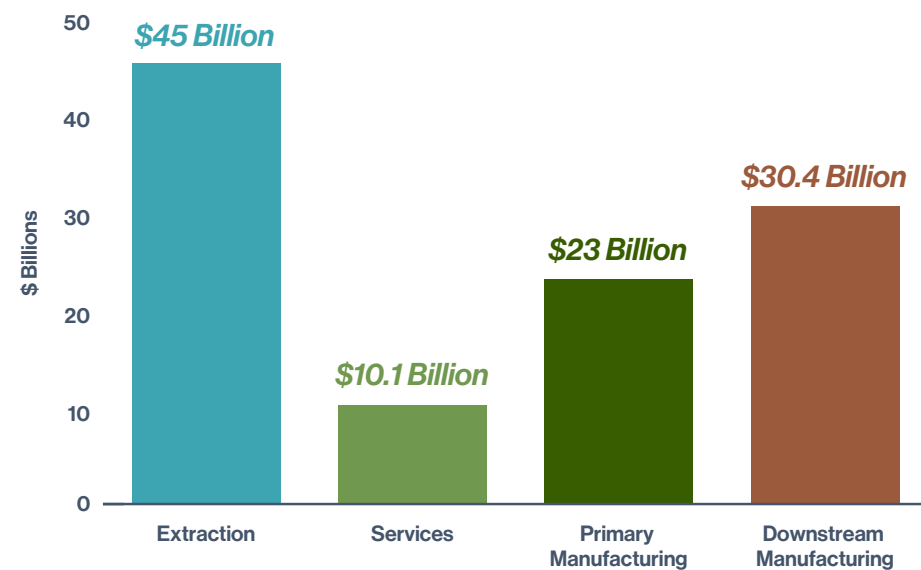


Figure 3: Metals and Minerals Sector GDP, 2022⁴

³ Statistics Canada. Table 38-10-0285-01 - Natural resources satellite account, indicators, annual. This table also forms the basis of discussion of GDP contributions of extraction, services, primary manufacturing, and downstream manufacturing, below.

⁴ Statistics Canada. - Natural resources satellite account, indicators, annual.

Extraction includes the mining of metals, non-metals, and coal. Metals mining, including gold, iron ore, copper, and zinc, contributed \$23.3 billion to Canada's GDP in 2022. Non-metal mining includes diamonds, potash and sand and gravel. The gross value added of non-metallic mineral production was \$10.7 billion in 2022. Canada produces both coal for generating heat and energy (thermal coal) and coal for industrial processes like making steel (metallurgical coal). In 2022, Canadian mines produced 47.3 million tonnes of coal, of which 59% was metallurgical and 41% was thermal. The value added was \$11.1 billion in 2022.

In the mining context, **services** means activities including exploration drilling on contract, and contracted services at mines like such as water removal or overburden removal. The nominal gross value added for mining services in 2022 was \$10.1 billion.

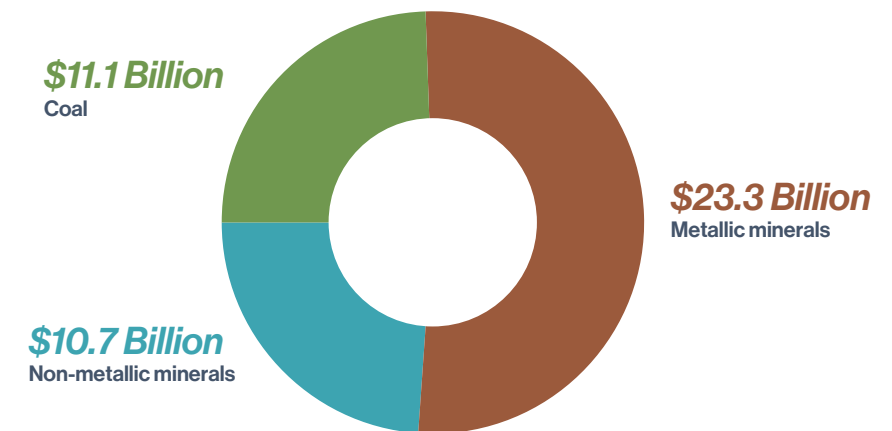


Figure 4: Extraction Subsector GDP, 2022

Primary manufacturing for metals includes smelting and refining activities. Primary manufacturing for non-metals includes manufacturing using lime, cement, concrete, and glass. In 2022, the gross value added by primary manufacturing was \$23 billion.

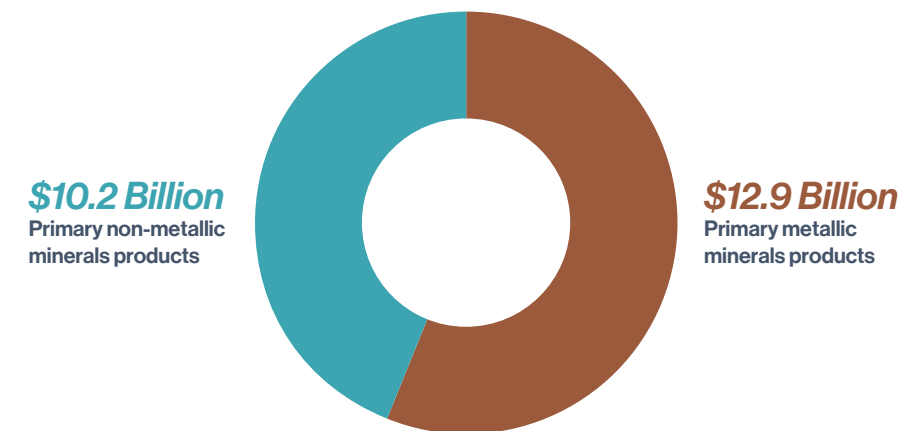


Figure 5: Primary Manufacturing Subsector GDP, 2022

Downstream manufacturing uses primary manufacturing products as inputs. Secondary metal products use primary products to produce things like iron and steel pipes, rolled steel products like wire, and foundry products. Tertiary metals products include things like cutlery, tools and hardware that require further processing. Downstream manufacturing also includes miscellaneous metals products such as communications cables and stamped motor vehicle components. Finally, services and custom work refer to specialized activities like heat treating, engraving, coating, or other custom work. The total value of downstream manufacturing in Canada's GDP in 2022 was \$30.4 billion.

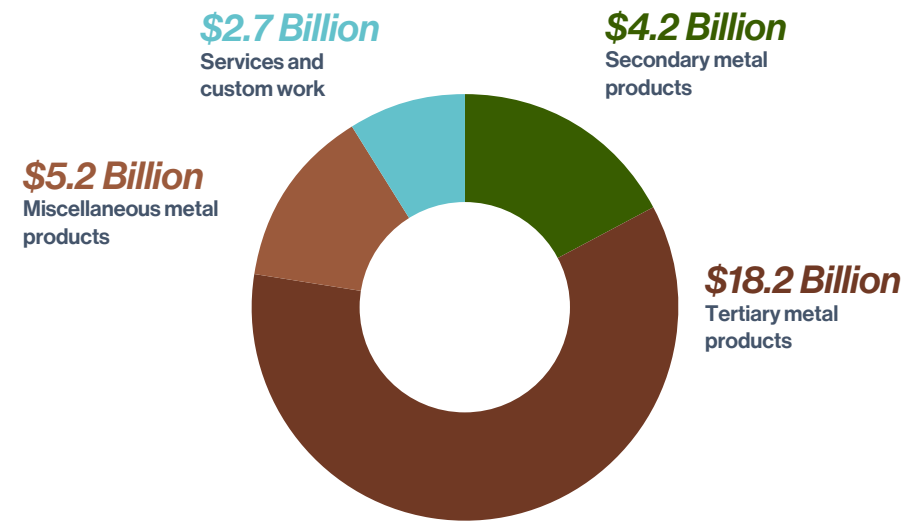


Figure 6: Downstream Manufacturing Subsector GDP

Real gross value added in extraction, services, primary manufacturing, and downstream manufacturing increased from 2021 to 2022. Real gross value added in the sector since 2011 is presented in Figure 7.

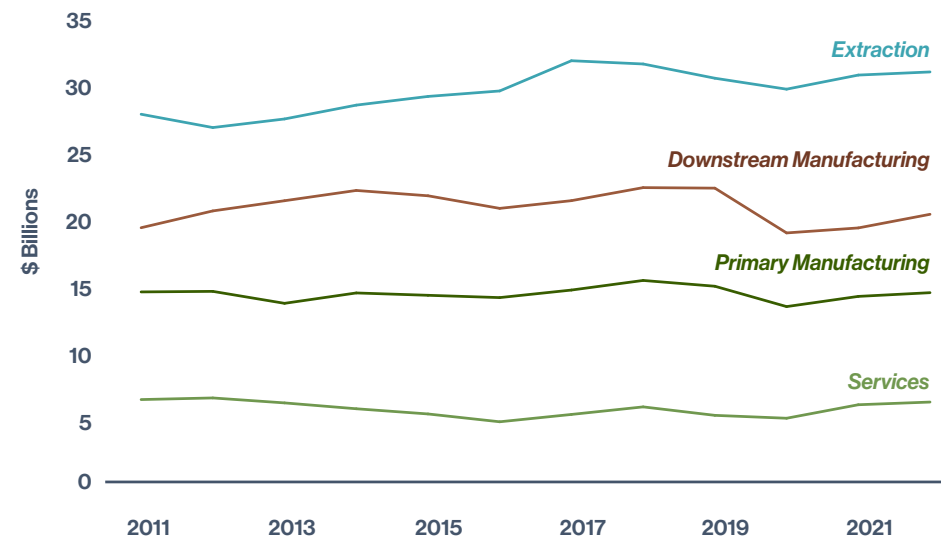


Figure 7: Real Gross Value Added, Mining Sector, Constant 2012 Dollars⁵

⁵ Statistics Canada. Table 38-10-0285-01 - Natural resources satellite account, indicators, annual.

MINING: A PAN-CANADIAN INDUSTRY

Mining is a significant contributor to the Canadian economy and takes place in communities from coast to coast to coast. The direct and indirect wages and employment of approximately 694,000 people across the country (of which 420,000 are direct jobs), taxes and royalties collected by governments, and the capital expenditures required for project development and operation are only a few examples of the essential role it plays.

Mining of industrial minerals like salt, gypsum and limestone takes place across the country. Some mine types, however, are found primarily in one area. For example, the Northwest Territories is the country's dominant source of diamonds. Ontario and Quebec lead in the production of gold. Alberta is home to Canada's oil sands sector. Saskatchewan produces all of Canada's uranium and has enormous potash reserves. British Columbia is prominent in steelmaking coal production. Newfoundland and Labrador and Quebec produce virtually all of Canada's iron ore.

Figure 8 illustrates the geographical location of Canada's mining clusters and active mineral development regions. Details for individual mines are presented in Annex 1.

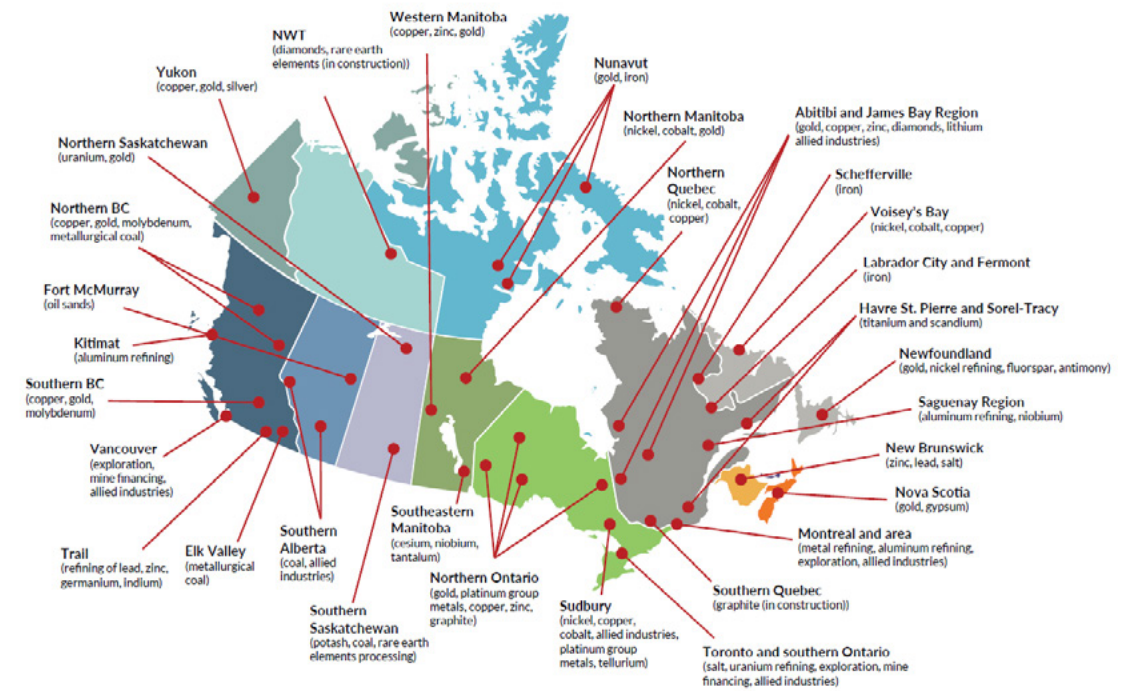


Figure 8: Mines in Canada

The total value of mineral production in Canada in 2022 was \$62 billion. That value represents a 35% increase since 2012.

Pacific Region

British Columbia produced \$5.5 billion of minerals and metals (excluding coal) in 2022⁶.

British Columbia is Canada's largest exporter of metallurgical coal, its leading producer of copper, and the only producer of molybdenum in the country. It also produces gold, silver, lead, and zinc and more than 30 industrial minerals⁷. Mining, quarrying and oil and gas extraction accounted for 5.4% of British Columbia's GDP in 2022⁸.

In British Columbia, 3,700 suppliers to the mining industry provided more than \$2.9 billion worth of goods to the mining industry⁹. Mining suppliers are found in every area of BC, from traditional mining communities like Kamloops and Prince George to BC's urban centres. Suppliers in Vancouver, Surrey and Burnaby combined generated \$561 million in revenue.

Vancouver is a global centre of expertise in mineral exploration. There are more than 1,100 global exploration companies headquartered in Vancouver. The mining sector in Vancouver includes support services like geological research, business administration, finance, engineering, and environmental consulting.

Both the University of British Columbia and the British Columbia Institute of Technology offer mining engineering programs. BCIT also offers a mineral exploration and mining technology program.

Almost 12% (\$2.08 billion) of Canada's mineral development expenditures were in British Columbia in 2022. Exploration spending was \$579 million, deposit appraisal expenditures were \$388 million, and mine complex development was \$1.1 billion¹⁰.

Twenty-six of the top-spending off-mine-site exploration and deposit appraisal projects tracked by Natural Resources Canada ("Canada's Top 100 Projects") are in BC, primarily in base metals¹¹.

There were two mine development projects underway in 2022: pre-commissioning for the Premier Gold Mine and site preparation for the Blackwater Gold project.

6 Preliminary data for 2022 for British Columbia (and other provinces) from Statistics Canada and Natural Resources Canada table Canada, Value of Mineral Production by Province and Territory, Excluding Coal, 2012 And 2022 (preliminary)

7 Clarke, G., Northcote, B., Corcoran, N.L., Heidarian, H., and Hancock, K., 2023. Exploration and Mining in British Columbia, 2022: A summary. In: Provincial Overview of Exploration and Mining in British Columbia, 2022, British Columbia Ministry of Energy, Mines and Low Carbon Innovation, British Columbia Geological Survey Information Circular 2023-01, pp. 1-48.

8 Statistics Canada. Table 36-10-0400-01, Gross domestic product (GDP) at basic prices, by industry, provinces and territories, percentage share

9 Data for 2018 from *Benefits of British Columbia's Mining Supply Chain* by the Mining Association of British Columbia.

10 Natural Resources Canada, based on the Federal-Provincial/Territorial Survey of Mineral Exploration, Deposit Appraisal and Mine Complex Development Expenditures.

11 Natural Resources Canada's Top 100 Projects data set. The data set covers the top-spending off-mine-site exploration and deposit appraisal projects in Canada.

The Prairies

Saskatchewan produced \$18 billion of minerals and metals (excluding coal) in 2022, and Manitoba produced \$1.8 billion. Alberta produced \$109 million of non-metals and \$626 million of aggregates, clay and refractory materials in 2022. Statistics Canada did not report the value of metal produced in Alberta because of confidentiality requirements of the *Statistics Act*¹².

The minerals industry in Alberta is a major part of its economy. The Western Canada Sedimentary Basin contains metallic and industrial minerals in addition to oil, gas, and coal.

Saskatchewan is the world's largest potash producer and has almost half of the world's potash reserves. It is home to the world's largest uranium mine and is the world's second largest primary uranium producer. Saskatchewan also produces gold, coal, sodium sulphate and clays.

Manitoba has four operating mines, primarily producing copper, zinc, gold, cesium, and nickel.

Mining, quarrying and oil and gas extraction accounted for 25% of Saskatchewan's GDP, 27% of Alberta's, and 2.6% of Manitoba's.

The University of Alberta's mining engineering program is among the largest in the country by undergraduate enrolment, and the University of Saskatchewan offers a mining engineering option. Two colleges in Alberta and five in Saskatchewan offer mining/petroleum technology programs.

Twelve of Canada's top 100 exploration projects are in the Prairies. Five of those are uranium projects, with the others being in base metals, diamonds, lithium, precious metals, and rare earth elements.

Ontario

Ontario produced \$13.5 billion of minerals and metals (excluding coal) in 2022.

There are 35 mines in Ontario, producing gold, base metals, platinum and palladium, iron, and industrial minerals. Mining, quarrying and oil and gas extraction contributes about 1% to Ontario's GDP.

Toronto is the global centre of mining finance. Between the TSX and the TSX Venture, Canadian exchanges have more than 1,150 mining issuers with a combined market capitalization of more than \$500 billion. The fact that Canada is a key player in mining finance means that professional services related to mining and mining finance have had a chance to develop around the exchanges.

Mining engineering programs are offered at Laurentian University, Queens University, and the University of Toronto. Cambrian College, College Boreal, and Northern College offer mining technology programs. Western University offers a graduate diploma in mining law, finance, and sustainability.

Sixteen of Canada's top 100 exploration projects are in Ontario. Twelve of these projects are concentrated on precious metals, two on base metals and two on lithium.

12 Some information collected by Statistics Canada is commercially or personally sensitive. To reduce the risk of revealing this type of information, the agency uses "suppression techniques," i.e., the removal of data points that can directly or indirectly reveal information about a respondent. This sometimes results in aggregate statistics being unavailable, as in this case.

Quebec

Quebec produced \$11.2 billion worth of metals and \$337 million worth of non-metals in 2022.

Quebec had 22 producing mines in 2022, concentrated in three regions: gold mining in Abitibi-Témiscamingue, iron mining on the North Shore, and gold, base metals, diamonds, and iron mining in Nord-du-Québec. Mining, quarrying and oil and gas extraction contributes 1.6% to Quebec's GDP.

McGill, Laval and Polytechnique Montréal offer mining engineering programs. Six colleges in Quebec offer mining/petroleum technology programs.

Twenty-two of Canada's top 100 exploration projects are in Quebec. Fifteen of these projects are concentrated on precious metals, three on base metals, three on lithium and one on graphite.

Atlantic Region

Nova Scotia produced \$337 million of minerals and metals (excluding coal) in 2022, New Brunswick produced \$314 million, and Prince Edward Island produced \$3 million. Newfoundland and Labrador produced \$5.1 billion of metals and \$10 million of aggregates in 2022; its non-metal production value was deemed confidential by Statistics Canada.

There are 13 operating mines in Newfoundland and Labrador, producing iron ore, nickel, copper, cobalt, gold and building materials like sand. There are ten mines in operation in Nova Scotia, producing gold, coal, salt, and gypsum. Primary production from mines in New Brunswick mines included peat, sand and gravel, and salt, along with zinc, lead, and silver. Mining in Prince Edward Island is concentrated on sand and gravel.

Mining, quarrying and oil and gas extraction were responsible for 33% of Newfoundland and Labrador's GDP, and less than one percent of the GDP of Prince Edward Island, Nova Scotia, and New Brunswick.

Dalhousie University offers programs in mineral resource engineering. Mining technician programs are offered at The College of the North Atlantic in Newfoundland and Labrador and at Collège Communautaire du Nouveau-Brunswick.

Nine of Canada's top 100 exploration projects are in the Atlantic region, primarily in Newfoundland and Labrador. Eight of the projects are for precious metals, and one is for uranium.

The North

Nunavut produced \$2.6 billion of minerals and metals (excluding coal) in 2022, and Yukon produced \$491 million. The Northwest Territories produced \$2.2 billion of non-metals in 2022, but production value for metals was not yet available in late 2023. Statistics Canada deemed the value of aggregate production in the Northwest Territories confidential.

Mining is the largest economic driver in Canada's North. Mining, quarrying and oil and gas extraction were responsible for 15% of the GDP in the Yukon, 22% of GDP in the Northwest Territories, and 41% of GDP in Nunavut. The mines operating in the Northwest Territories and Nunavut are the largest private sector contributors to each territory's economy. For example, in the Northwest Territories, diamond mining (\$1.2 billion in 2022) was a larger industry than public administration (\$800 million), construction (\$328 million) or retail trade (\$163 million)¹³.

¹³ From the Government of the Northwest Territories 2022 Socio-Economic Agreement Report for Mines Operating in the Northwest Territories.

As a leading producer of responsibly sourced mineral and metal products globally, Canada has an opportunity to become the world's leading supplier of inputs, specifically critical minerals, integral to a lower carbon economy. In order to achieve this goal, Canada must be able to build new mines and infrastructure, develop new mines in the North, and embrace innovation.

There are three diamond mines operating in the Northwest Territories. In Nunavut, there are three gold mines and one iron mine in operation. Yukon has three operating mines: one gold, one silver, and one copper mine.

Arctic College in Nunavut offers mining-related training and education.

Fifteen of Canada's top 100 exploration projects are in the North. Seven of the projects are for precious metals, six are for base metals, one is for diamonds, and one is for uranium.

INDIRECT EFFECTS

Resource wealth has built communities and infrastructure across the country. Mines create jobs and make direct payments to government through taxes and royalties.

But the mining industry's economic impact far surpasses its direct contribution to the GDP.

For example, mining accounts for approximately half of Canada's rail-freight revenues and tonnage annually, typically exceeding \$6 billion in expenditures. Organizations such as CN Rail, CPKC, and the Ports of Montreal, Quebec and Vancouver rely on a vibrant mining industry. Specialist firms, including those in the legal, environmental, taxation, engineering, and other fields, support the industry's many requirements to locate, develop, construct, operate and reclaim a mine. These supply relationships are mutually beneficial.

Clusters of expertise, like those in finance, geology and exploration noted above, create opportunities for other companies outside the mining sector.

LOOKING FORWARD

The Canadian mining sector remains strong and has responded well to the challenges of recent years. While the Mining Association of Canada's believes that the outlook is positive for the sector, there are certain essential steps required for the industry's continued success.

As a leading producer of responsibly sourced mineral and metal products globally, Canada has an opportunity to become the world's leading supplier of inputs, specifically critical minerals, integral to a lower carbon economy. In order to achieve this goal, Canada must be able to build new mines and infrastructure, develop new mines in the North, and embrace innovation.

Building the Projects Canada Needs

The urgency of addressing climate change, the need for materials to support technological evolution including the transition to electric vehicles, the fragility of supply chains exposed by the pandemic and geopolitical conflicts have highlighted the need for new mines and infrastructure projects. But Canada's complex regulatory processes mean that these projects will not be built in time to meet Canada's targets for climate change, supply chain security or critical minerals production.

Mining projects are subject to comprehensive provincial regulatory frameworks that are unique to each province, covering the full life cycle of a mine, from exploration through development, operation, closure, and reclamation. These frameworks consider environmental effects and potential impacts on Indigenous peoples, incorporate Indigenous engagement and consultation, and include environmental protection regulations and permits of general application, as well as regulations and permits specific to mining.

Mining projects can also be subject to federal requirements: the *Impact Assessment Act*, the *Fisheries Act*, the *Canadian Navigable Waters Act*, and the *Metal and Diamond Mining Effluent Regulations*. All mines must comply with relevant general federal legislation such as the *Explosives Act*, the *Species at Risk Act*, the *Migratory Birds Convention Act*, and the *Canadian Environmental Protection Act*. Uranium mines are further regulated by the Canadian Nuclear Safety Commission.

The aggregate of these provincial and federal requirements results in duplication of effort and even some conflicting requirements. Limited coherence and coordination are an ongoing issue, leading to uncertainty, increased costs, and lengthy permitting processes for the mining industry.

The federal *Impact Assessment Act*, the *Fisheries Act*, the *Canadian Navigable Waters Act* were amended in 2019 and implementation of the changes remains incomplete. Further legislative changes are expected following the opinion of the Supreme Court of Canada that parts of the *Impact Assessment Act* are unconstitutional. While the Mining Association of Canada (MAC) welcomed the improved clarity on boundaries of federal constitutional authority in undertaking impact assessment of activities in provincial jurisdiction, it called for the transition to another legislative framework to be quick and well-planned to mitigate uncertainty for investors.

In particular, MAC believes that federal and provincial governments should

- identify areas that are already regulated, and not require extensive studies that duplicate effort,
- build internal government expertise to facilitate better regulation,
- reduce requirements for long-term and low-relevance studies,

- scale information requirements to the magnitude of likely effects, and
- continue thoughtful scoping and communication of Indigenous engagement and participation.

Northern Mining

The future of Canada's mining industry lies increasingly in the North with its abundance of minerals and metals. Strategic policy decisions are needed to help overcome both acute and longstanding challenges of infrastructure deficit and a lack of policy cohesion.

The infrastructure deficit in Canada's North makes it one of the most expensive places to mine in the world. The mineral-rich Slave Geological Province, home to three diamond mines, has no railway, no highway, and no power grid. As a result, any development requires costly winter roads and air transportation for access. This means only the rarest and highest quality deposits of precious metals and diamonds are economically feasible to mine. A substantial investment in the region's infrastructure could improve the prospects of mines in the area.

The Mining Association of Canada and mineral industry partners undertook extensive research on how remote and northern mining costs compare to those in the south. This research indicates it costs 2-2.5 times more to build the same precious or base metal mine in the North and 60% more to operate. Most importantly, 70% of this cost differential derives from the infrastructure deficit.

Strategic investments in energy infrastructure, such as the Taltson and Kivalliq Hydro grids, the British Columbia/Yukon power grid interconnection, and promising emerging technologies like off-grid small modular reactors are all essential to reducing northern reliance on costly and higher-emitting fossil fuels.

The Kivalliq Hydro-Fibre Link is an Inuit-led project that will deliver renewable energy and broadband service to underserved remote communities while enabling the region's mining sector to flourish. The Hydro-Fibre Link project is a once-in-a-generation opportunity to decarbonize communities and industry in Nunavut, improve quality of life and connectivity, and create new economic opportunities long into the future. The benefits from this project will be enormous for the environment and for the economies of Nunavut and Canada and would work to solve two persistent problems at once.

Communications and transportation infrastructure are also essential to enhancing the mining supply chain and come at a much higher cost than those sites located in less-remote jurisdictions. For example, construction of the Slave Geological Province Corridor would extend all-season road access to the mineral rich area straddling the Nunavut-Northwest Territories border. This vast region shares many geological features with the Abitibi Geological Province along the Ontario-Quebec border, which has supported more than 100 mines since its discovery in the late 1800s.

Gold, diamond, and iron ore mining are excellent examples of the driving force the mining industry plays in supporting Indigenous reconciliation in remote regions. In Nunavut and the Northwest Territories, the mining sector is the largest employer of Indigenous peoples and the largest business partner to Indigenous firms. Cultivating relationships with local communities, establishing meaningful partnerships, constructing mines and training local workforces has taken decades of work.

With few alternative economic development opportunities, climate policy considerations in the North must be weighed against the long-term costs to the industry's competitiveness. For example, Nunavut's four operating mines have invested in best-in-class diesel energy infrastructure that still requires more than 100 million litres of diesel each year to power their mine sites. Currently, there are no other energy alternatives for Nunavut communities or industry. Strategic investments in energy infrastructure, including potential off-grid Small Modular Reactors, will reduce northern reliance on fossil fuels.

Better policy cohesion is required in the critical minerals, climate, Indigenous reconciliation, and clean technology spaces to ensure the prosperity that mining has brought to Canada's North, and the future Canada needs the North to play, isn't compromised. Infrastructure development, improving the impact assessment and regulatory processes, and providing greater support for operations in the North will do much to ensure our industry is well positioned to provide the minerals and metals needed both within Canada and around the world.

Innovation

Canadian mining companies are global leaders in innovative practices. Innovation by the industry has led to improved environmental performance, lower air emissions, reduced energy use, improved worker health and safety, improved recovery rates, greater efficiency, and reduced costs. The industry will need to continue improvements in all areas, which will require collaboration between the industry and government.

ReThink Mining (i.e., the Canadian Mining Innovation Council or CMIC), the Clean Resources Innovation Network (CRIN), Canada's Oil Sands Innovation Alliance (COSIA), the Centre for Excellence in Mining Innovation (CEMI) and COREM are helping to lead the way with research on topics including small modular reactors, carbon capture and storage, and mineral processing.

Recent supports to these organizations have included:

- \$40 million to CEMI in July 2021 for the Mining Innovation commercialization Accelerator,
- \$6.97 million to COREM in August 2021, and
- \$100 million to CRIN in October 2020.

In 2022, CMIC won the \$5 million grand prize in Natural Resources Canada's Crush It! Challenge with its entry, CanMicro. The goal of the challenge was to find innovations in the crushing and grinding of rocks ("comminution"), one of the most energy-intensive processes in mining. CanMicro combines microwave-assisted comminution and multi-sensor ore sorting to selectively break particles and sort waste from desired minerals, reducing crushing and grinding requirements. CanMicro exceeded Challenge guidelines, reaching over 35 percent energy savings across several commodities. It was selected from an initial field of 65 applicants and six finalists.

The Mining Association of Canada continues to partner with ReThink Mining, the organization that facilitated the creation of the Towards Zero Waste Mining (TZWM) strategy focused on the sector's energy, water, and environmental footprint. ReThink Mining is funded by its members and project-specific partnerships, with very limited government funding. Its current portfolio of technology development projects is valued at approximately \$57M, of which less than 2.5% is provided by government programs.

SECTION 2

The Activities: Production, Processing and Transportation

Canada's strength in mining rests on its ability to extract and process minerals and metals competitively and to transport products efficiently to and from domestic and international markets. Production, processing and transportation are the foundation that allows the industry to stay globally competitive and expand its Canadian investments.

MINERAL PRODUCTION

Canada is among the top producers of metals and non-metallic minerals in the world. It is the top producer of potash, second largest producer of niobium and uranium, and third largest producer of precious diamonds and palladium (by metal content). Minerals and metals where Canada is among the top three producers are shown in Figure 9.

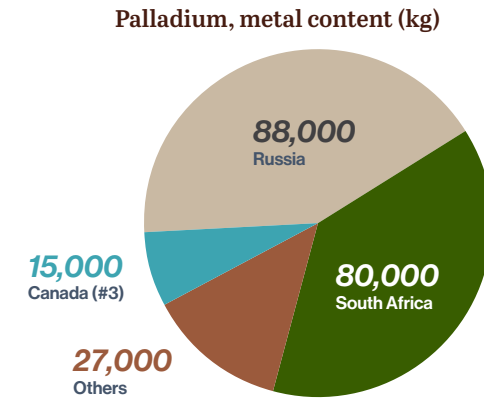
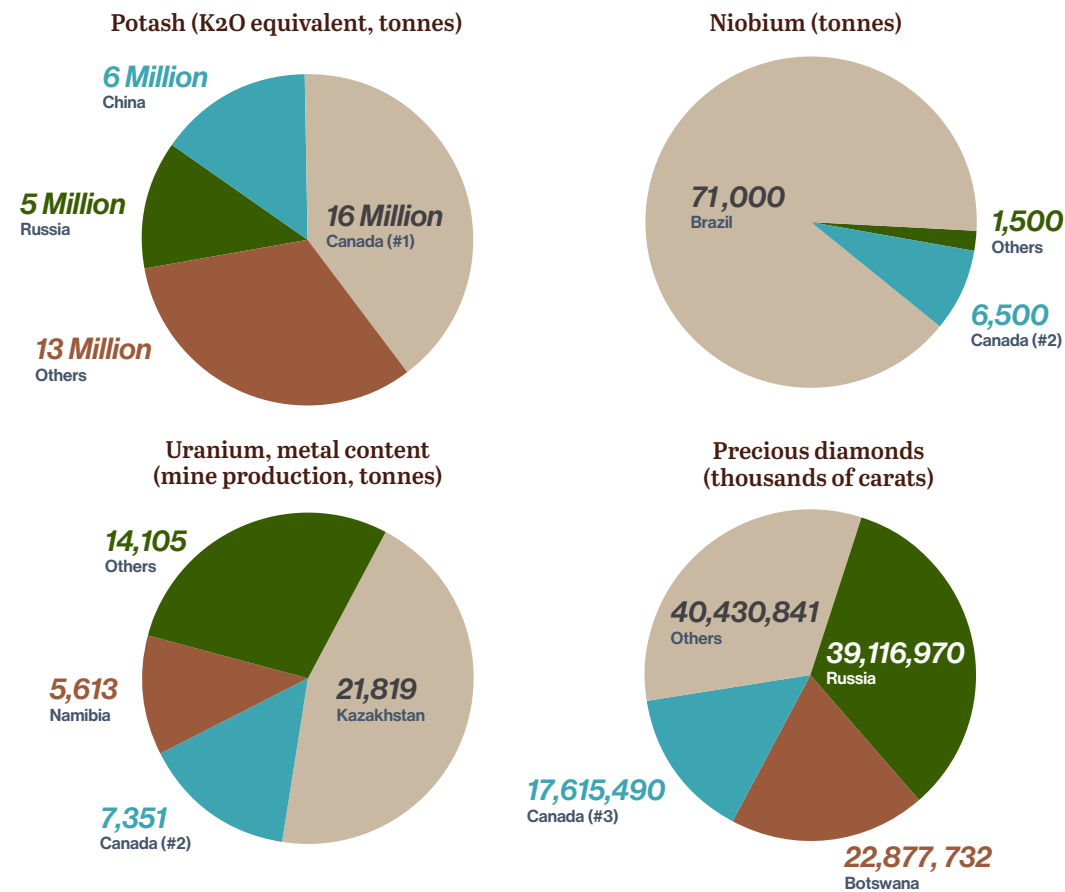


Figure 9: Canada's High Ranking Mineral Products¹⁴

Canada produces 60 minerals and metals and is among the top ten producers in the world for 26 of those. These materials are obtained from open pit or underground mines. The mined products are often transferred to concentrators, where the mined ore is converted to usable raw material through crushing and concentrating the ore.

After decreases in nonmetals and coal in 2020, all mineral production elements increased in 2021 and again in 2022. The total value of Canadian mineral production in 2022 was \$74.6 billion, up from \$58.6 billion in 2021. This growth was led by the increase in production values for nonmetals (up 68% over 2021) and coal (up 85% from 2021). The total value of minerals production has quadrupled since 2000 as shown in Figure 10.

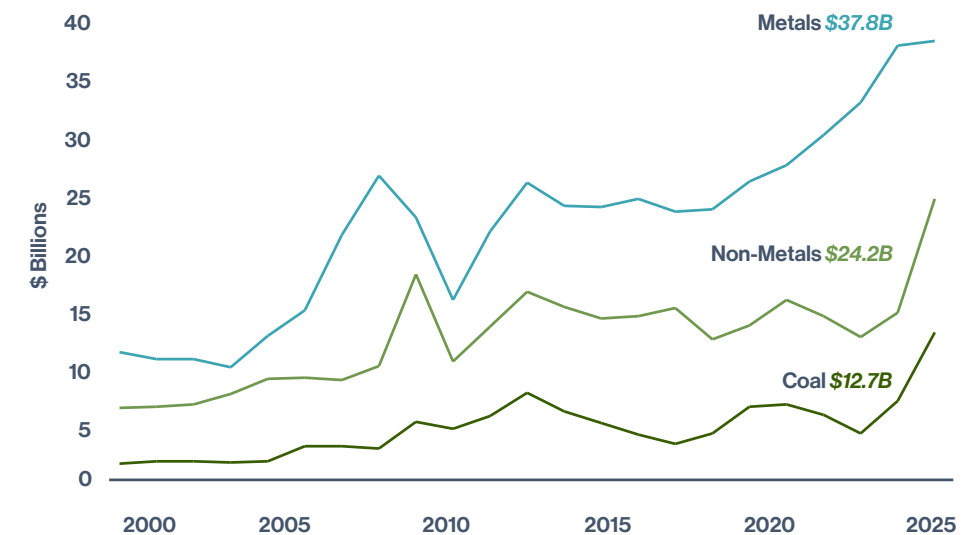


Figure 10: Value of Canadian Mineral Production, 2000-2022¹⁵

14 Sources: U.S. Geological Survey (USGS); bp Statistical Review of World Energy; World Nuclear Association (for uranium); Kimberley Process (for diamonds)

15 Sources: Natural Resources Canada; Statistics Canada. Data for 2022 are preliminary. This table includes the production of coal but excludes the production of petroleum and natural gas. Numbers may not add to totals due to rounding. As of 2017, Statistics Canada is no longer conducting the monthly survey of cement, and values are no longer included in Canada's mineral production. Cement production has also been excluded from 2000 to 2016 values for comparability.

Canada's top 10 minerals and metals (see Figure 11) each had projected production values of more than \$1 billion in 2021. Three (gold, potash, and coal) were valued at more than \$10 billion each.

Since 2012, production quantity of at least five of the top ten minerals and metals has declined. An increase in most commodity prices means that only stone has seen a decline in the value of production.

	Units	2013		2022 (p)		Change 2013 - 2022	
		Quantity	\$ Value	Quantity	\$ Value	Quantity	\$ Value
			(millions)		(millions)		(millions)	(millions)
Potash	kt (MOP)	16,645	5,769	23,876	16,833	+43%	+192%
Gold	t	131	6,141	204	13,168	+55%	+114%
Coal	kt	68,751	4,887	not avail.	12,655	NA	+159%
Copper	kt	621	4,695	529	6,030	-15%	+28%
Iron ore	kt	42,063	5,348	not avail.	5,866	NA	+10%
Nickel	kt	218	3,373	143	4,177	-34%	+24%
Diamonds	ooo ct	10,600	1,964	17,385	2,387	+64%	+22%
Platinum group	t	25	767	22	2,131	-14%	+178%
Sand and gravel	kt	241,061	1,942	204,410	2,023	-15%	+4%
Stone	kt	147,746	1,509	116,323	1,169	-21%	-23%

Figure 11: Mineral Production, Selected Minerals, 2012 and 2021¹⁶

Canada's Critical Minerals Strategy identifies six minerals as initial priorities: lithium, graphite, nickel, cobalt, copper and rare earth elements. Canada did not produce any lithium or rare earth elements in 2022. For the other four minerals, production is down since 2012 and Canada's rank as a world producer is static or declining. Changes between 2012 and 2022 for the priority critical minerals are shown in Figure 12.

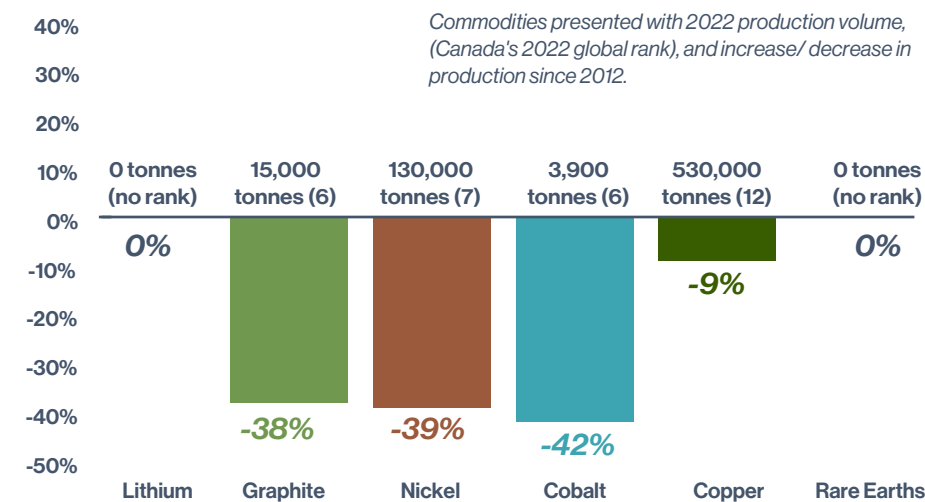


Figure 12: Change in Production of Priority Critical Minerals 2012-2022 by Percent¹⁷

16 Sources: Natural Resources Canada; Statistics Canada. For metals, the quantity refers to the recoverable metal in concentrates shipped. The quantity of potash reported for 2013 has been converted from K₂O to muriate of potash (MOP). As of 2019, iron ore only includes "Iron Ore Concentrates", since "Iron Ore agglomerates" is suppressed by the source.

17 From the USGS National Minerals Information Centre's Commodity Statistics and Information. Using mineral commodity summaries for the relevant years.

PROCESSING MINERALS

Once materials are mined, they must be processed to obtain a product that is useful to the customer. This processing may include:

- Smelting, which removes metal from ore by heating it, often in the presence of other materials to oxidize or reduce the target metal.
- Secondary smelting, which is similar, but uses recycled material as a feedstock rather than mined ore.
- Refining, which removes impurities from metals by chemical or physical processes.

Canada has a significant mineral-processing industry, with 36 non-ferrous metal smelters, refineries and conversion facilities in six provinces. Canada's processing industry is summarized in Figure 13

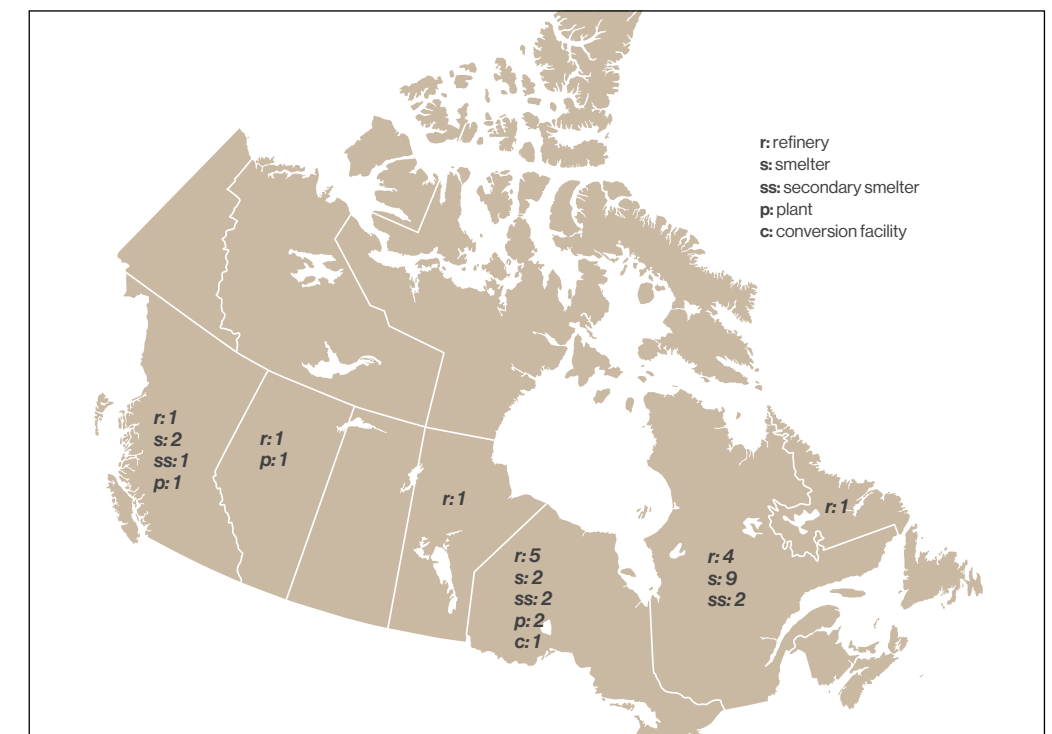


Figure 13: Non-Ferrous Smelters, Refineries, Plants and Conversion Facilities in Canada¹⁸

Canada's integrated smelters and refineries were originally built near mines, which were mostly inland, without access to affordable marine transport. As local ore reserves become depleted and the production of base metal concentrate declines, these smelters and refineries must move from integrated production to the more expensive custom treatment of concentrates imported from other countries.

As another method of addressing declining local ore reserves, Canada's refineries and smelters are using more secondary raw materials and scrap feed. This re-use of materials helps with sustainability but is more expensive than using raw mined materials.

18 Source: Natural Resources Canada. Includes all operations that produced in 2022.

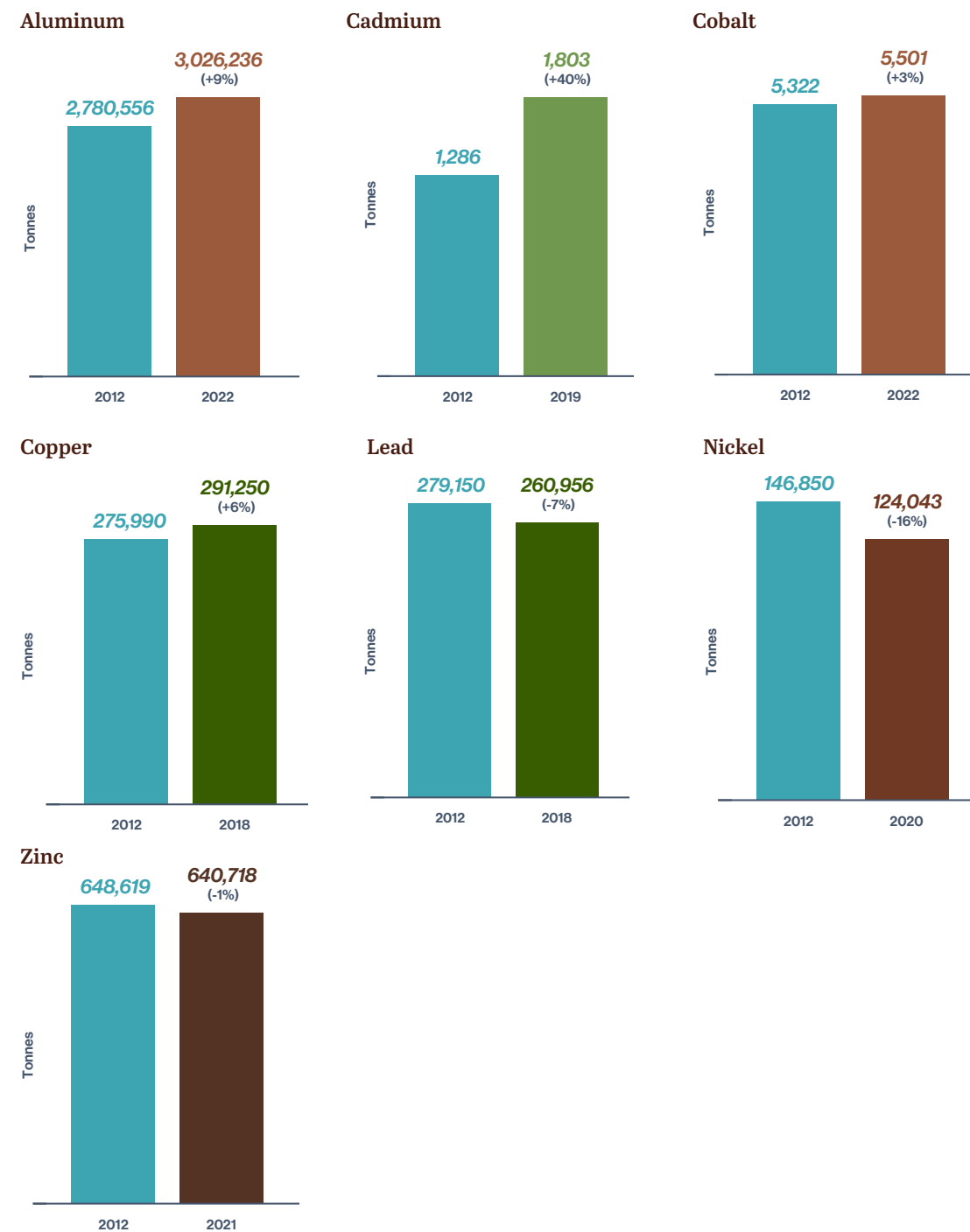


Figure 14: Canadian Refined Metals Production, Selected Metals¹⁹

The quantity and value of refined metal production in Canada have become irregular due to the depletion of reserves and greater dependence on imported concentrates. Figure 14 shows the production volumes for refined metals in 2012 and the most recent year available. Of the seven metals assessed, four are produced at levels higher than a decade ago, and three have less production in the most recent year measured.

¹⁹ Sources: Natural Resources Canada; Statistics Canada, Table 16-10-0019-01.



Photo credit: Suncor

TRANSPORTATION

The mining industry is one of the largest users of Canada's transportation sector, is the single largest industrial customer group of Canada's railways and is a major user of Canada's ports.

Mines and production facilities are often far from the manufacturers and consumers that will use what they produce. Mining products are bulky, heavy and must travel long distances over inhospitable terrain. Some mines are far outside Canada's main transportation networks and require transportation of goods by air, water or temporary ice roads.

As a result, Canada's logistics supply chain is critical to the flow of mined and refined products to both domestic and international markets. Canada's strength in mining rests on its ability to produce and process minerals competitively and to transport products efficiently to and from domestic and international markets.

Mining companies require a reliable transportation network to compete internationally. This is especially true for Canada, the world's second largest country by land mass. Rail, truck and marine shipping are all important means of transportation for the industry.

Rail

For more than a decade, crude and processed mineral products have made up more than half of the total freight volume transported by rail in Canada. In 2022, the total freight volume was 283.6 million tonnes, of which 132 million tonnes was crude minerals, and 28.3 million tonnes was processed mineral products. This means that crude and processed minerals made up more than 56% of the total freight volume in Canada.²⁰

Costs for shipping by rail have increased substantially since 2019 as shown in Figure 15. The Federal Rail Service Price Index tracks price changes for the mainline freight rail industry. Costs are compared to a reference year (2018), which is assigned a value of 100.

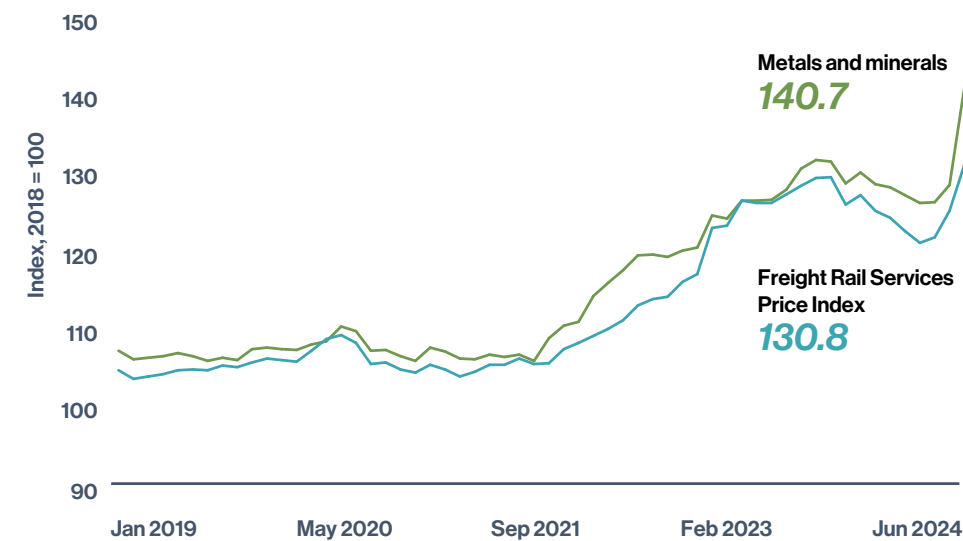


Figure 15: Freight Rail Service Price Index²¹

²⁰ Statistics Canada. Total freight volume reflects revenue freight, which refers to a local or interline shipment from which earnings accrue to a carrier. Total crude minerals include coal, but not oil and gas.

²¹ Statistics Canada, Freight Rail Services Price Index, monthly, Table 18-10-0212-01

For all commodities, rail prices have increased by 17% between 2019 and 2022. Prices remained relatively stable until the middle of 2021, when they began to increase dramatically. While costs began to drop in early 2023, they have resumed an upward trend. Of special concern, the index for metals and minerals has increased more than the rate for all commodities.

In Canada, freight rail is primarily handled by only two Class I railways: CN and CPKC. Of the \$16.5 billion in total industry revenues in 2021, CN and CP were responsible for more than 93%. Communities and businesses are often captive, served by only one of these companies, which gives rail customers little or no competitive choice, and gives the railways market power over their customers.

Both CN and CPKC charge customers fuel surcharges in addition to regular carload rates. In recent years, these fuel surcharges have increased substantially as shown in Figure 16.

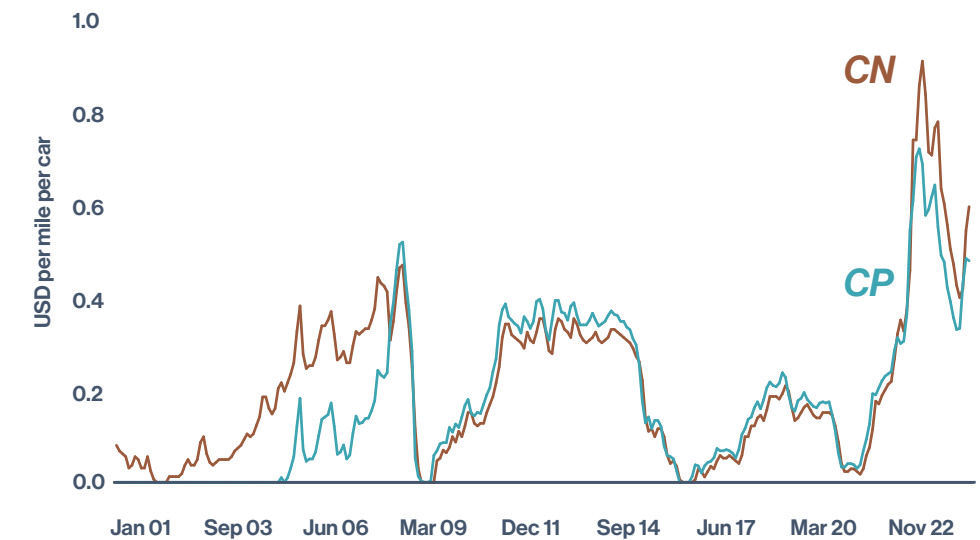


Figure 16: Freight Rail Surcharges²²

Fuel surcharges are based on benchmark costs for diesel for both railways. When the price of highway diesel exceeds a set rate per US gallon, the railways charge an additional per-mile per-car rate to shippers.

The increasing fuel surcharges do not take into account substantial improvements in efficiency by the railways.

Road

Trucking also plays an important role in moving mining products. Trucks move mining products from mines to production facilities and customers, and deliver mining supply inputs to mine sites, such as fuel for operations. Mining sites that do not have access to rail rely on truck and marine shipping for these essential materials.

²² From the United States Department of Agriculture's Railroad Fuel Surcharges data set. Fuel surcharges are per mile per car in US Dollars.

As with rail transport, trucking prices have risen dramatically in recent years. The for-hire motor carrier freight services price index is based on a comparison of current trucking prices to a baseline year (currently 2021) and is maintained by Statistics Canada. While the increase has dropped from its high points in 2022, costs for truck transport are still up substantially from the pre-pandemic era as shown in Figure 17. The index average in 2019 was 96 for local trucking and 97 for long-distance trucking. The average for the first six months of 2023 (the most recent data available) was 117 for local trucking and 121 for long-distance trucking. This is an increase of 22% for local trucking and 25% for long-distance trucking between 2019 and 2023.

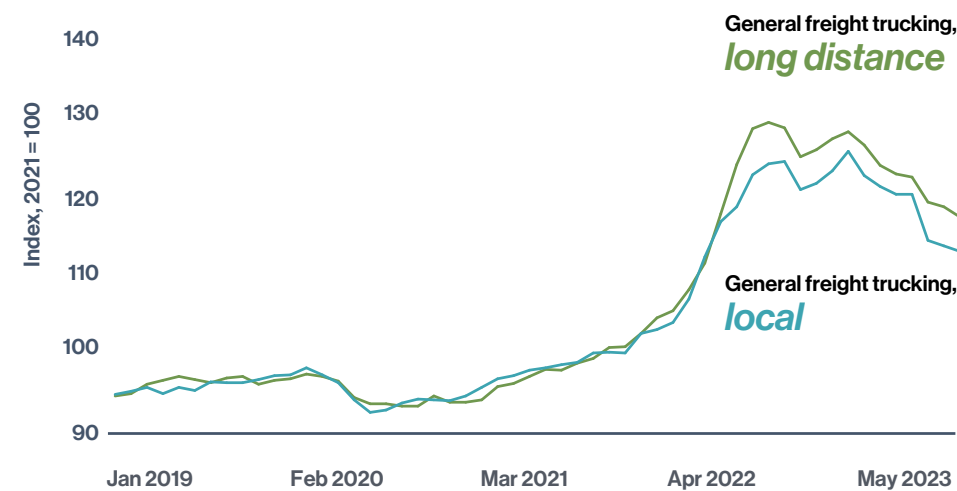


Figure 17: For-Hire Motor Carrier Freight Services Price Index

These increased costs put pressure on all producers of goods. The mining industry is particularly vulnerable to these increases in costs because of the high volume and long distances required to ship its products, and because of the need for transportation of essential supplies to mines.

Marine

Mining is among the largest customers of Canadian ports. The Port of Montreal handles large volumes of mineral products. Total dry bulk mined products accounted for approximately 3.8 million tonnes in 2022, or 46% of the port's dry bulk cargo shipments for the year. Inbound bulk shipments arrive by ship are transported by rail or truck to the region's smelting and refining facilities, and outbound products include iron ore and metal wastes being shipped for processing. On the container side, the port moves metallurgical steel and mineral products, which together accounted for 2.5 million tonnes of goods moved, or roughly 18% of total container volumes²³.

Steelmaking coal accounts for 17% of the total overall volume of goods handled at the Port of Vancouver annually, which moves shipments to China, Japan and other Asian markets. Fertilizer potash represents another 7% of the port's volume, and minerals, metals and ores another 9%. All told, mining products account for 66 million tonnes, or roughly 46% of the port's volume²⁴.

²³ Port of Montreal historical data tables: containerized cargo and dry bulk cargo.

²⁴ Using Principal Commodities, All Cargo table from the Port of Vancouver's 2022 Statistics Overview.

Cargo ships are expensive and take a long time to build. Shipowners do not typically maintain substantial excess capacity and plan for demand years in advance. This means that small increases in demand at the margins can cause substantial price increases. Increased demand for goods during the Covid-19 pandemic meant that prices increased across the board for shipping.

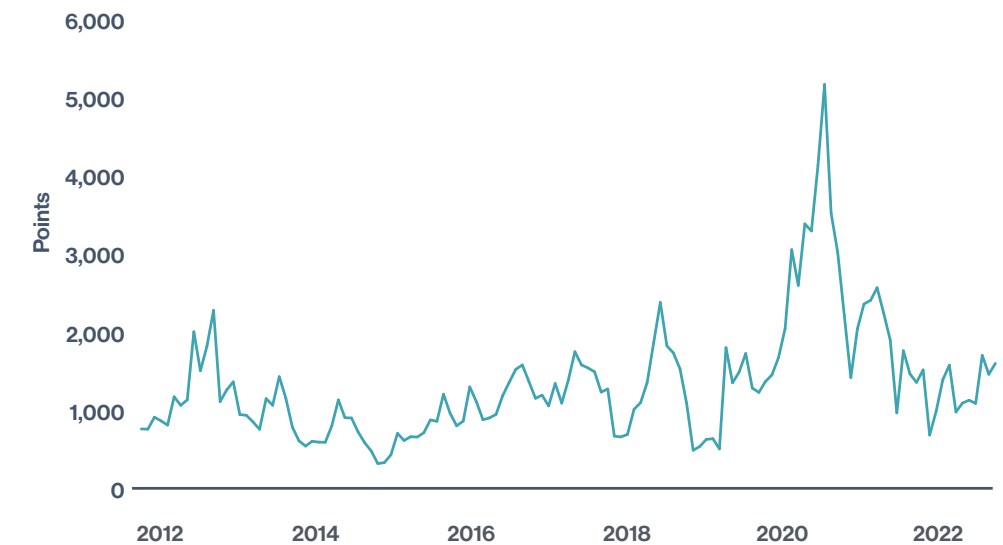


Figure 18: Baltic Dry Index²⁵

The Baltic Exchange's dry bulk sea freight index measures the cost of shipping goods around the world. Throughout 2020 and into 2021, bulk freight prices soared to levels not seen in more than a decade. Prices have declined since their high point in 2021 but were still about 35% above 2019 levels in 2022 as shown in Figure 18.

LOOKING FORWARD

Mineral Production

Canada's mineral production industry faces challenges: Canada is no longer a top producer of minerals critical for a low-carbon economy like copper and nickel, and many minerals are not even being produced at the level they were a decade ago. A decrease in mineral exploration and investment is responsible for part of this decline in production. Canada should be the top jurisdiction in the world to invest and explore.

In order to increase mineral production, Canadian governments should undertake comprehensive mineral resource assessments, based on geoscientific studies, in order to understand and incorporate the value of mineral potential into regional assessments and land management decisions. This is particularly true of northern Canada, where the potential for new discoveries is high.

²⁵ Using data for BDI Baltic Exchange Dry Index BDIY:IND from investing.com

Canada will also need to support mineral production by building infrastructure – transportation, energy and communication. Substantial investment in building the economic backbones of road, rail, power lines and communication lines will ensure that Canadians can benefit from the rich natural resources of our country.

Finally, strong fiscal policy is a requirement for competitiveness in the global mineral industry. Incentives, competitive taxation levels, and efficient and reliable securities regulations are critical for positively influencing investment in Canada's mineral sector.

Mineral Processing

The competitiveness of Canada's mineral-processing industry depends on its ability to secure reliable sources of feedstock from domestic mines. Transportation costs have increased dramatically in recent years, making it expensive to import feedstock from abroad. If the processing industry is to remain competitive, enhancing domestic levels of mineral production through investment in exploration and mine development is essential.

Canada's processing facilities operate in a global market, where China and other countries are expanding their capacity with new facilities and competing fiercely for raw materials. The cost of electricity is also a factor in some Canadian jurisdictions. Given the energy-intensive nature of mineral processing, high-power-cost jurisdictions dampen the competitiveness of existing operations and deter future investment.

Finally, the age of some Canadian operations, and their ability to meet potential regulatory requirements, also affects their viability.

In the face of these factors, the downstream Canadian mining industry risks being left behind.

The projected need for large volumes of minerals and metals, specifically critical minerals, means that demand both domestically and globally will be high. With among the lowest carbon intensity nickel production in the world, Canada must signal that it no longer takes its smelting and refining industry for granted, nor the extractive supply chain that supports these critical mineral assets. Action to protect its competitiveness is essential to the low-carbon economy both in Canada and abroad.

Supply Chain

A robust, dependable supply chain with stable prices is a significant determinant for mining industry investment given the volume of mineral and metal products transported in Canada. Natural disasters, labour disputes, and pandemic related disruptions have all had a negative impact on Canada's logistics network. The global supply chain is also strained from sharp swings in consumer demand during the pandemic and the knock-on impacts to land, air and sea freight.

The costs to Canada of uncertain supply chains are high: reputational damage as a reliable trade partner; additional operational costs to businesses; and reduced confidence in Canada as a destination for business investment for supply-chain reliant businesses, such as mining. While the government is seized with economy-wide supply chain challenges, concrete solutions, such as legislative fixes to longstanding mining industry recommendations to address transportation network challenges, (see Rail section below) remain elusive.

Rail

Canada's rail freight system is a duopoly, with limited choice for its customers. Communities and businesses are often captive to a single railroad serving their area.

The result of the lack of competition is railway market power that is exercised through railway internal/operational decisions that result in rail shippers paying excessive rates and receiving variable and inadequate service.

High fuel surcharges do not consider increased rail efficiencies over the past decade. Net CN and CPKC gains from excess fuel charges amounted to almost \$900 million in the decade before 2022. CN and CPKC fuel surcharges outpace increases in their respective fuel costs by 40% (CN) and 31% (CPKC).

Canadian miners need a reliable, efficient partner in the rail industry that works hard to reduce its costs, and passes part of the savings on to its customers rather than considering the money as windfall profits.

Marine Shipping

The International Maritime Organization (IMO) is the United Nations' Special Agency responsible for the safety of life at sea and the protection of the marine environment. As a signatory to the IMO's conventions, Canada's domestic maritime shipping policies tend to move in tandem with those of the IMO. The Canadian mining industry is committed to upholding the highest environmental protection standards pertaining to shipping in the marine environment.

MAC appreciates the constructive and solutions-oriented engagement our industry has had with Transport Canada, who lead and coordinate Canada's delegation to the IMO, on a range of marine issues, including most recently support from department and Canadian delegation to oppose a proposal by the Australian delegation to amend the current individual schedule for Coal in the International Maritime Solid Bulk Cargoes Code.

Canada's opposition was based on a specific technical problem related to the correct assessment and identification of the self-heating hazard of coal (while being shipped in bulk via marine vessel), the basis for the Australian proposal. Canada was not alone in this position at the IMO meeting, and a decision on the proposal was delayed with more study and discussion to be undertaken by an IMO technical committee.

As a regular observer on Canadian delegations to IMO, MAC appreciates Canada's reputation for excellence and collaboration at the IMO, and attributes this to the hard work and expertise of our diplomats and technical experts in these areas.

SECTION 3

The Money: Reserves, Prices, Financing, Exploration, Investment and Fiscal Policy

The process that brings mineral resources from identification to economic production is capital intensive. Mining companies require money to operate as they identify and quantify reserves. They require capital to build mines, to construct roads and bridges, to generate power, and to upgrade existing facilities.

Investment in infrastructure, construction and repairs depends on complicated interactions between global prices for minerals, the regulatory environment, and the cost and availability of capital.

As a result, mining requires sophisticated capital markets. Markets connect investors with companies that require capital for exploration, capital investment, and research and development. Access to capital is what transforms mineral resources from a potential asset to a real one.

CANADIAN RESERVES

Mineral resources of metals, non-metals and precious stones are present across the country. The process of determining whether it is economic to extract these resources begins with exploration.

There are specific names attached to mineral resources, depending on the level of confidence with which they are known. Mineral resources may be *inferred*, *indicated* or *measured* in increasing levels of confidence and measurement. *Indicated* and *measured* resources can be converted into *probable* or *proven* reserves depending on the confidence that a qualified person has in the estimates, and on the factors that affect the costs of extraction. A diagram of the relationship between resources and reserves is presented in Figure 19.

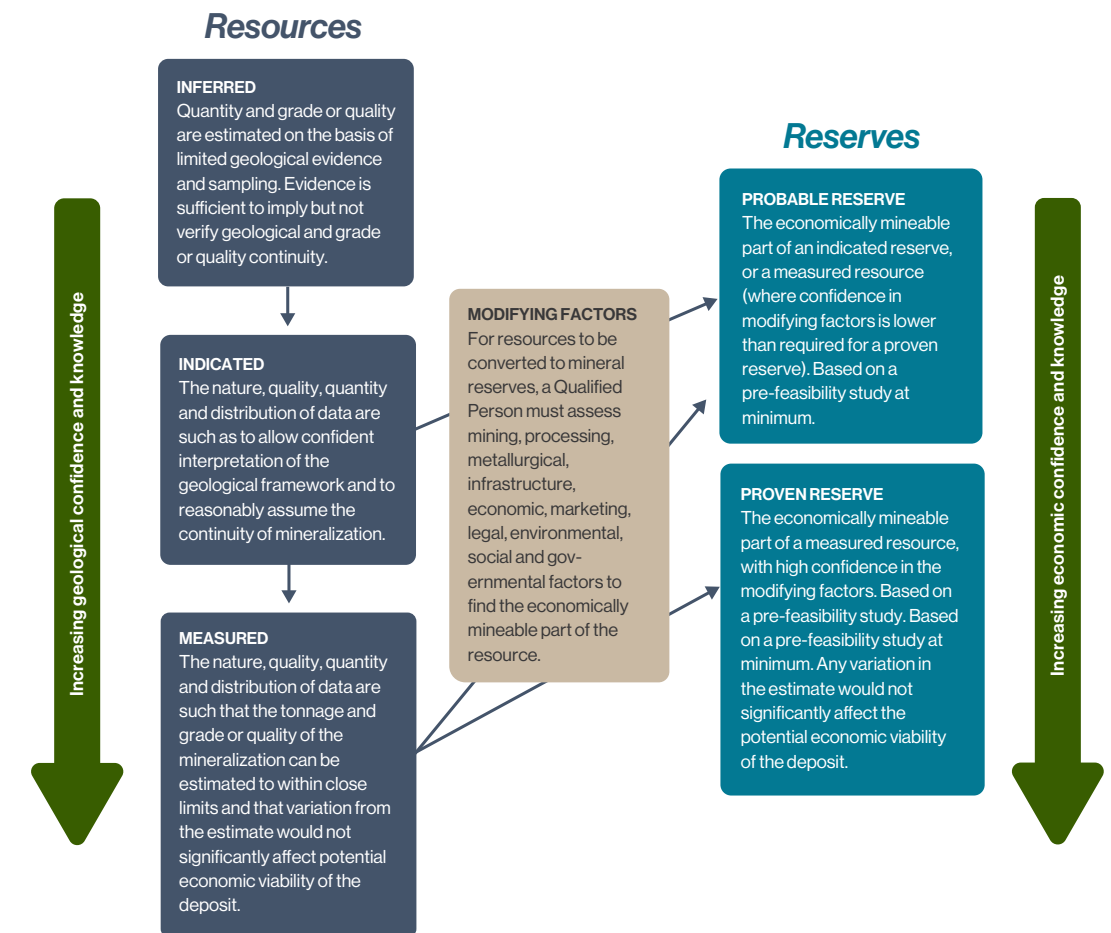


Figure 19: Resources and Reserves²⁶

Mineral reserves decrease through mining activities but can increase through exploration and the development of new technologies.

²⁶ Based on definitions and Figure 1 from the CIM Definition Standards for Mineral Resources & Mineral Reserves by the Canadian Institute of Mining, Metallurgy and Petroleum Standing Committee on Reserve Definitions.

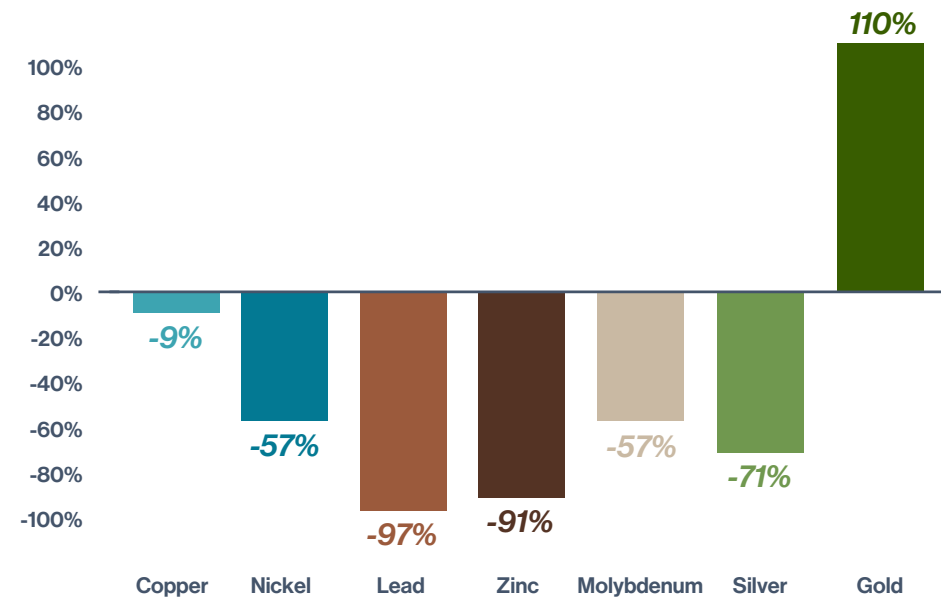


Figure 20: Proven/Probable Mineral Reserve Changes in Canada from 1997 to 2022²⁷

Figure 20 shows percentage change in proven and probable reserves from 1997 to 2022. In the past 25 years, there have been marked declines in Canadian mineral reserves in all major base metals except gold (see also Annex 5). The most dramatic declines have been in lead, down by 97% from its 1997 level; and zinc, down by 91% since 1997.

Consistent investment over time and access to large tracts of land to explore are needed to reverse the long-term decline in proven and probable reserves. Identifying new reserves to be mined and then used in the economy requires investment in both exploration and mining development.

New technologies may also be helpful in increasing reserves. Libraries of core samples containing many years of data can be re-evaluated by new algorithms aided by artificial intelligence to identify potential resources that were originally missed. Increasingly sophisticated methods for modelling the size of resources can also increase reserves. Because the economic viability of extraction is an important part of the calculation of reserves, extraction costs are important inputs. More efficient methods of extraction can increase reserve size when costs are reduced, and it becomes economical to extract larger amounts of ore.

²⁷ Canadian reserves are estimated by Natural Resources Canada and l'Institut de la statistique du Québec (Quebec) from information contained in annual and other corporate reports. Reserves reported here include only metal contained in material that is classified by companies as "proven reserves" or "probable reserves" at producing mines and in deposits that are firmly committed to production. Data from 2022 is preliminary.

EXPLORATION

Exploration is the first step in mineral resource extraction. Identifying and quantifying reserves mean that mines can be developed, smelters and refineries can be built and operated, and manufacturing is provided with the inputs it needs.

The goal of exploration is to locate mineral resources that may become reserves. Technological advances in surveying, airborne technologies and down-hole seismic imaging have enabled companies to find deposits with less environmental impact and more success than ever before. Increasing reserves over the long term, however, requires ongoing investments in exploration.

Exploration and Deposit Appraisal in Canada

Spending on exploration is a leading indicator for the future success of mineral production in Canada. Natural Resources Canada defines spending on finding and assessing mineral resources as follows:

- **Exploration expenditures:** Spending on activities up to and including the first delineation of a previously unknown mineral deposit.
- **Deposit appraisal expenditures:** Spending on activities that bring a delineated deposit to the stage of detailed knowledge required for a production feasibility study.

The two expenditures combined are "exploration spending."

Spending on exploration and deposit appraisal fell to \$2.2 billion in 2020, as a result of low commodity prices and the pandemic. After increases in mineral and metal prices and a lessening of pandemic impacts, exploration spending rose 17% to \$3.6 billion in 2021 and a further 8% to \$4.1 billion in 2022.

Exploration spending is expected to continue rising in 2023 as a result of commodity price increases and shortages due to the ongoing war in Ukraine.

Precious metals attracted most of Canadian exploration spending in 2022, accounting for 66% overall (see Figure 21). High gold prices have driven interest in precious metals exploration investment. If inflation continues above historical levels, the "safe-haven" status of gold may mean a continued focus on precious metals.

From 2012 to 2022, base metal exploration's share of total investment increased from 16.3% to 24.5%, and the absolute value of dollars increased from \$633 million to \$996 million. Uranium exploration spending increased slightly over the decade, from \$205 million to \$232 million. Most other targets also saw a decrease in the value invested in exploration between 2012 and 2022.

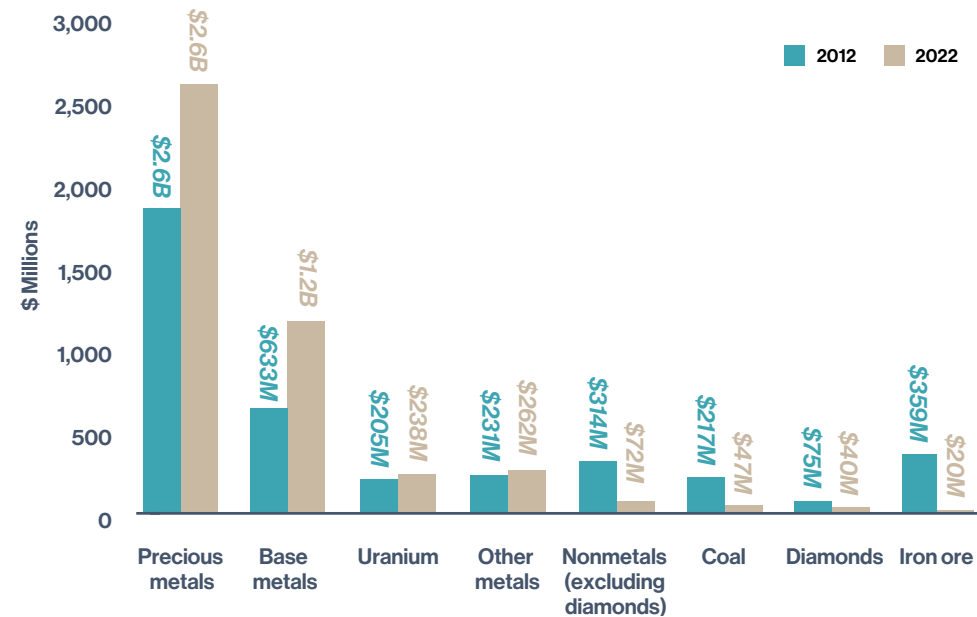


Figure 21: Mineral Exploration And Deposit Appraisal Expenditures in Millions of Dollars, By Target, 2012, 2022

Spending on exploration for the 31 minerals on Canada's Critical Minerals List has increased in recent years, based partly on the anticipated demand from the transition to cleaner energy and on Canada's new Critical Minerals Exploration Tax Credit. Battery minerals and metals, in particular, have seen substantial increases in exploration spending. Spending on copper, nickel and zinc was responsible for most of the exploration expenditures, but cobalt, graphite and rare earth elements saw sizeable percentage gains over the period.

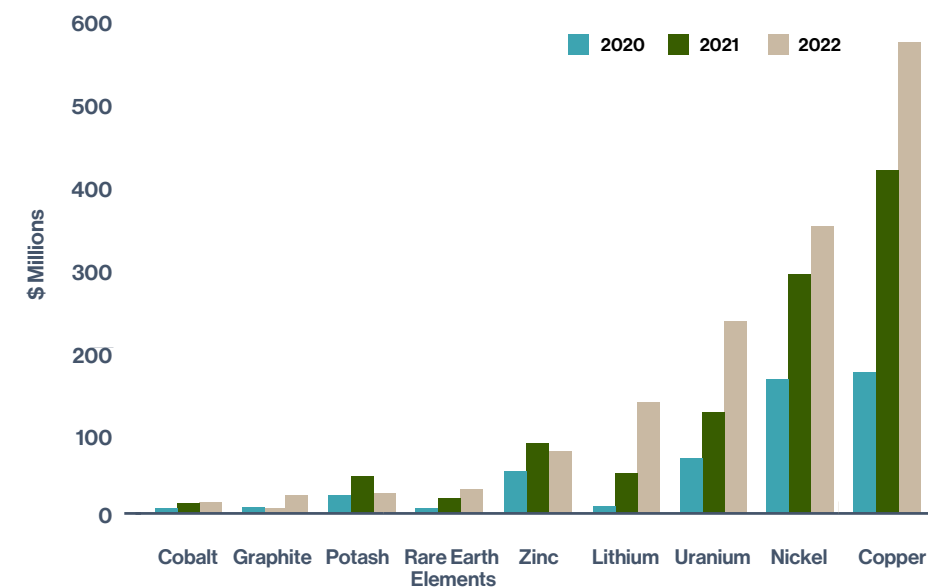


Figure 22: Critical Minerals Exploration Spending²⁸

28 From NRC's Canadian Mineral Exploration Information Bulletin (June 2023). Data for 2022 are preliminary.

Canada as a Global Destination for Exploration Spending

Globally, Canada has been a top destination for mineral exploration investment for the past forty years. In 2023, 19% of global exploration spending was in Canada, the top national destination. Recent spending in the top two destinations for mineral exploration is shown on Figure 23.

Global spending on exploration declined slightly in 2023 to \$12.8 billion. Global exploration spending remains substantially below the peak of US\$20.5 billion in 2012. Expenditures on exploration around the world are forecast to be approximately the same in 2024²⁹.



Figure 23: Exploration Spending, Top Countries 2007-2022³⁰

MINERAL AND METAL PRICES

Mineral and metal prices have a direct effect on the attractiveness of investment. When prices are high, investors are more likely to provide the capital required for projects. Given that most projects involving metals and minerals have a multi-year timeline, stable, increasing prices are the most desirable trend.

Mineral and metal prices have varied dramatically during the pandemic years. Quick changes in demand and supply chain challenges meant that price volatility was the norm.

29 Sean DeCoff, S&P Global Market Intelligence. CES 2023 – Monetary tightening weighs down exploration activity. <https://www.spglobal.com/marketintelligence/en/news-insights/research/ces-2023-monetary-tightening-weighs-down-exploration-activity>.

30 Canadian data from Natural Resources Canada, based on the Federal-Provincial/Territorial Survey of Mineral Exploration, Deposit Appraisal and Mine Complex Development Expenditures. Australian values from Australian Bureau of Statistics, 8412.0 Mineral and Petroleum Exploration, Australia Table 2. Mineral Exploration, (Other than for petroleum) - Expenditure and metres drilled. Dollar values converted to C\$.

Metal	Unit	High Value (month)	Low Value (month)	% difference
Aluminum	US ¢/lb	\$1.59 (March)	\$1.01 (September)	36%
Gold	US \$/tr. oz	\$1,950.03 (March)	\$1666.63 (October)	15%
Silver	US \$/tr. o	\$25.24 (March)	\$18.84 (September)	25%
Copper	US \$/lb	\$4.64 (March)	\$3.42 (July)	26%
Nickel	US \$/lb	\$17.08 (March)	\$9.74 (July)	43%
Zinc	US \$/lb	\$198.28 (April)	\$133.31 (November)	33%
Iron Ore	US \$/DMT	\$151.04 (March)	\$92.43 (October)	39%
Uranium	US \$/lb	\$58.20 (March)	\$43.08 (January)	26%

Figure 24: 2022 Minimum and Maximum Monthly Prices for Selected Metals³¹

In 2022, prices for metals varied substantially from their monthly minimum to their monthly maximum (see Figure 24). While gold prices were relatively stable, other metals like nickel and iron ore changed dramatically over the year.

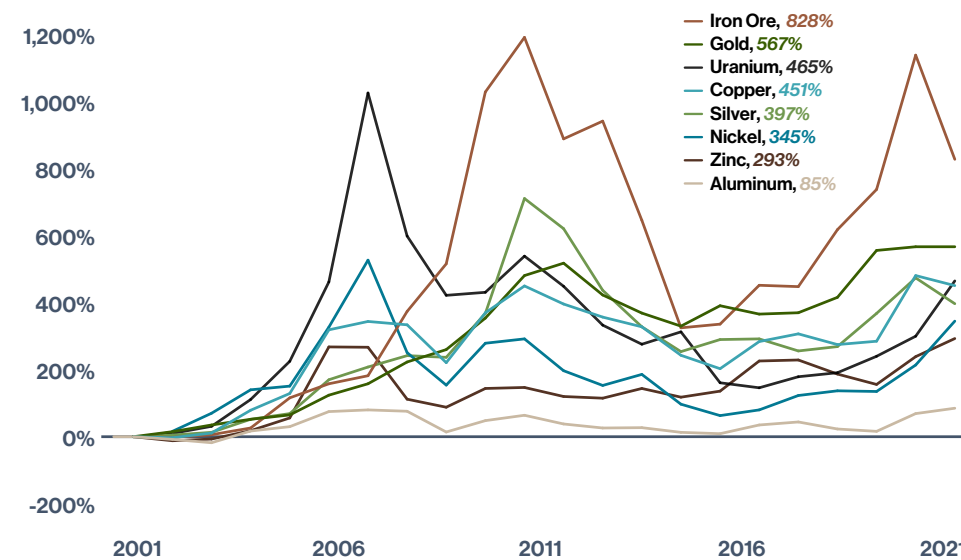


Figure 25: Price Increase/Decrease of Selected Metals Since 2001 (%)³²

Over the longer term, metals prices have increased from recent lows. Figure 25 illustrates the strong growth in mineral prices from 2000 to 2007, the dramatic decline for most metals in late 2008, the rebound of prices through 2011, and the subsequent downward pressure on many minerals and metals during the early to mid-2010s. Recent years have shown a robust increase in these metals relative to the baseline.

Demand for mineral and metal products is likely to increase over the medium to long-term at an accelerating rate. The transition to a lower carbon future will result in increasing demand for battery minerals and metals, including copper, nickel, lithium and cobalt. Increasing geopolitical tensions and their implications for supply-chains mean that there is increasing desire to keep inputs to critical manufacturing capabilities close to home.

31 Price data from Cameco (uranium) and Market Insider (all other metals).

32 Price data from Cameco (uranium) and Market Insider (all other metals).

FINANCING

Canada is the leading global centre for mining finance. The Toronto Stock Exchange (TSX) and TSX Venture Exchange (TSX-V) list 43% of the world's publicly traded mining companies. Combined, the two exchanges accounted for more mining equity capital raised (\$44 billion, or 37% of the total raised worldwide) than any other exchange³³.

At the end of 2022, 1,157 of the firms listed on the TSX and TSX-V were mining companies. Together, they had a combined market value of \$520 billion and raised \$7.6 billion in equity. TSX-listed mining companies mainly deal in gold, copper, uranium, silver, diamonds, zinc, nickel, lithium, iron ore, zinc and molybdenum. Listings of mining companies on both exchanges have been relatively steady in the past five years, but are down almost 30% over the past decade, as shown in Figure 26.

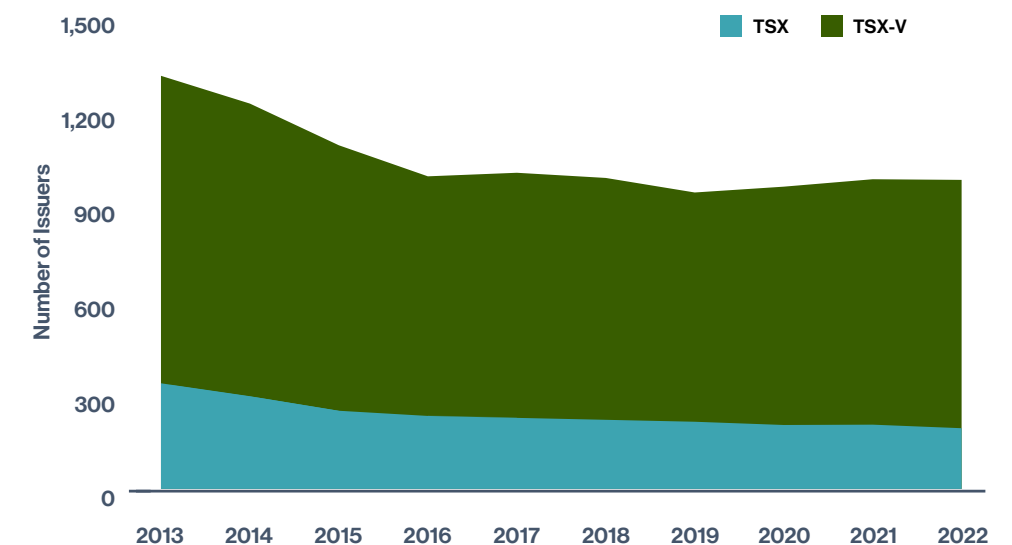


Figure 26: TSX and TSX-V Mining Listings by Year³⁴

Canadian exchanges have traditionally been the most desirable location for initial public offerings for mining companies. In recent years however, the Australian Securities Exchange has increasingly been a destination for IPOs as shown in Figure 27.

33 Toronto Stock Exchange, TSX Venture Exchange. *The MiG Report, December 2022*. <https://www.tsx.com/resource/en/2952>

34 From Market Intelligence Group reports by TSX and TSX-Venture Exchanges. Using December monthly reporting for years 2013-2022.

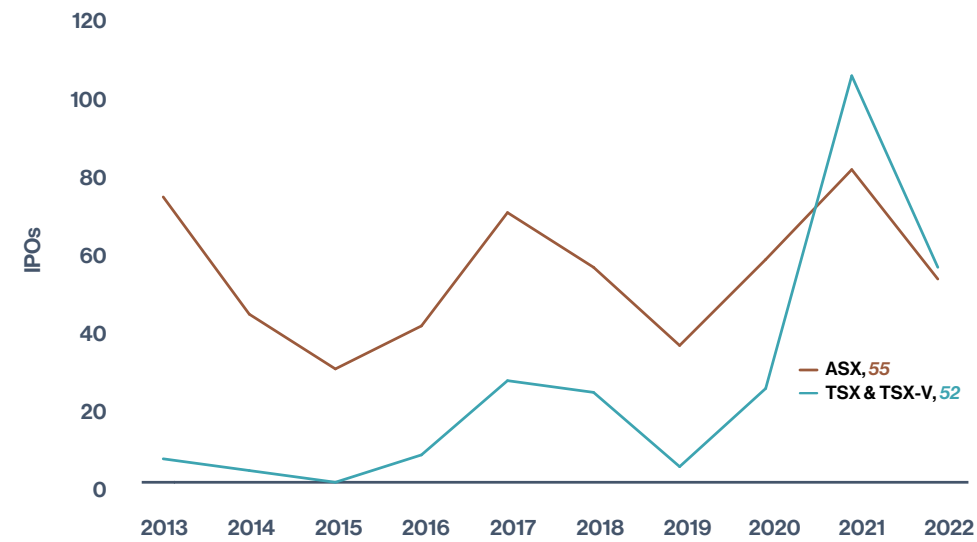


Figure 27: New Listings by Year, Canada and Australia³⁵

Canada's pre-eminence in the world of mining finance should not be taken for granted. The Canadian exchanges give mining companies access to capital while offering investors a regulated market for venture investments. The ecosystem of businesses that support mining finance in Canada form a beneficial cluster that creates benefits for the sector and the whole economy.

Global Financing

Global financing for the mineral sector, that is, both equity and debt raised by the industry across the world, contracted substantially in 2022, from US\$65 billion in 2021 to US\$42 billion. Equity financing was down by half from US\$34 billion in 2021 to US\$17 billion. Debt finance was also down, from US\$31 billion in 2021 to US\$25 billion in 2022. According to the Prospectors and Developers Association of Canada, the "increase of interest rates by central banks and growing concerns for [the] global economy are likely the key factors behind the decline of availability of both equity and debt capital, as high interest rates and economic uncertainty are expected to reduce the valuations of mining stocks and to discourage companies from issuing new debt."³⁶

Financing for the Junior Mining Sector

The mining sector has traditionally been divided into two types of company: junior and senior. Junior companies are nimble, flexible, and raise money on the equity markets to support their exploration activities. Senior mining companies are more experienced, larger, and generate cashflow from their operations and production instead of raising it on the market. When a junior company finds a mineral resource that could become a mine, they typically partner with a senior company to bring the mine into production.

³⁵ Using Initial Public Offerings (IPOs) on the Australian Securities Exchange for mining and materials companies from S&P Global Market Intelligence and IPOs, qualifying transactions, reverse takeovers and "other" transactions from the TMX Market Intelligence Group reports for each year for TSX and TSX-V.

³⁶ From Mineral Finance 2023: Shifting Tides Within the Mineral Industry by the Prospectors and Developers Association of Canada.

Junior mining companies face persistent challenges raising the capital that they need to operate. In Figure 28, the wide variation in expenditures by junior companies is visible: junior miners were able to raise only \$634 million in 2016, but more than \$2.3 billion in 2022. Because juniors don't generate cashflow from their activities, they require access to capital for all aspects of their operation: for salaries, for drilling equipment, for modelling geology and for conducting feasibility studies. Without sufficient access to capital, the years of work required to move a project forward may be substantially delayed.

At their high point in 2011, expenditures were roughly equal between senior (\$2.178 billion) and junior (\$2.049 billion) companies. At their recent low point in 2016, junior companies were responsible for less than 40% of the \$1.6 billion total. Preliminary figures for 2022 indicate that junior companies spent about 57% of the \$4.067 billion total. Intended spending for 2023 sees a drop in total spending to \$3.7 billion, of which 54% will be by juniors.

While proportions vary year to year, each party is projected to account for roughly 50% of expenditure over the long term.

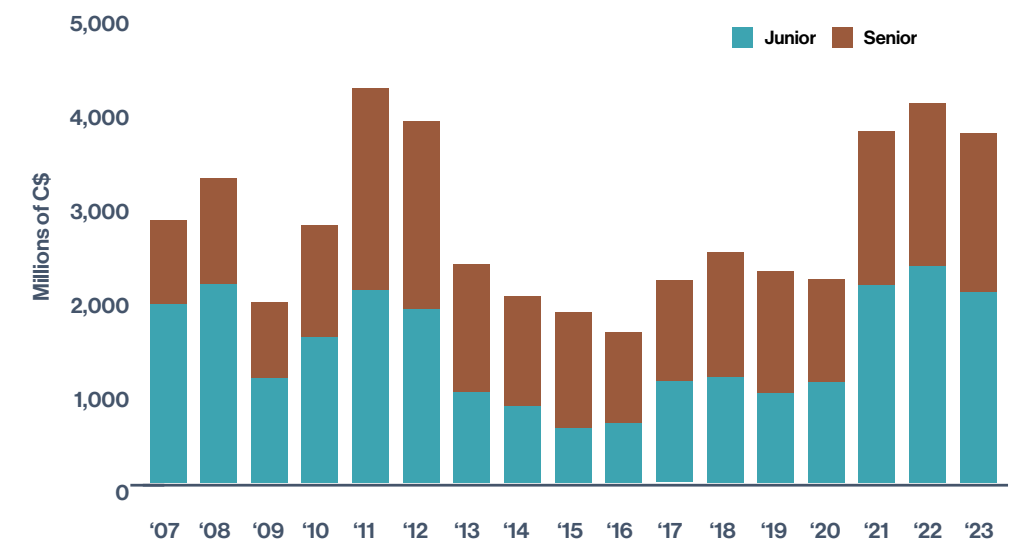


Figure 28: Mineral Exploration and Deposit Appraisal Expenditures, By Company Type, 2007 - 2023³⁷

³⁷ Natural Resources Canada, based on the Federal-Provincial-Territorial Survey of Mineral Exploration, Deposit Appraisal and Mine Complex Development Expenditures. Data for 2022 are preliminary, for 2023 intended.

MINING INDUSTRY CAPITAL INVESTMENT

In 2022, capital spending by the mining industry made up 4.3% of Canada's total capital expenditures on non-residential tangible assets. The value of capital spending in mining and quarrying was \$13.1 billion in 2022. This is down from a high of almost \$17 billion in 2012, but up from recent years as shown in Figure 29. Planned capital expenditures for 2023 are \$15.8 billion.

Capital investment in primary metal manufacturing has also seen recent increases, while fabricated metal product manufacturing and non-metallic mineral product manufacturing have remained steady.

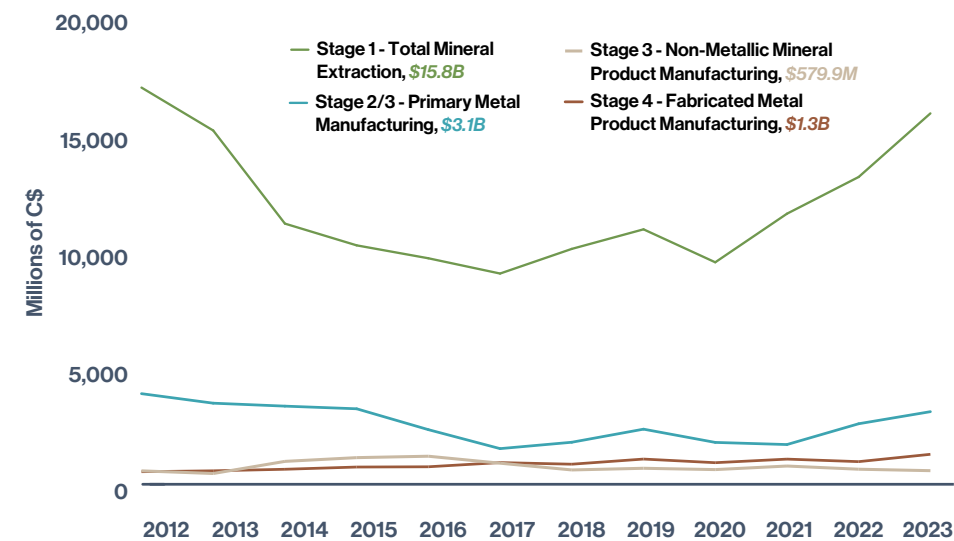


Figure 29: Capital Expenditures by the Mining Industry³⁸

Although capital spending covers all stages of the industry, 90% is typically invested in extraction and smelting/refining. Within Stage 1 (mining and quarrying), approximately two thirds of capital spending goes towards construction and one-third towards machinery and equipment. In Stage 2, primary metal manufacturing, the ratio is reversed, with about one-fifth of spending directed to construction and the rest to machinery and equipment.

Despite increased volatility, commodity prices have seen steady year-over-year increases since their low point in 2016. Increases in investment to meet projected demand have been evident in recent years, although the extent to which capital investment will rebound after years of low growth remains uncertain.

³⁸ Statistics Canada. Table 34-10-0035-01 Capital and repair expenditures, non-residential tangible assets, by industry and geography (x 1,000,000). Data for 2022 is preliminary, for 2023 is intended.

LOOKING FORWARD

Federal, provincial and allied international governments have recognized that Canada has the raw materials and value-added mineral and metal manufacturing expertise to help meet their growing demand while diversifying supply sources. In short, countries diversify their supply chains with improved security and sustainability when they source materials from Canada. But there remains work to do to ensure Canada's competitiveness isn't diminished.

Over the last 15 years, several Canadian senior mining companies have been acquired by multinationals, resulting in fewer head offices in Canada. Canada's share of global production for critical minerals and metals has been decreasing, with other jurisdictions capturing greater market share of growing global demand. Capital investment continues to be substantially below its level a decade ago.

One way to spur investment is through tax credits. Canada's 2022 Fall Economic Statement introduced the Clean Technology Investment Tax Credit, offering Canadian businesses a 30 percent refundable rate for adopting clean technology. In Budget 2023, the federal government extended the eligibility of the Clean Technology Investment Tax Credit to further boost the growth of Canada's expanding clean technology sector.

Budget 2023 proposed a new clean technology manufacturing refundable tax credit equal to 30 percent of investments in new machinery and equipment used for manufacturing or processing essential clean technologies and critical minerals.

An overarching objective of these tax credits is to accelerate mining projects into production, increasing the availability of critical minerals essential for the low-carbon economy. This is important in a North American context, where the United States' Inflation Reduction Act offers incentives to promote its own domestic production of minerals. The attractiveness of these incentives could redirect capital towards the U.S., reducing opportunities for Canadian miners.

Canada must establish streamlined procedures and transparent eligibility criteria for businesses that want to access investment tax credits. The credits should also be flexible enough to move with innovation in the industry as the landscape of clean technology and mineral extraction continues to evolve.

MAC recommends the following set of principles for the development of investment tax credits, ensuring they remain flexible and effective:

Clean Technology Manufacturing ITC: Eligible Expenses

- Eligible expenses should encompass all mine development-related expenditures, not limited to equipment.
- Eligible activities should include recycling activities associated with the six priority critical minerals to comprehensively address their entire value chain.
- Eligibility of all extracting and processing equipment associated with the six priority critical minerals should be clearer. MAC recommends that any property included in Class 41, 43, or 53 in Schedule II of the *Income Tax Regulations* and used entirely or substantially in the extraction, processing, or recycling of these minerals should qualify for the credit.

- Clarify whether eligible equipment that is leased or financed qualifies for the credits. This will assist mines in their planning efforts, while also allowing original equipment manufacturers and dealers to prepare programs that can support the industry.

Timely Rebates

Given the long construction timeline for new mines, Canada must establish a prompt and uncontested rebate process. Previous investment tax credits like the Scientific Research and Experimental Development tax incentive have had protracted waiting periods for cost verification and slow rebate processing.

The typical construction cycle for most mining operations is 2 to 3 years after permitting. As a result, delays in the rebate process compromise the intent of the tax credits – to provide financial assistance with the initial capital outlay associated with new mine construction.

Available for Use

The concept of “Available for Use” is significant for projects moving into construction and production. Rather than waiting for the availability for use of a qualifying asset, costs should be acknowledged as they are incurred. The time between when costs are incurred and assets are available for use can be very long, which could compromise the effectiveness of the tax credits. The credits are needed during the construction phase, when capital is most limited, not when production begins.

Clean Technology Manufacturing ITC: Metals Requirement

Ensuring that the qualifying criteria for metals do not impose excessive minimum requirements is crucial. This is particularly important considering that the majority of minerals on Canada’s list of 31 critical minerals (including the six priority critical minerals) are found within polymetallic deposits. MAC recommends that the draft legislation be crafted to anticipate situations where factors such as fluctuating metal prices, limitations in metallurgical extraction, or variations in orebody grade sequences could cause certain minerals to fall below a predetermined threshold. Such circumstances could potentially penalize companies for producing other essential metals and jeopardize their eligibility for tax credits.

Clean Technology ITC: Recapture Rules

The proposed recapture rules tied to the Clean Technology Investment Tax Credit suggest applicability to activities taking place within twenty calendar years after the initial property acquisition. This may be longer than the useful life of some mining equipment. Recapture rules should consider the case where the useful life of the property falls short of the stipulated 20-year period.

Labour Requirements: Administrative Burden

The proposed labour requirements for the Clean Technology Investment Tax Credit should not impose a significant administrative burden. Monitoring, documentation, compliance, and adaptability can be difficult to monitor when supervising third-party contractors or where there is no active union on the project site. Administrative burdens of this type can, instead of encouraging investment, inadvertently deter potential partners and delay or even impede projects.

Clean Technology ITC: Clean Technology Properties

The draft legislation for the Clean Technology Investment Tax Credit includes a definition of Clean Technology Property. The utilization of the equipment listed in this definition will contribute to the reduction of greenhouse gas emissions. The mining industry is actively striving to decarbonize its operations and should play a role in assisting Canada to achieve its 2030 target of reducing total greenhouse gas emissions by 40 to 45 percent relative to 2005 levels.

All investment tax credits should serve as incentives for the mining industry to engage in decarbonization efforts that go beyond what is currently outlined as clean technology property in the proposed draft legislation or budget announcements.

Examples of equipment that could be added include:

- Equipment employed in metal production through a process that substantially eliminates all greenhouse gases resulting directly from refining, smelting, processing, or casting activities. This category encompasses items necessary for manufacturing, transforming, and assembling materials required for such metal production, such as anodic and cathodic materials.
- Equipment utilized in the production of biochar.

Rising prices may help to spur investment in exploration and development, but there is strong global competition for investment dollars, and Canada’s economy is dependent on foreign direct investment. Investment tax credits are an important tool to spur investment, but the correct design is extremely important.

The stakes are high. If Canada loses its investment competitiveness, this will translate into an increasing amount of exploration and mining investments flowing offshore, job losses, deteriorating trade balances and a weakening of our overall economic strength, including on key policy objectives such as establishing a battery and electric vehicle supply chain.



SECTION 4

The People: Safety, Employment and Costs

Canada's mining workforce is growing. The demand for metals and minerals, sustainably sourced raw materials and high standards of environmental stewardship and community engagement mean that a diverse, skilled and knowledgeable mining workforce is increasingly important.

The strength of the mining industry is its people, and its challenge is to make the sector more representative of the Canadian workforce at large. The industry will require at least 100,000 new employees over the next decade, and increasing the proportion of women and visible minorities will be key to meeting that challenge.

Canada's miners can be proud of their record of accomplishment in Indigenous employment: the industry is, proportionally, the largest private sector employer of Indigenous peoples in Canada. Total employment increased to 11,300 people in 2020. However, given the proximity of many mining operations to Indigenous communities, even higher participation rates should be achievable.

SAFETY

Safety comes first in mining. Canadian mining companies work hard to create a positive safety culture with employees, contractors and communities. The results of this dedication to safety can be seen in the decline in rates of injury across the industry over the past decade.

Between 2012 and 2021, the most recent year for which data is available, the rate of fatal injuries per 10,000 employees fell from 3.5 to 2.7, a decline of 23%. Non-fatal injuries fell over the same period from 315 to 269 per 10,000 employees as shown in Figure 30.

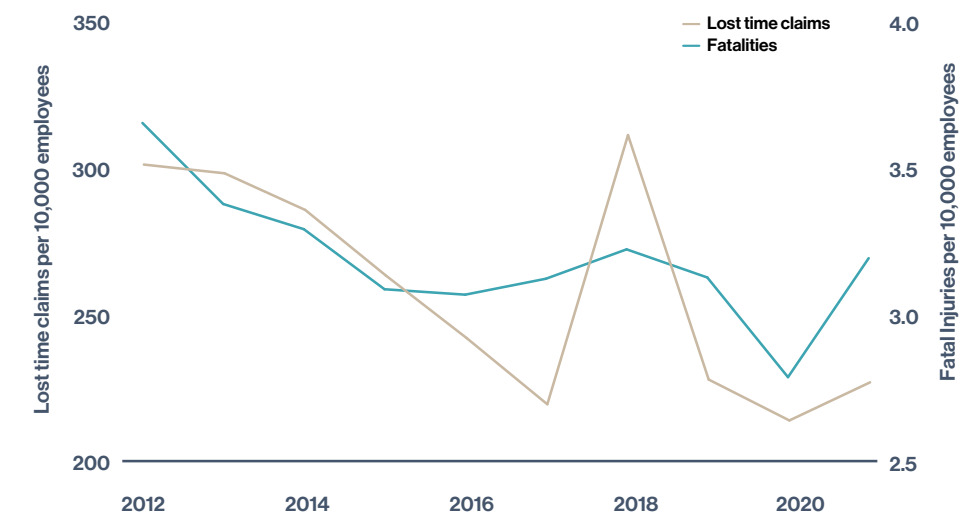


Figure 30: Compensated Injury Rates in the Minerals Sector³⁹

³⁹ From industry-specific data from the National Work Injury/Disease Statistics Program (NWISP) of the Association of Workers' Compensation Boards of Canada and Statistics Canada's Employment by Industry, Annual, [Table 14-10-0202-0](#)

EMPLOYMENT

The mining industry directly employed 420,000 people in 2022. Since the Canadian labour force was about 20.8 million, direct employment in mining accounted for one in 49 jobs in Canada. Indirect employment added another 274,000 jobs, for a total of 694,000 jobs in 2022. This represents one in 30 people in the Canadian labour force.

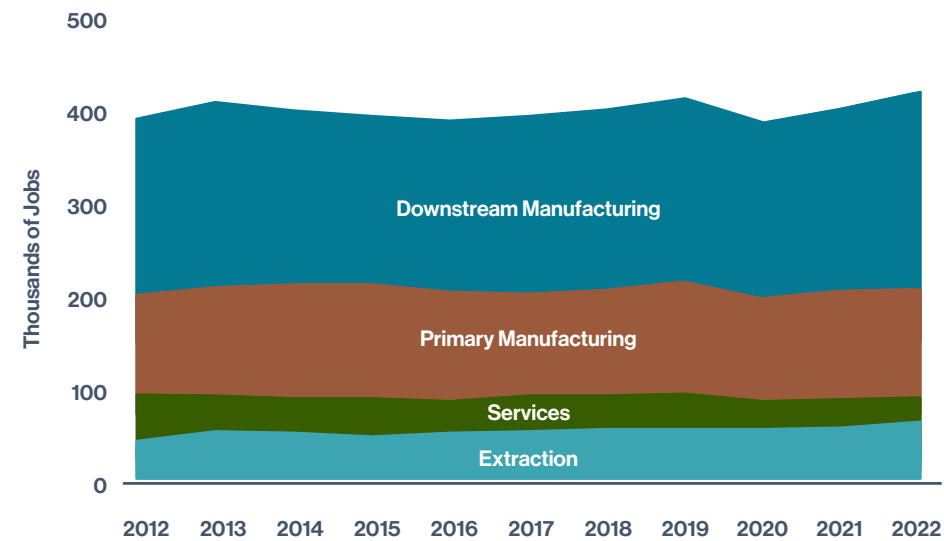


Figure 31: Employment in Mining, 2012-2021⁴⁰

Employment by subsector and product group is shown in Figure 31. About half of all employment in the sector is in downstream manufacturing: metal products like steel pipe, cutlery, cable, and more. Primary manufacturing makes up 22% of employment in the sector, and extraction makes up 19%. Services is the smallest subsector, at 9% of the sector's overall employment.

Unemployment remains low in the Canadian economy, but the unemployment rate for the mining sector is even lower. In December 2022, the unemployment rate for mining and quarrying was 3.9%, for support services in mining it was 2% and for primary metal manufacturing it was 1.4%⁴¹. These low rates, below the national average for all industries, mean that the industry has begun to exhaust its labour pool.

The tight labour market is an increasing challenge for mining employers: it drives up recruitment costs and wages and increases the need for competitors to inefficiently poach talent from each other. These employment trends require solutions to build a more sustainable, competitive and diverse labour market that is better able to respond to the short-term needs of the industry.

New Workers

The tight labour market is a critical impediment at a time when the mining industry needs new workers. The 2023 edition of the Mining Industry Human Resources Council's (MiHR) *Canadian Mining Labour Market Outlook* estimates that the Canadian mining industry will need to hire between 100,000 and 220,000 people over the next decade as shown in Figure 32. These new hires are required to replace retirees and fill new positions to meet baseline production targets.

⁴⁰ Statistics Canada; Natural Resources Canada. [Table 36-10-0489-01](#).

⁴¹ From the 2023 [Canadian Mining Outlook](#) by the Mining Industry Human Resources Council, Figure 2.

MiHR looked at three scenarios to predict the number of workers that will be required by 2033. The "baseline scenario" uses employment trends in each subsector and predictive variables like commodity prices to estimate future employment. The "expansionary scenario" is the upper bound 20% prediction interval of the baseline scenario, and the "contractionary scenario" is the lower 20% prediction interval. The expansionary scenario might be caused by a new, high-price regime for commodities, while the contractionary scenario could be the result of sustained lower commodity prices.

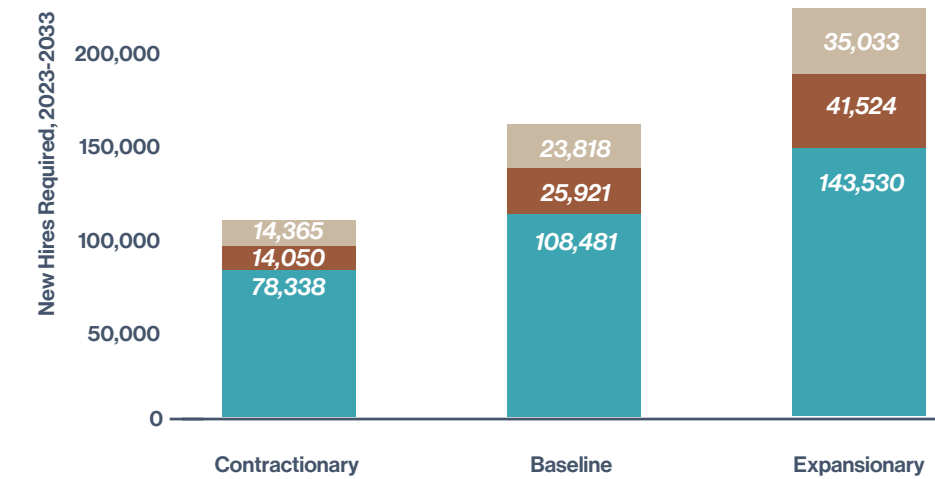


Figure 32: MiHR Forecast Hiring Requirements by Sector 2023-2033⁴²

Employees will be required in a variety of jobs across the sector – from trades to production occupations to human resources. The MiHR baseline scenario breaks down the requirements by occupation as shown in Figure 33.

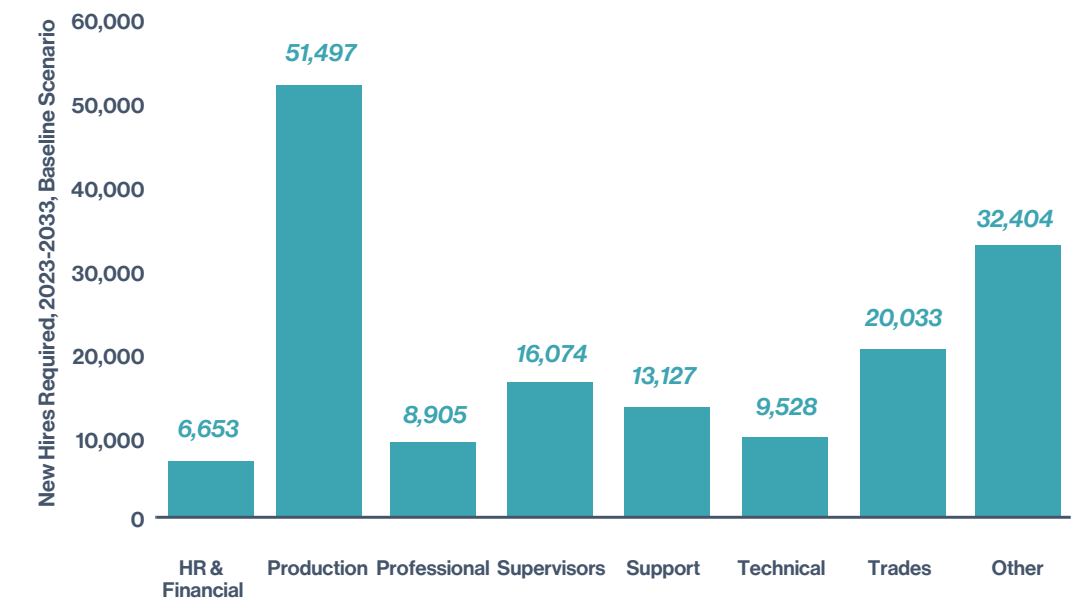


Figure 33: MiHR Forecast Hiring Requirements by Occupation 2023-2033⁴³

⁴² Mining Industry Human Resources Council. [2023 Canadian Mining Outlook](#). Table 8.

⁴³ Mining Industry Human Resources Council. [2023 Canadian Mining Outlook](#). Table 9.

The tight labour market is a short-term challenge for filling positions. Over the longer term, the industry's challenge is to manage generational turnover and changing workforce characteristics. The mining industry faces headwinds from youth attitudes towards the industry, the reduced numbers of graduates in mining-related professions, and low numbers of women and visible minorities in the industry.

Youth Attitudes

MiHR commissioned a survey of young Canadians that asked the question “How likely, if at all, would you consider working in these sectors?” The survey was first conducted in 2020, with a follow-up in 2023. Results for responses “probably would,” “definitely would,” and “might consider” are shown in Figure 34.

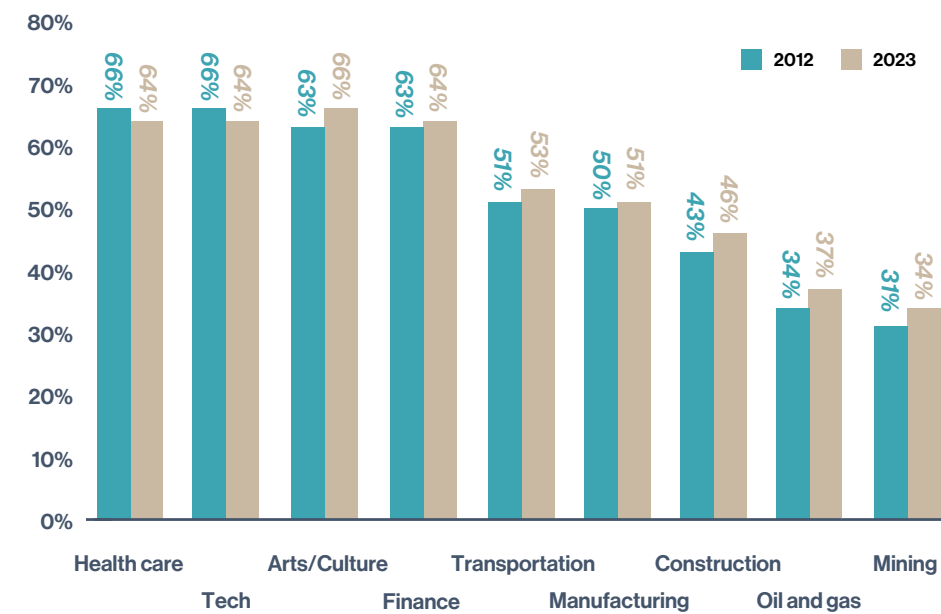


Figure 34: Survey Results, Young Canadians' Attitudes to Work in Sectors⁴⁴

In 2023, mining was the lowest rated occupation, with only 34% indicating an openness to work in the sector. This was a slight increase from 2020, when only 31% responded positively. The top reasons given by those who said they did not want to work in the industry were that it is “too dangerous” or “too physically demanding.”

Mining Education

MiHR also notes that fewer people are enrolling in and graduating from mining-related engineering programs. From 2015 through 2020, enrollment declined in all three types of engineering most closely associated with mining. Materials and metallurgical engineering enrollment declined by 7% from 2015 to 2020, to 934; mining or mineral engineering declined by 41% to 831, and geological engineering declined by 29%, to 556 as shown in Figure 35.

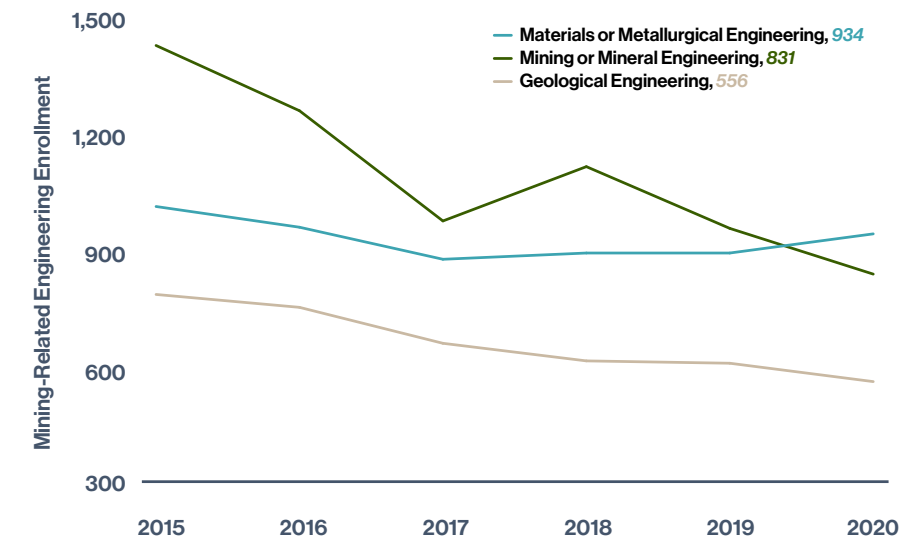


Figure 35: Mining-Related Engineering Enrollment, 2015-2020⁴⁵

The requirements for new employees, the low rate of interest from youth, and the declining number of graduates lead to a new set of challenges: small numbers of inexperienced workers replacing skilled and experienced older ones, particularly in trades and production occupations. This places additional onus on industry to work collaboratively with government and educational institutions to ensure that new entrants to the industry have the skills required for high-demand jobs within mining.

Women in Mining

The mining industry has historically been a male-dominated sector. Mining companies across the country increasingly have women occupying senior leadership roles and working at the site level, but there is still significant work to be done to achieve levels of female participation in the industry that more closely resemble those of the overall Canadian workforce.

44 Mining Industry Human Resources Council. [Perceptions and Interest in a Mining Sector Career](#). October 2023.

45 From *Canadian Engineers for Tomorrow: Trends in Engineering Enrolment and Degrees Awarded 2020* by Engineers Canada. [Link](#). Appendix A, Table U1.

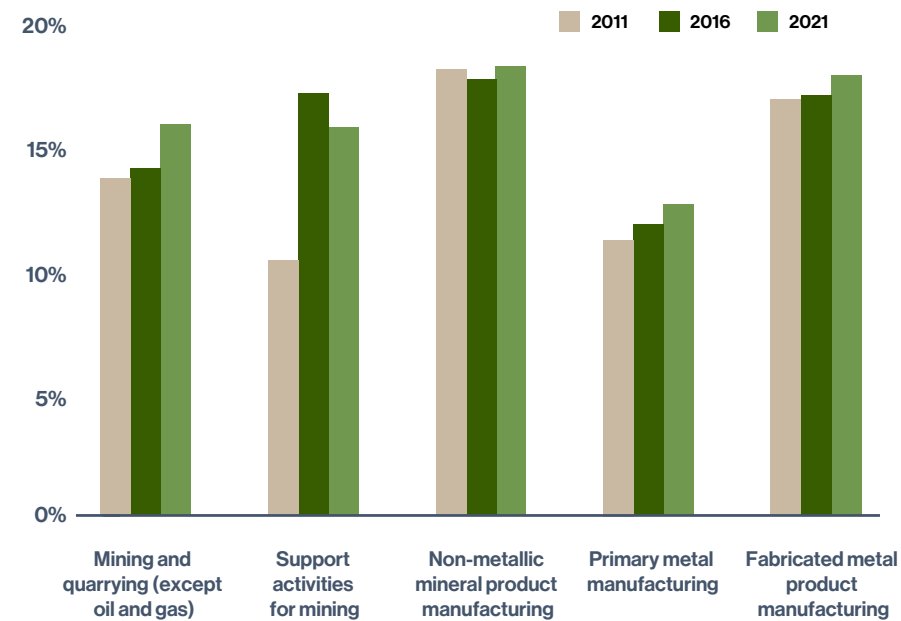


Figure 36: Women's Employment in Mining Subsectors, 2011-2021⁴⁶

According to Canada's most recent census data, women's representation has increased in mining-related employment. From 2011 through 2021, the proportion of women in all stages of the mining process has increased, as shown in Figure 36. While this improvement is encouraging, women are less than 20% of the workforce in all mining-associated sectors.

The *Canada Business Corporations Act* and annual reporting for listed firms on the TSX both require the production of data on women on corporate boards and in executive roles. Osler, Hoskin & Harcourt LLP reviews and summarizes these disclosures every year to produce a report on diversity in Canadian business. The percentage of women directors and board members have both increased since 2020, to 25% for directors and to 17% for executives.

46 From National Household Survey (2011) [Table 99-012-X2011034](#), Census 2016 [Table 98-400-X2016364](#), and Census 2021 [Table 98-10-0448-01](#).

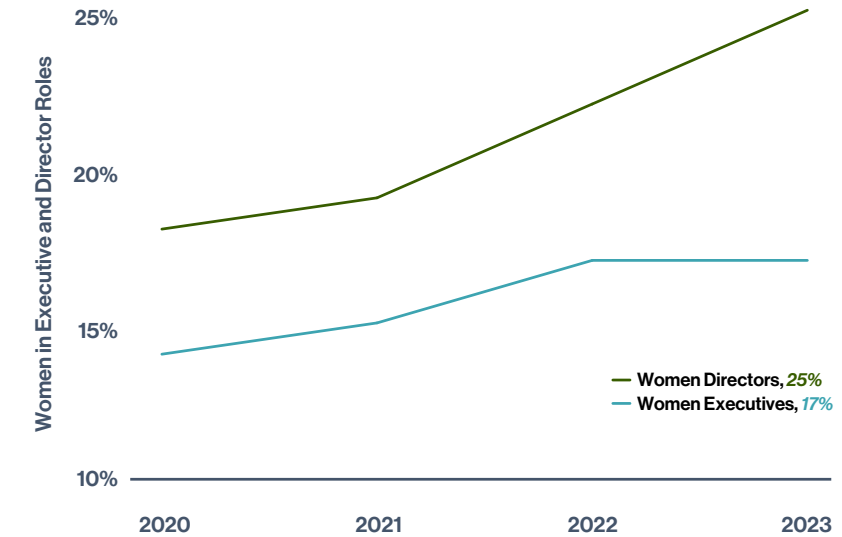


Figure 37: Women in Executive and Director Roles in the Mining Industry⁴⁷

The industry is making continuing efforts to increase the proportion of women in mining, but success will require efforts at both recruitment and retention.

Visible Minorities

Racialized groups make up more than a quarter of Canada's labour force. Statistics Canada expects that immigration will remain the main driver of Canada's population growth over the coming decades, continuing a trend that began in the early 1990s. By 2041, a quarter of Canadians will be part of a visible minority group, and one in four will have been born in Asia or Africa⁴⁸. It will be critical for the mining industry to recruit new Canadians and visible minorities to fill the expected hiring requirements of the next decade.

In 2016, just over 20% of the Canadian workforce were visible minorities. In 2021, that percentage had increased by more than five percentage points to almost 26%. The share of the mining workforce made up of visible minorities has also increased but is still substantially below the labour force percentage.

47 Andrew MacDougall, John M. Valley, Jessie Armour, Aliza Zigler. [Report: 2023 Diversity Disclosure Practices – Diversity and leadership at Canadian public companies](#). Previous year data sourced from the [2022 report](#) and [2021 report](#).

48 Statistics Canada *Daily Bulletin: Canada in 2041: A larger, more diverse population with greater differences between regions*.

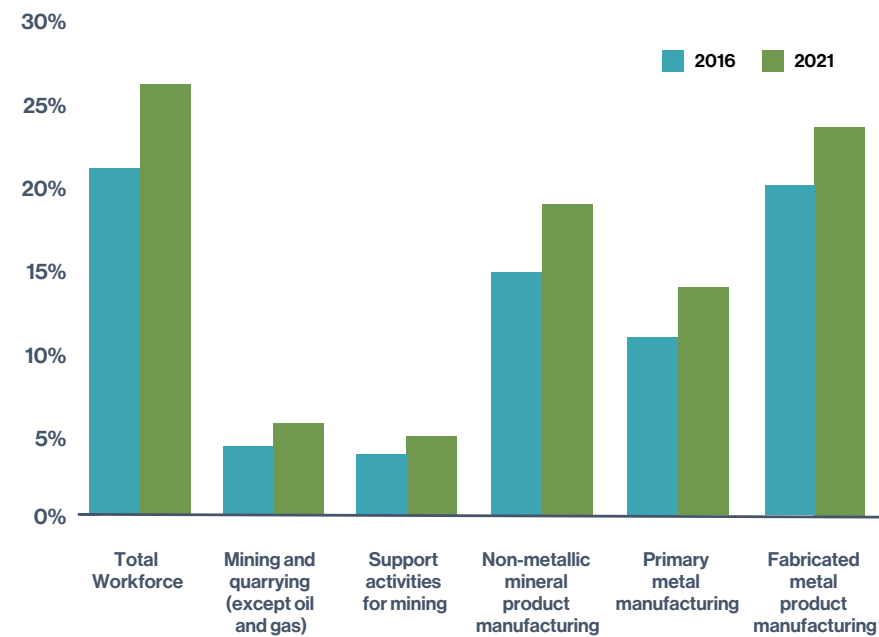


Figure 38: Representation of Visible Minorities in the Mining Workforce, 2016-2021⁴⁹

Wages

The Canadian mining industry has some of the highest wages and salaries of all sectors in Canada (see Annexes 6 and 7 for details). The average total compensation per job in the mining industry in 2022 was \$137,451, which surpassed the average for workers in forestry, manufacturing, finance and construction. The average total compensation per worker in mining, smelting and refining was \$65,000 more than the average for all jobs in Canada. This gap has been consistent for more than a decade, as shown in Figure 39.

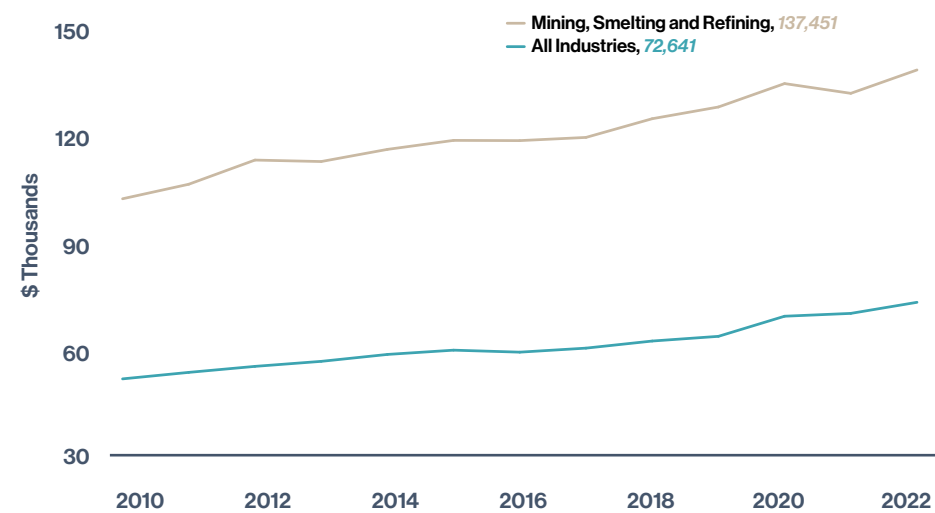


Figure 39: Mining Industry Wages, 2009-2021⁵⁰

49 Statistics Canada (2016 Census Table 98-400-X2016360, 2021 Census Table 98-10-0592-01).

50 Statistics Canada Table 36-10-0489-01 and Table 36-10-0489-05. Natural Resources Canada. "Total compensation per job" is the ratio between total compensation paid for all jobs and the total number of jobs.

In remote regions or in situations where workers rotate, higher wages help to attract and retain them.

INDIGENOUS PEOPLES

Proportionally, the mining industry is the largest private sector employer of Indigenous peoples in Canada. Total employment of Indigenous peoples increased between 2011 and 2020, from 9,100 to 11,300 as shown in Figure 40. For the period from 2011 through 2020, Indigenous employment accounted for an average of 7.6% of the employment in the mining industry and 3.6% in the broader minerals sector.

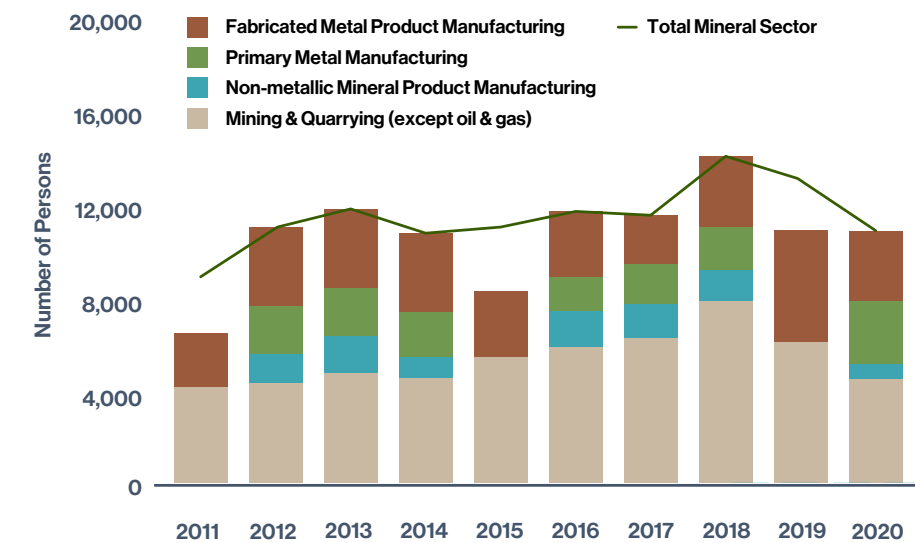


Figure 40: Indigenous Employment in the Minerals Sector, 2011-2020⁵¹

The mining industry has proven an effective vehicle not just for Indigenous employment, but also for skills training and upward mobility. For example, Indigenous people in the mining workforce are increasingly pursuing formal education credentials. According to 2019 MiHR research⁵², from 2006 to 2016, the share of Indigenous people in the mining workforce with a college, CEGEP or other non-university certificate or diploma rose by three percentage points, as did the rate for those with a university certificate, diploma or degree at bachelor level or above.

Potential for increased Indigenous employment remains strong. More than 200 producing mines and thousands of exploration properties are located within 200 km of Indigenous communities. Many mines and projects are located on traditional lands.

Between 2011 and 2020, more than 260 new agreements between mining companies and Indigenous communities or groups were signed⁵³. These agreements can cover activities from exploration to mine development and establish the way that companies and communities collaborate. The circumstances of each agreement are different, so the agreements are unique, covering topics like community benefits, employment targets and compensation for adverse impacts. As of December 31, 2020, there were 412 active agreements in place.

51 Mining Sector Performance Report, [Cat. No. M31-15E-PDF](#), Figure 20.

52 Mining Industry Human Resources Council. [2019 Canadian Mining Outlook](#), Figure 21.

53 Mining Sector Performance Report, [Cat. No. M31-15E-PDF](#)

LOOKING FORWARD

Hiring, training, and retaining new employees is likely to be a challenge for the mining industry for the foreseeable future. Salaries in the sector are already high, and the industry has limited ability to increase costs in a global market. As a result, new approaches may be necessary.

As in many other industries, the work of mining is becoming increasingly technical. Engineers, technicians and information technologists are required to run the advanced technologies required for extraction and processing.

MAC recommends the following to ensure the long-term sustainability of the labour force in the mining industry:

- Continued government support for MiHR to further its work in addressing the mining industry's human resources challenges.
- Continue to actively recruit Indigenous employees. Given the nature of the jobs available, this will increasingly require training in the specific technical skills required for mining. The federal government should continue to support Indigenous skills training programs, including the *Indigenous Skills and Employment Training Strategy*, and those administered by MiHR, such as the *Mining Essentials* program, which, in partnership with the Assembly of First Nations, allows mining companies to benefit from a local workforce, while fostering economic development in Indigenous communities.
- Efforts to increase equity, diversity and inclusion in the industry should continue, including via government initiatives like NRCan's Canadian Minerals and Metals Plan (CMMP), which sets an aspirational target of 30% of women in the mining sector by 2030.
- In June 2023, MAC's performance system Towards Sustainable Mining (TSM) released a new **Equitable, Diverse, and Inclusive Workplaces Protocol** to drive transparency and improved performance on equity, diversity and inclusion in the mining sector. The protocols were developed with experts inside and outside of the mining industry and stakeholder groups. The protocols will support companies as they review, develop, and implement:
 - A corporate strategy for equitable, diverse, and inclusive workplaces.
 - Processes to foster a workplace culture of equity, diversity, and inclusion at the mine site.
 - Approaches to information gathering, reporting, and setting objectives on equity, diversity, and inclusion at the mine site.

MAC member facilities will report confidentially on these new requirements in 2024 and 2025, followed by the first year of public reporting in 2026.

- Introducing standards for key mining occupations to facilitate domestic worker mobility and skills recognition. For example, MiHR's National Occupational Standards establish objective benchmarks for skills and knowledge required for various occupations. The Canadian Mining Certification Program (CMCP) recognizes workers who have met the Standards for diamond drillers, frontline supervisors, hoist operators, industry trainers, mineral processing operators, surface miners and underground miners.
- Ongoing efforts to recruit young people into the industry, including via career fairs or work placement programs. For example, Employment and Social Development Canada has supported work-integrated learning subsidies for mining employers, offering a wage subsidy of up to \$7,000.

The mining industry supports a successful, safe, high-paid, technically adept workforce. Through continued efforts, it will be possible to enhance the industry's track record of success at hiring, training and retaining these skilled workers through the next generation.

SECTION 5

Clean Technologies, Climate Change and Innovation

WATER, AIR AND EARTH

The Canadian mining and quarrying industry spent \$1.06 billion on environmental protection activities in 2020, the most recent year for which data is available. This is more than 10% of all capital and operating expenditures on the environment across all industries.

From 2019 to 2020, capital expenditures on the environment in the mining and quarrying industry rose from \$307 million to \$504 million. Operating expenses fell slightly from \$575 million to \$552 million, likely the result of the global pandemic.

Capital expenditures in 2019 and 2020 are presented in Figure 41.

More recent 2022 data provide a breakdown of capital expenditures: wastewater management (77%), solid waste management (10%), and protection and remediation of soil, groundwater and surface water (9%). Figure 41

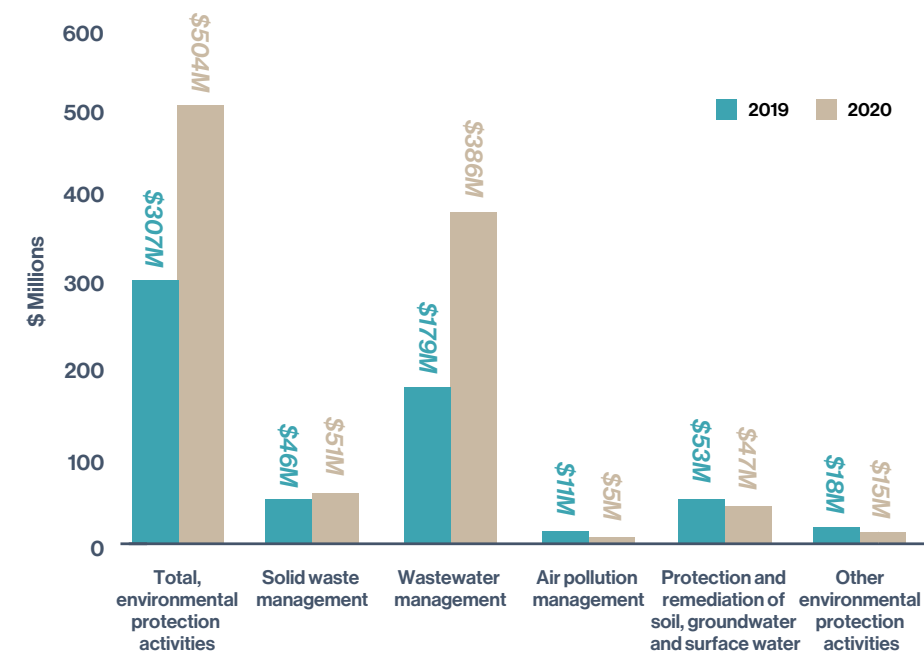


Figure 41: Capital Expenditures on the Environment by the Mining and Quarrying Industry, 2019-2020⁵⁴

54 Statistics Canada, Capital and operating expenditures on environmental activities by industry Table 38-10-0130-01.

Spending on the protection of biodiversity and habitat rose from \$14 million in 2019 to \$15.3 million in 2020.

CLEAN TECHNOLOGIES AND CLIMATE CHANGE

Climate change is a global crisis. To address greenhouse gases in the atmosphere, Canada and 192 other states signed the Paris Agreement in 2015. The agreement aims to limit global temperature increases to 2 degrees Celsius in this century and 1.5 degrees over the long term.

Minerals and metals will help the world transition to a low-carbon future. Electricity networks, electric vehicles, wind energy, photovoltaic solar cells, and battery storage all require mined materials.

The clean energy system of the future will be different from the current system, using more renewable resources to create energy. While operating clean energy systems produces fewer emissions than the hydrocarbon-based system we have now, the equipment required for clean energy is more mineral-intensive than equipment used for fossil fuels. Since 2010, the average amount of minerals needed for a new unit of power generation capacity has increased by 50%, primarily due to renewable projects.⁵⁵

The International Energy Agency (IEA) has studied climate change in detail, as energy is responsible for the majority of greenhouse gas generation. Using economic and scientific models, the IEA makes projections about how the world will make the change to a lower-carbon future. These studies have included an investigation of the role that minerals and metals will play.

According to the IEA, putting emissions on a trajectory consistent with the Paris Agreement in one scenario requires the annual installation of solar photovoltaic cells, wind turbines and electricity networks to triple by 2040, and sales of electric vehicles (EVs) to grow 25-fold over the same period.

The IEA's work in The Role of Critical Minerals in Clean Energy Transitions indicates that there was a 53% increase in critical mineral demand for clean energy technologies from 2010 to 2020, from 4.64 Mt to 7.1 Mt as shown in Figure 42. From 2020 to 2030, the IEA expects growth of 71% in critical mineral demand for clean energy technologies under stated policies, while a sustainable development scenario will require 168% growth.⁵⁶

The transition to cleaner energy requires less fossil fuel input but substantially more critical minerals. EVs require six times the critical mineral inputs of conventional cars (over 200kg compared to about 40kg). Onshore wind plants require nine times more critical mineral resources than a gas power plant of the same capacity⁵⁷.

55 IEA (2021), The Role of Critical Minerals in Clean Energy Transitions, IEA, Paris <https://www.iea.org/reports/the-role-of-critical-minerals-in-clean-energy-transitions>.

56 The IEA bases its estimates on multiple policy scenarios. The *Stated Policy Scenario* uses sector-by-sector analysis of national policies to produce a model for future climate change and input requirements. According to the IEA, this scenario "explores where the energy system might go without a major additional steer from policy makers." The *Sustainable Development Scenario* assumes a pathway that enables the world to meet climate, energy access and air quality goals. This scenario would require rapid and widespread changes across the energy system. See details at IEA <https://www.iea.org/reports/global-energy-and-climate-model>.

57 IEA (2021), *The Role of Critical Minerals in Clean Energy Transitions*, IEA, Paris <https://www.iea.org/reports/the-role-of-critical-minerals-in-clean-energy-transitions>.

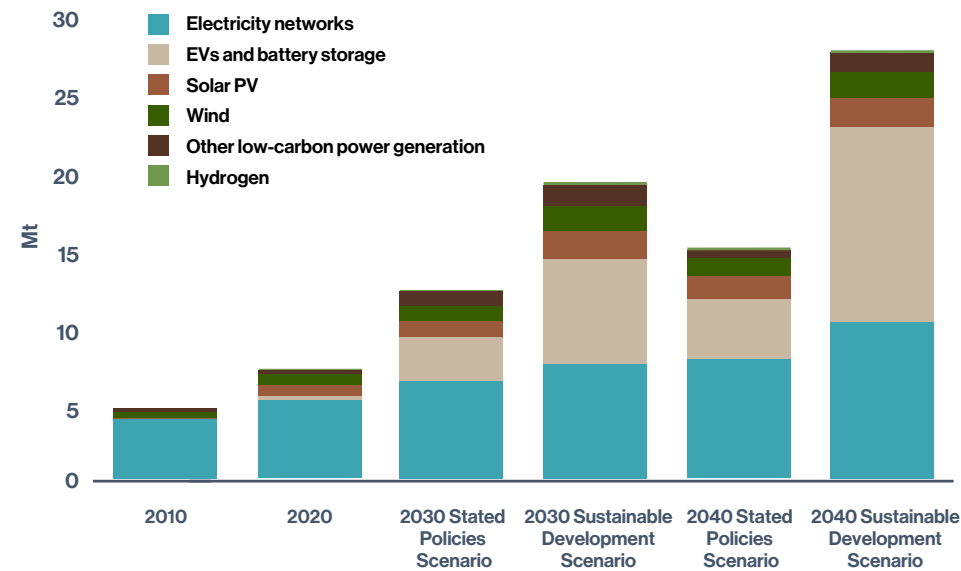


Figure 42: Critical Mineral Demand for Clean Energy Technologies, 2010-2040 (Various Scenarios)⁵⁸

One specific example of the transition to a clean economy is in the EV market. EV registrations in Canada reached 204,712 in 2022, an increase from 43,817 in 2017. As a proportion of the total registrations, electric vehicles have increased from 1.81% in the first quarter of 2017 to almost 15% of registrations in the fourth quarter of 2022, as shown in Figure 43. Over the same period, gasoline engines have declined from 94.83% of all registrations to 80.57% of registrations.

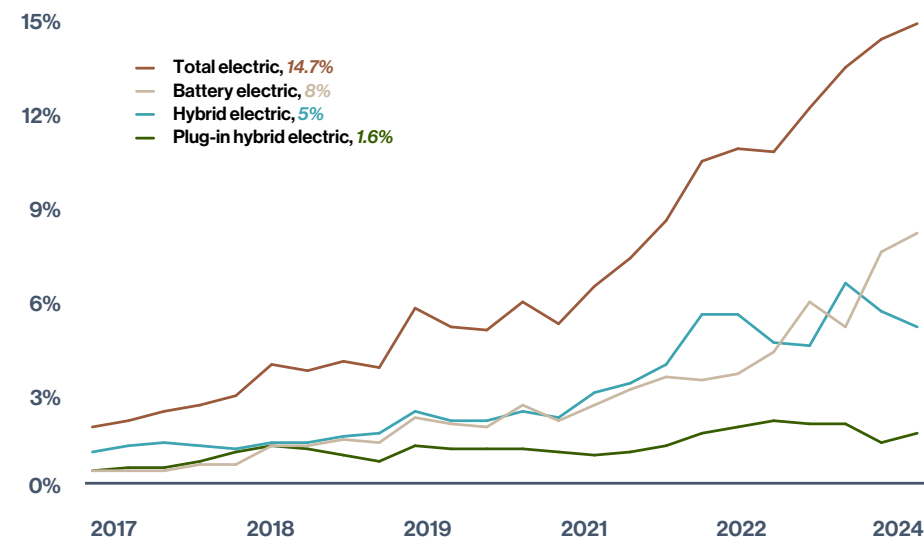


Figure 43: EVs as a Proportion of New Motor Vehicle Registrations, 2017-2022⁵⁹

58 IEA, Total mineral demand for clean energy technologies by scenario, 2010-2040, IEA, Paris <https://www.iea.org/data-and-statistics/charts/total-mineral-demand-for-clean-energy-technologies-by-scenario-2010-2040-2>.

59 New motor vehicle registrations, quarterly. Statistics Canada [table 20-10-0024-01](https://www150.statcan.gc.ca/n1/pub/20-10-0024-01/2023-01-24-eng.htm). Release date: 2023-01-24.

The increasing trend in EVs is expected to continue. The Government of Canada is working towards a light duty vehicle sales mandate for zero-emission vehicles, which will set annually increasing requirements towards achieving 100% zero-emission sales by 2035. The mandate will include mandatory interim targets of 20% by 2026 and 60% by 2030.

As these trends are mirrored globally, critical mineral demand for EV production will increase, as shown in Figure 44. The IEA's model suggests that overall demand for critical minerals grows by nine times from 2020 values to around 3,500 kt in 2040 under stated policies. The sustainable development scenario foresees even greater growth.

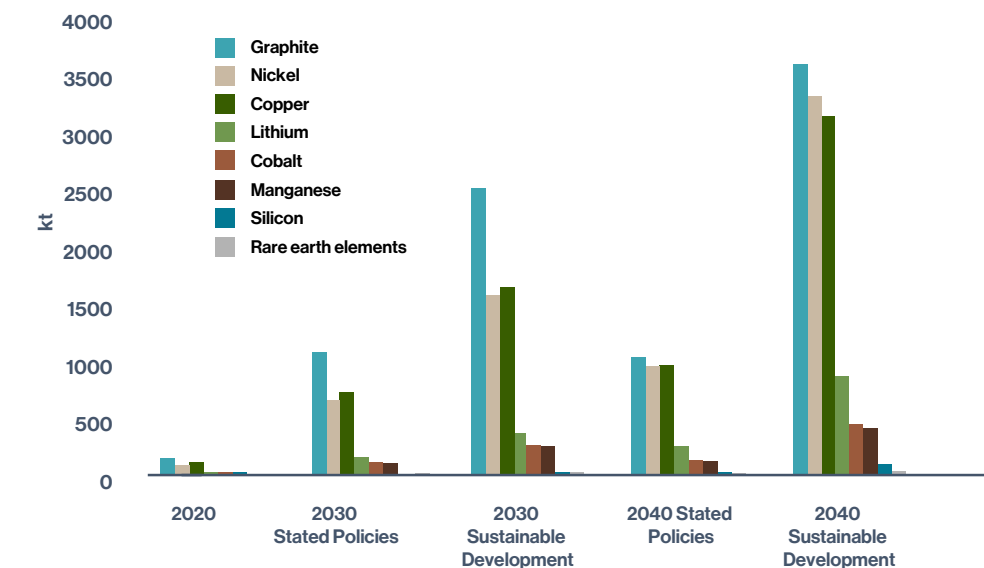


Figure 44: Mineral Demand for EVs, 2020-2040 (Various Scenarios)⁶⁰

From battery storage to new transmission infrastructure, critical mineral requirements are expected to grow substantially. Canada fulfills the need for critical minerals better, using less carbon intensity, than most competing mining jurisdictions. Canada has a clean electricity grid, with 82% of power from renewable or non-emitting sources. As a result, Canadian mineral products are among the lowest carbon intensity in the world.

CRITICAL MINERALS

Given the increase in demand expected over the next decades for clean energy, governments are attempting to secure reliable sources of the required minerals. As part of this process, they have been assessing the vulnerability of their economies to external supply shocks. While this process was underway before 2020, it was accelerated by the global pandemic and the war in Ukraine. Shortages of key inputs to the economy highlighted the extent of reliance on a small number of countries for critical minerals.

60 IEA, Total mineral demand from new EV sales by scenario, 2020-2040, IEA, Paris <https://www.iea.org/data-and-statistics/charts/total-mineral-demand-from-new-ev-sales-by-scenario-2020-2040>, IEA.

Critical minerals required for manufacturing clean energy technologies are concentrated in a few locations as shown in Figure 45. For lithium, cobalt, graphite and rare earth elements, the top three producing nations control over three quarters of the mine production annually. Copper concentration is slightly lower, at 44% for the top three producing countries.

Canada has known reserves of some of these minerals but has limited to no extraction of some. For example, the reserves of rare earth elements in Canada are 830,000 tonnes of rare earth oxide equivalent, but mine production was zero in both 2021 and 2022⁶¹. Production of lithium was 500 tonnes in 2022, or 0.4% of total global production. By contrast, Canada's lithium reserves are sixth in the world, at 930,000 tonnes⁶².

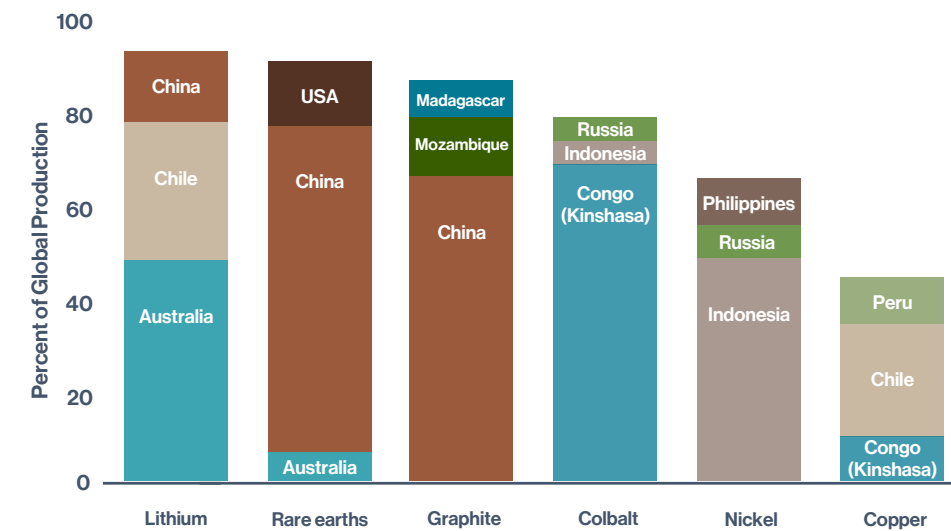


Figure 45: Percentage of Global Production, Top 3 Countries (2022 estimated), Selected Minerals⁶³

In response, governments are creating lists of minerals and metals on which their economies and national interests rely but to which they have insufficient or precarious access. While the materials on national critical minerals lists vary across jurisdictions, economic security, national defense and sustainability are common themes through which critical material identification has been justified.

In December 2022, Canada released *The Canadian Critical Minerals Strategy*⁶⁴ outlining Canada's approach to critical minerals. According to the Strategy, "there is no green energy transition without critical minerals, which is why their supply chain resilience is an increasing priority for advanced economies. Every stage of the critical mineral value chain presents an opportunity for Canada, from exploration to recycling and everything in between."

Canada is committed to working with its partners to provide critical minerals for a green transition. As the host of the UN Biodiversity Conference in 2022, Canada formed the Sustainable Critical

61 U.S. Geological Survey, Mineral Commodity Summaries, January 2023. Rare Earths. <https://pubs.usgs.gov/periodicals/mcs2022/mcs2022-rare-earth.pdf>.

62 Natural Resources Canada. Lithium Facts. <https://natural-resources.canada.ca/our-natural-resources/minerals-mining/mining-data-statistics-and-analysis/minerals-metals-facts/lithium-facts/24009>

63 Based on the USGS's National Minerals Information Center Mineral Commodity Summaries for each mineral, using estimates for 2022 production. <https://www.usgs.gov/centers/national-minerals-information-center/commodity-statistics-and-information>.

64 Natural Resources Canada, *The Canadian Critical Minerals Strategy*, HM The King in Right of Canada, Ottawa <https://www.canada.ca/content/dam/nrcan-rncan/site/critical-minerals/Critical-minerals-strategyDec09.pdf>.

Minerals Alliance, a group of countries committed to driving the "global uptake of environmentally sustainable and socially inclusive and responsible mining, processing and recycling practices and responsible critical minerals supply chains."⁶⁵ The seven nations of the alliance will work towards developing sustainable and inclusive mining practices and sourcing critical minerals to achieve environmental, social, economic and reconciliation goals.

Canada also joined with the United States, the European Union and 11 other countries to create the Minerals Security Partnership. The Partnership "aims to accelerate the development of diverse and sustainable critical energy minerals supply chains through working with host governments and industry to facilitate targeted financial and diplomatic support for strategic projects along the value chain."⁶⁶

Canada's list of critical minerals was developed to guide investment and prioritize decision-making. The Government of Canada sought comments and input on the list in late 2023 and early 2024.⁶⁷ The list consists of 31 minerals, of which six are prioritized as presenting the greatest opportunity: lithium, graphite, nickel, cobalt, copper, and rare earth elements.

The Strategy aims to create "value chains" in Canada for critical minerals: from exploration to recycling and advanced manufacturing. According to the Strategy, "[a]t present, the production and processing of many critical minerals are geographically concentrated, making global supply vulnerable to several risks... By ramping up critical mineral production and strengthening their affiliated value chains, Canada and its trusted international partners can reduce their dependency on high-risk imports as demand forecasts outpace mineral supply and investment plans."

LOOKING FORWARD

The economy of the future needs minerals and metals from Canada. To provide the resources that are required, Canada must create an investment and regulatory environment that works. Given the increasing demand for critical minerals for global carbon reduction, it will be critical to bring new mines into production in the years ahead. Based on an analysis of 35 mining projects that came online between 2010 and 2019, the IEA estimates that the average time between discovery and production is almost 17 years⁶⁸. To achieve climate goals for 2040 and beyond, it is important to bring production online faster.

The World Bank estimates that the production of minerals, such as graphite, lithium and cobalt, could increase by nearly 500% by 2050 to meet the growing demand for clean energy technologies and forecasts a doubling of global nickel production between now and 2050. For Canada to maintain its current global market share in this scenario, seven new nickel mines will need to be discovered, permitted, and built, in addition to two new smelters and one new refinery. It took thirteen years from discovery to production for Canada's most recent nickel mine in Voisey's Bay in Newfoundland and Labrador. Greater efficiency in getting mines into production is needed to supply global demand for minerals and metals and meet shared climate change goals.

65 Our critical minerals strategic partnerships. <https://www.canada.ca/en/campaign/critical-minerals-in-canada/our-critical-minerals-strategic-partnerships.html>

66 Minerals Security Partnership. <https://www.state.gov/minerals-security-partnership>

67 Let's Talk Canada's Critical Minerals list and methodology. <https://www.letstalknaturalresources.ca/lets-talk-canadas-critical-minerals-list>.

68 IEA, *Global average lead times from discovery to production, 2010-2019*, IEA, Paris <https://www.iea.org/data-and-statistics/charts/global-average-lead-times-from-discovery-to-production-2010-2019>, IEA.

The economy of the future needs minerals and metals from Canada. To provide the resources that are required, Canada must create an investment and regulatory environment that works.

Impact Assessment

The time between when a mining project is proposed and when construction can begin is significantly impacted by the sum of all the federal and provincial approval processes it must navigate. Delays can be reduced through improved coordination between federal and provincial processes and avoiding unnecessary duplication.

Mining projects are subject to comprehensive provincial regulatory frameworks that are unique to each province, including environmental assessment processes, environmental protection regulations, permits of general application and regulations, and permits specific to mining. They are also subject to several federal requirements. Limited coherence and coordination among these approval processes are an ongoing issue leading to uncertainty, delays, and increased costs for the mining industry.

The federal *Impact Assessment Act*, the *Fisheries Act*, and the *Canadian Navigable Waters Act* were amended in 2019 and implementation of the changes remains incomplete. Further legislative changes are expected following the opinion of the Supreme Court of Canada that parts of the *Impact Assessment Act* are unconstitutional. The Mining Association of Canada appreciates the improved clarity on boundaries of federal constitutional authority in undertaking impact assessment of activities in provincial jurisdiction called for by the Supreme Court. The transition to a revised legislative framework will need to be completed quickly and in a well-planned and well-implemented manner to mitigate uncertainty for project proponents, communities, and investors.

Climate Change Regulation

Some federal policies risk jeopardizing segments of Canada's mining and metal manufacturing supply chain, weakening one of Canada's strengths in the global transition to a green economy. Competing jurisdictions are quickly implementing their critical minerals plans, and Canada must expedite programs and fund projects to avoid falling behind. The implementation of programs like the *Clean Technology Manufacturing Tax Credit* will accelerate mining projects into production and strengthen Canada's place in the new global economy.

In August 2023, the Government of Canada published the proposed **Clean Electricity Regulations** in the *Canada Gazette*. The Mining Association of Canada recommends concentrating on the following elements:

- **Electricity Affordability:** energy costs are the third largest cost for mining operations in Canada, and a major determinant of Canada's investment attractiveness for mining foreign direct investment. Ensuring the availability of cost-competitive and clean electricity is key to attracting the long-term private sector capital required to drive Canada's attainment of climate targets.
- **Technological Viability:** more ambition, education, outreach, funding, and capacity is required by the federal government to facilitate the technological readiness, acceptance and commercialization of non-emitting and carbon capture and use technologies, such as small modular reactors; hydrogen; carbon capture, utilization and storage; energy storage; and others. While good work has been done in these areas to date, the government's level of ambition toward technology advancement must match its ambition in the climate mitigation space.

- **Self-Consumption Exemption:** the exemption for generators that do not supply electricity to the grid is a positive development.
- **Reliability:** ensure, at all costs, the safe and reliable delivery of electricity.
- **Off-Grid Realities:** remote and northern locations should be exempt due to the exceptionally limited abatement opportunities available to off-grid industrial operations.

Border Carbon Adjustments

As countries move to meet their international climate commitments, it is inevitable that there will be differences in approach, both in methods and speed of implementation. A key emerging challenge is how to address these disparities in a coordinated way, lowering GHG emissions while mitigating pressures on international trade without undermining Canada's global competitiveness. Border Carbon Adjustments are a potential solution to this challenge.

The complexity of developing carbon adjustment for imports, the potential risks for unintended consequences, and the risk that Canadian mineral exports may be discriminated against unfairly in export market jurisdictions are all concerns for miners. Specifically, the following considerations are important:

- **Traceability and Life-Cycle Carbon Intensity:** In smelting and refining, technology does not yet exist to trace materials through the supply chain. This limits the ability to adequately map life-cycle carbon intensity across the industry.
- **Applicable Scope:** Noting the traceability limitation, the EU regime proposal is limited to Scope 1 emissions, (i.e., those directly owned or controlled by a company). This means that Canada's huge advantage in Scope 2 emissions (i.e., indirect emissions from energy generation and transmission) from clean energy would be lost.
- **Enforcement:** While Canada has a number of free-trade agreements that include Investor State Dispute Settlement (ISDS) mechanisms to resolve trade conflicts, many export markets are without such agreements and tools, meaning that Canada would rely on World Trade Organization processes, which are much more uncertain.
- **Primacy of Emissions Intense-Trade Exposed Companies Protections:** The Mining Association of Canada unequivocally supports protections for companies that are emissions-intensive but whose global competitors are located in territories where emissions standards are less stringent. These protections should not be displaced in lieu of a border carbon adjustment regime.

Fisheries Act

The 2019 amendments to the *Fisheries Act* expanded the authority of Fisheries and Oceans Canada to create compliance tools for routine projects with no or little impact. The intent was to provide more consistent protection of fish habitat while reducing the administrative burden on proponents and the department. Few of these compliance tools are in place. In the meantime, the department and proponents must rely on site-specific reviews for common activities such as culvert replacement. The result is frustration for proponents as reviews are backlogged and officials overwhelmed with paperwork.

While there has been some progress, with the release of new Codes of Practice for some routine activities, the department continues to rely on site-specific reviews for most works, undertakings, and activities near water, even though many have little or no impact on fish habitat. The development of additional, pragmatic compliance tools – particularly the Prescribed Works and Waters Regulations – will support effective implementation of the Act and help ensure that adequate resources are available for complex projects that may impact fish and fish habitat.

Canadian Navigable Waters Act

The *Canadian Navigable Waters Act* (CNWA) came into force in 2019 and is significantly different from its predecessor *Navigation Protection Act*. The CNWA created a new process for works, such as culverts, bridges or outfalls, on all navigable waters and adds to the Act a definition of “navigable water”. Transport Canada moved quickly to put in place an efficient review and approval system for works on navigable waters, and to disseminate guidance and answer questions. However, proponents are encountering delays and uncertainty. The department is still working to clarify how to assess whether a water body is navigable water, whether a project may impact Indigenous rights, and whether a Governor in Council Order is required for a project. Since an Order requires Cabinet approval and publication in *Canada Gazette*, the need for one can greatly delay a project.

The Mining Association of Canada is working with Transport Canada officials to develop clear guidance for proponents for how to identify navigable waters and when an Order may be required. Early identification of navigation routes, particularly those used by Indigenous peoples for travel or transport, would help proponents in project design and planning.

Biodiversity

In December 2022, Parties to the Convention on Biological Diversity (CBD) agreed to the Kunming-Montreal Global Biodiversity Framework (KMGBF), which articulates ambitious 2030 goals and targets for biodiversity.

In response to the KMGBF, the Government of Canada is developing a renewed National Biodiversity Strategy that will outline how Canada intends to implement the KMGBF. It is anticipated that Canada's National Biodiversity Strategy will be complete ahead of the 16th Meeting of the Conference of Parties to the CBD, which will be held in December 2024.

The Government of Canada has engaged broadly on the development of the strategy, including through a public symposium, sector-specific engagement sessions, and the Nature Advisory Committee.

The successful implementation of the National Biodiversity Strategy will depend on the ability and willingness of governments to collaborate. Deliberate coordination across federal departments and with provincial, territorial and Indigenous governments is needed to maximize the effectiveness of conservation initiatives and avoid potential inter-governmental conflicts. It will also help ensure that funding is deployed efficiently and support informed decision-making.

Improved coordination is essential to tackle long-standing challenges such as accurate and consistent accounting of protected and conserved areas, recognizing and incentivizing private sector actions, and ensuring that initiatives designed to protect biodiversity are compatible with other federal priorities.

In December 2023, the federal government announced its intention to introduce federal nature accountability legislation in early 2024. The new legislation would establish an accountability framework to ensure that the federal government is fulfilling its commitments under the KMGBF.

Species at Risk Act

The implementation challenges of the *Species at Risk Act* (SARA) have become evident for wide-ranging terrestrial species such as boreal woodland caribou, highlighting problems created by shortcomings in federal-provincial cooperation, the limitations of a species-by-species approach and the inflexibility with respect to local circumstances. However, there have been encouraging signs that underlying problems are being recognized and solutions are being explored.

Increased uptake of conservation agreements under section 11 of SARA as a tool to protect and recover species at risk is encouraging. These agreements by federal government, provinces/territories and Indigenous governments demonstrate that efforts are being made for increased coordination and cooperation among different levels of government.

Over the last year, there is growing interest in the role of broader Nature Agreements between the federal government and provinces and territories. In December 2022, the Yukon became the first jurisdiction to announce a Nature Agreement with the federal government. In October 2023, the Canada-Nova Scotia Nature Agreement was signed. Finally, in November 2023, Canada, British Columbia and the First Nations Leadership Council signed a Tripartite Framework Agreement on Nature Conservation.

In 2024, it is anticipated that the Government of Canada will release updated policy documents related to the implementation of SARA. Of particular interest to much of the industry is the anticipated review of the recovery strategy for boreal woodland caribou as well as the development of policy related to the protection of critical habitat on non-federal land.

Migratory Birds

In 2022, the modernized *Migratory Birds Regulations* under the *Migratory Birds Convention Act* came into force. The modernized regulations provide clarity on issues that were ambiguous in past iterations of the regulations, such as nest protections outside of the breeding season. The Government of Canada has indicated that it is exploring additional improvements, including the development of new and enhanced compliance tools, which may help reduce legal vulnerabilities for industry while promoting practices that protect listed species. One area of particular interest for both miners and the federal government is the potential for an incidental take authorization system.

Recycling and the Circular Economy

Conventional economic consumption and disposal of resources is increasingly putting pressure on our climate, communities, and in some cases, public health. Transitioning to a cleaner economy starts with modifying practices and technologies to create economic opportunities out of the materials that might otherwise be thrown away.

The circular economy is the concept that we should extract as much value as possible from resources by recycling, repairing, reusing, repurposing, or refurbishing products and materials—eliminating waste and emissions at the design stage.

While minerals and metals are already recycled in Canada, there is an opportunity to do more. One expanding waste stream that could be more optimally managed is that of electronics.

E-waste is one of the fastest-growing waste streams in the world and includes items such as mobile devices, computers, monitors/televisions, and LED lightbulbs, among other electronic equipment. A record 53.6 million metric tonnes of electronic waste was generated worldwide in 2019, up 21% (>10 million tonnes annually) in just five years, according to the UN's Global E-Waste Monitor.

A large portion of e-waste can be recycled, components of which can be recovered as "urban ore." E-waste recycling involves reprocessing obsolete or unwanted electronics that have exhausted their reuse potential and would otherwise be disposed of in landfills. From 50,000 mobile phones, Electronics Product Stewardship Canada estimates that approximately one kilogram of gold, 400 grams of palladium, 10 kilograms of silver, and 420 kilograms of copper can be recycled. By recycling these items, valuable materials are kept out of landfills and can produce new products using resources that do not need to be mined.

Recycling and other circular economy measures should and will increase as the broader EV battery supply chain expands. While essential, however, these can contribute only modestly to fulfil projected demand. Long product lives and steep demand growth curves mean the supply of secondary material will remain a fraction of total demand for the foreseeable future, so policy must recognize that new mines are essential to meeting projected demand.

Canada's mining sector is a global leader. Its presence in more than 100 countries raises living standards and reduces poverty. Canada boasts the industry's best exploration firms and a capital market that is home to more than half of the world's publicly traded mining companies.

Canada's international mining leadership, powered by innovative and dynamic approaches, boosts Canada's strong reputation for sustainable mining and responsible business conduct.

MAC's Towards Sustainable Mining (TSM) represents the Canadian mining sector's contribution to global sustainable mining and responsible business conduct around the world and is being implemented by over 200 companies in 13 countries. In early 2023, TSM was formally adopted by national mining associations in Mexico and Panama.

SECTION 6

The World: International Market Activities and Developments

The strength of Canada's mining industry is evident in our relationships with other countries, where minerals and metals form the backbone of many of our trade flows.

EXPORTS

Canada's mining sector produces valuable goods that are used both in Canada and globally. Canada's mineral exports make up a substantial portion of the merchandise that we export: 21% of the total value in 2022.

The total value of Canada's domestic mineral and metal exports in 2022 was \$153.1 billion. Metals made up 72% of the total, non-metals 18%, and coal 10% of the total, as shown in Figure 46.

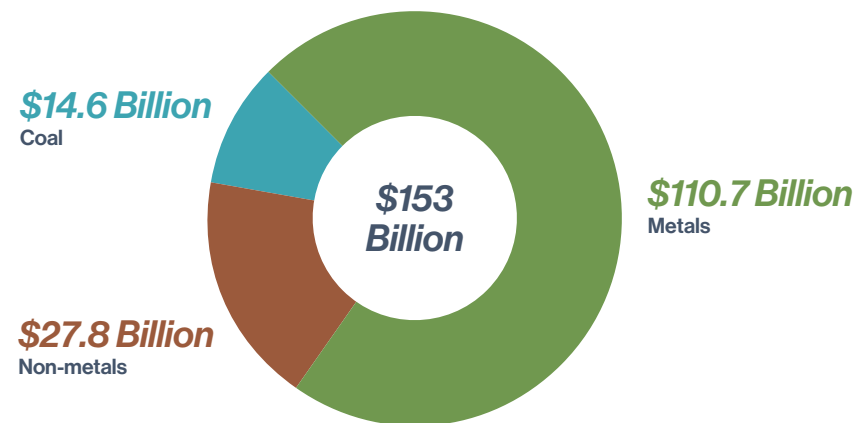


Figure 46: Canada's Mineral and Metal Exports, 2022⁶⁹

Excluding coal, the value of Canada's domestic exports of mineral and metal products increased in the five years from 2017 through 2021 from \$96.4 billion to \$138.5 billion as shown in Figure 47. The bulk of the exports, 57% in 2022, are to the United States. The United Kingdom (9.2% in 2021) and the European Union (7.8%) are also significant export destinations.

The value of Canada's mineral and metal exports increased dramatically in 2021 and 2022 due to high commodity prices. The total export value of minerals and metals excluding coal increased by 42% from 2020 to 2022 as shown in Figure 47.

69 Natural Resources Canada, *Mineral Trade Information Bulletin*, September 2023.

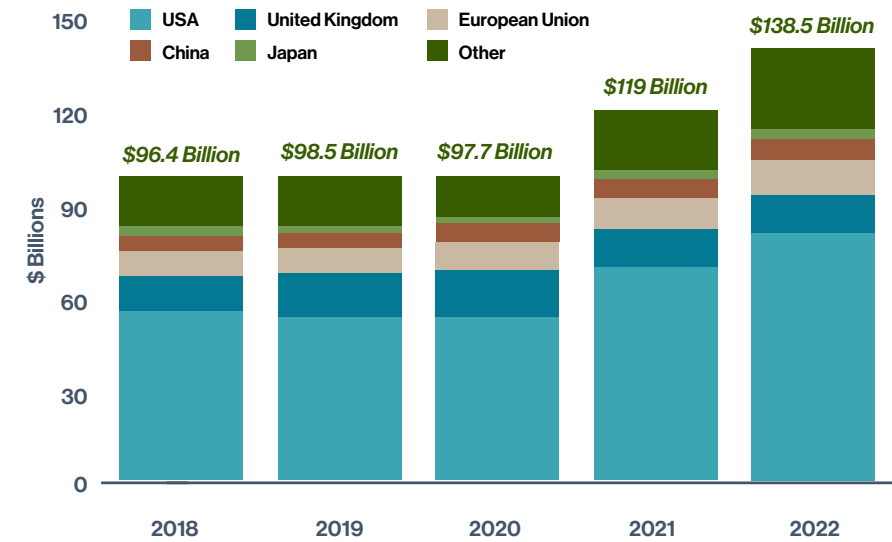


Figure 47: Exports of Mineral and Metal Products, Excluding Coal, By Destination⁷⁰

In 2022, Canada's top mineral exports were iron and steel (\$22.9 billion), gold (\$22.3 billion), aluminum (\$18.3 billion) and potash (\$16.4 billion). The value of domestic exports of these and other minerals and mineral products in 2022 are presented in Annex 8.

Canada imported \$126.9 billion of minerals and metals, excluding coal, in 2022. This is an increase of \$36.7 billion from 2018 as shown in Figure 48. Approximately 44% of these imports were from the United States, and 13% were from China, the next largest source. As with exports, the value of imports increased substantially in 2021 and 2022 as a result of high commodity prices.

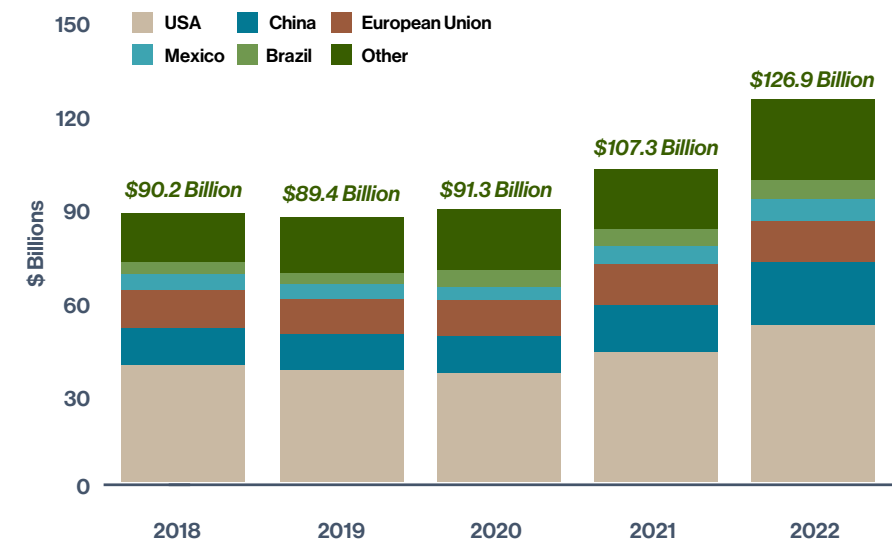


Figure 48: Imports of Mineral and Metal Products, Excluding Coal, By Source⁷¹

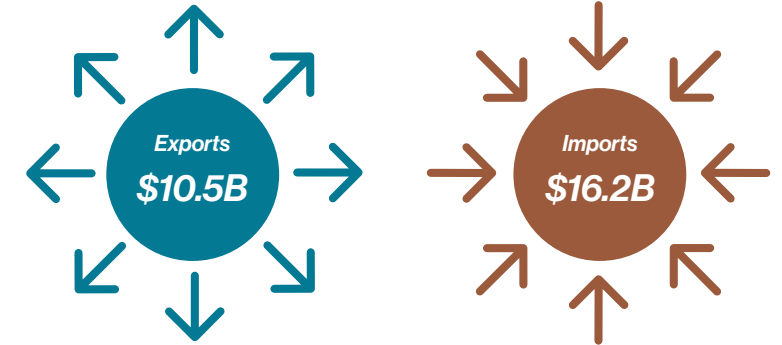
70 From Natural Resources Canada, *Canada: Value of imports and exports for mineral and metal products, excluding fuels, for select countries and regions*.

71 From Natural Resources Canada, *Canada: Value of imports and exports for mineral and metal products, excluding fuels, for select countries and regions*.

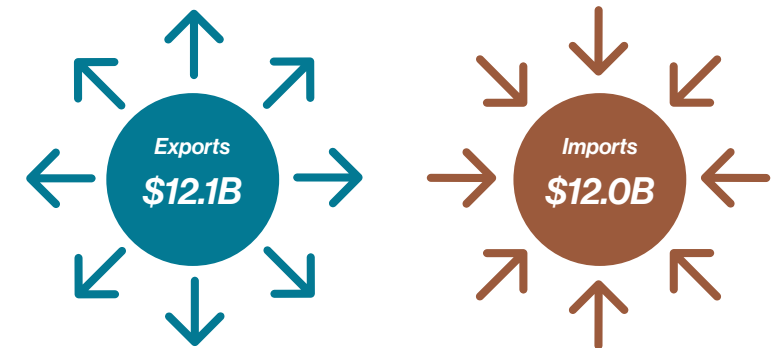


MINERALS AND METALS EXPORTED AND IMPORTED TO AND FROM CANADA

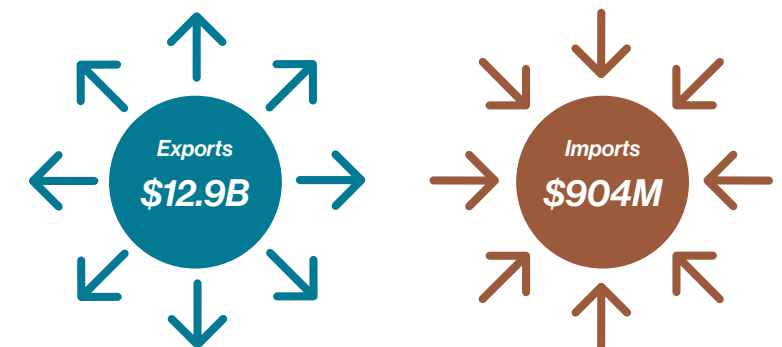
United States



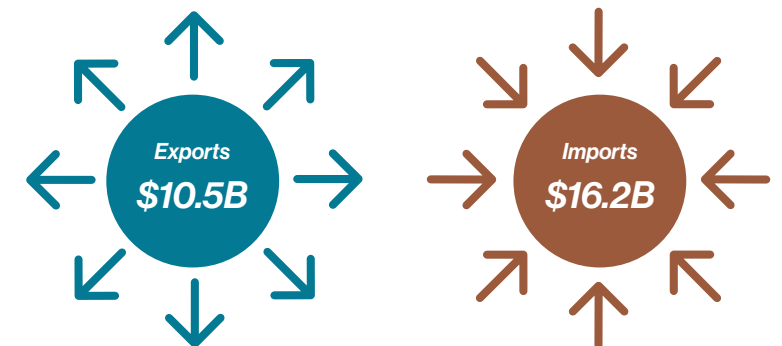
European Union



United Kingdom



China



In 2022, Canada's top mineral imports were iron and steel (\$36.3 billion), gold (\$14.6 billion), aluminum (\$10.4 billion) and copper (\$6.0 billion). The value of imports of these and other minerals and mineral products in 2022 are presented in Annex 9.

The balance of trade is Canada's total exports minus its imports. Canada had a surplus (i.e., exports greater than imports) of \$31.1 billion in 2022. Extraction (Stage 1) and primary manufacturing (Stage 2) both had surpluses, while Stage 3 and Stage 4 manufacturing showed trade deficits as shown in Figure 49.

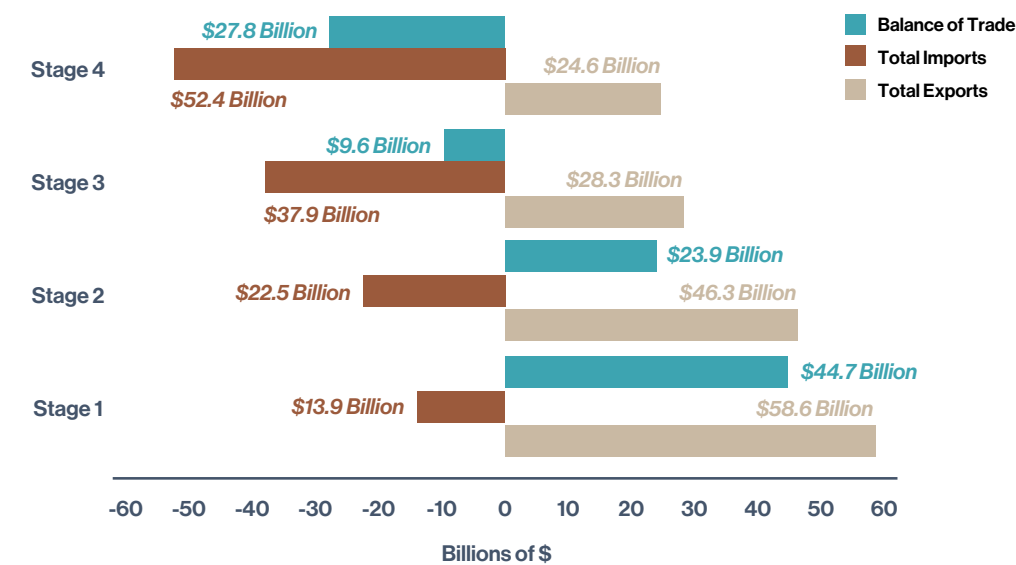


Figure 49: Balance of Trade by Stage, 2022⁷²

Canada's top trading partners in minerals make up a large proportion of total trade. The top four export destinations are the United States, the United Kingdom, the European Union and China. These four make up 75% of total exports of minerals and metals. Canada's top three sources of imports are the United States, China, and the EU. These three make up 66% of all of Canada's imports.

Canada's largest trading partner is the *United States*, responsible for about two thirds of our global trade. In 2022, the total trade in goods and services between Canada and the USA was \$1.2 trillion, or \$3.4 billion every day. Canada exports almost 80 billion dollars⁷³ worth of metals and minerals to our neighbour. The largest metals exports are iron and steel (\$20.9 billion), aluminum (\$16.8 billion), copper (\$4.9 billion) and gold (\$4.3 billion). The largest nonmetal exports are potash (\$6.5 billion) and cement (\$1.2 billion). Canada also exported \$767 million worth of coal and coke in 2022.

⁷² From Natural Resources Canada; Statistics Canada.

⁷³ Values for individual countries are for domestic exports, i.e., all goods grown, produced, extracted or manufactured in Canada leaving the country, through customs, for a foreign destination. "Total exports" are slightly different and include both domestic exports and re-exports, i.e., goods that were imported and are leaving the country in the same condition in which they first arrived.

Canada also imports a large volume of metals and minerals from the United States: \$56 billion in 2022. The top imports are iron and steel, gold, aluminum and copper. The total volume of trade in 2022 was \$135 billion, or about 10% of all of the trade in goods and services between the countries. Canada's balance of trade in minerals and metals with the United States in 2022 was positive by \$27 billion.

Canada's second largest export destination for metals and minerals is the *European Union*. The EU is a net importer of metals and minerals, and Canada is its fourth largest source⁷⁴. The largest volume of Canadian exports to Europe is iron ore, at \$3.0 billion, followed by diamonds at \$1.9 billion and nickel at \$1.3 billion. Canada also exports \$1.29 billion of coal to the EU, of which \$1.14 billion was metallurgical coal. Canada imported \$12 billion of minerals and metals from the EU in 2022. Iron and steel were the largest imports, at \$3.9 billion, followed by silver at \$1.1 billion. The total volume of minerals and metals trade in 2022 was \$24.1 billion. Canada's balance of trade in minerals and metals with the EU in 2022 was positive \$124 million.

Canada's next largest export destination is the *United Kingdom*. In 2022, Canada exported almost \$13 billion worth of minerals and metals to the UK. The vast majority of the exports (\$11.8 billion) were of gold. In fact, gold accounted for more than half of **all** of Canada's merchandise exports to the UK in 2022. The UK is a major destination for gold because of London's role as an international financial hub for the global gold trade. Canada's next largest exports were uranium and thorium (\$488 million), iron ore (\$226 million) and coal and coke (\$72 million).

Canada imported smaller amounts of minerals and metals from the UK: \$904 million in 2022. Iron and steel were the largest imports. The total volume of minerals and metals trade in 2022 was \$13.8 billion. Canada's balance of trade in minerals and metals with the UK in 2022 was positive by \$12.2 billion.

China is a major trade partner for Canada. It is both a large producer and consumer of minerals and metals: according to the United States Geological Survey, China is the leading producer and consumer of cement, gold, most nonferrous metals, and raw steel⁷⁵. In 2022, Canada exported \$10.5 billion worth of minerals and metals to China. Coal (\$3.5 billion, of which \$3.2 billion was metallurgical) was the largest export, followed by Iron and steel (\$2.1 billion) and copper (\$1.6 billion). Canada also exported \$1.5 billion of potash to China.

Canada imported \$16.2 billion of minerals and metals from China in 2022. These imports were mostly Stage 4 manufactured goods, which accounted for 70% of the value in 2022. The largest imports were iron and steel (\$5.8 billion) and aluminum (\$1.8 billion). The total trade volume between Canada and China in 2022 was \$26.8 billion, an increase of 20% from 2021. Canada's minerals and metals trade balance was negative by \$5.7 billion.

⁷⁴ Eurostat, [Extra-EU trade in raw materials](#), Table 11. The EU included rubber with metals and minerals in this category.

⁷⁵ Sean Xun, [The Mineral Industry of China](#) in the United States Geological Survey's 2019 Minerals Yearbook. Advance release copy.

CANADIAN MINING AROUND THE WORLD

In addition to assets in Canada, Canadian mining and exploration companies hold assets abroad. In 2021, 748 companies had mining assets outside of the country, with a total value of \$196 billion. This is more than double the value of Canadian mining assets in Canada, which were \$90 billion in 2021. Canadian mining assets abroad were held in 96 countries in 2021 as shown in Figure 50.

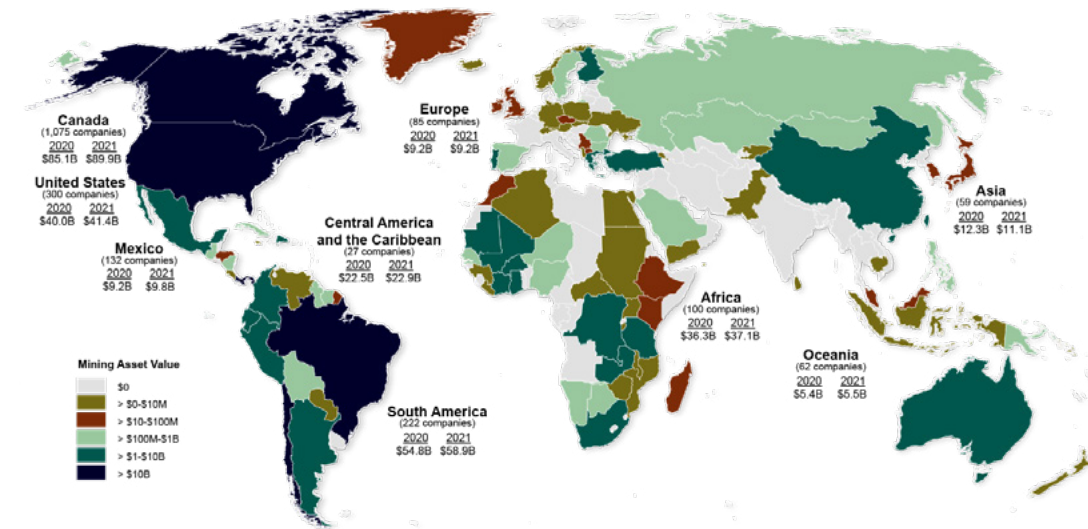


Figure 50: Geographic Distribution of Canadian Mining Assets⁷⁶

Junior companies account for most of the companies with assets abroad (88.1%) but a low share of the total value (6.4%) because of the high value of the mines owned by senior companies.

Canadian Direct Investment Abroad (CDIA) in mining is another indicator of the industry's international presence. A large majority of the book value of CDIA is represented by Stage 1, Extraction as shown in Figure 51. The total value of CDIA has increased substantially in recent years: from \$122 billion in 2019 to \$189 billion in 2022, as shown in Figure 52.

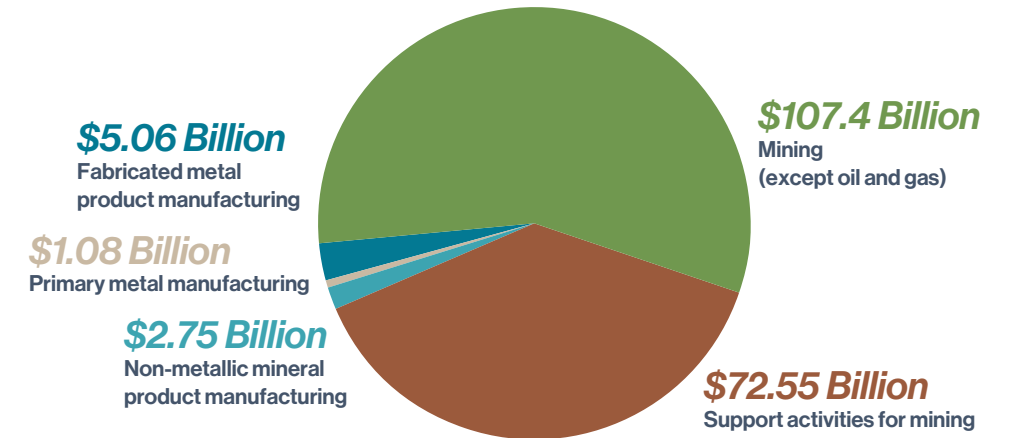


Figure 51: Canadian Direct Investment Abroad, Book Value by Subsector⁷⁷

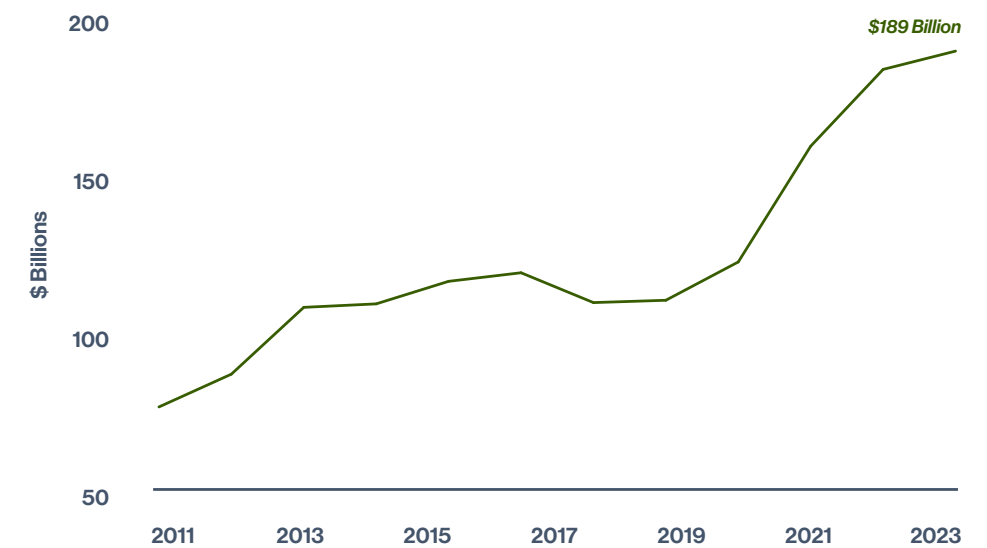


Figure 52: Canadian Direct Investment Abroad, Mining Sector 2011-2022⁷⁸

The major destinations for CDIA for Stage 1 extraction activities were North America (26%), South and Central America (18%), the Caribbean (17%), Europe (20%), Asia and Oceania (12%) and Africa (6%).

While outward flows of investment are essential to any open economy, the sheer scale of the increase in outward investment demonstrates the increasing global strength and reach of Canada's mining sector.

⁷⁶ From Natural Resources Canada's *Canadian Mining Assets Information Bulletin*, February 2023. <https://natural-resources.canada.ca/maps-tools-and-publications/publications/minerals-mining-publications/canadian-mining-assets/19323>. Note that this data describes "Canadian Mining Assets Abroad" which is slightly different from Canadian Direct Investment Abroad (CDIA) in the mining sector. CDIA is based on the international definition of foreign direct investment from national systems of accounts. Canadian Mining Assets Abroad are developed by Natural Resources Canada from financial accounting standards applied by Canadian public companies and auditors.

⁷⁷ From Statistics Canada Table International investment position, Canadian direct investment abroad and foreign direct investment in Canada, by North American Industry Classification System (NAICS) and region, annual (x 1,000,000) (Table 36-10-0009-01).

⁷⁸ From the same Statistics Canada table. Using Natural Resources Canada's method for calculating mining support services and NAICS codes 212, 213, 327, 331 and 332.

FOREIGN DIRECT INVESTMENT IN CANADA

As an open economy, Canada relies on foreign direct investment (FDI) in most sectors. The converse of CDIA, FDI is when other countries make investments in Canada. In 2022, FDI for the mining sector was \$65.0 billion, which made up 5.14% of Canada's total FDI. The subsector breakdown of FDI in Canada is present in Figure 53.

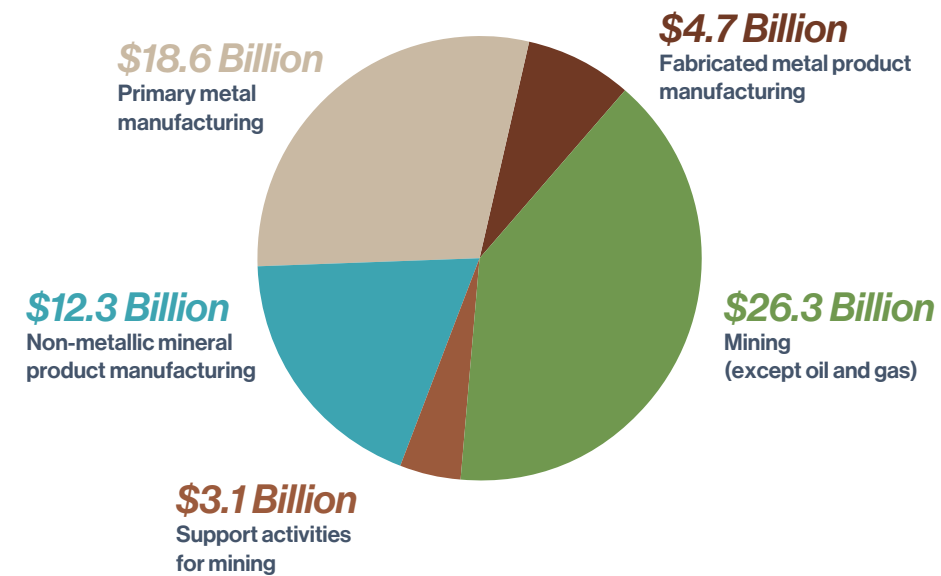


Figure 53: Foreign Direct Investment in Canada, Mining and Related Subsectors⁷⁹

FDI in Canada is up from recent lows observed during the 2020 pandemic year; however, it is still below the levels observed in the first half of the previous decade, as shown in Figure 54.

Major sources of FDI to Canada were Asia and Oceania (41%), Europe (26%) and the United States (26%).

⁷⁹ Statistics Canada. Table 36-10-0009-01 International investment position, Canadian direct investment abroad and foreign direct investment in Canada, by North American Industry Classification System (NAICS) and region, annual (x 1,000,000).

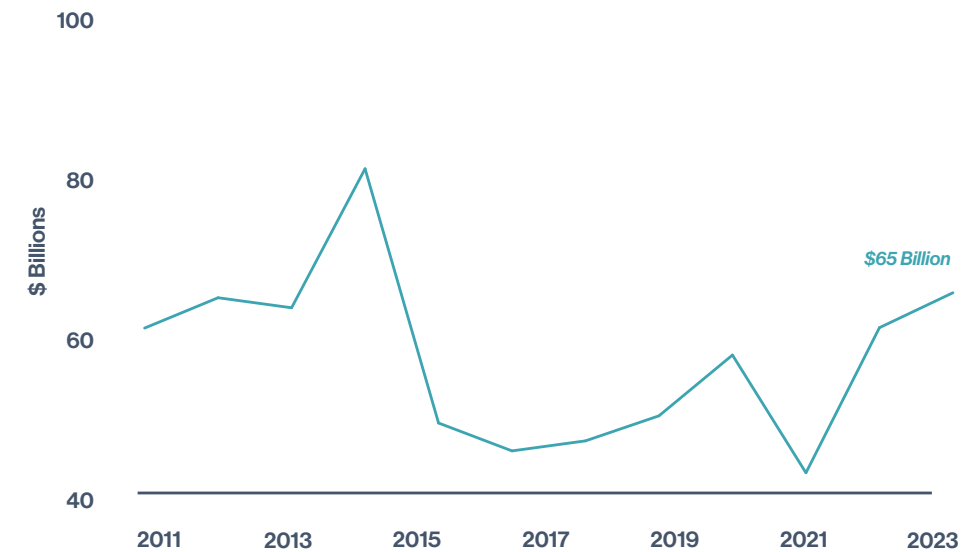


Figure 54: Foreign Direct Investment in the Mining Sector, 2011-2022⁸⁰

LOOKING FORWARD

Free trade, investment and taxation agreements help facilitate the trade of mining products and investment flows. These agreements reduce barriers for investment, enhance transparency and advance cooperation. The reduction and elimination of tariffs increases the competitiveness of Canadian mineral products in foreign jurisdictions by levelling the playing field from a cost standpoint, thus enabling companies to capture greater market share.

Investment agreements, complete with dispute resolution mechanisms, provide mining investors with greater certainty over the investments that companies make in foreign jurisdictions. Labour mobility and regulatory cooperation mechanisms enable companies to secure the key skills they need for project development and operation and promote dialogue through the complex process of obtaining regulatory approvals.

Part of maintaining Canada's global leadership is ensuring that Canadian mining and supply sectors have access to modern and comprehensive trade and investment vehicles to meet the world where it does business.

Investor State Dispute Settlement

Investor State Dispute Settlement (ISDS) mechanisms in trade agreements provide foreign investors with the right to access an international tribunal to resolve investment disputes. ISDS protections are critically important to the Canadian mining industry because of the unique factors that define mineral investments. Mining operations are vulnerable to state action because of the very high up front capital costs. It is common for a mine's initial capital expenditure to exceed \$1 billion before minerals are produced. After production begins, mines typically operate for several years to recover capital before any profit is realized. In the event of an interruption of mineral production beyond the miner's control, that investment is immobile as it is grounded in the host

⁸⁰ From Statistics Canada Table International investment position, Canadian direct investment abroad and foreign direct investment in Canada, by North American Industry Classification System (NAICS) and region, annual (x 1,000,000) (Table 36-10-0009-01). Using Natural Resources Canada's method for calculating mining support services and NAICS codes 212, 213, 327, 331 and 332

country. MAC believes that all trade agreements should include ISDS provisions to protect Canada's interests abroad.

Foreign Investment Promotion and Protection Agreements

Foreign investment gives Canadian businesses easier access to new technologies and ideas and enhances connectivity to larger markets and production chains. Ensuring that two-way flows of capital remain fair and open is essential. Negotiating safeguards for industry investment abroad, while enabling foreign investment into Canada, are key.

A Foreign Investment Promotion and Protection Agreement (FIPA) is a bilateral agreement aimed at protecting and promoting foreign investment through legally binding rights and obligations. Canada has 38 FIPAs in force. The status of current FIPA negotiations and free trade agreements is presented in Figure 55.

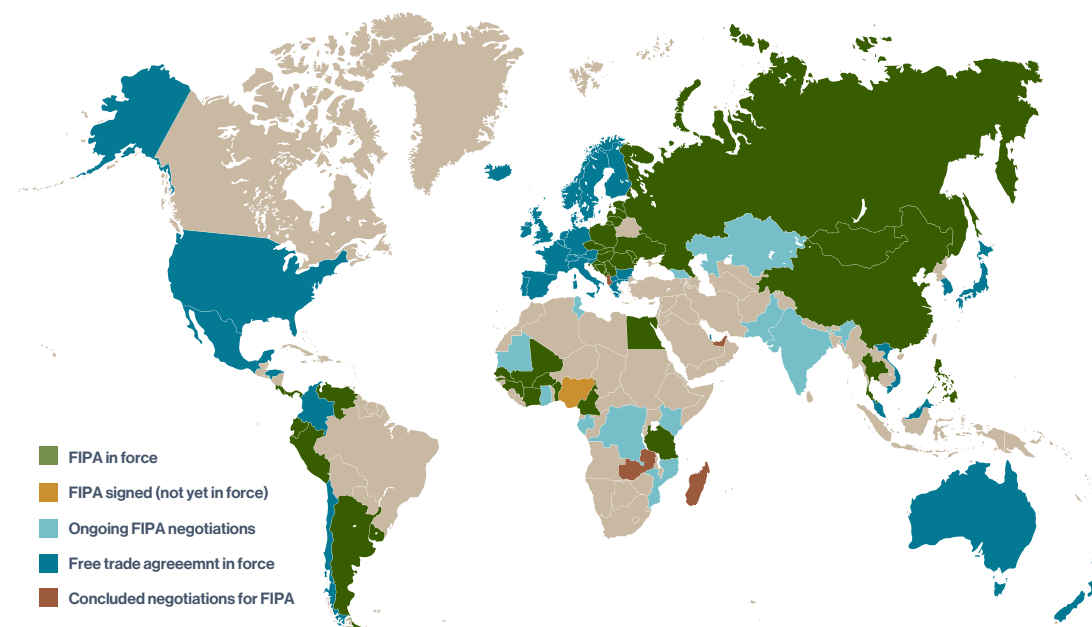


Figure 55: FIPA Agreements, Status of FIPA Negotiations and Free Trade Agreements⁸¹

The existence of a FIPA provides foreign governments with a set of rules and expectations for fairness and transparency and gives investors additional confidence. MAC is pleased that ISDS mechanisms remain part of Canada's model FIPA agreement.

⁸¹ From the Global Affairs Canada [Trade and Investment Agreements database](#).

Annexes

ANNEX 1: PRODUCING MINES IN CANADA, 2022

COMPANY	MINE SITE	ACTIVITY TYPE	LOCATION	COMMODITY
Newfoundland & Labrador				
China Minmetals Rare Earth Group Co. Ltd.	Beaver Brook	(U., C.)	Glenwood	OM
Rambler Metals and Mining PLC	Nugget Pond	(C.)	Snook's Arm	BM
Rambler Metals and Mining Canada Limited	Ming	(U.)	Baie Verte	BM
Signal Gold Inc.	Point Rouse	(P., C.)	Baie Verte	PM
Vale Newfoundland and Labrador Limited	Voisey's Bay	(P., U., C.)	Voisey's Bay	BM
Tacora Resources Inc.	Scully	(P., C.)	Wabush	Iron ore
Iron Ore Company of Canada Inc.	Carol Lake	(P., C.)	Labrador City	Iron ore
Tata Steel Minerals Canada Limited	DSO (Timmins)	(P., C.)	Menihek	Iron ore
Trinity Performance Minerals	Conception Bay South	(P.)	Conception Bay South	IM
Canada Fluorspar (NL) Inc. (subsidiary of Golden Gate Capital)	AGS Fluorspar	(P., C.)	St. Lawrence	IM
BarCan	Buchans	(P.)	Buchans	IM
Nova Scotia				
St Barbara Limited	Moose River Consolidated	(P., C.)	Upper Musquodoboit	PM
Nova Scotia Power Inc.	Glen Morrison	(P.)	Cape Breton	IM
Antigonish Limestone Ltd.	Southside Antigonish Harbour	(P.)	Southside Antigonish Harbour	IM
Nova Construction Ltd.	Brierly Brook	(P.)	Antigonish	IM
Mosher Limestone Company Limited	Upper Musquodoboit	(P.)	Upper Musquodoboit	IM
Lafarge Canada Inc.	Brookfield	(P., Plant)	Brookfield	IM
National Gypsum (Canada) Ltd.	East Milford	(P.)	Milford	IM
K+S Windsor Salt Ltd.	Pugwash	(U.)	Pugwash	IM
Compass Minerals Canada Corporation	Amherst (Nappan)	(Solution mining)	Amherst	IM
Kameron Collieries ULC	Donkin	(U.)	Cape Breton	Coal
Pioneer Coal Ltd.	Stellarton	(P.)	Stellarton	Coal
New Brunswick				
Trevali Mining Corporation	Caribou	(P., U., C.)	Bathurst	BM
Graymont Inc.	Havelock	(P., Plant)	Havelock	IM
Graymont Inc.	Springhill	(P.)	Havelock	IM
Nutrien Ltd.	New Brunswick	(U.)	Sussex	IM
Hammond River Holdings Ltd.	Upham East	(P.)	Upham	IM
Brookville Manufacturing Company	Brookville	(P., Plant)	Saint John	IM
Elmtree Resources Ltd.	Sormany	(P., Plant)	Sormany	IM
Quebec				
Rio Tinto Group	Lac Tio	(P.)	Havre-Saint-Pierre	OM
Champion Iron Ltd.	Bloom Lake	(P.)	Fermont	Iron ore
ArcelorMittal	Mont-Wright	(P., C.)	Fermont	Iron ore
Tata Steel Minerals Canada Limited	DSO (Goodwood)	(P.)	Schefferville	Iron ore
ArcelorMittal	Fire Lake	(P.)	Fermont	Iron ore
Magris Performance Materials	Niobec	(U., C.)	Saint-Honoré-de-Chicoutimi	OM

COMPANY	MINE SITE	ACTIVITY TYPE	LOCATION	COMMODITY
Glencore Canada Corporation	Raglan	(U., C.)	Katinniq	BM
Canadian Royalties Inc.	Nunavik	(P., U., C.)	Kangiqsujuaq	BM
Newmont Corporation	Éléonore	(U., C.)	Opinaca Reservoir	PM
Glencore Canada Corporation	Bracemac-McLeod	(U., C.)	Matagami	BM, PM
Eldorado Gold	Lamaque	(U., C.)	Val-d'Or	PM
Agnico Eagle Mines Limited	Goldex	(U., C.)	Val-d'Or	PM
Wesdome Gold Mines Ltd.	Kiena	(P., C.)	Val-d'Or	PM
Abcourt Mines Inc.	Sleeping Giant	(C.)	north of Amos	PM
Agnico Eagle Mines Limited and Yamana Gold Inc.	Canadian Malartic	(P., C.)	Malartic	PM
Agnico Eagle Mines Limited	LaRonde	(U., C.)	Preissac	PM
Agnico Eagle Mines Limited	LaRonde - Zone 5	(U.)	Preissac	PM
IAMGOLD Corporation	Westwood-Doyon	(U., C.)	Cadillac	PM
Abcourt Mines Inc.	Elder	(U.)	Rouyn-Noranda	PM
Hecla Mining Company	Casa Berardi	(U., C.)	north of La Sarre, Casa Berardi Twp.	PM
Stone Canyon Industries Holding	Seleine	(U.)	Îles-de-la-Madeleine	IM
St Marys Cement	McInnis Plant	(P., Plant)	Port-Daniel-Gascons	IM
Ressources minérales Pélican Inc.	Ressources minérales Pélican	(P.)	Grande-Vallée	IM
Le Groupe Berger Ltée	Saint-Modeste	(P.)	Saint-Modeste	IM
Sitec Amérique du Nord inc.	Petit Lac Malbaie	(P.)	Saint-Urbain	IM
Ciment Québec inc.	Quebec	(P., Plant)	city of Québec	IM
Graymont Inc.	Marbleton	(P., Plant)	Marbleton	IM
Ciment Québec inc.	Saint-Basile	(P., Plant)	Saint-Basile	IM
Graymont Inc.	Les Carrières Calco	(P., Plant)	St-Marc-des-Carrières	IM
Stornoway Diamonds Corporation	Renard	(P., U., C.)	Mistissini	DIAM
Carrière d'Acton Vale ltée	Acton Vale	(P., Plant)	Acton Vale	IM
Graymont Inc.	Bedford	(P., Plant)	Bedford	IM
OMYA (Canada) Inc.	Saint-Armand	(P., Plant)	Saint-Armand	IM
CRH Canada Group Inc.	Joliette	(P., Plant)	Joliette	IM
Lafarge Canada Inc.	St-Constant	(P., Plant)	St-Constant	IM
Demix Agrégats	Laval	(P., Plant)	Laval	IM
Ciment Québec inc.	Laval	(P., Plant)	Laval	IM
Imerys Mica Suzorite, Inc.	Lac Letondal	(P.)	Parent, Suzor Twp.	IM
Lehigh Hanson	Kilmar	(P., Plant)	Grenville-sur-la-Rouge	IM
Northern Graphite Corporation	Lac-des-Îles	(P., Plant)	Saint-Aimé-du-Lac-des-Îles	IM
Ontario				
Agnico Eagle Mines Limited	Detour Lake	(P., C.)	Matagami	PM
Agnico Eagle Mines Limited	Macassa	(U., C.)	Kirkland Lake area	PM
McEwen Mining Inc.	Black Fox	(P., U., C.)	Matheson	PM
Alamos Gold Inc.	Young-Davidson	(U., C.)	Kirkland Lake area	PM
Glencore Canada Corporation	Nickel Rim South	(U.)	Sudbury	BM

COMPANY	MINE SITE	ACTIVITY TYPE	LOCATION	COMMODITY
Vale Canada Limited	Garson	(U.)	Sudbury	BM
Vale Canada Limited	Clarabelle	(C.)	Sudbury	BM
Vale Canada Limited	Copper Cliff Complex	(U.)	Sudbury	BM
Newmont Corporation	Hoyle Pond	(U.)	south of Porcupine	PM
Pan American Silver Corp.	Bell Creek	(U., C.)	Timmins	PM
Vale Canada Limited	Creighton	(U.)	Sudbury	BM
Newmont Corporation	Porcupine	(C.)	Timmins	PM
Newmont Corporation	Hollinger	(P.)	Timmins	PM
Vale Canada Limited	Coleman	(U.)	Sudbury	BM
Glencore Canada Corporation	Fraser	(U.)	Sudbury	BM
Glencore Canada Corporation	Strathcona	(C.)	Sudbury	BM
Glencore Canada Corporation	Kidd Creek	(U., C.)	Timmins	BM
KGHM Polska Miedź S.A.	McCreeley West	(U.)	Sudbury	BM, PM
Vale Canada Limited	Totten	(U.)	Worthington	BM
Pan American Silver Corp.	Timmins West	(U.)	Timmins	PM
Newmont Corporation	Borden	(P., U.)	Chapleau	PM
Alamos Gold Inc.	Island	(U., C.)	Dubreuilville	PM
Silver Lake Resources Ltd.	Sugar Zone	(U., C.)	White River	PM
Wesdome Gold Mines Ltd.	Mishi	(P.)	Wawa	PM
Wesdome Gold Mines Ltd.	Eagle River	(U., C.)	Wawa	PM
Barrick Gold Corporation	Hemlo (Williams)	(P., U., C.)	Marathon	PM
Impala Canada Ltd.	Lac des Iles	(P., U., C.)	Thunder Bay	PM
Newmont Corporation	Musselwhite	(U., C.)	north of Pickle Lake	PM
Evolution Mining Ltd.	Red Lake	(U., C.)	Balmertown	PM
Pure Gold Mining Inc.	PureGold	(P., C.)	Red Lake	PM
New Gold Inc.	Rainy River	(P., U., C.)	Fort Frances	PM
Canadian Wollastonite	St. Lawrence	(P.)	Kingston	IM
OMYA (Canada) Inc.	Tatlock	(P.)	Tatlock	IM
Lafarge Canada Inc.	Bath	(P.)	Bath	IM
Lehigh Hanson	Picton	(P.)	Picton	IM
CRH Canada Group Inc.	Ogden Point	(P.)	Ogden Point	IM
Covia Canada Ltd.	Blue Mountain	(P., Plant)	Blue Mountain	IM
St Marys CBM (Canada) Inc.	Bowmanville	(P.)	Bowmanville	IM
Miller Minerals (Miller Paving Co.)	Bucke	(P., Plant)	New Liskeard	IM
Carmeuse Lime (Canada) Limited	Dundas	(P.)	Dundas	IM
Lafarge Canada Inc.	Dundas	(P.)	Dundas	IM
CGC Inc.	Hagersville	(U., Plant)	Hagersville	IM
Carmeuse Lime (Canada) Limited	Beachville	(P., Plant)	Ingersoll	IM
E.C. King Contracting Ltd. (Miller Paving Co.)	Sydenham	(P.)	Owen Sound	IM
Owen Sound Ledgerock Ltd.	Owen Sound	(P.)	Owen Sound	IM
St Marys CBM (Canada) Inc.	St Marys	(P.)	St. Marys	IM
Boreal Agrominerals Inc.	Spanish River Carbonite	(P.)	northwest of Sudbury	IM
Compass Minerals Canada Corporation	Goderich	(U., Plant)	Goderich	IM
Compass Minerals Canada Corporation	Goderich	(Solution mining)	Goderich	IM
Magris Talc Canada Inc.	Penhorwood	(P.)	Penhorwood	IM

COMPANY	MINE SITE	ACTIVITY TYPE	LOCATION	COMMODITY
K+S Windsor Salt Ltd.	Windsor	(Solution mining)	Windsor	IM
K+S Windsor Salt Ltd.	Ojibway	(U.)	Windsor	IM
Lafarge Canada Inc.	Meldrum Bay	(P., Plant)	Manitoulin Island	IM
Manitoba				
Sinomine Resource Grp Co. Ltd.	Tanco	(U., C.)	Lac-du-Bonnet	BM
Vale Canada Limited	Thompson (T-1 and T-3)	(P., U., C.)	Thompson	BM
Hudbay Minerals Inc.	Stall Lake	(C.)	Snow Lake	BM, PM
Hudbay Minerals Inc.	New Britannia	(C.)	Snow Lake	BM, PM
Hudbay Minerals Inc.	Lalor Lake	(U.)	Snow Lake	BM, PM
Hudbay Minerals Inc.	777	(U., C.)	Flin Flon	BM
Graymont Inc.	Faulkner	(P., Plant)	Faulkner	IM
ERCO Worldwide	Hargrave	(U., Plant)	Viriden	IM
Saskatchewan				
SSR Mining Inc.	Santoy	(U.)	Santoy Lake	PM
SSR Mining Inc.	Seabee	(C.)	Laonil Lake	PM
Orano Canada Inc.	McClellan Lake	(C.)	McClellan Lake	Uranium
Cameco Corporation	Cigar Lake	(U.)	Waterbury Lake	Uranium
Cameco Corporation	McArthur River	(U.)	north of Key Lake	Uranium
Cameco Corporation	Key Lake	(C.)	north of Highrock Lake	Uranium
Nutrien Ltd.	Rocanville	(U., Plant)	Rocanville	IM
The Mosaic Company	Esterhazy (K-3)	(U., Plant)	Esterhazy	IM
Compass Minerals Canada Corporation	Wynyard (Big Quill)	(Plant)	Wynyard	IM
The Mosaic Company	Belle Plaine	(U., Plant)	Belle Plaine	IM
Nutrien Ltd.	Lanigan	(U.)	Lanigan	IM
K+S Potash Canada	Bethune	(U., Plant)	Bethune	IM
Nutrien Ltd.	Allan	(U., Plant)	Allan	IM
Nutrien Ltd.	Patience Lake	(U., Plant)	Blucher	IM
ERCO Worldwide	Saskatoon facility	(Solution mining, Plant)	Saskatoon	IM
Saskatchewan Mining and Minerals Inc.	Chaplin Lake	(P., Plant)	Chaplin	IM
Nutrien Ltd.	Cory	(U., Plant)	Cory	IM
Nutrien Ltd.	Vanscoy	(U., Plant)	Vanscoy	IM
Compass Minerals Canada Corporation	Unity	(Solution mining)	Unity	IM
Westmoreland Coal Company	Estevan	(P.)	Bienfait	Coal
Westmoreland Coal Company	Poplar River	(P.)	Coronach	Coal
Alberta				
K+S Windsor Salt Ltd.	Lindbergh	(Solution mining)	Elk Point	IM
Hammerstone Corporation	Steepbank	(P.)	north of Fort McMurray	IM
Jarodon Resources Ltd.	Sunnynook	(Solution mining)	Cessford	IM
Suncor Energy Inc.	Fort McMurray West	(P.)	Fort McMurray	IM
Ward Chemical	Calling Lake	(Solution mining)	Calling Lake	IM
Tiger Calcium Services Inc.	Mitsue	(Solution mining)	Slave Lake	IM
Graymont Inc.	Exshaw (Gap)	(P., Plant)	Exshaw	IM

COMPANY	MINE SITE	ACTIVITY TYPE	LOCATION	COMMODITY
Lafarge Canada Inc.	Exshaw	(P., Plant)	Exshaw	IM
Burnco Rock Products Ltd.	Clearwater	(P., Plant)	Clearwater River	IM
Lehigh Hanson	Mcleod	(P.)	Cadomin	IM
Westmoreland Coal Company	Genesee	(P.)	Genesee	Coal
Westmoreland Coal Company	Coal Valley	(P.)	Edson	Coal
Bighorn Mining Ltd.	Vista	(P.)	Hinton	Coal
Imperial Oil Ltd.	Kearl	(P.)	Fort McMurray	Oil
Suncor Energy Inc.	Millennium and Steepbank	(P.)	Fort McMurray	Oil
Canadian Natural Resources Limited	Jackpine	(P.)	Fort MacKay	Oil
Syncrude Canada Ltd.	Aurora North and South	(P.)	Fort MacKay	Oil
Syncrude Canada Ltd.	Mildred Lake	(P.)	Fort MacKay	Oil
Canadian Natural Resources Limited	Muskeg River	(P.)	Fort MacKay	Oil
Suncor Energy Inc.	Fort Hills	(P.)	Fort MacKay	Oil
Canadian Natural Resources Limited	Horizon	(P.)	Fort MacKay	Oil
British Columbia				
New Gold Inc.	New Afton	(U., C.)	Kamloops	BM, PM
Copper Mountain Mining Corporation	Copper Mountain	(P., C.)	Princeton	BM
Teck Resources Limited	Highland Valley	(P., C.)	Logan Lake	BM
Imperial Metals Corporation	Mount Polley	(P., C.)	northeast of Williams Lake	BM
Taseko Mines Limited	Gibraltar	(P., C.)	north of Williams Lake	BM
Centerra Gold Inc.	Mount Milligan	(P., C.)	Fort St. James	BM, PM
Trafigura Mining Group	Myra Falls	(U.)	Strathcona	BM, PM
Newcrest Mining Ltd.	Red Chris	(P., C.)	Kinaskan Lake	BM
Newcrest Mining Ltd.	Brucejack	(U., C.)	Stewart	PM
Baymag Inc.	Mount Brussilof	(P.)	Mount Brussilof	IM
CertainTeed Gypsum Canada, Inc.	Elkhorn	(P.)	Windermere	IM
Lafarge Canada Inc.	Falkland	(P., Plant)	Falkland	IM
Progressive Planet Solutions Inc.	Bud	(P.)	Princeton	IM
Progressive Planet Solutions Inc.	Red Lake	(P.)	Kamloops	IM
Imperial Limestone Co. Ltd.	Van Anda	(P.)	Texada Island	IM
Texada Quarrying Ltd. (Lafarge Canada Inc.)	Texada	(P.)	Texada Island	IM
Fireside Minerals Ltd.	Fireside	(P.)	Fireside	IM
Teck Resources Limited	Line Creek	(P.)	Sparwood	Coal
Teck Resources Limited	Elkview	(P.)	Sparwood	Coal
Teck Resources Limited	Fording River	(P.)	Elkford	Coal
Teck Resources Limited	Greenhills	(P.)	Sparwood	Coal
Conuma Coal Resources Ltd.	Wolverine	(P., Plant)	Tumbler Ridge	Coal
Conuma Coal Resources Ltd.	Brule	(P.)	Tumbler Ridge	Coal
Conuma Coal Resources Ltd.	Willow Creek	(P.)	Chetwynd	Coal
Yukon				
Hecla Mining Company	Keno Hill Silver District	(U., C.)	Mayo	PM, BM
Victoria Gold Corporation	Eagle (Dublin Gulch)	(P., C.)	Mayo	PM
Minto Metals Corporation	Minto	(P., U., C.)	Pelly Crossing	BM

COMPANY	MINE SITE	ACTIVITY TYPE	LOCATION	COMMODITY
Northwest Territories				
De Beers Canada Inc.	Gahcho Kué	(P., Plant)	Lac de Gras	DIAM
Rio Tinto Group	Diavik	(U., Plant)	Lac de Gras	DIAM
Arctic Canadian Diamond Company	Ekati	(U., Plant)	Lac de Gras	DIAM
Nunavut				
Baffinland Iron Mines Corporation	Mary River	(P.)	Pond Inlet	Iron ore
Agnico Eagle Mines Limited	Meliadine	(P., U., C.)	Rankin Inlet	PM
Agnico Eagle Mines Limited	Meadowbank	(C.)	Baker Lake	PM
Agnico Eagle Mines Limited	Amaruq	(P., U.)	Baker Lake	PM

Source: Natural Resources Canada.

(P.) Open-Pit, (U.) Underground, (C.) Concentrator

Notes: Excluded operations are clay products, peat, and most construction materials (most stone, sand and gravel). Included are operations that produced during 2022.

ANNEX 2: CANADIAN PRODUCTION OF LEADING MINERALS BY PROVINCE AND TERRITORY, 2022 (p)

	GOLD		COAL		IRON ORE (2)	
	kilograms	\$000	kilotonnes	\$000	kilotonnes	\$000
Newfoundland	x	50,874			x	x
Prince Edward Island						
Nova Scotia	1,379	111,894	x	x		
New Brunswick						
Quebec	54,103	3,728,713			30,110	x
Ontario	92,904	5,358,046				
Manitoba	3,160	333,635				
Saskatchewan	x	200,000	x	x		
Alberta	x	x	x	x		
British Columbia	20,426	1,461,454	x	x		
Yukon	4,568	332,681				
Northwest Territories						
Nunavut	x	x			x	x
Canada	203,879	13,168,359	39,468	12,654,895	44,848	5,865,871

	POTASH (MOP)		COPPER		NICKEL	
	kilotonnes	\$000	tonnes	\$000	tonnes	\$000
Newfoundland			21,173	x	19,125	683,463
Prince Edward Island						
Nova Scotia						
New Brunswick						
Quebec			x	x	39,147	1,079,807
Ontario			160,030	1,926,469	71,277	1,883,398
Manitoba			20,357	260,463	13,689	530,688
Saskatchewan	23,876	16,832,519				
Alberta						
British Columbia			287,613	3,224,915		
Yukon			x	x		
Northwest Territories						
Nunavut						
Canada	23,876	16,832,519	529,007	6,029,912	143,238	4,177,356

	SAND AND GRAVEL (1)		PLATINUM GROUP	
	kilotonnes	\$000	kilograms	\$000
Newfoundland	1,442	x	11	2,145
Prince Edward Island	47	x		
Nova Scotia	6,881	82,613	0.1	X
New Brunswick	3,650	x		
Quebec	x	x	4,683	462,621
Ontario	90,480	778,807	17,021	1,643,969
Manitoba	9,631	87,606	198	22,222
Saskatchewan	6,190	68,239		
Alberta	48,178	561,537		
British Columbia	37,634	400,320		
Yukon	189	x		
Northwest Territories	x	x		
Nunavut	..	..
Canada	204,410	2,023,080	21,914	2,130,957

	DIAMONDS		STONE	
	000 carats	\$000	kilotonnes	\$000
Newfoundland			x	x
Prince Edward Island			x	x
Nova Scotia			9,128	x
New Brunswick			3,657	x
Quebec	1,825	219,000		
Ontario			79,220	808,838
Manitoba			4,852	x
Saskatchewan			x	x
Alberta			5,097	x
British Columbia			12,672	x
Yukon				
Northwest Territories	15,560	2,168,176	x	x
Nunavut				
Canada	17,385	2,387,176	116,323	1,168,926

Sources: Natural Resources Canada; Statistics Canada.

(p) Preliminary; - Nil; x Confidential; .. Not available for specific reference period.

- Notes: (1) For metals, the quantity refers to the recoverable metal in concentrates shipped.
(1) Mineral production of sand and gravel for Nunavut is included in totals for the Northwest Territories.
(2) The quantity and value reflect iron ore concentrates only because agglomerates values are suppressed by the source.

ANNEX 3: CANADA'S WORLD ROLE AS A PRODUCER OF CERTAIN IMPORTANT MINERALS, 2022 (p)

		RANK OF FIVE LEADING COUNTRIES					
		World	1	2	3	4	5
			Canada	China	Russia	Belarus	Germany
Potash (K ₂ O equivalent)	000 t	40,000	16,000	6,000	5,000	3,000	2,800
(mine production)	% of world total		40.0	15.0	12.5	7.5	7.0
			Brazil	Canada			
Niobium (mine production)	t	79,000	71,000	6,500			
	% of world total		89.9	8.2			
			Kazakhstan	Canada	Namibia	Australia	Uzbekistan
Uranium (metal content)	t	48,888	21,819	7,351	5,613	4,087	3,300
(mine production)	% of world total		44.6	15.0	11.5	8.4	6.8
			Russia	Botswana	Canada	Congo	South Africa
Diamonds (precious)	000 carats	120,041	39,117	22,878	17,615	14,091	9,718
	% of world total		32.6	19.1	14.7	11.7	8.1
			Russia	South Africa	Canada	United States	Zimbabwe
Palladium (metal content)	kg	210,000	88,000	80,000	15,000	11,000	12,000
	% of world total		41.9	38.1	7.1	5.2	5.7
			China	India	Russia	Canada	UAE
Aluminum (primary metal)	000 t	69,000	40,000	4,000	3,700	3,000	2,700
	% of world total		58.0	5.8	5.4	4.3	3.9
			China	South Korea	Japan	Canada	Kazakhstan
Cadmium (metal)	t	24,000	10,000	4,000	1,900	1,800	1,200
	% of world total		41.7	16.7	7.9	7.5	5.0
			China	Australia	Russia	Canada	United States
Gold (mine production)	t	3,100	330	320	320	220	170
	% of world total		10.6	10.3	10.3	7.1	5.5
			China	South Korea	Japan	Canada	France
Indium	000 t	900	530	200	66	55	20
	% of world total		58.9	22.2	7.3	6.1	2.2
			Finland	Germany	Ireland	Canada	Belarus
Peat	000 t	20,000	5,400	2,600	2,000	1,700	1,700
	% of world total		27.0	13.0	10.0	8.5	8.5
			South Africa	Russia	Zimbabwe	Canada	United States
Platinum (metal content)	kg	190,000	140,000	20,000	15,000	6,000	3,300
	% of world total		73.7	10.5	7.9	3.2	1.7
			China	Russia	Japan	Canada	Sweden
Tellurium	t	640	340	80	70	50	40
	% of world total		53.1	12.5	10.9	7.8	6.3

		RANK OF FIVE LEADING COUNTRIES						
		World	1	2	3	4	5	
			China	India	Mexico	Canada		
Wollastonite	000 t	1,200	900	120	100	20		
	% of world total		75.0	10.0	8.3	1.7		
			Congo	Russia	Australia	Philippines	Canada	
Cobalt (mine production) 2	t	190,000	130,000	8,900	5,900	3,800	3,900	
	% of world total		68.4	4.7	3.1	2.0	2.1	
			China	Madagascar	Finland	United States	Canada	
Mica (natural)	000 t	390	100	65	60	42	16	
	% of world total		25.6	16.7	15.4	10.8	4.1	
			China	Mozambique	South Africa	Australia	Canada	
Titanium concentrate (Ilmenite)	000 t	8,900	3,400	1,200	900	660	470	
	% of world total		38.2	13.5	10.1	7.4	5.3	
			China	Mozambique	Madagascar	Brazil	Korea	Canada is 6th
Graphite	000 t	1,300	850	170	110	87	17	
	% of world total		65.4	13.1	8.5	6.7	1.3	
			Indonesia	Philippines	Russia	New Caledonia	Australia	Canada is 6th
Nickel (mine production)	000 t	3,300	1,600	330	220	190	160	
	% of world total		48.5	10.0	6.7	5.8	4.8	
			China	India	United States	Germany	Australia	Canada is 6th
Salt (mine production)	000 t	290,000	64,000	45,000	42,000	15,000	13,000	
	% of world total		22.1	15.5	14.5	5.2	4.5	
			China	United States	Russia	S.Arabia	U.A.Emirates	Canada is 6th
Sulfur, elemental (mine production)	000 t	82,000	18,000	8,600	7,300	7,000	6,000	
	% of world total		22.0	10.5	8.9	8.5	7.3	
			China	Korea, Republic of	Laos	Japan	Kazakhstan	Canada is 7th
Bismuth	t	20,000	16,000	950	2,000	480	220	
	% of world total		80.0	4.8	10.0	2.4	1.1	
			United States	Qatar	Algeria	Russia	Australia	Canada is 7th
Helium	M m3 of contained	164	69	20	14	5	4	
Molybdenum (Mo content) (mine production)	t	250,000	100,000	44,000	42,000	32,000	16,000	
	% of world total		40.0	17.6	16.8	12.8	6.4	
			Australia	Chile	China	Argentina	Brazil	Canada 8th
Lithium	t	130,000	61,000	39,000	14,000	6,200	2,200	
	% of world total		46.9	30.0	10.8	4.8	1.7	
			China	Australia	Peru	India	United States	Canada 8th
Zinc (mine production)	000 t	13,000	4,200	1,300	1,400	830	770	
	% of world total		32.3	10.0	10.8	6.4	5.9	

		RANK OF FIVE LEADING COUNTRIES							
		World	1	2	3	4	5		
			Chile	Peru	Congo	China	United States	Canada is 10th	
Copper (mine production)	000 t	22,000	5,200	2,200	2,200	1,900	1,300	530	
	% of world total		23.6	10.0	10.0	8.6	5.9	2.4	
			Australia	Brazil	China	India	Russia	Canada is 10th	
Iron ore (mine production)	mt	2,600	880	410	380	290	90	58	
(Usable ore)	% of world total		33.8	15.8	14.6	11.2	3.5	2.2	
			United States	Netherlands	India	Italy	Russia	Canada is 12th	
Sand and Gravel (Industrial)	000 t	380,000	97,000	54,000	12,000	14,000	7,300	5,000	
	% of world total		25.5	14.2	3.2	3.7	1.9	1.3	
			China	India	Indonesia	United States	Australia	Canada 13th	
Coal	Mt	8,318	4,237	893	622	535	446	67	
	% of world total		50.9	10.7	7.5	6.4	5.4	0.8	
			United States	Iran	China	Oman	Turkey	Canada is 13th	
Gypsum (mine production)	000 t	150,000	21,000	16,000	13,000	12,000	9,300	2,400	
	% of world total		14.0	10.7	8.7	8.0	6.2	1.6	
			China	Russia	Brazil	Norway	United States	Canada is 14th	
Silicon	000 t	8,800	6,000	640	400	360	310	49	
	% of world total		68.2	7.3	4.5	4.1	3.5	0.6	
			China	United States	India	Russia	Brazil	Canada is 15th	
Lime	000 t	430,000	310,000	17,000	16,000	11,000	8,100	1,600	
	% of world total		72.1	4.0	3.7	2.6	1.9	0.4	

Sources: U.S. Geological Survey (USGS); bp Statistical Review of World Energy; World Nuclear Association; Kimberley Process
n.a. Not applicable.

ANNEX 4: MINERAL PRODUCTION OF CANADA, 2012-2022 (p)

		2013		2014		2015		2016		2017		
		Unit	(quantity)	(\$000)	(quantity)	(\$000)	(quantity)	(\$000)	(quantity)	(\$000)	(quantity)	(\$000)
METALLIC MINERALS												
Antimony	t	148	1,562	4	45	1	5	0	3	1	11	
Bismuth	t	103	2,006	4	97	2	29	2	31	4	59	
Cadmium	t	160	316	129	276	68	102	60	113	158	381	
Cesium	t	x	x	x	x	x	x	x	x	x	x	
Cobalt	t	4,005	118,114	3,907	137,844	4,339	156,720	4,216	149,145	3,704	290,783	
Copper	t	620,989	4,695,298	654,468	4,983,772	697,322	4,905,661	679,524	4,379,532	580,097	4,639,616	
Gold	kg	131,404	6,141,048	151,472	6,817,154	160,751	7,667,339	161,497	8,590,179	172,877	9,069,125	
Ilmenite	000 t	x	x	x	x	x	x	x	x	x	x	
Indium	kg	x	x	x	x	x	x	x	x	x	x	
Iron ore ⁵	000 t	42,063	5,348,433	43,173	4,173,516	46,220	2,854,585	46,731	3,165,022	50,300	4,693,042	
Iron, remelt	000 t	x	x	x	x	x	x	x	x	x	x	
Lead	t	22,895	50,506	3,579	8,288	3,699	8,485	12,020	29,785	13,494	40,589	
Lithium	t	-	-	x	x	-	-	-	-	-	-	
Molybdenum	t	7,956	186,788	9,358	259,876	2,505	48,846	2,783	53,105	4,765	112,054	
Nickel	t	218,026	3,372,864	218,233	4,069,165	225,351	3,408,431	230,210	2,926,428	206,354	2,787,020	
Niobium (Columbium)	t	4,916	x	5,774	x	5,385	x	6,099	x	x	x	
Platinum group	kg	25,465	767,363	31,386	1,058,992	33,248	1,059,512	31,471	947,560	27,342	1,016,402	
Selenium	t	138	10,411	142	8,879	156	6,575	175	3,886	72	3,204	
Silver	t	620	489,872	472	320,274	371	239,656	385	282,666	368	261,688	
Tantalum	t	40	12,698	-	-	-	-	-	-	-	-	
Tellurium	t	8	895	8	1,066	10	990	18	870	18	885	
Titanium dioxide ⁵	t	3,017	86,293	2,708	84,331	2,289	62,339	-	-	-	-	
Uranium	t	7,889	806,418	9,780	933,583	13,279	1,609,476	14,133	1,248,600	12,207	876,473	
Zinc	t	412,277	811,361	322,605	771,026	275,410	632,892	301,210	832,545	305,314	1,146,760	
TOTAL, METALLIC MINERALS		..	23,497,305	..	24,225,029	..	23,125,240	..	23,302,112	..	25,738,171	

	Unit	2018		2019		2020		2021		2022(p)	
		(quantity)	(\$000)	(quantity)	(\$000)	(quantity)	(\$000)	(quantity)	(\$000)	(quantity)	(\$000)
METALLIC MINERALS											
Antimony	t	5	54	x	x	..	..	..	..	..	..
Bismuth	t	5	58	x	x	..	..	..	..	..	..
Cadmium	t	148	595	x	x	x	x	x	x	..	..
Cesium	t	x	x	-	-	-	-	-	-	..	..
Cobalt	t	3,279	310,086	4,365	180,029	4,775	186,219	4,361	198,274	3,063	265,578
Copper	t	527,510	4,422,120	551,562	4,293,553	574,818	4,211,626	520,682	4,507,058	529,007	6,029,912
Gold	kg	191,882	10,118,125	190,412	11,461,406	174,526	13,252,137	214,592	13,716,908	203,879	13,168,359
Ilmenite	000 t	x	x	x	x	x	x	x	x	..	..
Indium	kg	x	x	64,802	15,552	57,665	12,110	47,385	12,591	..	..
Iron ore ⁵	000 t	52,755	4,949,188	35,723	3,579,753	40,600	5,448,928	37,772	6,495,069	44,848	5,865,871
Iron, remelt	000 t	x	x	x	x	x	x	x	x	x	x
Lead	t	15,605	45,131	x	x	x	x	68,660	32,112	6,891	17,083
Lithium	t	x	x	..	..	..	..	-	-	..	..
Molybdenum	t	5,048	152,725	4,367	142,908	2,442	x	1,418	72,409	793	x
Nickel	t	175,761	2,970,887	172,743	3,288,404	166,932	2,687,585	149,131	2,597,165	143,238	4,177,356
Niobium (Columbium)	t	x	x	x	x	x	x	x	x	x	x
Platinum group	kg	28,596	1,206,948	33,287	1,946,378	19,476	1,704,480	22,197	1,810,812	21,914	2,130,957
Selenium	t	85	4,133	x	x	x	x	x	x	..	..
Silver	t	392	254,759	380	258,439	309	261,145	308	275,932	336	297,820
Tantalum	t	-	-	-	-	-	-	-	-	-	-
Tellurium	t	x	x	x	x	x	x	x	x	-	-
Titanium dioxide ⁵	t	-	-	-	-	-	-	-	-	x	x
Uranium	t	6,975	490,077	6,997	143,527	3,704	123,637	4,710	116,329	-	-
Zinc	t	287,632	1,087,538	263,941	840,313	229,713	597,106	300,207	630,725	5,100	660,172
TOTAL, METALLIC MINERALS		..	27,058,554	..	29,496,447	..	31,634,809	..	35,656,938	207,200	772,820

	Unit	2013		2014		2015		2016		2017	
		(quantity)	(\$000)	(quantity)	(\$000)	(quantity)	(\$000)	(quantity)	(\$000)	(quantity)	(\$000)
NONMETALLIC MINERALS											
Barite	000 t	x	x	x	x	x	x	x	x	x	x
Carbonatite	000 t	x	x	x	x	x	x	x	x	..	..
Cement ¹	000 t	12,022	1,618,827	12,136	1,692,131	12,334	1,689,851	11,820	1,615,674	-	-
Chrysotile	000 t	x	x	x	x	x	x	x	x	-	-
Clay	000 t	-	-	-	-	-	-	-	-	..	147,131
Clay products ²	000 t	..	122,577	..	118,012	..	124,446	..	140,122	23,199	2,677,723
Diamonds	000 ct	10,600	1,964,125	12,012	2,236,043	11,677	2,148,583	13,315	1,888,732	89	4,612
Gemstones	t	554	4,607	6,919	5,991	8,233	7,953	154	5,852	14	20,336
Graphite	000 t	x	x	x	x	x	x	x	x	3,001	33,120
Gypsum ³	000 t	1,837	25,872	1,793	25,474	1,726	19,675	1,679	17,655	1,842	336,642
Lime	000 t	1,856	308,127	1,995	344,816	1,852	335,489	1,807	330,366	x	x
Magnesite	000 t	x	x	x	x	x	x	x	x	-	-
Marl	000 t	-	-	-	-	-	-	-	-	x	x
Mica	000 t	x	x	x	x	x	x	x	x	612	64,712
Nepheline syenite	000 t	646	72,911	654	83,805	614	97,880	571	81,219	1,459	330,991
Peat	000 t	1,173	213,798	1,178	249,078	1,297	257,030	1,452	330,653	-	-
Phosphate	000 t	x	x	-	-	-	-	-	-	-	-
Potash (MOP)	000 t	-	-	-	-	-	-	-	-	12,563	4,371,065
Potash (K ₂ O) ⁴	000 t	10,196	5,768,609	10,818	5,581,264	11,462	6,132,751	10,790	3,735,632	x	x
Potassium sulphate	000 t	x	x	x	x	x	x	x	x	x	x
Pumice	000 t	x	x	x	x	x	x	5	273	2,540	99,278
Quartz (silica) ³	000 t	2,331	80,064	2,011	90,441	2,053	107,377	2,256	95,614	11,424	476,674
Salt	000 t	12,244	655,848	14,473	752,321	14,343	791,980	10,252	445,891	231,219	2,095,005
Sand and gravel	000 t	241,113	1,941,867	223,407	1,831,464	228,030	1,884,531	280,550	2,398,633	215	51,754
Soapstone, talc, pyrophyllite	000 t	175	34,223	90	38,985	175	50,335	199	55,513	x	x
Sodium sulphate	000 t	x	x	x	x	x	x	x	x	169,518	1,747,125
Stone ³	000 t	147,746	1,509,427	147,739	1,541,321	158,034	1,687,916	160,016	1,664,188	4,803	206,740
Sulphur, elemental	000 t	5,624	342,937	5,252	326,335	5,187	423,452	4,746	193,877	524	72,739
Sulphur, in smelter gas	000 t	677	129,197	590	100,125	558	114,383	635	110,307	-	-
Sulphuric Acid	000 t	-	-	-	-	-	-	-	-	x	x
Titanium dioxide ⁵	000 t	x	x	x	x	x	x	x	x	x	x
Wollastonite	000 t	-	-	-	-	-	-	x	x	1	5
Zeolite	000 t	x	x	-	-	-	-	x	x		
TOTAL, NONMETALLIC MINERALS (including cement¹)		..	15,476,804	..	15,778,620	..	16,519,513	..	13,724,154	..	..
TOTAL, NONMETALLIC MINERALS (excluding cement¹)		..	13,857,977	..	14,086,489	..	14,829,662	..	12,108,480	..	13,304,062

	Unit	2018		2019		2020		2021		2022(p)	
		(quantity)	(\$000)	(quantity)	(\$000)	(quantity)	(\$000)	(quantity)	(\$000)	(quantity)	(\$000)
NONMETALLIC MINERALS											
Barite	000 t	x	x	x	x	x	x	x	x	x	x
Carbonatite	000 t	-	-	-	-	-	-	-	-	-	-
Cement ¹	000 t	..	..	..	..	..	..	..	..	..	..
Chrysotile	000 t	-	-	-	-	-	-	-	-	-	-
Clay	000 t	-	-	364	1,216	196	x	218	1,927	219	2,080
Clay products ²	000 t	..	131,928	384	x	336	x	299	x	455	x
Diamonds	000 ct	22,789	2,704,302	18,363	2,301,989	14,293	1,332,035	17,593	1,840,664	17,385	2,387,176
Gemstones	t	87	2,349	64	1,746	80	1,256	50	1,462	59	1,367
Graphite	000 t	11	19,156	11	x	8	x	13	x	13	17,680
Gypsum ³	000 t	3,240	40,157	2,452	38,361	3,054	50,898	2,922	50,680	2,979	53,666
Lime	000 t	1,785	335,739	1,976	374,340	1,488	248,081	1,761	309,141	1,681	312,829
Magnesite	000 t	x	x	x	x	x	x	x	x	x	x
Marl	000 t	-	-	-	-	-	-	-	-	-	-
Mica	000 t	x	x	x	x	15	x	15	x	x	x
Nepheline syenite	000 t	565	131,689	524	115,844	652	132,610	x	x	691	140,494
Peat	000 t	1,306	314,924	1,422	352,637	1,618	390,577	1,581	303,052	1,921	351,989
Phosphate	000 t	-	-	-	-	-	-	-	-	-	-
Potash (MOP)	000 t	-	-	20,717	6,422,081	22,682	6,350,613	22,934	7,995,825	23,876	16,832,519
Potash (K ₂ O) ⁴	000 t	14,024	5,726,798	12,686	-	13,904	-	14,047	-	14,646	-
Potassium sulphate	000 t	x	x	x	x	x	x	x	x	x	x
Pumice	000 t	x	x	x	x	x	x	x	x	x	x
Quartz (silica) ³	000 t	4,864	202,387	..	..	..	..	..	..	-	-
Salt	000 t	10,713	488,535	11,798	577,942	12,643	551,441	11,102	428,887	14,402	584,348
Sand and gravel	000 t	245,815	2,284,402	193,017	1,921,544	196,393	1,959,738	202,678	1,988,922	204,410	2,023,080
Soapstone, talc, pyrophyllite	000 t	279	42,635	x	x	x	x	x	51,651	x	51,050
Sodium sulphate	000 t	x	x	x	x	x	x	x	x	x	x
Stone ³	000 t	188,974	1,987,973	152,570	1,671,053	97,728	992,071	117,923	1,084,538	116,323	1,168,926
Sulphur, elemental	000 t	4,828	449,441	..	..	..	..	..	..	..	..
Sulphur, in smelter gas	000 t	505	87,206	..	..	..	..	..	..	..	..
Sulphuric Acid	000 t	-	-	-	-	-	-	-	-	-	-
Titanium dioxide ⁵	000 t	x	x	..	..	..	..	..	..	..	..
Wollastonite	000 t	x	x	x	x	x	x	x	x	x	x
Zeolite	000 t	1	12	x	x	-	-	1	10	x	10
TOTAL, NONMETALLIC MINERALS (including cement ¹)		..	..	..	..	..	..	..	..	..	..
TOTAL, NONMETALLIC MINERALS (excluding cement ¹)		..	15,530,709	..	14,061,625	..	12,279,531	..	14,402,541	..	24,180,545

	Unit	2013		2014		2015		2016		2017	
		(quantity)	(\$000)	(quantity)	(\$000)	(quantity)	(\$000)	(quantity)	(\$000)	(quantity)	(\$000)
MINERAL FUELS											
Coal	000 t	68,751	4,886,804	69,035	3,896,746	61,985	3,126,266	61,332	4,009,353	60,750	6,280,947
TOTAL MINERAL FUELS		68,751	4,886,804	69,035	3,896,746	61,985	3,126,266	61,332	4,009,353	60,750	6,280,947

TOTAL MINERAL PRODUCTION (including cement ¹)	..	43,860,914	..	43,900,395	..	42,771,019	..	41,035,618	..	..
TOTAL MINERAL PRODUCTION (excluding cement ¹)	..	42,242,087	..	42,208,264	..	41,081,168	..	39,419,944	..	45,323,180

	Unit	2018		2019		2020		2021		2022(p)	
		(quantity)	(\$000)	(quantity)	(\$000)	(quantity)	(\$000)	(quantity)	(\$000)	(quantity)	(\$000)
MINERAL FUELS											
Coal	000 t	54,599	6,459,413	51,746	5,625,050	40,824	3,956,724	38,229	6,828,995	39,468	12,654,895
TOTAL MINERAL FUELS		54,599	6,459,413	51,746	5,625,050	40,824	3,956,724	38,229	6,828,995	39,468	12,654,895

TOTAL MINERAL PRODUCTION (including cement ¹)	..	..	..	..	..	..	..	..	..	..
TOTAL MINERAL PRODUCTION (excluding cement ¹)	..	49,048,676	..	49,381,494	..	48,749,575	..	58,586,393	..	74,649,706

Sources: Natural Resources Canada; Statistics Canada.

(p) Preliminary; x Confidential; - Nil; .. Not available.

Notes:

(1) As of reference year 2017, Statistics Canada has ceased the collection of the cement data. NRCAN is no longer deducting the quantity and value of gypsum, sand and gravel, silica, and stone used in the manufacture of cement products from the totals for gypsum, sand and gravel, silica, and stone. (2) Production values for bentonite and diatomite have been included in clay products. (3) Shipments of gypsum, silica and stone to Canadian cement, lime and clay plants are not included in this table.

(4) Shipments of potash to Canadian potassium sulphate plants are not included in this table. (5) As of 2022, the iron ore value reported comprises concentrates only as agglomerates value is not suppressed by the source. Numbers may not add due to rounding. (5) as of 2019, titanium dioxide is classified as a metal by the source whereas previously it was reported with non-metal.

ANNEX 5: CANADIAN RESERVES OF SELECTED MAJOR METALS, 1978-2022 (p)

YEAR	COPPER	NICKEL	LEAD	ZINC	MOLYBDENUM	SILVER	GOLD (3)
	(000 t)	(000 t)	(000 t)	(000 t)	(000 t)	(t)	(t)
1978	16,184	7,843	8,930	26,721	464	30,995	505
1979	16,721	7,947	8,992	26,581	549	32,124	575
1980	16,714	8,348	9,637	27,742	551	33,804	826
1981	15,511	7,781	9,380	26,833	505	32,092	851
1982	16,889	7,546	9,139	26,216	469	31,204	833
1983	16,214	7,393	9,081	26,313	442	31,425	1,172
1984	15,530	7,191	9,180	26,000	361	30,757	1,208
1985	14,201	7,041	8,503	24,553	331	29,442	1,373
1986	12,918	6,780	7,599	22,936	312	25,914	1,507
1987	12,927	6,562	7,129	21,471	231	25,103	1,705
1988	12,485	6,286	6,811	20,710	208	26,122	1,801
1989	12,082	6,092	6,717	20,479	207	24,393	1,645
1990	11,261	5,776	5,643	17,847	198	20,102	1,542
1991	11,040	5,691	4,957	16,038	186	17,859	1,433
1992	10,755	5,605	4,328	14,584	163	15,974	1,345
1993	9,740	5,409	4,149	14,206	161	15,576	1,333
1994	9,533	5,334	3,861	14,514	148	19,146	1,513
1995	9,250	5,832	3,660	14,712	129	19,073	1,540
1996	9,667	5,623	3,450	13,660	144	18,911	1,724
1997	9,032	5,122	2,344	10,588	149	16,697	1,510
1998	8,402	5,683	1,845	10,159	121	15,738	1,415
1999	7,761	4,983	1,586	10,210	119	15,368	1,326
2000	7,419	4,782	1,315	8,876	97	13,919	1,142
2001	6,666	4,335	970	7,808	95	12,593	1,070
2002	6,774	4,920	872	6,871	82	11,230	1,023
2003	6,037	4,303	749	6,251	78	9,245	1,009

YEAR	COPPER	NICKEL	LEAD	ZINC	MOLYBDENUM	SILVER	GOLD (3)
	(000 t)	(000 t)	(000 t)	(000 t)	(000 t)	(t)	(t)
2004	5,546	3,846	667	5,299	80	6,568	787
2005	6,589	3,960	552	5,063	95	6,684	965
2006	6,923	3,940	737	6,055	101	6,873	1,032
2007	7,565	3,778	682	5,984	213	6,588	987
2008	7,456	3,605	636	5,005	222	5,665	947
2009	7,290	3,301	451	4,250	215	6,254	918
2010	10,747	3,074	400	4,133	254	6,916	1,473
2011	10,570	2,936	247	4,812	256	6,954	2,225
2012	10,364	2,617	126	4,163	256	5,598	2,148
2013	10,777	2,682	116	3,532	145	5,013	2,140
2014	10,214	2,287	88	2,972	121	5,498	2,070
2015	9,937	2,725	83	3,009	101	5,345	1,984
2016	9,101	2,604	40	2,231	98	3,626	1,910
2017	8,984	2,790	165	2,286	96	5,074	2,578
2018	8,115	2,296	118	1,913	77	4,865	2,597
2019	7,348	2,236	203	2,180	75	4,480	2,359
2020	7,001	1,977	176	1,630	69	5,223	2,659
2021r	7,652	1,909	160	1,454	80	4,714	2,765
2022p	8,254	2,219	79	947	64	4,865	3,175

Source: Natural Resources Canada, based on company reports and the Federal-Provincial/Territorial Annual Survey of Mines and Concentrators.

(1) No allowance is made for losses in milling, smelting and refining. Excludes material classified as "resources."

(2) Includes metal in mines where production has been suspended temporarily.

(3) Excludes metal in placer deposits because reserves data are generally unavailable.

(r) Revised; (p) Preliminary.

Note: One tonne (t) = 1.1023113 short tons = 32 150.746 troy oz.

ANNEX 6: EMPLOYMENT AND ANNUAL COMPENSATIONS IN THE CANADIAN MINING, SMELTING AND REFINING INDUSTRIES, 2009-2022

	NUMBER OF EMPLOYEES	COMPENSATION PER JOB (1)
Metal Mines		
2010	28,480	112,794
2011	29,905	116,443
2012	30,675	123,687
2013	39,380	119,323
2014	38,415	126,362
2015	34,295	131,212
2016	38,410	129,922
2017	39,825	127,297
2018	40,170	131,832
2019	41,850	137,625
2020	39,855	146,883
2021	40,285	146,020
2022	42,220	152,578
Non-metal Mines		
2010	18,890	92,858
2011	19,210	99,497
2012	18,055	106,595
2013	21,865	99,767
2014	22,705	104,857
2015	22,695	108,073
2016	22,320	105,827
2017	24,045	105,804
2018	24,950	108,625
2019	24,745	107,533
2020	24,580	111,638
2021	26,005	111,007
2022	25,855	116,362
Coal Mines		
2010	6,275	108,086
2011	6,985	113,346
2012	7,405	116,275
2013	9,670	117,430
2014	8,155	117,383
2015	6,435	125,063
2016	7,640	123,450
2017	7,390	127,417
2018	8,455	133,471
2019	8,590	133,996
2020	6,540	138,283
2021	7,670	136,033
2022	8,405	142,401

	NUMBER OF EMPLOYEES	COMPENSATION PER JOB (1)
Smelting & Refining (2)		
2010	50,615	97,591
2011	53,325	100,644
2012	46,530	106,408
2013	46,225	110,169
2014	44,480	110,671
2015	45,305	111,496
2016	44,800	112,257
2017	45,160	116,382
2018	43,320	123,327
2019	41,890	126,766
2020	40,830	133,237
2021	48,950	128,284
2022	51,850	134,846
Total Mining, Smelting and Refining		
2010	104,260	101,518
2011	109,425	105,571
2012	102,665	112,316
2013	117,140	111,904
2014	113,755	115,290
2015	108,730	117,803
2016	113,170	117,740
2017	116,420	118,631
2018	116,895	123,845
2019	117,075	127,113
2020	111,805	133,648
2021	122,910	130,925
2022	128,330	137,451

Sources: Statistics Canada; Natural Resources Canada. Table: 36-10-0489-01 (formerly CANSIM 383-0031)

(1) Compensation for Smelting and Refining and Total based on weighted average.

(2) Comprised of NAICS 3311, NAICS 3313, and NAICS 3314.

ANNEX 7: TOTAL COMPENSATION PER JOB, BY SELECT CANADIAN INDUSTRIAL SECTOR, 2009-2022(p)

	FORESTRY AND LOGGING	MINING, SMELTING AND REFINING (1)	MANUFACTURING	CONSTRUCTION	FINANCE & INSURANCE
2010	67,852	101,518	66,207	64,452	64,262
2011	72,045	105,571	67,820	66,665	66,413
2012	75,534	112,316	70,233	69,618	68,621
2013	77,970	111,904	72,188	72,059	70,924
2014	82,250	115,291	74,463	75,034	75,079
2015	85,236	117,803	75,889	75,381	79,137
2016	81,578	117,740	75,530	73,806	81,448
2017	82,484	118,631	76,203	73,419	85,201
2018	85,087	123,845	78,727	75,481	90,123
2019	84,119	127,113	80,125	76,606	91,613
2020	88,874	133,648	85,797	81,458	97,427
2021	90,535	130,926	85,262	81,969	96,958
2022(p)	95,981	137,451	90,016	87,100	102,005

Sources: Statistics Canada Table 36-10-0489-01; Natural Resources Canada.
 (1) Based on a weighted average of NAICS 212, 3311, 3313, and 3314 (refer to Annex 6).

ANNEX 8: VALUE (\$) OF DOMESTIC EXPORTS OF MINERALS AND MINERAL PRODUCTS, BY COMMODITY AND COUNTRY OF DESTINATION, 2022

	U.S.A.	UNITED KINGDOM	EUROPEAN UNION (EU-27)	CHINA	JAPAN	OTHER COUNTRIES	TOTAL
METALS							
Aluminum	16,801,616,521	38,290,005	247,888,178	96,344,125	15,658,426	1,031,996,570	18,231,793,825
Antimony	1,124,514	537,779	-	37,443	32	17,383,079	19,082,847
Barium	23,626	-	-	-	-	-	23,626
Beryllium	303,138	-	-	-	-	578	303,716
Bismuth	636,211	-	10,874	31,703	-	610,813	1,289,601
Cadmium	551,619	-	4,296,388	378,574	115,367	3,028,473	8,370,421
Calcium metals	4,360,478	-	-	35,491	706	209,887	4,606,562
Chromium	4,813,146	16,339	-	-	-	121,650	4,951,135
Cobalt	76,056,809	24,994,642	183,497,832	93,912,936	106,273,259	308,533,777	793,269,255
Copper	4,851,573,291	7,067,260	575,299,867	1,562,195,297	1,193,781,773	1,232,656,822	9,422,574,310
Germanium	7,266,968	-	225,427	8,229,441	7,456,655	5,288,314	28,466,805
Gold	4,345,990,004	11,769,798,374	38,836,437	425,196,221	120,327,213	5,638,086,656	22,338,234,905
Hafnium	3,503	-	-	-	-	-	3,503
Iron and steel	20,871,842,068	33,011,152	316,442,333	78,984,626	10,726,539	1,565,573,728	22,876,580,446
Iron ore	424,914,613	226,466,829	3,043,067,459	2,176,307,422	980,672,133	1,925,649,540	8,777,077,996
Lead	523,070,630	82,453	4,488,242	2,375,340	1,661,383	76,576,220	608,254,268
Lithium	122,006,859	1,300,044	3,870,307	2,232,389	166,433	12,923,800	142,499,832
Magnesium and magnesium compounds	161,230,352	760,999	1,021,596	232,122	-	467,577	163,712,646
Manganese	1,480,812	-	23,583	10,055	-	498,121	2,012,571
Mercury	122,081	-	763	376	2,031	4,762	130,013
Molybdenum	41,844,182	894,103	15,744,221	11,233	-	5,673,595	64,167,334
Nickel	1,820,576,543	65,556,250	1,260,622,085	469,162,165	398,923,081	2,988,897,053	7,003,737,177
Niobium	176,262,345	-	135,169,932	11,560,046	2,008,041	38,095,726	363,096,090
Platinum group metals	2,796,848,736	6,070,706	17,124,549	50,040	873,774	214,550,676	3,035,518,481
Rare earth metals	41,067	-	-	6,067	72,208	27,639	146,981
Rhenium	1,592,957	-	-	-	-	-	1,592,957
Selenium	1,066,230	-	1,697,321	3,081,882	-	1,601,763	7,447,196
Silicon	396,603,603	-	28,529,704	919,300	2,500	33,565,451	459,620,558
Silver	1,163,058,158	1,657,765	35,194,608	17,951,630	29,015,426	33,395,281	1,280,272,868
Tantalum	3,209,991	4,984	39,485	6,000	-	260,290	3,520,750
Tellurium	3,554,329	172,632	35,852,123	-	522,561	3,419,340	43,520,985
Tin	41,413,597	2,123,209	7,261,007	436,579	-	3,432,364	54,666,756
Titanium metal	108,085,671	1,907,927	32,576,566	9,767,270	1,056,980	14,228,132	167,622,546
Tungsten	38,039,464	22,894	6,466,956	89,390	22,479	4,293,166	48,934,349
Uranium and thorium	990,039,117	488,379,562	563,628,304	32,367,242	18,800,976	86,483,303	2,179,698,504
Vanadium	71,689,439	-	-	-	-	-	71,689,439
Zinc	2,162,090,559	2,941,612	10,693,038	7,238,828	2,647,446	255,057,220	2,440,668,703
Zirconium	1,665,207	-	1,267,494	6,225,719	-	33,922	9,192,342
Other metals	6,746,723,946	85,174,687	1,493,457,389	156,893,116	222,244,750	1,333,307,741	10,037,801,629
TOTAL METALS	64,763,392,384	12,757,232,207	8,064,294,068	5,162,270,068	3,113,032,172	16,835,933,029	110,696,153,928

	U.S.A.	UNITED KINGDOM	EUROPEAN UNION (EU-27)	CHINA	JAPAN	OTHER COUNTRIES	TOTAL
NONMETALS							
Abrasives	232,434,444	4,083,820	12,896,721	6,638,202	8,470,945	34,202,743	298,726,875
Barite and witherite	74,975	-	-	-	-	-	74,975
Boron	1,101,021	66,978	815,562	420,196	23,550	3,362,778	5,790,085
Bromine	-	-	750	-	-	5,421	6,171
Cement	1,170,655,151	974,470	6,471,421	1,028,146	8,023	5,714,265	1,184,851,476
Chlorine and chlorine compounds	299,826,955	-	411,228	4,193	1,691	369,206	300,613,273
Chrysotile (Asbestos)	37,303,344	8,890	88,151	74,510	235,206	1,234,764	38,944,865
Clay and clay products	22,866,925	348,964	3,015,794	193,268	66,391	10,186,264	36,677,606
Diamonds	122,050,047	1,330,054	1,850,433,931	177,595	111,190	583,595,278	2,557,698,095
Dolomite	36,938,509	-	554,778	-	-	1,175,155	38,668,442
Feldspar	12,524	-	-	-	-	-	12,524
Fluorspar	16,937,668	-	184,255	3,234	12,875	774,126	17,912,158
Glass and glassware products	762,910,500	9,366,827	23,982,270	4,777,363	2,305,676	21,261,460	824,604,096
Granite	50,488,168	-	369,293	772,208	91,234	698,454	52,419,357
Graphite	57,546,209	789,979	12,300,929	5,930,818	1,470,268	7,872,267	85,910,470
Gypsum	133,954,057	63,603	404,342	53,444	27,924	1,949,326	136,452,696
Iodine	6,289,767	569,884	622,943	63	132	1,184,634	8,667,423
Lime	56,868,115	-	-	27,242	-	1,300	56,896,657
Limestone flux and other limestone	20,509,146	-	3,254,665	30,237	-	834,243	24,628,291
Marble, travertine and other calcareous stones	30,250,393	15,620	462,898	558,422	-	134,070	31,421,403
Mica	7,461,145	234,294	559,351	139,755	2,258,664	1,751,860	12,405,069
Mineral pigments	188,293,897	187,539	1,049,616	66,126	111,240	6,962,357	196,670,775
Nepheline syenite	133,358,326	34,821	990,301	1,205,160	1,298,581	9,931,833	146,819,022
Pearls	2,812,695	4,755	1	-	-	78,597	2,896,048
Peat	657,167,282	37,453	751,067	126,548	10,038,452	28,209,711	696,330,513
Phosphate and phosphate compounds	110,886,057	1,311,982	889,602	184,314	1,050,803	25,898,287	140,221,045
Potash and potassium compounds	6,546,361,988	729,514	760,208,776	1,536,800,949	137,392	7,591,520,790	16,435,759,409
Salt and sodium compounds	576,593,298	85,297	20,950,468	3,679,505	43,532,673	53,668,420	698,509,661
Sand and gravel	111,936,181	2,152,810	-	-	-	178,306	114,267,297
Sandstone	547,416	45,865	-	-	-	-	593,281
Silica and silica compounds	136,719,368	700,831	5,297,584	656,363	199,246	3,779,263	147,352,655
Slate	10,494,538	4,096,291	2,102,646	-	79,534	1,312,395	18,085,404
Sulphur and sulphur compounds	660,492,950	229	463,009	272,082,973	479	566,858,829	1,499,898,469
Talc, soapstone and pyrophyllite	49,818,748	-	5,879,381	1,247,102	-	582,103	57,527,334
Titanium oxides	473,691,864	1,309,440	15,529,387	607,046	4,638	5,482,070	496,624,445
Other nonmetals	998,786,569	6,731,395	30,331,179	26,902,371	1,754,291	69,867,901	1,134,373,706
Other structurals	284,422,375	3,761,665	6,909,862	2,377,909	151,339	43,069,313	340,692,463
TOTAL NONMETALS	14,008,862,615	39,043,270	2,768,182,161	1,866,765,262	73,442,437	9,083,707,789	27,840,003,534

	U.S.A.	UNITED KINGDOM	EUROPEAN UNION (EU-27)	CHINA	JAPAN	OTHER COUNTRIES	TOTAL
MINERAL FUELS							
Coal	760,772,485	49,296,777	1,268,621,601	3,510,324,762	3,716,027,920	5,226,135,813	14,531,179,358
Coke	6,466,792	22,818,254	22,048,931	-	-	25,278,191	76,612,168
TOTAL MINERAL FUELS	767,239,277	72,115,031	1,290,670,532	3,510,324,762	3,716,027,920	5,251,414,004	14,607,791,526
TOTAL MINING DOMESTIC EXPORTS	79,539,494,276	12,868,390,508	12,123,146,761	10,539,360,092	6,902,502,529	31,171,054,822	153,143,948,988

Sources: Natural Resources Canada; Statistics Canada.

- Nil.

Note: Stages 1 to 4 - includes ores, concentrates and semi-fabricated and fabricated metal and mineral products

ANNEX 9: VALUE (\$) OF IMPORTS OF MINERAL AND METAL PRODUCTS, BY COMMODITY AND COUNTRY OF IMPORT, 2022

	U.S.A.	CHINA	EUROPEAN UNION (EU-27)	MEXICO	OTHER COUNTRIES	TOTAL
METALS						
Aluminum	4,221,433,796	1,826,452,578	664,663,192	90,747,467	3,606,790,991	10,410,088,024
Antimony	5,798,720	26,387,573	3,055,544	-	4,634,712	39,876,549
Barium	5,263,935	2,519,418	680,862	-	174,365	8,638,580
Beryllium	850,345	1,199	28,781	-	10,995	891,320
Bismuth	2,150,633	436,192	934	-	121,556	2,709,315
Cadmium	6,187,499	560,058	8,876,697	2,196	40,751,010	56,377,460
Calcium metals	32,117,341	15,324,075	3,233,264	648,573	10,808,322	62,131,575
Chromium	8,899,118	7,176,376	33,158,722	480,750	98,578,202	148,293,168
Cobalt	48,020,187	76,259	32,321,071	18,273	34,081,362	114,517,152
Copper	2,977,618,795	285,697,990	305,357,472	143,068,821	2,332,462,800	6,044,205,878
Germanium	10,298,108	362,144	232,556	238	942,683	11,835,729
Gold	5,345,668,463	2,189,576	57,933,674	484,548,413	8,723,298,817	14,613,638,943
Hafnium	16,801	-	-	-	-	16,801
Iron and steel	16,582,383,995	5,815,710,170	3,931,126,844	1,702,307,296	8,315,653,556	36,347,181,861
Iron ore	934,303,097	464	4,022,140	662	7,184,419	945,510,782
Lead	950,783,992	106,889,519	100,774,702	81,655,521	219,685,667	1,459,789,401
Lithium	237,179,259	121,718,658	13,092,654	235,779	101,594,440	473,820,790
Magnesium and magnesium compounds	49,288,664	609,636,283	19,158,292	4,454,261	52,817,500	735,355,000
Manganese	98,799,878	85,347,889	11,135,567	18,112,235	323,893,608	537,289,177
Mercury	604,849	328,000	315,332	1,921,150	569,818	3,739,149
Molybdenum	34,905,120	5,243,362	2,233,536	18,370,942	45,621,072	106,374,032
Nickel	700,879,206	28,152,980	446,090,550	1,836,953	286,120,081	1,463,079,770
Niobium	693,237	-	50,336	-	43,015,831	43,759,404
Platinum group metals	1,449,160,680	183,175	724,280,192	2,455,211	1,421,456,880	3,597,536,138
Rare earth elements (REEs)	2,798,486	4,636,116	440,841	-	172,221	8,047,664
Rhenium	4,558	-	57,326	-	3	61,887
Selenium	6,020,192	8,915	219,246	189,146	6,547	6,444,046
Silicon	22,518,356	27,293,026	562,333	7	133,692,100	184,065,822
Silver	939,004,317	56,705,430	1,052,430,141	306,779,234	1,955,337,319	4,310,256,441
Strontium	14,063	8	554,320	419,659	-	988,050
Tantalum	1,955,130	351,434	30,994	-	48,936	2,386,494
Tellurium	64,282	16,764,691	405	-	14,294,423	31,123,801
Thallium	296	-	36	-	7	339
Tin	31,673,651	5,109,331	2,708,342	803,002	86,945,164	127,239,490
Titanium metal	138,701,986	68,786,310	28,029,978	212,793	104,265,713	339,996,780
Tungsten	45,660,520	8,023,167	1,666,672	13	4,393,119	59,743,491
Uranium and thorium	105,120,997	5,818,206	31,784,302	-	1,682,300,795	1,825,024,300
Vanadium	1,987,148	25,180,114	28,268,730	-	45,156,249	100,592,241
Zinc	1,006,858,846	13,524,743	72,876,533	129,076,444	613,098,826	1,836,066,592
Zirconium	59,288,443	274,709	1,938,113	-	4,050,465	65,551,730
Other metals	8,351,545,325	4,086,533,425	2,454,155,445	1,479,770,313	4,012,528,145	20,384,532,653
Grand Total	44,416,522,314	13,259,403,563	10,037,546,671	4,468,746,552	34,326,558,719	106,508,777,819

	U.S.A.	CHINA	EUROPEAN UNION (EU-27)	MEXICO	OTHER COUNTRIES	TOTAL
NONMETALS						
Abrasives	266,796,095	120,427,331	149,438,523	15,822,207	122,031,619	674,515,775
Arsenic	9,382	254,290	1,983	-	21,756	287,411
Barite and witherite	12,299,161	707,640	752,409	-	4,914,783	18,673,993
Boron	37,930,030	1,330,774	1,877,399	24,742	32,152,322	73,315,267
Bromine	1,471,519	120,807	208,741	-	6,072,908	7,873,975
Cement	592,041,632	185,269,973	143,531,035	41,500,252	218,037,858	1,180,380,750
Chlorine and chlorine compounds	153,112,518	18,669,690	10,990,219	1,937,210	6,719,215	191,428,852
Chrysotile (Asbestos)	209,251,441	13,863,518	7,859,374	1,348,779	17,287,623	249,610,735
Clay and clay products	406,955,762	627,332,690	407,721,458	92,620,087	294,671,603	1,829,301,600
Diamonds	81,676,133	3,261,259	29,061,779	15,878	423,389,596	537,404,645
Dolomite	14,333,100	506,941	2,688	-	20,307	14,863,036
Feldspar	356,626	-	5,294	-	7,358	369,278
Fluorspar	22,483,106	15,707,563	7,194,288	68,641,068	14,898,890	128,924,915
Glass and glassware products	2,442,819,251	852,782,729	419,587,008	470,780,392	292,368,175	4,478,337,555
Granite	12,554,770	19,486,311	9,481,469	6,358	42,295,550	83,824,458
Graphite	135,574,149	479,505,700	128,677,130	19,019,697	76,585,600	839,362,276
Gypsum	236,413,634	567,989	33,847,826	9,538,943	1,338,220	281,706,612
Iodine	11,009,529	413,909	49,040	-	20,601,997	32,074,475
Lime	39,418,254	4,031	525,615	222	1,239,191	41,187,313
Limestone flux and other limestone	34,161,839	50,166	359,957	-	677,860	35,249,822
Marble travertine and other calcareous stones	15,242,208	28,256,446	40,194,837	891,750	31,181,025	115,766,266
Mica	4,094,048	454,591	1,047,511	69,412	404,762	6,070,324
Mineral pigments	257,517,658	17,269,730	52,282,568	2,170,514	20,388,202	349,628,672
Nepheline syenite	2,538,144	32,744		-	17,857	2,588,745
Olivine	311,903	55,034	226,045	2,101	500,941	1,096,024
Pearls	12,550,001	30,737,577	2,929,048	106,241	20,088,237	66,411,104
Peat	22,941,539	37,984	6,302,379	240	2,860,994	32,143,136
Perlite	17,082,838	8,103	39,998	150,757	5,307	17,287,003
Phosphate and phosphate compounds	1,513,281,231	25,868,387	19,546,578	72,777,945	344,258,773	1,975,732,914
Potash and potassium compounds	152,413,885	12,331,726	22,866,356	99,341	43,360,794	231,072,102
Salt and sodium compounds	708,952,754	79,626,146	69,873,853	30,985,666	193,722,145	1,083,160,564
Sand and gravel	32,360,618	1,422,734	180,558	178,874	329,655	34,472,439
Sandstone	1,483,570	2,988,829	397,602	-	4,921,398	9,791,399
Silica and silica compounds	441,112,858	68,521,261	33,328,646	8,082,864	19,930,889	570,976,518
Slate	2,451,976	1,837,593	875,894	-	2,657,791	7,823,254
Sulphur and sulphur compounds	34,823,136	1,539,432	10,788,063	9,553	1,379,614	48,539,798
Talc soapstone and pyrophyllite	19,385,770	410,370	716,726	-	507,165	21,020,031
Titanium oxides	272,212,508	130,242,852	39,775,016	43,457,193	19,903,826	505,591,395
Other nonmetals	1,518,338,713	140,860,324	209,822,931	28,874,272	220,940,982	2,118,837,222
Other structurals	162,776,136	71,728,573	32,536,414	6,683,741	45,575,927	319,300,791
Grand Total	9,902,539,425	2,954,493,747	1,894,904,258	915,796,299	2,548,268,715	18,216,002,444

	U.S.A.	CHINA	EUROPEAN UNION (EU-27)	MEXICO	OTHER COUNTRIES	TOTAL
MINERAL FUELS						
Coal	1,149,777,238	25,948,461	62,571,042	9,340	336,130,937	1,574,437,018
Coke	490,457,760	38,729	3,861,876	-	8	494,358,373
TOTAL MINERAL FUELS	1,640,234,998	25,987,190	66,432,918	9,340	336,130,945	2,068,795,391
TOTAL MINING IMPORTS	55,959,296,737	16,239,884,500	11,998,883,847	5,384,552,191	37,210,958,379	126,793,575,654

Sources: Natural Resources Canada; Statistics Canada.

- Nil.

Note: Stages 1 to 4 - includes ores, concentrates and semi-fabricated and fabricated metal and mineral products

The **Mining Association of Canada (MAC)** is the national organization of the Canadian mining industry. We represent companies involved in mineral exploration, mining, smelting, refining and semi-fabrication. Our member companies account for most of Canada's output of metals and minerals. MAC's functions include advocacy, stewardship and collaboration. Our goals are to promote the industry's interests nationally and internationally, to work with governments on policies affecting minerals, to inform the public and to encourage member firms to cooperate to solve common problems. We work closely with provincial and territorial mining associations, other industries, and environmental and community groups in Canada and around the world.



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