

FACTS & FIGURES 2019

The State of Canada's Mining Industry

The Mining Association of Canada

ADVOCACY STEWARDSHIP COLLABORATION

THE MINING ASSOCIATION OF CANADA

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.

DATA AND SOURCES

This annual report reflects currently available data, the majority from 2018, though some from prior years and some from 2019. Dollar amounts are expressed in Canadian dollars unless noted otherwise.

Author: Brendan Marshall, Vice President, Economic and Northern Affairs

Design: McKenna Design & Strategy

Acknowledgments: This report could not have been prepared without the significant assistance of the dedicated staff of the Minerals and Metals Sector at Natural Resources Canada. Special thanks are also extended to Cynthia Waldmeier from MAC and Monique Laflèche.

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STATE OF THE INDUSTRY AND KEY ISSUES

WHILE CANADA HAS LONG BENEFITED FROM A PROSPEROUS MINERALS AND METALS INDUSTRY, THE COUNTRY IS NOT IMMUNE TO GLOBAL COMPETITIVE FORCES AND CANNOT TAKE THE BENEFITS AND OPPORTUNITIES THAT EXPLORATION AND MINING PRESENT TO CANADIANS FOR GRANTED.

With mineral exploration and mining playing critical roles in the move towards a low carbon future, the need to support one of the country's most significant sectors is more important now than ever before.

While our industry faces challenges, there are also significant opportunities. Last year's Fall Economic Statement included a five-year renewal of the Mineral Exploration Tax Credit and enhanced accelerated capital cost treatment for resource projects. The recently unveiled Canadian Minerals and Metals Plan, if implemented well by federal, provincial and territorial governments, could help catalyze further policy and regulatory improvements.

ECONOMIC CONTRIBUTION

The mining industry has contributed greatly to Canada's economic strength. The industry directly employs 409,000 workers across the country in mineral extraction, smelting, fabrication and manufacturing, and indirectly employs an additional 217,000 people. Proportionally, the mining industry is also the largest private sector employer of Indigenous peoples, providing over 16,500 jobs. In 2018, the minerals sector directly and indirectly contributed $97 billion, or 5%, to Canada's total nominal GDP.

Internationally, Canada is one of the leading mining countries and one of the largest producers of minerals and metals. The industry accounted for 20%, or $104.5 billion, of the overall value of Canadian goods exports in 2018, selling a diversified array of minerals and metals abroad.

Canada remained the world's top destination for non-ferrous exploration spending in 2018, growing its share by 1.3% to 15% of total global expenditures, and capital spending in the sector is projected to account for 5.1% of Canada's total at $12.9 billion, up 5% year-over-year. After recent years of trending downward, both statistics represent a shift toward growth and expansion.

While mining is important to Canada at the local community level, it also contributes to the economies of large cities. Toronto, for example, is the global hub for mining finance. The Toronto Stock Exchange (TSX) and TSX Venture Exchange are the world's number one mining and exploration listing venues, where 34%, or $6.5 billion, of the world's total equity capital was raised in 2018. Vancouver features the world's leading cluster of exploration companies, while Montreal is home to major aluminum and iron ore firms. Edmonton has become a centre for oil sands expertise and Saskatoon for uranium and potash.

Other evidence of the industry's vast economic reach is that mining is the single largest industrial customer group of Canada's railways and is a major user of Canada's ports. Annually, the industry accounts for approximately 50% of total rail freight revenue generated and is the largest single shipping sector by volume by both rail and marine modes.

The average annual pay for a mining worker in 2018 exceeded $123,000, which surpassed the average annual earnings of workers in the forestry, manufacturing, finance and construction sectors respectively.



Syncrude Canada Ltd. employees collect biological matter at the oil sands mining industry's first commercial demonstration of water-capped tailings technology.

A STATE OF TRANSITION

Canada has long been the dominant global mining nation—in mineral production, mining finance, mining services and supplies, and sustainability and safety. However, there are signs that this leadership position is slipping, which has the potential to jeopardize Canada's ability to seize new opportunities for growth.

- While 2019 saw a modest increase in the value of mining projects planned and under construction from 2019 to 2029 (by $8 billion year-over-year), the total 10-year projected value ($80 billion) remains 50% below the 2014 level of $160 billion.

- From 2007-2018, Mining Direct Investment Abroad has increased more than 3-fold (from $25.5 billion to $80 billion), while Mining Foreign Direct Investment into Canada, despite volatility, has remained stagnant (rising from $23.5 billion to $24.5 billion).

Critical to bolstering the industry's domestic and international leadership is a predictable and consistent domestic policy and regulatory environment. Given several pieces of legislation and accompanying regulations were finalized last year – including several statutes that affect federal permitting of natural resources projects and federal carbon pricing – it is yet to be seen how the broader mining investment community looks at Canada as a place to do business.

FEDERAL POLICIES AND CANADIAN MINING COMPETITIVENESS

Looking forward, the Mining Association of Canada (MAC) and its members urge the federal government to focus on the following areas:

- **Economic Development, Regulatory Certainty and Investment Competitiveness**
  Acknowledging there is fierce global competition for finite exploration and mine development investment dollars, that Canada's economy is dependent on foreign direct investment, and that tax competitiveness and regulatory certainty are critical determinants of Canada's investment attractiveness, it is essential that a number of critical measures be considered. These include the effective and efficient regulation of the mining industry, including sound implementation of the new federal *Impact Assessment Act*, access to prospective lands, and continued and expanded investments in remote and northern infrastructure. Additionally, it is important that a strategic review of Canada's tax regime be conducted with the aim of augmenting Canada's investment attractiveness.

- **Advancing the Participation of Indigenous Peoples in the Minerals Sector**
  The Canadian mineral industry is a leader in Indigenous engagement and partnerships. Governments can support enhanced participation of, and partnerships with, Indigenous communities in the sector through foundational social investments in areas such as health, education and housing, and by targeting funding for skills training and entrepreneurship to assist Indigenous peoples in securing employment and business development opportunities generated by the industry. Governments should also focus on adequately discharging its duty to consult.

- **Environment**
  The Canadian mineral exploration and mining industry is well-positioned to play a pivotal role in the low-carbon economy as the provider of the raw materials necessary for innovation in many other sectors, including clean tech, manufacturing, transportation, high-tech, and aerospace and defence. Addressing climate change, while preventing carbon leakage, is critical to ensuring Canada's "best-in-class" mineral industry becomes a supplier of choice to meet global demand for raw materials in the most sustainable and environmentally responsible way possible. Respecting the country's biodiversity also continues to be a priority for the sector and ensuring appropriate approaches to conserving species at risk will play a pivotal role in Canada's exploration and mining future.

- **Science, Technology and Innovation**
  Geoscience and innovation continue to be focal points for the mineral exploration and mining sector. Federal, provincial and territorial governments should expand rigorous geological studies across Canada, particularly for mapping of remote regions in greater detail. Innovation, in everything from autonomous vehicles to mine electrification, is increasingly important to the sector. By investing in new exploration techniques and technologies, and providing financial support to catalyze private sector innovation investments, real progress can be made in energy efficiency, environmental protection and business productivity.

- **Communities**
  Investments in human resources and skills training are essential for the sector. Increasing collaboration between governments, industry and educational institutions to ensure new entrants to the mineral industry have the required skills is particularly important. It is also essential that governments work together to enhance support for initiatives to address barriers to diversity and inclusion in the mineral exploration and mining sector.

- **Global Leadership**
  Supporting the Canadian mineral industry, including the continued expansion of market access through free trade and investment agreements, is critical to its future success. Canada is a global leader in responsible business conduct, and its leading practices should be promoted by governments to advance Canada's development goals and expand the benefits that exploration and mining activity brings to communities around the globe. The federal government should continue to work with the private sector, including Canadian exploration and mining companies operating abroad, to leverage Canadian development activities and realize better outcomes for communities.

As a leader in the responsible sourcing movement, Canada's mining industry plays a significant role in promoting sustainable mining practices, particularly through the MAC's externally-verified performance system, *Towards Sustainable Mining® (TSM)*. This program has received international attention, and six mining associations outside of Canada, including most recently Brazil, have adopted *TSM* to support meeting society's needs for minerals, metals and energy products in the most socially, economically and environmentally responsible way.

In order to attract greater investment and enhance the competitiveness of the mineral sector, Canada's mining industry must be bold. The mining industry, one of the most important in Canada's economy, requires support to ensure its ongoing competitiveness. ■



— MINING —

MINERALS AND METALS ARE ESSENTIAL TO OUR EVERY DAY LIVES

Photo credit: Sherritt International

CANADA'S MINING SECTOR PROVIDES THE BUILDING BLOCKS FOR THE PRODUCTS WE RELY ON AND FOR THE TECHNOLOGIES AND INFRASTRUCTURE REQUIRED FOR A LOW CARBON FUTURE.

The mining and mineral manufacturing sector – covering metal, non-metal and coal mines; oil sands mining operations; and manufacturing in the form of smelters, refineries, and fabrication facilities – is generically known as the "mining industry."

Our lives depend on mining. From providing the metals needed to power our transportation to providing the materials required to make communication possible through devices like our smartphones and computers, it is impossible to imagine a reality without it. And its essential role in our transition to a low carbon economy, one that requires mined minerals and metals to be fully realized, cannot be overstated.

Because the mining industry is vital to daily life and Canada's future, its opportunities, challenges, investments and needs must be prioritized. Historically, Canada has benefited from low-cost mineral and metal products, good jobs and significant wealth development opportunities. With demand for minerals and metals expected to grow, particularly given their essential role as building blocks in clean and low energy technologies, Canada's mining industry is proud to be seen as providing global leadership in corporate social responsibility and environmental stewardship. ■

PRODUCTS THAT RELY ON MINING

- **Solar PV panels** (copper, iron ore, titanium, silver, gallium, indium)
- **Batteries** (nickel, cadmium, lithium, cobalt)
- **Circuitry** (gold, copper, aluminum, steel, lithium, titanium, silver, cobalt, tin, lead, zinc)
- **Smartphones** (silicon, boron, lead, barium, strontium, phosphorus, indium)
- **Electric cars** (copper, lithium, aluminum, nickel, cadmium, cobalt, zinc)
- **Wind turbines** (steelmaking coal, iron ore, copper, nickel)
- **Medicine** (uranium, zinc)
- **Energy** (uranium, oil sands)
- **Musical instruments** (silver, steel, nickel, brass, cobalt, copper, iron, aluminum)
- **Sports equipment** (graphite, aluminum, titanium, calcium carbonate, sulphur)



SECTION 1

MINING AND THE CANADIAN ECONOMY

WHILE CANADA HAS LONG BENEFITED FROM A PROSPEROUS MINERALS AND METALS INDUSTRY, WE ARE NOT IMMUNE TO GLOBAL COMPETITIVE FORCES, AND CANNOT TAKE THE BENEFITS AND OPPORTUNITIES THAT MINING OFFERS CANADIANS FOR GRANTED.

In the face of declining competitiveness, it is essential that our country's mining companies have the tools to encourage growth, particularly given the sector's importance as an economic contributor and employer in communities across Canada. The extent to which mining companies contribute to the Canadian economy, be it through direct and indirect employment, taxes, royalties and other benefits, depends on their ability to operate profitably. Economic forecasts help companies plan their business activities.

GLOBAL ECONOMIC TRENDS

In July, the International Monetary Fund (IMF) characterized global growth as "subdued", projecting the global economy to grow at 3.2% in 2019 and 3.5% in 2020. The "weaker-than-anticipated global activity" reduced the IMF's April forecast by 0.1 percentage point for both years, respectively, attributing the weakened forecast to increased trade tensions, ongoing uncertainty surrounding the outcome for Brexit, and softening investment and consumer demand. Most notably, the reciprocal increases in trade tariffs between the United States and China have had a dampening effect on sentiment around global growth, as well as trade between the world's largest economies. IMF Chief Economist Gita Gopinath emphasized this point and has urged that "countries should work jointly toward reviving liberalization efforts and strengthening the rule-based multilateral trade system that has served the global economy well over the past 75 years."

Emerging Economies

Despite augmented trade tensions, projected growth for emerging markets and developing economies, while also revised down, is set to increase at a greater rate than the IMF's advanced economies group. The IMF's emerging market and developing economy group is expected to grow at 4.1% in 2019, rising to 4.7% in 2020. While the forecasts for 2019 and 2020 are 0.3 and 0.1 percentage points lower, respectively, than in April, there are some reasons for optimism. Indian growth is projected to increase by 7.2% in 2020, and Chinese growth, while projected to decrease, remains elevated at 6% in 2020 and over a larger economic base than in prior years.

Developments in Advanced Economies

Economic activity in advanced economies is forecast to nudge upward 0.1 percentage points in 2019, to 1.9%, and then contract to 1.7% in 2020. Notably, US economic growth is projected to decrease for two consecutive years from 2.9% in 2018 to 1.9% in 2020. Given Canada's reliance on the US market as our largest trading partner, this has implications domestically for the Canadian economy.

In July, the IMF held Canada's low-growth trajectory steady with growth projections of 1.5% in 2019, and 1.9% in 2020. After 3% growth in 2017, Canadian economic growth shrunk year-over-year by 1.1%, slowing to 1.9% in 2018. The IMF attributed these developments to concerns over weak external competitiveness, sluggish labour productivity growth, and an aging population.



At Diavik diamond mine, Rio Tinto operates one of the largest hybrid wind-diesel power facilities at a remote mine site in the world. The off-grid mine is located on an island in a subarctic lake called Lac de Gras, in Canada's remote Northwest Territories, and since coming on line in 2012 has offset Diavik's diesel use by over 26 million litres and reduced the overall greenhouse gas emissions by 72 thousand tonnes.

Underscoring the above are mixed economic trends and indicators:

- Canada's unemployment rate remains at a near-historic low of 5.7% (at the time of writing).
- Wage growth was up year-over-year in July 2019 by 4.5%, the indicator's strongest month since January 2009.
- Canada's labour productivity remains below the OECD average.
- While 12 out of 20 industrial sectors plan to increase capital expenditures in 2019, projected oil and gas sector expenditures' share of the overall total remains at half (14.6%) of its 2014 peak (28%), and the projected increases for mining are modest after multi-year declines.
- After having moved in tandem since 1987, since 2014, growth in total Canadian Direct Investment Abroad has significantly outpaced that of Foreign Direct Investment into Canada, creating a gap of $412 billion as of 2018.

The above underscores strengths and weaknesses in the Canadian economy. Low unemployment and wage growth are positive indicators, but their longevity are ultimately reliant on investment-driven economic growth. Canada is fundamentally reliant on foreign direct investment for the generation of employment and wealth. On the backdrop of projected low-growth scenarios more needs to be done by Canadian governments to bolster economic competativeness and re-attract investment dollars.

Canadian Mining Industry Outlook

The Canadian mining industry's economic prospects are uncertain over the short term and a number of indicators are concerning:

- While 2019 saw a modest increase in the value of mining projects planned and under construction from 2019 to 2029 (by $8 billion year-over-year), the total 10-year projected value ($80 billion) remains 50% below the 2014 level of $160 billion.
- From 2007-2018, Mining Direct Investment Abroad has increased more than 3-fold (from $25.5 billion to $80 billion), while Mining Foreign Direct Investment into Canada, despite volatility, has remained stagnant (rising from $23.5 billion to $24.5 billion).

Domestically, several key pieces of legislation and regulation with implications for project permitting and operational costs were enacted, finalized or came into force over the last year. Among these include the federal price on carbon, a package of tax competitiveness reforms, and the *Impact Assessment Act* (the regime that governs how mineral, energy and other resource projects are assessed and permitted federally). Too little time has passed between the preparation of this edition of this publication and these measures coming into force to assess their implications for mineral and energy investment in Canada, despite substantial public commentary on these measures.

Looking forward, the opportunity for responsible growth is significant. As the world transitions to a lower carbon economy, demand for a number of mineral and metals is going to increase substantially. On this last point, according to research by KPMG, the projection for global growth for metals needed for battery production by 2028 is massive:

- Nickel +1,237%
- Cobalt +256%
- Lithium +575%
- Graphite +530%

Beyond batteries, the material demand for renewable power technology is also set to rise. For example, *Clean Energy Canada* highlights the opportunity that a lower carbon economy presents to Canada and its mining industry, noting that Canada has rich deposits in many of the minerals and metals needed in renewable energy technologies. Noting that Canada is home to 14 of the 19 metals and minerals needed to make a solar PV panel, the think-tank highlights MAC's *Towards Sustainable Mining® (TSM)* initiative, and the fact that Canada hosts some of the lowest carbon-intensive mines in the world thanks to the energy mix and company adoption of lower emitting technologies at their sites.

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 integral to a lower carbon economy. *TSM* can help demonstrate responsible sourcing as it produces site-level performance data in key environmental and social areas. It is essential that Canada's role in the responsible sourcing of the mined materials necessary for green technology be prioritized. (For more information, *see Section 5*).

As the middle classes of the world's most populous countries continue to emerge, and as their consumption patterns more closely resemble those of western industrialized countries, growth in mineral and metal demand will likely continue. The degree to which Canada participates in this longer-term growth trajectory depends on the establishment of a competitive domestic business environment.

MINING'S CONTRIBUTION TO THE CANADIAN ECONOMY

Mining is a significant contributor to the Canadian economy. The direct and indirect wages and employment of approximately 626,000 people across the country (of which 409,000 are direct jobs), taxes and royalties collected by governments, and the capital expenditures required for project development and operation are only some examples of the essential role it plays. Beyond its direct economic impact, the industry also supports many firms and sectors that supply miners with the goods and services they need to operate.

Contribution to Canada's GDP

Real GDP is used by policy makers, financial institutions and other businesses to help determine the economic health of the nation. Since real GDP measures the volume of goods and services produced, an increase in its value is a sign of a healthy economy while a decline indicates that the economy is not functioning to its full capacity.

Historically, the value of minerals and metals to Canada's economy has ranged between 2.7% and 4.5% of the country's real GDP. In 2018, the industry's contribution remained within this range at 3.5%.

2018 Contribution

The extractive industry, which combines mineral extraction with oil and gas extraction, contributed $151.5 billion, or 7.8%, to Canada's real GDP in 2018 (*see Figure 1*). By this measure – down 0.8% year-over-year – the extractive industry is the fourth largest of Canada's 18 industries, surpassed only by the services, real estate, and manufacturing sectors.

The mining industry as a whole goes beyond extraction to include mineral manufacturing and needs to be carved out from the broader mining and oil and gas category. The mining industry's 2018 contribution to real GDP is detailed in *Figure 2*, which divides industry activity into four stages:

- **Stage 1**, extraction of minerals (metals, non-metals and coal): $34.5 billion
- **Stage 2**, primary metal manufacturing (smelting, refining, rolling, extruding, alloying and casting of primary metals): $12.5 billion
- **Stage 3**, non-metallic mineral product manufacturing (abrasives, lime, cement, glass and ceramics): $6.8 billion
- **Stage 4**, fabricated metal product manufacturing (forging, stamping and heat-treating to produce reinforcing bars, fabricated wire, cutlery, tools and hardware): $15.5 billion

MINING'S DIRECT CONTRIBUTION TO 2018 REAL GDP TOTALED $69.5 BILLION, A 19% INCREASE YEAR-OVER-YEAR, WHILE THE SECTOR'S DIRECT CONTRIBUTION TO NOMINAL GDP TOTALED $72 BILLION, A 11% INCREASE YEAR-OVER-YEAR.

The difference between real and nominal GDP is that real GDP is only calculated in terms of expenditure, whereas nominal GDP is calculated by using current dollars, and is produced in terms of income and expenditure.

Real GDP is better at illustrating the performance of a sector over time, whereas nominal GDP is useful to illustrate an industry's contribution to the economy in a given year. Accordingly, mining's nominal GDP for 2018 increased year-over-year by 11% from $64-$72 billion dollars, largely due to rising prices over the course of 2018. *See Figure 3* and read about GDP for more information.

These numbers increase further when indirect contributions that the industry generates are factored in. These would include service consumption from third parties, such as railways and other service providers discussed further below. NRCan reports that for 2018, mining indirect contributions to nominal GDP were $25 billion, making total direct and indirect mining industry nominal GDP contributions $97 billion in 2018.

MINING IN THE PROVINCES AND TERRITORIES

Year-over-year, mineral production values were projected to increase for 2018 in six of Canada's 13 provinces and territories. The production values for four jurisdictions were projected to decrease and two remained roughly consistent. Quebec posted the largest gain in absolute value, exceeding $1.4 billion. Saskatchewan also increased by more than $1 billion year-over-year. Alberta experienced the single largest absolute drop in production value year-over-year, falling from $2.4 billion to $2 billion. Overall, total production value is up 7%, or more than $3 billion.

Regional Distribution of Mining

Figure 4 illustrates the geographical location of Canada's mining clusters and active mineral development regions (*details in Annex 1*). The Northwest Territories are the country's dominant source of diamonds. Leading in the production of gold are Ontario and Quebec. Saskatchewan produces all of Canada's uranium and has world-class potash reserves. British Columbia is prominent in steelmaking coal production. Newfoundland and Labrador and Quebec produce virtually all of Canada's iron ore. (For detailed mineral production by province and territory, *see Annex 2 and Annex 3*).

Canada's mining business has significant ties to its major cities. Some of the largest Canadian and international mining companies are headquartered or have a significant presence in urban centres, including: Vancouver (Newmont Teck Resources Limited), Saskatoon (Cameco Corporation, PotashCorp), Calgary (Canadian Natural Resources Limited, Suncor Energy Inc.), Toronto (IAMGOLD, Vale, Glencore) and Montreal (ArcelorMittal, Iron Ore Company of Canada, Rio Tinto Alcan).

Vancouver is the global centre of expertise for mineral exploration. Some 700 exploration companies are located in British Columbia, most of which are in the greater Vancouver area.

Toronto is the global centre for mining finance. The Toronto Stock Exchange (TSX) and TSX Venture Exchange are the world's number one mining and exploration listing venues, where much of the world's total mining equity capital is raised annually (*see Section 3* for more information). The city itself hosts mining company head offices, as well as several hundred mining suppliers, consulting firms and service providers.

As home to Rio Tinto Alcan, and to significant mining research and education facilities, Montreal holds considerable global expertise in aluminum smelting.

The global emergence of the oil sands over the past two decades has transformed Edmonton, Fort McMurray and Calgary into centres of expertise in this area, and Saskatoon has risen to the forefront of the uranium and potash sectors.

Regional Value of Mining

Mining is truly pan-Canadian, with operations from coast-to-coast-to-coast, and its significance in the different provinces and territories is worth noting.

CANADIAN MINES IN 2018

Total mining establishments – 1060
Metals – 63
Non-metals – 997

PROVINCES WITH THE MOST METAL MINES

Quebec – 20
Ontario – 18
British Columbia – 7

MAIN TYPES OF NON-METAL MINES

Sand and gravel – 629
Stone – 271
Peat – 50

Overall, the value of Canadian mineral production increased by 7% in 2018, rising more than $3 billion from 2017 levels (*see Figure 5*).

VALUE OF MINING IN 2018

Canada-wide: $47 billion

TOP 3 PROVINCES

1. Ontario: $10 billion
2. Quebec: $9.98 billion
3. British Columbia: $9.66 billion

A correlation exists between production values and expenditures on resource development. The top three provinces by production value in 2018 – Ontario, Quebec and British Columbia – also led in expenditures on mineral resource development (*see Figure 6*). Of the $9.4 billion invested in mine complex development in Canada, combined spending across these three provinces exceeded $5 billion (53% of the total). Substantial sums were also invested in mine complex development in Saskatchewan ($1.3 billion) and Nunavut ($1.4 billion). This suggests that these jurisdictions will remain vital to Canada's mineral production well into the future.

The three territories together received 19% ($445 million) of total 2018 Canadian spending on exploration and deposit appraisal (the first two columns of *Figure 6*). This amount, nearly three times the territories' share of production value (7%), reflects global interest in Canada's northern mineral potential given it is seen by many as the future of the country's mining sector. On certain measures, this interest is materializing into wealth development as the territories also accounted for 21% ($2.0 billion) of total mine complex development expenditure. The majority of this investment (68%) went to Nunavut, where Agnico Eagle recently opened its Meliadine mine and Amaruq Whale Tail Project, both of which are now operational. A smaller, but regionally significant investment was made in the Yukon by Victoria Gold to develop its Eagle Gold project, which poured its first gold during summer 2019.

While these investments are positive, long-term wealth generating opportunities for Canada's North, continued investment in territorial exploration and deposit appraisal is needed to generate the opportunities of the future.

Fortunately, upward signs of recovery in exploration investment can be seen in recent years in the Yukon and the Northwest Territories, with a leveling out in Nunavut after some buoyant years:

- $91 million in the Northwest Territories
- $99 million in Nunavut
- $99 million in Yukon

TAXES AND OTHER PAYMENTS TO GOVERNMENTS

Canadian governments receive substantial taxes and royalties as a result of mining activity, with these payments coming from the first three stages of activity – extraction, smelting and processing (*see Figure 2*). These tax revenues, in turn, are reinvested to provide education, healthcare and other social and economic development programs that support the quality of life that Canadians enjoy. The industry proactively discloses the taxes, royalties and other payments companies make to Canadian governments.

Payments to Governments

Canada's payment disclosure legislation, the *Extractive Sector Transparency Measures Act*, which came into force in 2015, requires companies to disclose the payments they make to governments that exceed a $100,000 threshold. This creates greater transparency of the taxes, royalties and other forms of disbursement that companies pay to governments, both at home and abroad.

According to the *Natural Resource Governance Institute,* in 2018, extractive sector companies reported payments of more than $10.4 billion to Canadian governments. These payments, to Indigenous, municipal, provincial and federal governments, are generally royalty or tax payments sourced from over 377 companies for more than 1,800 projects across the country.

EXTRACTIVE SECTOR PAYMENTS TO CANADIAN GOVERNMENTS WERE MORE THAN $10.4 BILLION IN 2018.

While payments to governments are a significant benefit generator from natural resource extraction and processing, they do not characterize the full extent of the benefit. For example, the mining industry pays the highest industrial wage in Canada, on which the federal government levies

taxes from both companies and employees, both of whom pay tax on virtually all goods and services they consume, augmenting these benefits even further.

INDIRECT CONTRIBUTIONS TO MINING INDUSTRY SUPPLIERS

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 expenditure (*details in Section 2*). Organizations such as CN Rail, CP Rail, and the Ports of Montreal, Quebec and Vancouver rely on a vibrant mining industry. Many other related 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. As just one example, supplier companies play a crucial role in introducing and spreading innovative technologies and ideas within the mining industry.

InfoMine, a mining database, reported in 2019 that more than 3,700 firms provide technical, legal, financial, accounting, environmental and other expertise to the Canadian mining industry. Most of these suppliers are located in Ontario and British Columbia, followed by Alberta, Quebec, Saskatchewan, and Manitoba, and generate significant local benefits for Canada. For example, according to the Mining Suppliers of British Columbia, that province's supply sector generated $2.9 billion worth of economic activity in 2018.

Recently, InfoMine reported that Australia's identified mining supply sector surpassed that of Canada's, bumping Canada to third place. In 2019, neither Canada nor Australia's sectors grew much year-over-year, but the gap between them persists at roughly 700 firms. This is one of many indicators suggesting that Canada's attractiveness as a destination for mineral investment has declined in recent years. (*See Section 3* of this report for more discussion on investment trends.) ■

NUMBER OF MINING SUPPLIERS IN LEADING COUNTRIES

United States: 5,992
Australia: 4,545
Canada: 3,763
Brazil: 3,652
Chile: 1,825

Source: InfoMine



Protecting people and the environment are top priorities; regular water monitoring is conducted near Cameco's Cigar Lake facility in northern Saskatchewan.

FIGURE 1

CANADA'S REAL GROSS DOMESTIC PRODUCT, BY INDUSTRY, 2007-2018

Return to text

($ millions)	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
All industries	1,609,908	1,621,860	1,569,642	1,624,731	1,678,329	1,710,432	1,753,922	1,804,500	1,819,352	1,839,238	1,898,412	1,938,394
Agriculture	23,655	25,895	24,841	24,314	25,051	25,568	31,191	27,843	29,476	31,225	31,291	32,298
Forestry and logging	4,304	4,020	3,173	3,668	4,034	3,937	4,049	4,210	4,259	4,255	4,128	4,169
Fishing, hunting and trapping	1,187	1,231	1,198	1,274	1,250	1,269	1,292	1,343	1,261	1,195	1,142	1,107
Support activities for agriculutre and forestry	2,341	2,182	2,250	2,291	2,356	2,322	2,470	2,475	2,496	2,543	2,598	2,596
Mining (including milling) and quarrying, and oil and gas extraction	**123,492**	**120,897**	**108,195**	**118,700**	**126,955**	**124,526**	**131,038**	**141,701**	**137,783**	**133,050**	**144,752**	**151,534**
Support activities for mining and oil and gas extraction	16,368	17,590	12,754	15,784	18,710	19,078	19,330	20,178	14,202	10,206	13,514	14,106
Electric power, gas and water utilities	38,520	39,927	37,605	38,121	39,344	38,954	38,986	40,238	40,378	40,854	42,297	42,503
Construction	115,395	118,474	111,197	120,344	125,049	134,959	140,830	144,554	141,176	134,927	140,900	141,843
Manufacturing	203,881	192,987	166,375	174,409	180,460	183,090	182,490	187,914	188,979	190,340	197,478	202,594
Trade, wholesale	82,652	81,913	76,333	82,073	88,224	91,307	95,163	97,598	94,411	95,305	100,892	102,757
Trade, retail	81,372	84,024	81,974	84,347	85,126	85,541	90,309	91,276	91,158	93,849	99,414	100,246
Transportation and warehousing	68,186	67,827	65,361	67,861	70,485	71,428	72,706	77,060	79,095	81,356	85,069	87,605
Information and cultural industries	52,645	53,044	52,370	53,480	54,218	54,677	54,378	56,130	57,290	57,797	58,537	58,390
Finance and insurance	99,995	98,536	97,555	99,679	103,061	104,909	108,753	111,814	117,263	122,076	125,859	127,955
Real estate and rental and leasing	181,749	186,130	191,269	197,448	203,639	210,100	215,931	222,014	228,619	235,390	241,380	245,277
Community, business and personal services**	202,704	206,289	201,819	202,201	208,764	215,169	220,313	230,830	232,623	233,338	238,017	243,977
Public administration	107,262	111,941	117,964	121,234	123,419	122,427	121,921	121,309	122,079	123,635	125,942	128,996
Health care and social assistance	111,310	113,826	116,492	118,226	120,291	122,167	122,357	124,221	126,012	128,931	131,423	135,285
Educational services	85,062	88,088	89,418	91,166	91,927	93,705	95,112	96,452	97,640	99,198	100,514	103,503

Source: Statistics Canada, CANSIM Table 379-0031.
Note: Values at Basic Prices in 2012 Constant Dollars.
***Combination of Professional, scientific and technical services, administrative and support, waste management, accomodation and food services, other services.*

FIGURE 2

CANADA'S REAL GROSS DOMESTIC PRODUCT, MINING, MINERAL MANUFACTURING, AND OIL AND GAS, 2007-2018

Return to text

($ millions)	2007	2008	2009	2010	2011	2012
Metal mines	15,024	15,494	12,732	13,189	14,462	14,669
Nonmetal mines	10,967	10,377	6,139	9,836	10,648	9,151
Coal mines	3,774	3,978	3,326	3,771	3,686	3,717
Total Mining	**29,765**	**29,849**	**22,197**	**26,796**	**28,796**	**27,537**
Primary metal manufacturing	12,806	12,517	9,310	10,623	11,270	11,151
Fabricated metal product manufacturing	15,988	14,588	12,417	12,949	14,004	15,052
Non-metallic mineral product manufacturing	7,203	6,905	5,857	6,002	6,120	6,215
Total Mineral Manufacturing	**35,997**	**34,010**	**27,584**	**29,574**	**31,394**	**32,418**
Oil and gas extraction	78,700	75,264	72,888	75,975	79,581	77,912
Petroleum and coal products manufacturing	12,004	11,806	12,557	11,851	11,344	11,396
Support activities for mining and oil & gas	16,368	17,590	12,754	15,784	18,710	19,078
Total Oil and Gas and Associated Manufacturing	**107,072**	**104,660**	**98,199**	**103,610**	**109,635**	**108,386**

($ millions)	2013	2014	2015	2016	2017	2018
Metal mines	16,296	17,605	18,883	19,069	18,670	18438
Nonmetal mines	9,672	10,512	10,572	10,226	12,064	12827
Coal mines	4,040	3,935	3,359	3,381	3,365	3265
Total Mining	**30,008**	**32,052**	**32,814**	**32,676**	**34,099**	**34,530**
Primary metal manufacturing	10,785	11,637	11,495	11,791	12,128	12,553
Fabricated metal product manufacturing	15,434	15,368	14,819	13,813	14,605	15,549
Non-metallic mineral product manufacturing	6,098	6,219	6,140	6,075	6,474	6,834
Total Mineral Manufacturing	**32,317**	**33,224**	**32,454**	**31,679**	**33,207**	**34,936**
Oil and gas extraction	81,706	89,179	91,532	93,143	99,887	107286
Petroleum and coal products manufacturing	11,331	11,637	11,645	11,525	12,271	11,896
Support activities for mining and oil & gas	19,330	20,178	14,202	10,206	13,514	14,106
Total Oil and Gas and Associated Manufacturing	**112,367**	**120,994**	**117,379**	**114,874**	**125,672**	**133,288**

Source: Statistics Canada, CANSIM Table 379-0031.
Note: Values at Basic Prices in 2012 Constant Dollars.

FIGURE 3

NATURAL RESOURCES SATELLITE ACCOUNT, INDICATORS, ANNUAL (DOLLARS X 1,000,000)

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Mining Industry Nominal

Indicators	Commodities	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2018 - 2017	% diff.
Gross value added	Total commodities	46,502	48,579	33,422	43,329	54,095	46,934	43,711	43,308	41,861	42,346	47,469	47,888	419	1%
Gross value added	Extraction	23,347	25,877	17,533	25,336	32,892	26,444	24,862	23,888	22,821	23,285	26,552	27,058	506	2%
Gross value added	Coal	1,669	3,881	3,242	3,989	5,575	3,704	2,726	1,998	1,506	2,017	3,274	3,848	574	18%
Gross value added	Metallic minerals	16,198	13,218	8,210	13,056	16,766	14,132	14,105	13,568	12,565	13,486	14,831	14,294	-537	-4%
Gross value added	Non-metallic minerals	5,480	8,778	6,081	8,291	10,551	8,608	8,031	8,322	8,750	7,782	8,447	8,916	469	6%
Gross value added	Services	3,861	4,684	3,472	4,550	6,127	6,269	5,873	5,368	5,171	4,769	5,438	5,067	-371	-7%
Gross value added	Primary manufacturing	19,294	18,018	12,417	13,443	15,076	14,221	12,976	14,052	13,869	14,292	15,479	15,763	284	2%
Gross value added	Primary metallic minerals products	12,435	11,733	7,191	8,157	9,605	8,538	7,432	8,312	8,281	8,684	9,584	9,835	251	3%
Gross value added	Primary non-metallic minerals products	6,859	6,285	5,226	5,286	5,471	5,683	5,544	5,740	5,588	5,608	5,895	5,928	33	1%
Gross value added	Total commodities	18,380	17,534	15,537	16,527	18,664	20,226	20,731	21,455	21,898	21,280	22,280	24,483	2,203	10%
Gross value added	Miscellaneous metal products	2,155	1,714	2,320	2,694	3,298	3,516	3,452	3,624	3,943	4,147	3,719	3,574	-145	-4%
Gross value added	Secondary metal products	3,083	3,303	2,093	2,559	2,788	2,941	2,948	3,307	3,268	3,138	3,428	3,668	240	7%
Gross value added	Services and custom work	2,128	2,026	1,933	1,980	2,115	2,165	1,973	2,072	2,129	2,049	2,183	2,461	278	13%
Gross value added	Tertiary metal products	11,014	10,491	9,191	9,294	10,463	11,604	12,358	12,452	12,558	11,946	12,950	14,780	1,830	14%
Total	**Tertiary metal products**	**64,882**	**66,113**	**48,959**	**59,856**	**72,759**	**67,160**	**64,442**	**64,763**	**63,759**	**63,626**	**69,749**	**72,371**	**2,622**	**4%**

Source: Statistics Canada. Table 388-0010 - Natural resources satellite account, indicators, annual (dollars unless otherwise noted). (accessed: May 18, 2018)

FIGURE 3 CONTINUED

NATURAL RESOURCES SATELLITE ACCOUNT, INDICATORS, ANNUAL (DOLLARS X 1,000,000)

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Mining Industry Nominal

Indicators	Commodities	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2018 - 2017	% diff.
Gross value added	Total commodities	50,170	50,877	38,692	43,596	47,769	46,937	46,315	47,686	47,771	47,219	49,643	49,716	73	0%
Gross value added	Extraction	28,684	29,156	21,903	24,822	27,440	26,446	27,087	28,120	28,768	28,633	29,950	29,460	-490	-2%
Gross value added	Coal	3,733	3,932	3,289	3,730	3,646	3,705	3,984	3,435	2,931	2,952	2,937	2,851	-86	-3%
Gross value added	Metallic minerals	14,251	14,919	11,582	12,007	14,054	14,133	14,395	15,103	16,199	16,360	16,016	14,863	-1,153	-7%
Gross value added	Non-metallic minerals	10,700	10,305	7,032	9,085	9,740	8,608	8,708	9,582	9,638	9,321	10,997	11,746	749	7%
Gross value added	Services	5,248	5,779	4,188	5,184	6,148	6,269	5,899	5,462	5,074	4,489	5,002	4,813	-189	-4%
Gross value added	Primary manufacturing	16,238	15,942	12,601	13,590	14,181	14,222	13,329	14,104	13,929	14,097	14,691	15,443	752	5%
Gross value added	Primary metallic minerals products	9,694	9,669	7,282	8,140	8,623	8,539	8,124	8,792	8,684	8,908	9,162	9,841	679	7%
Gross value added	Primary non-metallic minerals products	6,544	6,273	5,319	5,450	5,558	5,683	5,205	5,312	5,245	5,189	5,529	5,602	73	1%
Gross value added	Total commodities	19,850	17,984	15,793	17,100	18,971	20,225	20,986	21,753	21,355	20,457	21,052	22,050	998	5%
Gross value added	Miscellaneous metal products	2,354	1,867	2,199	2,591	3,280	3,517	3,485	3,497	3,519	3,408	3,299	3,078	-221	-7%
Gross value added	Secondary metal products	3,072	3,254	2,184	2,721	2,862	2,940	3,170	3,506	3,571	3,695	3,695	3,661	-34	-1%
Gross value added	Services and custom work	2,098	1,842	1,703	1,800	2,018	2,165	2,231	2,343	2,301	2,203	2,267	2,443	176	8%
Gross value added	Tertiary metal products	12,326	11,021	9,707	9,988	10,811	11,603	12,100	12,407	11,964	11,151	11,791	12,868	1,077	9%
Total	**Tertiary metal products**	**70,020**	**68,861**	**54,485**	**60,696**	**66,740**	**67,162**	**67,301**	**69,439**	**69,126**	**67,676**	**70,695**	**71,766**	**1,071**	**2%**

Source: Statistics Canada. Table 388-0010 - Natural resources satellite account, indicators, annual (dollars unless otherwise noted). (accessed: May 18, 2018)

FIGURE 4
CANADIAN MINING INDUSTRY CLUSTERS

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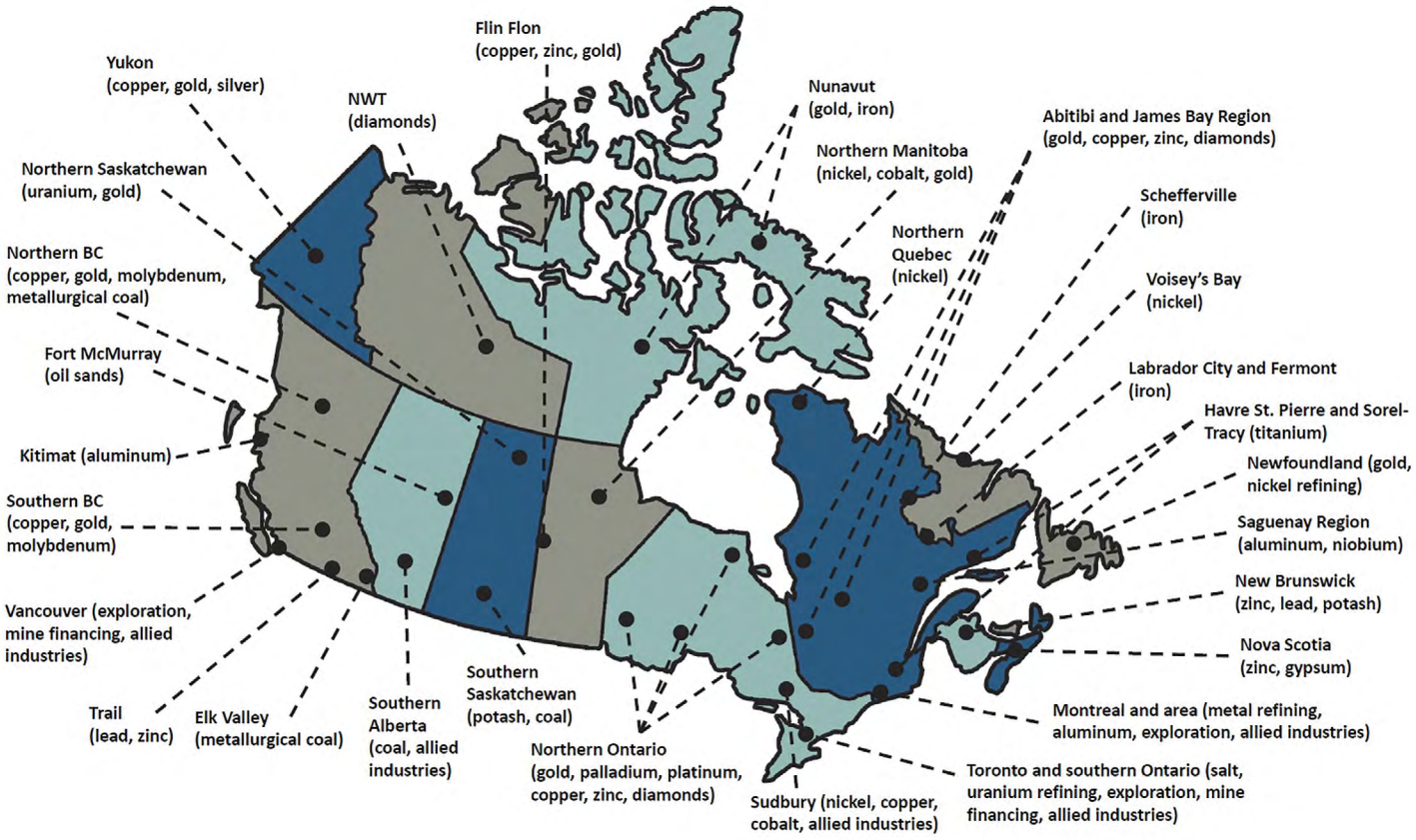

Source: The Mining Association of Canada.

FIGURE 5

CANADA, VALUE OF MINERAL PRODUCTION BY PROVINCE AND TERRITORY, 2009 AND 2018[P]

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($ millions)	2009			2018[P]		
Province/Territory	($ current millions)	(%)	RANK	($ current millions)	(%)	RANK
Newfoundland and Labrador	5,802.8	19.3	1	10,060.4	21.4	1
Nova Scotia	5,271.6	17.6	3	9,986.9	21.2	2
New Brunswick	5,417.6	18.0	2	9,656.9	20.5	3
Quebec	5,059.1	16.9	4	6,737.1	14.3	4
Ontario	2,409.5	8.0	5	2,817.0	6.0	5
Manitoba	1,633.9	5.4	6	2,031.7	4.3	6
Saskatchewan	1,506.6	5.0	7	2,110.5	4.5	7
Alberta	1,341.4	4.5	8	1,504.2	3.2	8
British Columbia	0.0	…	13	1,164.3	2.5	9
Yukon	1,100.4	3.7	9	344.8	0.7	10
Northwest Territories	240.3	0.8	10	216.8	0.5	11
Nunavut	232.8	0.8	11	371.5	0.8	12
Prince Edward Island	3.6	…	12	4.6	…	13
Canada	**30,019.5**	**100.0**		**47,006.7**	**100.0**	

Sources: Natural Resources Canada; Statistics Canada.
[P] Preliminary; … Amount too small to be expressed.
Notes: 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 reference year 2017, Statistics Canada has ceased the collection of the cement data. Values for cement production have been removed from 2009 values.

FIGURE 6

TOTAL MINERAL DEVELOPMENT EXPENDITURES, BY STAGE AND PROVINCE AND TERRITORY, 2018[p]

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Province/Territory	Exploration ($ millions)	Deposit Appraisal ($ millions)	Mine Complex Development ($ millions)	Total Expenditures ($ millions)
Newfoundland and Labrador	37.4	8.0	477.5	522.9
Nova Scotia	21.5	15.0	79.0	115.5
New Brunswick	18.9	1.2	21.0	41.1
Quebec	374.2	124.0	1962.2	2,460.3
Ontario	386.9	196.1	2147.4	2,730.4
Manitoba	42.8	2.8	164.2	209.7
Saskatchewan	130.9	116.3	1257.3	1,504.4
Alberta	6.1	22.8	429.7	458.5
British Columbia	236.5	133.1	897.0	1,266.6
Yukon	98.7	87.4	348.2	534.3
Northwest Territories	91.0	18.0	282.6	391.6
Nunavut	99.0	50.6	1365.4	1,515.0
Canada	**1,543.7**	**775.2**	**9,431.7**	**11,750.4**

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

[p] Preliminary.

Note: Includes on-mine-site and off-mine-site activities. Includes field work, overhead costs, engineering, economic, pre-feasibility, feasibility, and environmental studies, and land access costs. Expenditures for mine complex development include machinery and equipment and non-residential construction.



SECTION 2

THE ACTIVITIES: PRODUCTION, PROCESSING AND TRANSPORTATION

CANADA'S STRENGTH IN MINING RESTS ON ITS ABILITY TO PRODUCE AND PROCESS MINERALS COMPETITIVELY AND TO TRANSPORT PRODUCTS EFFICIENTLY TO DOMESTIC AND INTERNATIONAL MARKETS. THESE PRODUCTION, PROCESSING AND TRANSPORTATION ACTIVITIES FORM THE BASE THAT ALLOWS THE INDUSTRY TO STAY GLOBALLY COMPETITIVE AND EXPAND ITS CANADIAN INVESTMENTS.

PRODUCTION OF KEY MINERALS

Richly endowed with natural resources, Canada ranks among the top five countries in the global production of 15 minerals and metals (*details in Annex 4*):

- First in potash, gemstones and titanium concentrate
- Second in uranium and niobium
- Third in graphite, indium and platinum group metals
- Fourth in aluminum, cadmium, graphite and salt
- Fifth in sulphur, gold and mica

While Canada produces some 60 different minerals and metals, its status as a top-five producer has shifted and slipped over the past 15 years. Today, Canada no longer holds the position as a top producer of copper, zinc, molybdenum, lead and cadmium, having been surpassed by other countries. Since last year, Canada has also now lost a top-five ranking for nickel and cobalt (having slipped to 6th globally for each). Notable, however, is that Canada has become a top-five producer over the same time period of four commodities for which it previously was not on the charts. These include mica, indium, gemstones and graphite. Also of note is Canada's position as third in the world for diamonds, according to value, despite being fourth in production – an increase from fifth globally for production year-over-year.

PRODUCTION VALUES

In 2018, the value of Canadian mineral production increased for the second consecutive year, rising 3.8% (or by $1.7 billion) to $47 billion (*see Figure 7*). Values increased across metal, non-metal and coal streams, though coal accounted for the largest increase, rising $2.2 billion. Increases are indicative of steady upward mobility in commodity prices over the course of the preceding year.

Canada's top 10 minerals and metals (*see Figure 8*) each had projected production values of more than $1.2 billion in 2018, with five (gold, potash, copper, iron ore and coal) at more than $3 billion each. Together, the top 10 minerals and metals represented $41.4 billion (88%) of Canada's total mineral production value in 2018. *See Annex 5* for a complete set of production volumes and values.

On the petroleum front, synthetic crude oil accounted for 28% of Canada's crude oil production volume in 2018, a modest decrease from 2017 (*see Figure 9*). Indicative of an increase in oil prices, the absolute value of synthetic crude oil production increased from $25.4 billion to $26.6 billion year-over-year.

PROCESSING OF MINERALS

Canada has a large mineral-processing industry, with 31 facilities – comprised of non-ferrous metal smelters, refineries and conversion facilities – in seven provinces (*see Figure 10*). Canada's integrated smelters and refineries were

CANADA'S MINERAL-PROCESSING FACILITIES

- **New Brunswick:** 1 smelter
- **Quebec:** 9 smelters, 4 refineries, 2 secondary smelters
- **Ontario:** 2 secondary smelters, 3 refineries, 3 smelter/refineries, 1 conversion facility
- **Manitoba:** 1 smelter/refinery, 1 refinery
- **Alberta:** 1 refinery
- **British Columbia:** 1 smelter, 1 secondary smelter, 1 smelter/refinery, 1 processing plant
- **Newfoundland and Labrador:** 1 refinery

built in proximity to world-class mines, most located inland, without access to affordable marine transport. As local ore reserves become depleted over time (*discussed in Section 3*) and the production of base metal concentrate declines, smelters and refineries are transitioning from integrated production to the more expensive custom treatment of concentrates from multiple mines imported from other countries. Additionally, they are also using more secondary raw materials and scrap feed.

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. *Figure 11* shows that the production volumes for refined metals over the past 10 years have been mixed. Since 2008, production of refined copper and zinc have dropped, while aluminum has fluctuated. The production of cadmium, cobalt and lead has increased. In absolute terms, total refined Canadian metal production has decreased by 8.4%, or 403,700 tonnes, since 2008.

The competitiveness of Canada's mineral-processing industry depends largely on the ability to secure reliable sources of feedstock from domestic mines – a supply that, in recent years, has declined. Importing feedstock from abroad greatly influences the cost and profitability of domestic refining and smelting operations. If the industry is to remain competitive, enhancing domestic levels of mineral production through requisite investment in exploration and mine development is essential.

Other factors also influence the competitiveness of Canada's mineral-processing industry. Canada's processing facilities operate in a global arena, where China and other countries are expanding their capacity with newer facilities and competing fiercely for raw materials. The cost of electricity is also a factor in some Canadian jurisdictions, such as Ontario, where rates have steadily increased in recent years. Given the energy-intensive nature of these value-added processes, high-cost power jurisdictions dampen the competitiveness of existing operations and can 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 combined factors, the downstream Canadian mining industry risks being left behind. At stake are the benefits Canada has historically derived from a robust value-added mineral-processing and manufacturing sector, such as stable, long-term, and high-paying employment, many of which are union jobs. For example, primary metal manufacturing accounted for more than 62,000 jobs in 2018. Adding non-metallic mineral product manufacturing increases that number by nearly 47,000 jobs. Both sectors combined account for almost 30% of the industry's overall direct employment for the year. While significant, these numbers have been in decline. Since 2008, employment in primary metal manufacturing and non-metallic mineral product manufacturing has dropped by nearly 29,000 jobs, or 8% of the industry's current total direct workforce. A concrete example of this is the recently announced closure of the Brunswick Smelter in northern New Brunswick, where 420 workers were let go.

TRANSPORTATION OF MINING PRODUCTS

Canada's logistics supply chain is 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, providing it with considerable tonnage, especially in select bulk commodities such as iron ore, coal, potash and sulphur.

Rail

As the largest shipper by both freight revenue and volume shipped, the mining industry is the Canadian rail system's most significant customer. In 2018, shipments of coal, iron ore, potash and other minerals and metals represented 52.3% of total Canadian rail freight revenue (*see Figure 12*).

Canada's rail freight system operates primarily as a dual monopoly, shared by CN and CP – Canada's only Class I railways. Mining operations, in addition to communities

and businesses, are frequently captive to only one railway given the remoteness of their locations.

In light of numerous service challenges, the federal government launched the Rail Freight Service Review in 2010, aimed at identifying service problems, examining best practices, and recommending remedies to improve service. Despite the resulting recommendations, the federal government's commitment to table legislation to enact a shipper's right to a service-level agreement fell short, as specific service provisions were not legislated in the *Fair Rail Freight Service Act*.

The inadequacy of this legislation resulted in continued rail service failures across all shipping sectors. The government responded with the *Fair Rail for Grain Farmers Act*, which enacted narrow grain-sector-specific legislative measures without any consultation. The scale of this issue garnered national media attention, and in June 2014, then-Minister of Transport, the Honourable Lisa Raitt, launched the 2015 statutory review of the *Canada Transportation Act* ahead of schedule.

Transportation Modernization Act

In spring 2017, and building on *Transportation 2030: A Strategic Plan for the Future of Transportation in Canada*, the Minister of Transport, the Honourable Marc Garneau, tabled Bill C-49, the *Transportation Modernization Act*.

While the package of reforms went further than those of Minister Garneau's predecessors, they still fell short of rebalancing the position of railways and customers in the rail freight market. On the backdrop of a costly and reputationally damaging supply chain disruption in winter 2018, MAC, in partnership with seven other resource shipping associations, advanced two recommendations to improve the bill. The first was to give shippers a right to a costing assessment in the context of a Final Offer Arbitration (FOA), one of the remedies under the CTA. The second was to give the Canada Transportation Agency unilateral "own-motion" powers to investigate service disruptions in the rail freight market – with the aim of expeditiously advancing solutions to reduce economic harm.

For decades, the one useful remedy for captive shippers was FOA, and in order for it to work properly, there has to be reasonable access to information on both sides of an arbitration, including with respect to costing. Without such information, shippers are negotiating in the dark, and arbitrators are unable to assess the reasonableness of bids. For many years, shippers requested such information during a FOA and the railways complied, leading to fair processes and reasonable outcomes. But that changed about a decade ago when railways started objecting to this information being shared, leaving shippers at a major disadvantage and effectively nullifying the FOA remedy.



Kelsie Trowbridge, an electrical student, maintaining an energy efficient ventilation control system at Vale's Totten Mine in Sudbury, Ontario.

MAC's proposed amendment would have made the provision of costing information a mandatory input into a FOA process, restoring the remedies to function as originally designed. The amendment was rejected on the basis of a false premise, and the own-motion powers proposal was reduced in scope, requiring the Agency to seek permission from the Minister instead of being able to act independently as a third-party regulator should be.

Currently ongoing is a rail data transparency consultation to establish a permanent data transparency regime and a Canadian Transportation Agency consultation on a plurality of measures that come to bear on railway costing and

federally regulated interswitching rates. MAC has made submissions to these consultations, both of which will continue throughout 2020.

Trucking

Trucking plays a smaller yet important role in moving mining products. This, for the most part, has to do with the sheer volume of mined materials needing shipment, the remote location of many mining operations, and the factors that determine the economic viability of freight shipment by rail versus truck.

According to the federal government's 2018 report, Transportation in Canada, trucks carried more than $220 billion in Canadian exports in 2017, 11% of which ($23.4 billion) were mining-related products. Trucks also carried $306 billion in imports to Canada, 89% of which ($26 billion) were mining-related products. There is no detailed information about domestic truck shipments by commodity.

Another key role trucking plays in the mining industry is the delivery of 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.

Marine

Mining is also a leading customer of Canadian ports. The Port of Montreal handles large volumes of iron ore and salt, as well as other mineral products such as fertilizer, ores, gypsum and scrap metal. Total mined products accounted for approximately 5.2 million tonnes in 2018, or ~66%, of the port's dry bulk cargo shipments for the year. Generally, these arrive by ship as inbound cargo and are then transported by rail or truck to the region's smelting and refining facilities.

Beyond Montreal, the mining industry is a major contributor to Canada's St. Lawrence Seaway. Shipments of iron ore, coke and coal represent ~20% of total seaway traffic, with iron ore accounting for the second-largest share of any commodity shipped.

Steelmaking coal accounts for ~19% 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 8% of the port's volume, and minerals and ores another 9%. All told, mining products account for more than 50 million tonnes, or roughly 40% of the port's volume.

The International Maritime Organization (IMO) is the global body that regulates pollution and safety practices at sea. The evolution of the International Maritime Solid Bulk Cargoes Code has implications for the way mining companies ship their products. (*See Section 6* of this report for more discussion).

Pipelines

The North American energy landscape is changing rapidly. Historically, Canadian oil companies shipped the majority of their product to the US, which was reliant on imports to meet its oil demand. However, hydraulic fracturing to produce oil and gas from shale and tight rock formations has transformed the US into a self-sufficient energy producer. Even in a low-price environment, this development has drastically reduced the country's needs for imported oil. Meanwhile, growth in global oil demand has shifted to Asia, with China surpassing the US as the world's largest oil importer.

This shift in demand is challenging Canadian oil companies because existing transportation infrastructure is impeding their ability to access global markets. It is important to note that there are costs associated with the inadequacy of Canada's existing pipeline network. Declining US demand, together with insufficient pipeline capacity and transportation bottlenecks in the US Midwest, are driving down the price for Canadian crude oils relative to other crude oils. When tallied, annual economic losses approaching $30 billion have been estimated pending the fluctuations in the global price of oil.

To address this situation, Canada must develop new pipeline and port infrastructure to reach markets in Asia, the US Gulf Coast, eastern Canada, and the US seaboard markets. The first step is constructing the Trans Mountain Expansion Pipeline as expeditiously as possible. ■

FIGURE 7
VALUE OF CANADIAN MINERAL PRODUCTION, 1999-2018[P]

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	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018[P]
Metals	9.7	11.0	10.4	10.4	9.7	12.4	14.6	21.1	26.2	22.6	15.5	21.4	25.6	23.6	23.5	24.2	23.1	23.3	25.7	26.2
Non-metals	6.1	6.2	6.3	6.5	7.4	8.7	8.8	8.6	9.8	17.7	10.2	13.2	16.2	14.9	13.9	14.1	14.8	12.1	13.3	14.4
Coal	1.5	1.4	1.6	1.6	1.5	1.6	2.9	2.9	2.7	5.0	4.4	5.5	7.5	5.9	4.9	3.9	3.1	4.0	6.3	6.4
Total Mineral Production	**17.3**	**18.6**	**18.2**	**18.5**	**18.6**	**22.7**	**26.3**	**32.6**	**38.7**	**45.3**	**30.1**	**40.1**	**49.3**	**44.4**	**42.3**	**42.2**	**41.0**	**39.4**	**45.3**	**47.0**

Sources: Natural Resources Canada; Statistics Canada.
[P] Preliminary.
Notes: 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 1999 to 2016 values for comparability.

FIGURE 8

CANADA'S TOP TEN METALLIC AND NON-METALLIC MINERAL PRODUCTS, BY VALUE OF PRODUCTION, 2008 AND 2018[P]

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		2008		2018[P]	
	Unit of Measure	Quantity ($ millions)	$ Value ($ millions)	Quantity ($ millions)	$ Value ($ millions)
Gold	t	95	2,824	183	9,590
Coal	kt	68,106	4,292	54,326	6,408
Potash (K_20)[1]	kt	10,455	8,243	13,835	5,494
Iron Ore	kt	31,273	2,427	52,388	4,802
Copper	kt	581	4,438	535	4,495
Nickel	kt	251	5,856	176	2,971
Diamonds	000 ct	14,803	2,404	23,240	2,736
Sand and gravel	kt	239,646	1,496	216,707	1,938
Stone	kt	145,825	1,373	166,488	1,715
Platinum group	kt	23	619	29	1,207

Sources: Natural Resources Canada; Statistics Canada.

[P] Preliminary.

Notes: [1]Shipments of potash to Canadian potassium sulphate plants are not included in this table. 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 2008 values for comparability with 2018 data.

FIGURE 9

PRODUCTION OF SYNTHETIC CRUDE OIL BY OIL SANDS MINING PLANTS, ALBERTA AND CANADA, BY QUANTITY AND VALUE, 1998-2018

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	Synthetic Crude Oil (000's of m3)	Total Crude Oil and Equivalents	Synthetic Crude as % of Total	Synthetic Crude Oil ($000)	Total Crude Oil and Equivalents ($000)	Synthetic Crude as % of Total
ALBERTA						
1998	17,870.8	94,676.2	18.9	2,313,518	9,734,475	23.8
1999	18,766.9	89,065.5	21.1	3,252,547	13,727,829	23.7
2000	18,608.0	89,136.1	20.9	5,188,916	21,687,681	23.9
2001	20,260.6	89,364.5	22.7	4,995,003	17,734,825	28.2
2002	25,494.6	89,885.1	28.4	6,455,743	19,778,759	32.6
2003	25,028.8	95,311.4	26.3	6,777,342	22,187,602	30.5
2004	26,661.9	101,007.0	26.4	8,570,468	27,767,704	30.9
2005	21,932.5	98,878.7	22.2	9,213,624	33,282,754	27.7
2006	28,764.2	106,017.8	27.1	14,831,145	38,498,843	38.5
2007	39,900.2	108,853.3	36.7	18,012,945	42,130,415	42.8
2008	38,020.7	108,322.4	35.1	25,214,415	62,941,690	40.1
2009	44,330.8	112,937.7	39.3	19,043,537	43,934,049	43.3
2010	46,110.5	119,559.3	38.6	23,473,269	54,005,153	43.5
2011	49,375.1	129,183.4	38.2	30,518,182	69,033,911	44.2
2012	52,455.2	143,873.9	36.5	28,588,084	69,346,737	41.2
2013	54,328.1	154,324.2	35.2	34,382,129	79,535,264	43.2
2014	55,345.9	168,971.7	32.8	35,467,401	94,140,139	37.7
2015	56,646.4	179,262.9	31.6	21,512,827	57,544,954	37.4
2016	54,072.0	179,202.5	30.2	19,276,126	51,957,648	37.1
2017	59,560.6	196,698.9	30.3	25,368,232	71,038,745.4	35.7
2018	61,299.8	215,919.5	28.4	28,599,046	81,540,262	35.1
CANADA						
1998	17,870.8	128,400.3	13.9	2,313,518	12,940,149	17.9
1999	18,766.9	122,287.0	15.3	3,252,547	18,698,282	17.4
2000	18,608.0	127,769.2	14.6	5,188,916	30,523,595	17
2001	20,260.7	128,951.0	15.7	4,995,003	24,911,953	20.1
2002	25,494.6	136,969.8	18.6	6,455,743	29,956,080	21.6
2003	25,028.8	144,813.2	17.3	6,777,342	33,610,498	20.2
2004	26,661.9	149,159.6	17.9	8,570,468	40,639,940	21.1
2005	21,932.5	146,207.9	15.0	9,213,624	49,159,801	18.7
2006	28,764.2	161,434.0	17.8	14,831,145	63,649,683	23.3
2007	39,900.2	160,448.3	24.9	18,012,945	62,919,592	28.6
2008	38,020.7	158,950.4	23.9	25,214,415	91,757,005	27.5
2009	44,330.8	158,100.4	28.0	19,043,537	61,558,676	30.9
2010	46,110.5	165,335.3	27.9	23,473,269	75,174,373	31.2
2011	49,375.1	175,312.1	28.5	30,518,182	95,496,704	32.3
2012	52,455.2	189,133.7	27.7	28,588,084	94,076,834	30.4
2013	54,328.1	202,292.6	26.9	34,382,129	106,507,173	32.3
2014	55,345.9	218,050.8	25.4	35,467,401	122,128,728	29.0
2015	56,646.4	224,157.5	25.3	21,512,827	72,081,704	29.8
2016	54,072.0	225,089.3	24.0	19,276,126	65,401,866	29.5
2017	59,560.6	243,808	24.4	25,368,232	88,563,252	28.6
2018	61,299.8	266,742.6	23.0	28,599,046	101,490,975	28.2

Sources: Natural Resources Canada; Statistics Canada.

FIGURE 10
NON-FERROUS SMELTERS AND REFINERIES IN CANADA, 2018

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Owner/Operator	Operation	Type of facility	Location	Outputs
Newfoundland and Labrador				
Vale Newfoundland and Labrador Limited	Long Harbour	(Ref.)	Long Harbour	Ni, Cu, Co
New Brunswick				
Glencore Canada Corporation	Brunswick	(Sm.)	Belledune	Pb, Ag, Bi
Quebec				
Rio Tinto Aluminum Inc./Aluminium Austria Metall Québec/Hydro Aluminium a.s./Société générale de financement du Québec/Marubeni Québec Inc.	Alouette	(Sm.)	Sept-Îles	Al
Alcoa Corporation	Baie-Comeau	(Sm.)	Baie-Comeau	Al
Rio Tinto Aluminum Inc.	Grande-Baie	(Sm.)	Grande-Baie	Al
Rio Tinto Aluminum Inc.	Laterrière	(Sm.)	Laterrière	Al
Rio Tinto Aluminum Inc.	Vaudreuil Works	(Ref.)	Jonquière	Alumina
Rio Tinto Aluminum Inc.	Arvida	(Sm.)	Arvida	Al
Rio Tinto Aluminum Inc.	Alma	(Sm.)	Alma	Al
Alcoa Corporation	Deschambault	(Sm.)	Deschambault	Al
Alcoa Corporation/Rio Tinto Aluminum Inc.	Bécancour	(Sm.)	Bécancour	Al
Glencore Canada Corporation	CCR	(Ref.)	Montréal-Est	Cu, Au, Ag, Se, Te, Ni, PGM
Terrapure Environmental	Sainte-Catherine	(Ref.), (Sec. Sm.)	Sainte-Catherine	Recycled Pb
Glencore Canada Corporation	General Smelting Company of Canada	(Sec. Sm.)	Lachine	Recycled Pb
Glencore Canada Corporation/Noranda Income Fund	Canadian Electrolytic Zinc Limited (CEZinc)	(Ref.)	Valleyfield	Zn, Cd, S*
Glencore Canada Corporation	Horne	(Sm.)	Rouyn-Noranda	Cu, Au, Ag

Source: Natural Resources Canada.
Note: Included are operations that produced in 2014.
(Sm.) Smelter.
(Ref.) Refinery.
(Sec. Sm.) Secondary smelter.
(Pl.) Plant.
(Con. Fac) Conversion facility.
S Sulphuric acid.*

FIGURE 10 CONTINUED
NON-FERROUS SMELTERS AND REFINERIES IN CANADA, 2018

Ontario				
Royal Canadian Mint	Ottawa	(Ref.)	Ottawa	Au, Ag, Cu, PGM
Cameco Corporation	Port Hope	(Con. Fac.)	Port Hope	U
Vale Canada Limited	Port Colborne	(Ref.)	Port Colborne	Electrolytic Co, PGM, Co oxide
Tonolli Canada Ltd.	Mississauga	(Sec. Sm.)	Mississauga	Recycled Pb
Real Alloy Canada Ltd.	Mississauga	(Sec. Sm.)	Mississauga	Recycled Zn
Asahi Refining Canada Ltd.	Brampton	(Sm.), (Ref.)	Brampton	Au, Ag, Recycled Pb
Glencore Canada Corporation	Sudbury	(Sm.), (Pl.)	Sudbury	Ni, Cu, Co, Au, Ag, PGM
Vale Canada Limited	Copper Cliff Complex	(Sm.), (Ref.), (Pl.)	Sudbury	Ni, Au, Ag, Se, Te, PGM, S*
Cameco Corporation	Blind River	(Ref.)	Blind River	U
Manitoba				
Vale Canada Limited	Thompson	(Sm.), (Ref.)	Thompson	Ni, Cu, Co
HudBay Minerals Inc.	Flin Flon	(Ref.)	Flin Flon	Zn
Alberta				
Sherritt International Corporation/General Nickel Company S.A. (The Cobalt Refinery Company Inc.)	The Cobalt Refinery Company Inc.	(Ref.)	Fort Saskatchewan	Ni, Co, Cu sulphide, ammonium sulphate
British Columbia				
Teck Resources Limited	Trail	(Sm.), (Ref.), (Pl.)	Trail	Zn, Pb, Bi, Cd, In, Ge, Au, Ag, S*
Metalex Products Ltd.	Richmond	(Sec. Sm.)	Burnaby	Recycled Pb
Rio Tinto Alcan Inc.	Kitimat	(Sm.)	Kitimat	Al

Source: Natural Resources Canada.
Note: Included are operations that produced in 2017.
(Sm.) Smelter.
(Ref.) Refinery.
(Sec. Sm.) Secondary smelter.
(Pl.) Plant.
(Con. Fac) Conversion facility.
S Sulphuric acid.*

FIGURE 11

CANADIAN PRODUCTION OF SELECTED REFINED METALS, 2004-2018[P]

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Metals	2004	2005	2006	2007	2008	2009	2010	2011
Aluminum	2,592,160	2,894,204	3,051,128	3,082,625	3,120,148	3,030,269	2,963,210	2,987,964
Cadmium	1,880	1,727	2,090	1,388	1,409	1,299	1,357	1,240
Cobalt	4,673	4,618	4,555	4,883	4,899	4,358	4,145	5,317
Copper	526,955	515,223	500,463	453,453	442,050	335,896	319,618	273,761
Lead	241,169	230,237	250,464	236,688	259,094	258,854	273,017	282,589
Nickel	151,518	139,683	146,899	153,647	167,732	116,909	105,413	142,445
Zinc	805,438	724,035	824,464	802,103	764,310	685,504	693,014	662,151

Metals	2012	2013	2014	2015	2016	2017	2018[P]
Aluminum	2,780,556	2,967,364	2,858,238	2,880,035	3,208,707	3,211,882	2,936,921
Cadmium	1,286	1,313	1,187	1,159	2,305	1,802	1,676
Cobalt	5,322	4,012	4,527	5,359	5,584	5,152	6,296
Copper	275,990	321,511	325,352	330,902	314,074	330,386	290,728
Lead	279,150	281,781	281,456	268,863	273,299	274,061	289,604
Nickel	146,850	152,728	149,486	149,717	158,381	154,759	135,921
Zinc	648,619	651,638	649,217	683,118	685,409	598,438	694,753

Sources: Natural Resources Canada; Statistics Canada.
[P] Preliminary.

FIGURE 12

CRUDE MINERALS AND PROCESSED MINERAL PRODUCTS TRANSPORTED BY CANADIAN RAILWAYS, 2005-2018

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(million tonnes)	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Total Freight Volume[1]	260.7	258.7	255.7	244.4	212.9	235.4	250.8	253.5	268.0	277.9	287.6	281.7	298.6	311.2
Total Crude Minerals	112.8	108.0	112.0	111.9	85.0	107.6	109.8	103.4	112.0	112.0	123.2	120.5	129.6	132.5
Total Processed Mineral Products	27.3	27.9	27.7	27.6	21.7	24.6	26.5	27.3	28.3	28.1	28.7	28.3	29.3	30.3
Total Crude and Processed Minerals	**140.1**	**135.9**	**139.8**	**139.4**	**106.7**	**132.3**	**136.4**	**130.7**	**140.3**	**140.1**	**151.9**	**148.8**	**158.9**	**162.8**
Crude Minerals and Processed Mineral Products as a Percentage of Total Freight Volume	53.7	52.5	54.7	57.1	50.1	56.2	54.4	51.5	52.4	50.4	52.8	52.8	53.2	52.3

Source: Statistics Canada.
Note: [1]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. Totals may not add due to rounding.



SECTION 3

THE MONEY: RESERVES, PRICES, FINANCING, EXPLORATION AND INVESTMENT

THE FINANCIAL HEALTH OF THE MINERAL EXPLORATION AND MINING SECTOR CAN BE MEASURED BY EXPLORATION AND DEPOSIT APPRAISAL AND BY CAPITAL SPENDING, BOTH OF WHICH ARE AFFECTED BY MINERAL AND METAL PRICES. CANADA'S ABILITY TO CAPTURE MINERAL INVESTMENT IS CONTINGENT ON MINERAL PROSPECTS AND THE POLICY ENVIRONMENT, OF WHICH TAX POLICY IS A KEY DETERMINANT.

CANADIAN RESERVES

The past 30 years have seen marked declines in proven and probable Canadian mineral reserves in all major base metals *(see Figure 13* and *Annex 6*). Since 1980, the most dramatic declines have been in lead (98.2%) and zinc (92%). Copper (46%) and nickel (67%) reserves have also fallen significantly, as have silver (84%).

Recent years have shown fluctuating growth for certain commodities. Since 2009, gold, silver and copper reserves have fluctuated, with gold at historic highs and copper at heights not seen since the early 1990s. For example, gold reserves have increased by 206% since 2009, with a year-over-year increase of 47%. Zinc, on the other hand, has ebbed downward, with current levels suggesting continued decline.

Consistent investment over time and access to large tracks of land to explore are needed to reverse the long-term decline in proven and probable reserves. To ensure the Canadian mining industry maintains its competitive advantage in this crucial area, the federal and provincial governments should continue to invest in geoscience and strengthen policies that stimulate exploration spending within Canada's borders.

MINERAL AND METAL PRICES

Mineral and metal prices are affected daily by global economic events. Prices for mined products are driven largely by the strength and performance of major economies. China, in particular, buys approximately 50% of the world's base metals, up from just 5% in the 1980s. Additionally, as a means of controlling exports of key commodities, China stockpiles iron ore, aluminum, copper, nickel, tin, zinc, oil and other commodities when prices are low, making it difficult for analysts to accurately forecast how supply and demand dynamics are likely to affect prices for minerals.

Figure 14 illustrates the strong growth, on an annual basis, in mineral prices from 2000 to 2007, the dramatic decline for most metals in late 2008, the robust rebound of prices through 2011, and the subsequent downward pressure on many minerals and metals during the recent downturn. Post 2016, after three years of upward momentum across a number of minerals and metals, a number of prices for key materials are down year-to-date. From January 2019 to the time of writing, the price performance of metals and mining commodities has been mixed. Aluminum, copper, uranium and zinc are down modestly, while gold, silver, nickel and iron ore are all up, with gold skyrocketing over $220/oz, from $1,291/oz to $1513/oz in September (*see Figure 15*).

The general consensus is that demand for mineral and metal products should be favourable over the medium to long term, despite volatility. Rising incomes and increased prosperity in developing countries due to industrialization and urbanization will continue to drive global demand. Further, the transition to a lower carbon future will result in significant demand for certain minerals and metals,

including copper, nickel, lithium and cobalt, among others. With the gradual emergence of India and its demand for minerals and metals – which some speculate will overtake China by 2050 – the mining industry should enjoy favourable commodity prices despite anticipated periods of market volatility.

FINANCING

Canada is the leading global centre for mining finance. The Toronto Stock Exchange (TSX) and TSX Venture Exchange (TSX-V) list 50% of the world's publicly traded mining companies, which combined accounted for more mining equity capital raised (34% of the global total) than any other exchange in the last five years. In 2018, 1,189 of the firms listed on the TSX were mining companies – 30% of total overall listings. Together, they had a combined market value of $271.8 billion and raised $6.5 billion in equity. TSX-listed mining companies mainly deal in gold, copper, uranium, silver, diamonds, zinc, nickel, lithium, iron ore, zinc and molybdenum.

The TSX-V gives emerging companies efficient access to capital while offering investors a regulated market for venture investments. As of December 31st 2018, the 971 mining companies listed on the TSX-V had a combined quoted market value of $17.3 billion and raised $3.1 billion in equity capital for the year. While junior mining companies have faced challenges in raising capital in recent years, this indicates improvement in access to capital to finance exploration activities. The federal government's decision to renew the Mineral Exploration Tax Credit for a five-year period in November 2018 – the first time such an expansive renewal has ever occurred – will surely help bolster these numbers in the years ahead. For more information, please visit the TSX at *www.tsx.com/listings/listing-with-us/sector-and-product-profiles/mining*.

TSX-LISTED MINING COMPANIES - 2018

On the TSX: 1,189

- Senior TSX companies: 218
- TSX-V companies: 971

Global Financing

The global mining industry raised $16.1 billion in equity in 2018, down $8.1 billion year-over-year, or more than 33%. As *Figure 16* shows, this represents the biggest year-over-year drop in global mining equity raised since 2011-2012. Noteworthy is that the drop in equity raised in 2011-2012 coincided with the end of the supercycle – with prices peaking at historic highs – after which mineral and metal prices went into a 5-year downturn until January 2016.

In 2018, 49% of all global mining equity financings were done on the two exchanges, representing over 34% of the equity capital raised globally for the same year. Also noteworthy is that the TSX and TSX-V's share of global mining equity raised in 2018 ($6.4 billion) represented a $2.4 billion drop in absolute value compared to the previous year. For context, at a time when global mining equity raised dropped significantly, the corresponding decline in equity raised in Canada was comparably smaller. The same trend is observable in 2011-2012, suggesting the TSX and TSX-V are insulated to some degree from the more extreme volatility observable in global mining capital markets.

The large proportion of public financing conducted on the TSX reflects the exchange's appeal to both junior and senior companies. The TSX-V's unique ability to efficiently handle equity financing in the $1 million to $5 million range is one reason why Canadian companies lead the exploration business.

TSX-listed mining companies also have a strong global focus. As of January 2019, TSX and TSX-V companies were involved in 5,363 mineral projects worldwide (*see Figure 17*), with more than half of them in Canada. Most of the projects involve exploration, and very few will turn into operating mines. However, the locations do illustrate the prime areas of mining interest, and the broad international reach of the exchange.

EXPLORATION

The goal of exploration is to locate large, high-grade reserves with minimal disturbance to the ground and the environment. Technological advances, including GPS surveying, airborne technologies and down-hole seismic imaging, have enabled companies to locate new deposits previously beyond discovery using traditional methods. Like research and development, exploration requires healthy levels of investment over the long term in order to achieve success.

Exploration and subsequent mine development are required to maintain healthy reserve levels. If this does not happen, the value-added aspects of Canada's mining industry – such as smelting, refining and manufacturing – will diminish over time, and national and regional

economies that benefit from strength in sectors such as manufacturing will weaken.

Exploration and Deposit Appraisal in Canada

The financial health of the mineral exploration sector can be measured by spending on exploration and deposit appraisal. Gauging spending levels also assists in predicting the future of Canada's mineral production. Natural Resources Canada (NRCan), which provides the numbers below, defines the two kinds of spending 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 generically called "exploration spending."

2018 saw a year-over-year increase in exploration spending of 9.5% in 2018, with total expenditure rising from $2.1 billion in 2017 to $2.3 billion in 2018 (*see Figure 18*). Looking ahead, investment intentions suggest that this gain will be reversed with projected spending in 2019 returning to 2017 levels.

Financing for Junior Mining Sector

A major issue for junior mining companies is the persistent challenge of raising capital.

Indicative of this dampened financial investment climate is the reversal in exploration and deposit appraisal expenditures. For example, in 2007, junior companies accounted for the majority (67%) of expenditure on these activities, with majors accounting for the balance (*see Figure 19*). From 2007 until 2015, juniors accounted for less each year, and the majors' share grew to 69%. The three consecutive years from 2016 to 2018 are indicative of a return toward normalcy as junior companies' absolute share of exploration and deposit appraisal has strengthened. Spending intentions for 2019 indicated a continuation of this trend with junior companies accounting for 55% of spending.

Allocation of Investment by Minerals and Metals

Precious metals attracted the lion's share of Canadian exploration spending again in 2018, accounting for 61% overall (*see Figure 20*) – a 4% decrease over 2017.

Base metal exploration's share of total investment edged upward year-over-year to 16%. Over the last two years, the absolute value of dollars invested in base metal exploration increased by 73%, from $209 million to $363 million. This trend, while in its infancy, is welcome as these investments are essential to address the ongoing depletion of Canadian base metal reserves. Without sustained and effective exploration, Canadian base metal production will outstrip reserve additions, reducing the competitiveness of our smelters and refineries.

In absolute terms, it is noteworthy that exploration and deposit appraisal expenditures were up year-over-year for all targets save one: iron ore. The decrease in this target is very modest at $2 million year-over-year. One factor involved in this shift is the recent transition at Baffinland from advanced deposit appraisal to project permitting for its proposed Mary River mine expansion. Overall, it is positive to see upward movement in exploration spending broadly year-over-year.

International Exploration

Globally, Canada has been a top destination for mineral exploration investment for the past 37 years. Canada dropped to second place in 1992 for non-ferrous exploration budgets, surpassed by Australia. In 2004, Canada regained the top position where it has remained ever since, despite forfeiting market-share.

S&P Global Market Intelligence, in its 2019 edition of the State of Mineral Finance, assessed that global exploration expenditures from 2012-2017 declined over 65% from a peak of US $20.5 billion in 2012 to US $7 billion in 2016. The report confirmed a trend reversal in 2017 as expenditures increased approximately 15% compared to 2016 (to US $8.1 billion) and this trend continued in 2018, with global expenditures rising a further 18% to $9.6 billion. Canada and Australia continued to lead global activity in 2018, accounting for 15% and 13.8% of expenditures, respectively. Of note is Canada's long-term decline in the share of global exploration spending, from 20.5% in 2008. Year-over-year, Canada's share of global expenditure increased by 1.3%.

When exploration budgets factor in iron ore, S&P data indicate that Canada no longer attracts the single-largest share of total global mineral exploration budgets, conceding first place to Australia. Australia's attractiveness as a destination for investment has increased recently with its introduction of a flow-through share mechanism to bolster investment in early stage exploration.

Part of the challenge in Canada is regulatory uncertainty, as companies will not invest where they do not believe they can permit a mine. At the time of writing the *Impact Assessment Act* had just come into force, and it is too soon to assess the success of this legislation in bringing greater certainty to companies seeking to permit natural resources projects in Canada. Another challenge for junior companies in recent years has been raising capital to finance exploration activities. The government's decision to extend the Mineral Exploration Tax Credit for five years will help address this challenge and bring more predictability for explorers seeking to raise capital.

INVESTMENT

Capital Spending

Capital spending is a barometer of how confident managers and investors are about current production capacity and future demand. Capital spending enables improvements such as:

- New mine construction and increases to existing mine capacity
- Process and technology improvements
- Modernization and expansion of smelters and refineries
- New product lines
- Mill improvements
- Energy retrofits
- Environmental improvements

Government and business capital spending also open up new regions for development. The extension of the Highway 37 transmission line in northeastern British Columbia is a good example of a long-term strategic infrastructure investment. Notably, this capital cost of $400 million will enhance the economics of an estimated $15 billion in mineral projects, with one already built – the $450 million, 300-person Red Chris mine owned by Newcrest Mining – and others in development. Similarly, the extension of the Monts Otish Highway in northern Quebec will improve prospects for the development of gold, diamond and copper projects in the surrounding region.

The federal government recently announced several new projects that will provide much needed enhancements to mine related infrastructure, including $155 million for the T'licho Road and $90 million to extend a section of the McKenzie Valley Highway in the Northwest Territories (NWT), and $360 million for the Yukon Resource Gateway to expand several road networks in the Yukon. Most recently, funding was announced to advance a road that would connect Gray's Bay Nunavut to Yellowknife via the Slave Geological Province in the NWT. These projects will enhance the economics of several mining projects, such as Fortune Minerals' Nico project in the NWT, Newmont's Kaminak Gold project and Western Copper and Gold's Casino project in the Yukon. In addition, these investments in infrastructure will reduce exploration costs, improve land access, thus enhancing the accessibility of Canada's richest diamond resources in the NWT.

Mining Industry Capital Investment

In 2018, capital spending in the Canadian mining industry is projected to account for 5.1% of Canada's total at $12.9 billion, up 5% year-over-year. This modest increase breaks a five-year downward trend in capital investment in the Canadian mining sector, which peaked in 2012 at $19.5 billion, before falling 43% over consecutive years (*see Figure 21*). Looking forward, intentions for 2019 forecast a continuation of this trend, with investment slated to rise to $13.6 billion.

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

Spending on repairs, most of which falls into the machinery and equipment category, is not included in *Figure 21* as this data lags behind capital expenditure data by one year. Adding 2016 repair costs (about $4.1 billion) to 2018 capital ($12.9 billion) and exploration ($2.3 billion) spending produced roughly $19.5 billion in Canadian mineral development investment in 2018, an aggregate increase of 13% year-over-year.

Current and Future Investments

Despite volatility, healthier commodity prices in recent years have seen a return to normalcy in the global mining industry, which could lead mining companies to make new and significant investments to meet growing projected demand. The extent to which Canada's mining industry will rebound after recent years of lower growth remains uncertain. Recent indicators provide some line of sight into Canada's competitiveness as a destination for mineral investment:

- The most recent edition of NRCan's annual report, Natural Resources: *Major Projects Planned and Under Construction – 2018 to 2028*, while showing modest upward growth of 5% (or $8 billion) year-over-year, indicates the total value of projects planned and under construction from 2019 to 2029 has reduced by 50% since 2014, from $160 billion to $80 billion.
- Australia's mining supply sector surpassed Canada's in 2015, leading now by more than 700 firms
- Over the last 15 years, several Canadian senior mining companies have been acquired by multi-nationals.
- Canada's share of global production for critical minerals and metals has been eroding. For example, since 2016, Canada has dropped from 2nd to 6th in the global production of nickel, with production falling 38% from 256,000 tonnes to 160,000 tonnes.

Beyond the above quantitative metrics, qualitative indicators from MAC member companies suggest that Canada's competitiveness is declining compared to other jurisdictions. Mining companies are assessing other jurisdictions outside of our own as alternative destinations for developing projects.

Mining Industry Competitiveness and Federal Fiscal Policy

MAC maintains that federal and provincial regulations and policies have dampened Canada's competitiveness as a destination for mineral investment in recent years. Concurrent reviews of federal environmental legislation, the set of pan-Canadian climate change policies, long-standing transportation challenges, tax competitiveness concerns, all overlapping with various developments at the provincial level have contributed to an uncertain policy landscape in Canada.

MAC remained very engaged in many of these policy consultations, several of which have reformed how Canada's fiscal policy treats mining and mining-related activities. For example, MAC welcomed the measures included in the federal government's 2018 Fall Economic Statement as an important first step to boosting Canadian mining competitiveness. Key measures proposed that will enhance the investment competitiveness of Canada's mining and metal manufacturing sector, included:

- The Accelerated Investment Incentive, which will enable miners to write off three times the eligible cost of newly acquired assets in the year the investment is made.
- Extending the Mineral Exploration Tax Credit for a five-year term, bringing greater investment certainty for early stage mineral exploration.
- Allowing businesses to immediately write-off the full cost of clean energy equipment.

While positive, more work is needed to improve Canada's mining tax competitiveness, including enhancing the Accelerated Investment Incentive to enable immediate and whole depreciation of capital investments made in the mining and mineral manufacturing industries. Implementing this policy is important to balance investment competitiveness with the US where this tax treatment is offered for these types of investments. Further, expanding the definition of clean energy equipment to include heavy industrial battery electric equipment is critical. With the advent of mine electrification and zero-emissions mining, the Canadian mining industry is at a tipping point in the transition to a lower carbon economy. Encouraging these investments to help green the mining process, which will enable the responsible extraction of the raw materials needed to support the low-carbon economy must be a priority.

Mining is a significant engine of the Canadian economy and supports many other important sectors, including construction, manufacturing and transportation. While Canada remains one of the top mining countries, its leadership in this arena is being challenged, and is not guaranteed going forward. If Canada loses its competitiveness, this will translate into an increasing amount of exploration and mining investments flowing offshore, job losses, deteriorating trade balances and, overall, a weakening of our economic strength. Further, it will decrease the economic prospects for many Indigenous Canadians, and rural communities. ■

FIGURE 13
CANADIAN RESERVES OF SELECTED METALS, 1980 - 2017[P]

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Metal Contained in Proven and Probable Mineable Ore[1] in Operating Mines[2] and Deposits Committed to Production[3]

Year	Copper (000 t)	Nickel (000 t)	Lead (000 t)	Zinc (000 t)	Molybdenum (000 t)	Silver (t)	Gold (t)
1980	16,714	8,348	9,637	27,742	551	33,804	826
1985	14,201	7,041	8,503	24,553	331	29,442	1,373
1990	11,261	5,776	5,643	17,847	198	20,102	1,542
1995	9,250	5,832	3,660	14,712	129	19,073	1,540
2000	7,419	4,782	1,315	8,876	97	13,919	1,142
2003	6,037	4,303	749	6,251	78	9,245	1,009
2004	5,546	3,846	667	5,299	80	6,568	787
2005	6,589	3,960	552	5,063	95	6,684	958
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	534	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[P]	8,984	2,790	165	2,286	96	5,074	2,813

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

FIGURE 14
METAL PRICES, 2001-2018

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Prices	Aluminum US ¢/lb	Copper US ¢/lb	Gold US $/tr. oz	Iron Ore[1] US $/DMT	Nickel US $/lb	Silver US ¢/tr. oz	Uranium US $/lb	Zinc US ¢/lb
2018	105.72	326.04	1,268.09	71.20	6.56	1,570.19	24.59	146.13
2017	89.25	279.86	1,257.56	71.76	4.72	1,706.58	21.66	131.13
2016	72.12	214.20	1,326.03	56.67	4.62	1,928.50	23.00	103.79
2015	75.41	249.52	1,160.11	55.21	5.36	1,571.67	36.46	81.50
2014	84.62	311.13	1,266.12	96.84	7.65	1,907.15	33.21	98.05
2013	83.70	332.29	1,411.06	135.36	6.81	2,385.81	38.17	86.64
2012	91.59	360.58	1,668.81	128.53	7.89	3,121.17	48.40	88.35
2011	108.77	400.10	1,568.58	167.79	10.38	3,526.42	56.37	99.47
2010	98.55	341.74	1,224.66	146.72	9.89	2,019.67	46.84	97.99
2009	75.50	233.67	972.98	79.99	6.64	1,469.43	46.06	75.06
2008	116.68	315.47	871.67	61.57	9.57	1,499.90	61.71	85.01
2007	119.65	322.83	696.66	36.63	16.88	1,341.47	99.33	147.03
2006	116.55	304.85	604.34	33.45	11.00	1,156.96	49.61	145.15
2005	86.10	166.84	444.88	28.11	6.69	733.96	28.67	62.66
2004	77.82	129.96	409.21	16.39	6.27	669.05	18.60	47.51
2003	64.92	80.68	363.51	13.82	4.37	491.07	11.55	37.75
2002	61.23	70.72	309.97	12.68	3.07	462.52	9.88	35.31
2001	66.46	72.74	269.98	12.99	2.77	441.43	8.82	41.27

Source: Market Insider
[1]April 2010 marked the end of the 40-year global benchmarking system for sale of iron ore under contract prices. Thus, new historical data based on U.S. $/dmt will have to be utilized.

FIGURE 15
MONTHLY METAL PRICES 2018

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($ current)	Aluminum US ¢/lb	Gold US$/tr. oz	Silver US$/tr. oz	Copper US$/lb	Nickel US$/lb	Zinc US$/lb	Iron Ore US$/DMT	Uranium US$/lb
Jan-18	111.78	$1,331.24	$17.23	$3.54	$6.78	$1.80	$73.10	$21.88
Feb-18	109.47	$1,333.01	$16.44	$3.45	$6.87	$1.74	$78.90	$21.38
Mar-18	105.07	$1,326.58	$16.28	$3.34	$6.63	$1.64	$63.10	$21.05
Apr-18	115.13	$1,334.79	$16.38	$3.39	$6.80	$1.56	$65.35	$21.00
May-18	115.56	$1,306.22	$16.55	$3.42	$7.58	$1.55	$64.30	$22.73
Jun-18	112.61	$1,284.53	$16.03	$3.31	$7.41	$1.45	$64.45	$22.65
Jul-18	104.33	$1,239.42	$15.43	$3.14	$6.97	$1.34	$67.55	$25.78
Aug-18	104.31	$1,202.30	$14.66	$2.98	$6.35	$1.23	$66.15	$26.30
Sep-18	103.63	$1,197.05	$14.31	$3.13	$6.25	$1.33	$69.50	$27.50
Oct-18	102.99	$1,214.79	$14.34	$3.02	$5.71	$1.28	$75.55	$27.95
Nov-18	98.06	$1,221.53	$14.24	$3.11	$5.57	$1.33	$65.45	$29.10
Dec-18	97.03	$1,250.03	$15.47	$2.97	$5.30	$1.26	$72.70	$27.75
Jan-19	84.28	$1,291.51	$15.58	$2.70	$5.22	$1.17	$76.03	$28.90
Feb-19	84.68	$1,320.34	$15.81	$2.86	$5.77	$1.23	$87.33	$28.00
Mar-19	85.06	$1,300.37	$15.32	$2.93	$5.92	$1.30	$85.70	$25.33
Apr-19	83.92	$1,285.97	$15.03	$2.93	$5.80	$1.33	$93.24	$25.20
May-19	80.92	$1,284.13	$14.62	$2.74	$5.47	$1.25	$98.76	$24.05
Jun-19	79.82	$1,360.59	$15.00	$2.67	$5.43	$1.18	$109.18	$24.60
Jul-19	81.68	$1,414.29	$15.75	$2.70	$6.16	$1.11	$120.02	$25.38
Aug-19	79.13	$1,502.84	$17.13	$2.59	$7.16	$1.03	$90.91	$25.30
Sep-19	80.10	$1,513.65	$18.17	$2.62	$8.07	$1.06	$93.38	$25.68
% Change -to-date	**-28.33%**	**13.70%**	**5.46%**	**-25.92%**	**19.06%**	**-41.05%**	**27.74%**	**17.37%**

Source: Market Insider.

FIGURE 16
MINING EQUITY RAISED—ROLE OF TORONTO STOCK EXCHANGE, 2000-2018

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Equity Raised	2000	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
					(US$ billions)								
Worldwide	3.1	50.3	46.6	65.9	29.6	31.7	14.8	15	14.40	19.8	22.7	24.2	16.1
TSX exchanges	1.1	17.6	8.3	22.2	17.8	12.5	10.3	6.9	8.9	6.8	9.4	8.5	6.4
Percent of worldwide total reported by TSX and TSXV	36	35	18	34	60	39	70	46	62	34	41	35	34

Source: Gamah International, compiled by Toronto Stock Exchange.
Note: All values as at December 31, 2018.

FIGURE 17
GEOGRAPHIC REACH OF TSX-LISTED COMPANIES, JANUARY 2019

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Location of Mineral Projects	Number	Percent
Canada	2,950	55%
Latin America	1,019	19%
United States	590	11%
Africa	375	7%
United Kingdom and Europe	215	4%
Asia	107	2%
Australia/PNG/NZ	107	2%
Total	**5,363**	**100%**

Source: Infomine, TSX/TSXV Market Intelligence Group, compiled by the Toronto Stock Exchange.

FIGURE 18

MINERAL EXPLORATION AND DEPOSIT APPRAISAL EXPENDITURES, BY PROVINCE AND TERRITORY, 2007-2019[I]

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Province/Territory	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018[P]	2019[I]	% Change from 2018 to 2019
Newfoundland and Labrador	148.0	146.7	54.9	105.2	156.8	199.9	117.2	80.7	47.4	25.4	41.5	45.4	39.5	-14.3%
Nova Scotia	23.5	21.4	9.0	16.7	13.7	14.6	12.3	7.0	10.1	5.3	18.2	36.5	26.7	-53.9%
New Brunswick	35.8	32.7	8.1	17.1	27.1	28.0	27.6	29.0	8.6	14.2	15.8	20.1	15.6	-28.3%
Quebec	476.4	526.1	379.3	511.6	833.9	620.7	381.8	317.4	259.5	297.4	573.9	498.1	554.7	9.9%
Ontario	571.7	799.3	536.2	853.4	1,067.7	961.5	562.0	468.1	440.2	394.3	539.7	583.0	517.2	-12.2%
Manitoba	102.6	152.1	97.8	83.5	140.0	105.6	61.4	28.0	46.9	47.3	41.1	45.5	46.0	1.2%
Saskatchewan	314.0	430.7	311.0	299.4	334.6	411.1	221.7	245.2	257.0	228.7	191.2	247.1	273.4	13.7%
Alberta	11.8	20.8	8.3	15.2	47.3	35.2	38.9	26.1	18.5	16.7	24.6	28.8	28.8	-0.1%
British Columbia	470.6	435.4	217.1	374.4	645.1	734.1	493.0	448.9	346.3	231.5	302.6	369.6	318.1	-17.0%
Yukon	144.7	134.0	90.9	156.9	331.7	233.2	100.6	107.1	92.2	90.4	168.7	186.1	129.2	-33.7%
Northwest Territories	193.7	147.7	44.1	81.7	93.8	108.7	77.9	101.7	100.9	73.0	91.2	109.0	67.2	-45.8%
Nunavut	338.0	432.6	187.6	256.7	535.7	422.5	257.6	158.0	215.0	204.5	177.0	149.6	144.3	-3.0%
Total	**2,830.8**	**3,279.5**	**1,944.4**	**2,771.9**	**4,227.4**	**3,875.1**	**2,352.0**	**2,017.4**	**1,842.4**	**1,628.8**	**2,185.5**	**2,318.9**	**2,160.7**	**-7.24%**

Source: Natural Resources Canada, based on the Federal-Provincial-Territorial Survey of Mineral Exploration, Deposit Appraisal and Mine Complex Development Expenditures.
[P] Preliminary; [I] Intentions.
Note: Includes on-mine-site and off-mine-site activities. Includes field work, overhead costs, engineering, economic and pre- or production feasibility studies, environment, and land access costs. Totals may not add due to rounding.

FIGURE 19

MINERAL EXPLORATION AND DEPOSIT APPRAISAL EXPENDITURES, BY COMPANY TYPE, 2007-2019[I]

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Type of Company	2007	%	2008	%	2009	%	2010	%	2011	%	2012	%	2013	%
Junior	1,904.4	67.3	2,117.8	64.6	1,110.7	57.1	1,547.0	55.8	2,049.1	48.5	1,847.0	47.7	963.6	41.0
Senior	926.5	32.7	1,161.7	35.4	833.7	42.9	1,224.9	44.2	2,178.3	51.5	2,028.1	52.3	1,388.4	59.0
Total	**2,830.8**		**3,279.5**		**1,944.4**		**2,771.9**		**4,227.4**		**3,875.1**		**2,352.0**	

Type of Company	2014	%	2015	%	2016	%	2017	%	2018[P]	%	2019[I]	%
Junior	814.3	40.4	577.7	31.4	633.9	38.9	1,109.3	50.8	1,320.8	57.0	1,199.7	55.5
Senior	1,203.2	59.6	1,264.7	68.6	994.9	61.1	1,076.2	49.2	998.1	43.0	961.0	44.5
Total	**2,017.4**		**1,842.4**		**1,628.8**		**2,185.5**		**2,318.9**		**2,160.7**	

Source: Natural Resources Canada, based on the Federal-Provincial/Territorial Survey of Mineral Exploration, Deposit Appraisal and Mine Complex Development Expenditures.
[P] Preliminary; [I] Intentions.
Notes: Includes on-mine-site and off-mine-site activities. Includes field work, overhead costs, engineering, economic and pre- or production feasibility studies, environment, and land access costs. Totals may not add due to rounding.

FIGURE 20

MINERAL EXPLORATION AND DEPOSIT APPRAISAL EXPENDITURES, BY TARGET, 2009 and 2018[P]

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	2009		2018[P]	
	$ millions	% of Total	$ millions	% of Total
Precious metals	989.3	50.9	1,423.2	61.4
Base metals	296.6	15.3	363.3	15.7
Uranium	205.1	10.5	164.6	7.1
Coal	57.1	2.9	69.5	3.0
Nonmetals (excluding diamonds)	165.9	8.5	63.8	2.8
Other metals	99.1	5.1	102.9	4.4
Diamonds	70.0	3.6	106.8	4.6
Iron ore	61.4	3.2	24.7	1.1
Total	**1,944.4**	**100.0**	**2,318.8**	**100.0**

Source: Natural Resources Canada, based on the Federal-Provincial/Territorial Survey of Mineral Exploration, Deposit Appraisal and Mine Complex Development Expenditures.
[P] Preliminary.
Notes: Includes on-mine site and off-mine site activities. Includes field work, overhead costs, engineering, economic and pre- or production feasibility studies, environment, and land access costs. Totals may not add due to rounding.

FIGURE 21

CAPITAL EXPENDITURES IN THE CANADIAN MINING INDUSTRY, 2009-2019[I]

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Equity Raised	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018[P]	2019[I]
						($ millions)					
Stage 1 - Total Mineral Extraction	6,194	9,054	12,163	16,916	15,086	11,115	10,188	9,637	8,986	9,481	9,946
Metal ore mineral extraction	3,537	5,504	8,108	11,020	9,174	5,298	4,881	5,137	5,413	6,629	6,466
Non-metallic mineral extraction	2,297	2,853	3,083	4,812	5,243	5,433	5,078	4,294	3,201	2,169	2,867
Coal mining	361	697	972	1,085	668	384	230	206	373	683	614
Stage 2 - Primary Metal Manufacturing	948	1,823	2,936	3,864	3,458	3,332	3,219	2,329	1,520	2,034	2,145
Stage 3 - Non-Metallic Mineral Product Manufacturing	581	765	672	572	459	976	1,136	1,196	899	547	614
Stage 4 - Fabricated Metal Product Manufacturing	750	608	729	536	574	640	735	746	925	846	881
Total Mining and Mineral Processing	**8,473**	**12,250**	**16,500**	**21,888**	**19,577**	**16,062**	**15,279**	**13,908**	**12,330**	**12,907**	**13,587**
Non-conventional oil extraction (oil sands)	10,249	17,113	22,163	26,246	29,029	35,711	23,420	16,596	14,278	10,647	10,785

Source: Statistics Canada , CANSIM Table 029-0046.

[P] Preliminary; [I] Intentions.

Notes: Includes capital construction and machinery and equipment. As of 2014, capital expenditures on non-residential construction and on machinery and equipment exclude expenditures related to intellectual property, including mineral exploration activities. Historical values have been revised to reflect these methodological changes. Totals may not add due to rounding.



SECTION 4

THE PEOPLE: EMPLOYMENT, COSTS AND INNOVATION

THE CANADIAN MINING INDUSTRY ACCOUNTS FOR ONE IN EVERY 30 JOBS ACROSS CANADA AND, PROPORTIONALLY, IS THE LARGEST INDUSTRIAL EMPLOYER OF INDIGENOUS CANADIANS.

MINING INDUSTRY EMPLOYMENT

According to Statistics Canada data, the mining industry directly employed 409,000 people in 2018, accounting for roughly one in every 46 Canadian jobs (*see Figure 22*). When indirect jobs are included, the industry's employment reach increases significantly. According to Natural Resources Canada estimates, the mining industry indirectly employed an additional 217,000 individuals in 2018. Together, the industry's direct and indirect employment exceeds 626,000 jobs, accounting for one in every 30 jobs in Canada.

Overall Employment Numbers

In 2018, 190,000 (46%) of those directly employed in mining worked in Stage 1, mineral extraction (*see Figure 22*). This included approximately 36,000 workers in metal mining, 27,000 workers in non-metal mining and 7,000 workers in coal mining (*see Figure 22*), with services accounting for the balance.

In the oil sands extraction sector, recent data show that Suncor, Syncrude and Canadian Natural directly employ approximately 12,600, 4,600, and 15,700 people respectively, in mining and oil and gas activities. These figures do not include indirect employees, which number in the thousands.

Employment statistics for the mining and oil sands sectors are dynamic because of the cyclical reality of commodity markets and fluctuating prices, globalization and other trends. Recent mergers and acquisitions have changed the landscape of Canadian mining. Some companies have been acquired or no longer report separate employment figures. Other companies report global figures without disaggregating for the Canadian component of their operations. Canada's Mining Industry Human Resources Council (MiHR) is focused on researching these changing trends and forecasts labour market demand to help the industry meet its human resources needs and objectives.

ACCORDING TO NATURAL RESOURCES CANADA, THE MINING INDUSTRY INDIRECTLY EMPLOYED AN ADDITIONAL 217,000 INDIVIDUALS IN 2018, BRINGING TOTAL EMPLOYMENT TO 626,000 JOBS.

Need for Workers and Skills

The mining industry, both in Canada and abroad, faces a number of human resources challenges. MiHR's 2020 edition of the *Canadian Mining Labour Market Outlook*, estimates that the Canadian mining industry will need to hire 79,680 new workers over the next decade to 2030. These new hires are required to replace retirees and fill new positions to meet baseline production targets (*see Figure 23*). In its report, MiHR also forecasts contractionary and expansionary hiring scenarios. Notably, even in a contractionary scenario, the hiring forecast predicts that new hires will be necessary to meet labour demand.

This workforce shortage is compounded by the wave of the industry's skilled core of workers who are retiring. By 2030, MiHR forecasts that more than 57,000 employees will retire from the sector, which represents over 25% of the industry's current workforce by MiHR definitions.



A welding trainee at the vocational training school founded by B2Gold in the host municipality of its Masbate Gold Project.

This will result in a significant loss of industry knowledge and experience. Also concerning is MiHR's forecast of further contraction in employment in the Primary Metal Manufacturing sector, projecting 4,400 additional job losses in the business as usual baseline projection compared with last year's forecast.

These shifts lead to an entirely new set of challenges, with relatively inexperienced workers replacing those far more seasoned, particularly in the high turnover trades and production occupations. Further, with smelters and refineries often located in rural communities, the loss of these employment opportunities are likely to present local economic challenges in these communities. This places an 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. Companies need to ensure that new employees have opportunities to learn from those with significant experience both during training programs and on the job. Beyond skilled talent, a broader set of policy considerations should be undertaken with the aim of ensuring Canada's downstream metal manufacturing sector remains competitive over the next decade.

The mining industry comprises 70 core mining occupations and needs new workers for all of them. Among those required are geoscientists, metallurgists, mining engineers and geologists, as well as workers skilled in computer technology, information management, mechanical repair, and heavy equipment operation in addition to other areas. Because today's mining industry relies on advanced technologies, much of the demand is for highly skilled workers.

It is also important to note that competition for skilled workers is fierce both within Canada and globally. In fact, companies in other countries are actively recruiting Canadian graduates and workers, making retention challenging and recruitment highly competitive.

Various actions have been proposed to address the mining skills shortage in Canada:

- Promote the industry to women, youth, Indigenous people and non-traditional worker groups.
- Develop programs that bring back retired workers, retain older workers and increase mentoring.
- Improve educational programs and employer-provided training.
- Introduce standards for key occupations to facilitate domestic worker mobility and skills recognition.

The federal government has taken some steps to help address these problems, including through the expansion

of the Youth Employment Strategy, the proposed Post-Secondary Industry Partnership and Co-operative Placement Initiative, and continued funding for the Indigenous Skills and Employment Training Strategy (ISETS). MAC supports an expansion of this program, which has proved to be a valuable source of funding for Indigenous skills training initiatives.

MiHR has also benefited from programmatic support, specifically in developing critical research to inform industry actions to address its human resources challenges and meet its employment needs. Ensuring MiHR can continue to produce crucial research and deliver strategic programs is essential for supporting the industry's workforce needs and meeting its commitments to diversity.

Women in Mining

Women continue to be underrepresented in the mining labour force. According to MiHR's 2020 *Canadian Mining Labour Market Outlook*, women accounted for only 15% of mining's labour force in 2018 – down 2% from 2011. This remains significantly lower in relation to the Canadian labour force as a whole, where according to 2016 census data, women represent 48% of the national workforce.

While it is clear that the industry has more work to do to attract and retain female workers, longer term trends indicate some progress has been made in certain mining occupations. For example, over the past two decades, the share of women in mining and quarrying increased from 6% in 1987 to 15% in 2018 – a significant improvement. Moreover, women are better represented in mining and quarrying than in other industries, such as construction, which draw from similar labour pools (e.g., trades occupations and production occupations).

For the selected occupations, women's representation has increased across all industries in recent years, from 27% in 2011 to 31% in 2016 (*see Figure 24*). However, the mining industry has yet to realize these gains since the share in these occupations has remained constant, at 12% in both 2011 and 2016. This trend points to potential opportunities for the mining industry to increase its representation among the selected occupations. Overall, the most significant finding from MiHR's research remains consistent — the industry continues to struggle with underrepresentation of women.

Recognizing this fact, concerted efforts by both industry and government are underway to attract and retain women in the mining industry. Developed on the foundation of a previous research initiative – Strengthening Mining's Talent Alloy: Exploring Gender Inclusion – MiHR's Gender Equity in Mining Works (GEM Works) program offers comprehensive training to help establish Change Agents within an organization and ultimately eliminate unintentional barriers to gender inclusion found in dated policies, procedures and practices. Validated through industry leading labour market research and funded through Employment and Social Development Canada's Sectoral Initiatives Program and the Department of Status of Women, the driving intent of GEM Works is to provide mining companies with tangible tools and training to increase the participation of women in the sector.

Following a successful launch of the pilot program, the number of active sites who have adopted and/or continue to use GEM Works training has increased. To learn more about this important work, visit *MiHR's website*.

THE PROPORTION OF ABORIGINAL WORKERS IN THE MINING INDUSTRY IS WELL ABOVE THAT OF INDIGENOUS WORKERS IN THE CANADIAN WORKFORCE

The Prospectors and Developers Association of Canada (PDAC) also recently published a resource, *Gender Diversity and Inclusion: A Guide for Explorers*, which is designed as a guide for mining companies that are new to understanding issues and implementing efforts related to gender, diversity and inclusion. The purpose of the document is to provide the information and tools needed for exploration and mining companies to both implement gender diversity and inclusion strategies and programs and cultivate more gender inclusive and diverse environments both internally and externally within the communities in which they engage. MAC was pleased to play a role in the production of this important resource and remains an active member of PDAC's Diversity and Inclusion Working Group.

Employment of Indigenous People

Proportionally, the mining industry is the largest private sector employer of Indigenous Canadians. According to MiHR research, Indigenous people represented more than 7% of the mining workforce in Canada in 2016, up from roughly 5% in 2011.

Most of the Indigenous people in the mining industry are either Métis or First Nations, though Inuk employment in the sector has been growing as mining opportunities in

Inuit regions have increased in recent years. Indigenous people are better represented in the mining industry (7.4%) than in all other industries (3.9%). Interestingly, the share of the mining workforce that is Métis nearly doubles the share found in all industries (*see Figure 25*).

Indigenous people in Canada comprise three main groups: First Nations, Métis and Inuit. In 2016, they accounted for 5% of the total population, up from about 4% in 2006, and 3% in 1996. Since 2006, the Indigenous population in Canada has grown by 43% – more than four times the rate of the non-Indigenous population – and is expected to reach more than 2.5 million over the next two decades.

A critical challenge is to ensure that this new cohort of Indigenous Canadians has the opportunity to participate meaningfully in the Canadian workforce and is provided with training and educational opportunities to advance and thrive. Approximately one in four Indigenous people of working age are not participating in the labour force. Since attaining an appropriate level of education is an important factor to entering the labour force, training to develop the requisite skills for meaningful participation is critical for accessing well-paying mining jobs.

Fortunately, 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. In 2006, 30% had no certificate, diploma or degree; by 2016, that rate fell to 22%. 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. Some 180 producing mines and more than 2,500 exploration properties are located within 200 km of Indigenous communities. Also, many mines and projects are located on traditional lands. Indigenous people across the country are, therefore, ideally situated to access employment opportunities (and other benefits) in the mining industry. To learn more about how mining demonstrates opportunities for inclusive growth, *see Section 5*.

New Canadians and Visible Minorities Workers

Census data from 2016 demonstrate that immigrants and visible minorities in Canada each make up one-fifth of the country's total population. Of the visible minority population, 30% were born in Canada. Statistics Canada projects that the immigrant share of Canada's population could reach between 25% and 30% by 2036; Canada's visible minority population is expected to be even higher, between 31% and 38%.

According to MiHR research, in 2016, the representation of immigrants (13%) and visible minorities (9%) in the mining workforce were both lower relative to all industries (23% and 21% respectively). Concurrently, the share of the mining workforce that are immigrants has been modestly increasing, from 12% in 2006 to 13% in 2016 (*see Figure 26*). Similarly, the share of visible minorities in mining is smaller relative to immigrants, but this gap is closing; the share of visible minorities in the mining workforce grew from 7% in 2006 to 9% in 2016.

Given Canada's aging population, the need for new immigrants is increasing. Thus, appealing to this demographic is important to the medium and longer-term sustainability of the mining sector workforce.

WORKPLACE SAFETY AND HEALTH

In mining, safety comes first. As a core industry value and practice, Canadian mining companies invest significant time and effort in developing and maintaining a positive safety culture in all aspects of their operations, diligently working with their employees, contractors and communities to reach the goal of "zero harm."

All mine sites have on-site professionals dedicated to safety and health in the workplace. Larger mines have numerous specialized safety trainers on site; smaller mines often contract out safety training to specialist companies.

Labour unions and industry associations have played a key role in improving worker safety and health by encouraging the sharing of best practices, developing industry standards and providing third-party verification of safety programs. MAC members, through the *Towards Sustainable Mining® (TSM®)* initiative, for example, make commitments in safety and health, crisis management and communications planning protocols to ensure that key mining risks are managed responsibly at our members' facilities (*see Section 5* of this report for more on *TSM*.)

The John T. Ryan Trophies

Mining Safety Appliances (MSA) Canada began sponsoring a mine safety trophy in 1941. Named the John T. Ryan Trophies in honour of the company's co-founder, the



A truck carries ore towards the crusher at Raglan Mine, a nickel mine in Nunavik (Québec).

trophies have since become the most prestigious safety awards in the Canadian mining industry. They are still sponsored by MSA Canada and are presented nationally and regionally in three mining categories: metal mines, coal mines and select mines. The trophies are awarded annually by the Canadian Institute of Mining Metallurgy and Petroleum to the Canadian metalliferous mine, coal mine and select mines that had the lowest accident frequency per 200,000 hours worked during the previous year.

Mining safety statistics can be an invaluable tool for tracking the effectiveness of safety programs and driving improvements, whether for a safety manager working on site or for industry discussions on safety regulations. Ensuring that safety statistics are useful requires that not only are existing figures and analyses made easily accessible, but that the people and organizations compiling statistics understand the information needs of safety professionals.

In 2019, the following MAC members were recipients of John T. Ryan Trophies, in the following categories:

- Agnico Eagle's Lapa Mine – Canada Trophy for Metal Mines
- Vale's Voisey's Bay Mine – Canada Trophy for Select Mines
- New Gold's New Afton Mine – Regional Metal BC / Yukon
- Cameco's Cigar Lake Mine – Regional Metal Prairies and Territories
- Glencore's Raglan Mine – Regional Metal Trophy Quebec/ Maritimes
- Newmont's Red Lake Mines – Regional Metal Trophy Ontario
- DeBeers' Victor Mine – Regional Select East

KEY COSTS

Mining companies have limited control over the revenue side of their statement of return because mineral prices are generally set through international trading and exchanges. To remain competitive, companies rigorously work to control their costs.

Wages

The Canadian mining industry boasts the highest wages and salaries of all industrial sectors in Canada (*see Annexes 7 and 8* for details). The average annual pay for a mining worker in 2018 exceeded $123,000, which surpassed the average annual earnings of workers in forestry, manufacturing, finance and construction by a range of $37,000 to $51,000.

This wage gap has remained relatively consistent in recent years. In remote regions or in situations where workers rotate, higher wages help to attract and retain them.

Overall Production Costs

Mining operations incur significant production costs. The industry's three main production costs – wages, energy (fuel and electricity), and materials and supplies – totalled $4.9 billion, $2.8 billion and $8 billion, respectively, in 2016, the most recent year for which data are available (*see Figure 27*). Together, these figures constitute a 4% increase in the cost of mining in Canada year-over-year for operational expenditures.

Remote and Northern Regions

Lack of infrastructure, sparse or no population, and often extreme seasonal temperatures make remote and northern regions in Canada high-cost jurisdictions in which to build and operate a mine. Frequently, companies that seek to develop mining projects in remote and northern regions must build the infrastructure they require for operation. Historically, this infrastructure has included the following: power generation and transmission; transportation infrastructure such as ports, road and railways; and airstrips and on-site accommodation for fly-in/fly-out employees.

These additional costs constitute a northern premium that companies and industries operating in centrally located jurisdictions generally do not incur. The mining cost differential can be significant between jurisdictions that lack infrastructure and those that have better access to a mode of transport for mining resupply and bringing product to market, a community where workers can live, and access to the power grid. A company's requirement to build infrastructure in Canada's North that would already be built and accessible in the south accounts for a large portion of the increased costs.

To better understand these costs, MAC and industry partners undertook a study that compared the costs of operating in a remote and northern region relative to the costs of operating a comparable mine in a centrally located jurisdiction. The study determined that for base and precious metals, the premium associated with developing a remote and northern mine ranges from 2 to 2.5 times the cost of a comparable mine in a southern region. Furthermore, the report determined that 70% of this cost increase is related directly to infrastructure investment.

The future of mining lies increasingly in remote and northern Canada. At the same time, mining development is at a critical intersection of stated federal government economic, Indigenous reconciliation and climate change goals in these regions. For this reason, MAC was encouraged by recent federal infrastructure investment decisions that recognize northern challenges and opportunities, such as the 2017 Trade and Transportation Corridors Initiative (TTCI), which dedicated $400 million for trade-enabling infrastructure in the territories. MAC was pleased to see this program renewed in the 2019 federal budget and sees promise in the Canada Infrastructure Bank to help advance larger-scale nation building projects. MAC also supports the Investing in Canada Plan, which allocated funding on a per-capita "plus" model to help offset the reduced abilities of the territorial governments to address their infrastructure challenges. These are creative and much-needed investments in Canada's North. Beyond these programmatic developments, positive funding decisions have been made in support of:

- The Yukon Resource Gateway ($360 million)
- The T'licho Road in the NWT ($155 million)
- A section of the McKenzie Valley Highway in the Northwest Territories ($90 million)
- Planning for the road that will connect the Slave Geological Province in the NWT to the Kitikmeot Inuit region of Nunavut ($27 million)

These projects will increase project viability and community connectivity, reduce costs and remoteness and, ultimately, will support economic activity that lessen territorial reliance on Ottawa over the long term.

INNOVATION AND RESEARCH AND DEVELOPMENT

Innovation is a broad theme, and relevant statistics are not always current or easy to compare. The information presented below indicates that Canadian mining embraces innovation, but that Canada faces a challenge in facilitating a robust environment in which to foster innovation and enhance research and development (R&D).

While the industry invests millions each year in R&D, Canada underperforms compared to its peers. At risk is Canada's ability to attract new investment as other jurisdictions offer more attractive innovation environments.

Canada's Approach to Innovation

MAC and its members are committed to ongoing improvement and are continually innovating to protect

the environment and reduce their energy use and GHG emissions. Over the past two decades, mining companies have focused on improving energy efficiency and reduced emissions at their operations through measures such as MAC's mandatory *TSM* initiative and through innovations at the mine-site level.

To remain sustainable, progressive and profitable, the industry must innovate and collectively challenge existing ways of thinking. Through innovation investment from industry and governments, the Canadian mining industry can address these critical business challenges and continuously improve the sector's environmental and health and safety performance.

This will help ensure that Canada's mining sector can maintain and grow its immense socio-economic contributions to communities across the country, while meeting Canadians' evolving expectations about the industry.

Canada's current innovation system comprises in excess of 7,000 funding programs, the vast majority of which support university research and not innovation. As a nation, Canada has made significant progress in fundamental research yet continues to lag far behind other OECD countries when it comes to innovation, business investments in innovation and business productivity.

While many sectors of Canada's economy have benefitted from significant innovation investments by governments, including through the innovation superclusters program, the minerals industry is notable by the lack of any substantial, strategic and long-term government investment in innovation. While companies invest significantly in their own projects, the existing funding apparatus does not complement many industry priorities, and, therefore, opportunities to leverage greater value for innovation investments are lost. ■

NEWMONT'S BORDEN PROJECT

Canada's mining industry is committed to innovation and environmental sustainability, and these two priorities are being realized at Newmont's Borden mine, the country's first all-electric underground mine.

Newmont's 100 percent owned Borden mine is located near Chapleau, Ontario and features state-of-the-art health and safety controls, digital mining technologies and processes, and low-carbon energy vehicles – all anchored in a mutually beneficial partnership with local communities. Borden achieved commercial production in October 2019.

At the inauguration of Borden in September 2019, Tom Palmer, Newmont's President said, "Borden opens a new gold mining district in Ontario and profitably extends operations at the Porcupine complex near Timmins. In addition, Borden's electric underground fleet will eliminate diesel particulate matter from the underground environment and lower greenhouse gas emissions. This will help reduce energy costs, protect employee health and minimize impacts to the environment."

Ore from Borden is processed at the existing mill at Newmont's Porcupine operation in Timmins, 180 kilometres to the east. Borden is fully permitted for operation, and Partnership Agreements have been signed with local First Nations. At 1,000 square kilometres, Borden's land package represents additional exploration upside as the Borden deposit remains open at depth.

In recognition of Borden's contribution to the future of safe and sustainable mining, the Canadian and Ontario governments each granted CAD $5 million towards electrification of the mine.

FIGURE 22

MINERALS SECTOR EMPLOYMENT, BY SUBSECTOR AND PRODUCT GROUP, 2018[P]

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Subsector/Commodity group	(000 jobs)
Direct	**409**
Primary	**190**
Extraction	**70**
Coal	7
Metallic minerals	36
Non-metallic minerals	27
Services	**28**
Primary manufacturing	**91**
Primary metallic mineral products	43
Primary non-metallic mineral products	48
Downstream	**220**
Secondary metal products	27
Tertiary metal products	129
Miscellaneous metal products	40
Services and custom work	23
Indirect	**217**
Total minerals sector	**626**

[P] Preliminary
Source: Statistics Canada.
Table 38-10-0285-01 Natural resources satellite account, indicators. Indirect employment is a Natural Resources Canada estimate based on Statistics Canada data.

FIGURE 23

CUMULATIVE HIRING REQUIREMENTS BY FORECAST SCENARIO (2020–2030)

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		Replacement Requirements		
	Net Change in Employment	Retirement	Non-Retirement	Cumulative Hiring Requirements
Contractionary	-25,940	56,020	21,800	49,880
Baseline	-1,140	57,830	23,260	79,680
Expansionary	26,330	61,960	24,840	113,130

Source: Mining Industry Human Resources Council, Statistics Canada (2016 Census), 2018.

FIGURE 24

REPRESENTATION OF WOMEN IN MINING INDUSTRY AND ALL INDUSTRIES, SELECTED OCCUPATIONS AND ALL OCCUPATIONS (2011 AND 2016)

Return to text

	2016	2011
Mining Industry / Selected Occupations	0.12372316	0.12
Mining Industry / All Occupations	0.160904827	0.17
All Industries / Selected Occupations	0.313121909	0.27
All Industries / All Occupations	0.478100731	0.48

Source: Mining Industry Human Resources Council, Statistics Canada (2006 Census, 2011 NHS, 2016 Census).

FIGURE 25

REPRESENTATION OF INDIGENOUS PEOPLES IN THE WORKFORCE, MINING INDUSTRY AND ALL INDUSTRIES, 2016

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Aboriginal Status	All Industries	Mining Industry
Indigenous	3.9%	7.4%
Métis	1.7%	3.2%
First Nations	2.0%	3.4%
Inuk (Inuit)	0.1%	0.6%
Indigenous responses not included elsewhere	0.1%	0.1%
Multiple Indigenous responses	0.0%	0.1%

Source: Mining Industry Human Resources Council, Statistics Canada, (2016 Census).

FIGURE 26

REPRESENTATION OF NEW CANADIANS AND VISIBLE MINORITIES IN THE MINING WORKFORCE (2006, 2011, 2016)

Return to text

Diversity Status	2006	2011	2016
Immigrant	12%	14%	13%
Visible Minority	7%	9%	9%

Source: Mining Industry Human Resources Council, Statistics Canada (2006 Census, 2011 NHS, 2016 Census).

FIGURE 27

SELECTED COSTS OF PRODUCTION IN THE MINERAL INDUSTRY[1], 2017

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By Industry	Establishments Surveyed (number)	Wages for Production and Related Workers ($000)	Fuel and Electricity ($000)	Materials and Supplies ($000)	Value of Production ($000)
Metal Ore Mining	63	2,949,582	1,639,560	5,738,591	24,995,935
Nonmetallic Mining and Quarrying	996	1,516,065	880,086	1,549,876	11,960,246
Coal	17	422,638	324,870	783,966	3,934,782
Total Mineral Industry	**1 076**	**4 888 285**	**2 844 516**	**8 072 433**	**40 890 963**

Sources: Natural Resources Canada; Statistics Canada.
[1]Excludes the oil and gas extraction industry.
Note: Value of Production vs. Mineral Production: Value of Production is for mining activity only and wouldn't include all costs related to shipping etc. that are included in Value of Shipments (or Mineral Production).
Numbers may not add due to rounding.



SECTION 5

THE ENVIRONMENT: SUSTAINABLE DEVELOPMENT AND SOCIAL RESPONSIBILITY

THE CANADIAN MINING INDUSTRY IS PROVIDING GLOBAL LEADERSHIP THROUGH ITS TOWARDS SUSTAINABLE MINING® PROGRAM TO FOCUS ON ENABLING MINING COMPANIES TO MEET SOCIETY'S NEEDS FOR MINERALS, METALS AND ENERGY PRODUCTS IN THE MOST SOCIALLY AND ENVIRONMENTALLY RESPONSIBLE WAY.

Environmental and social considerations are increasingly well integrated into mine planning and management. Resource development and environmental conservation are not mutually exclusive but can be achieved by effective regulation and responsible sustainability practices. In Canada, mining companies are required to plan for closure well before entering into production. Not only are closure plans required by law in Canada, but companies must also provide financial assurance to ensure that appropriate funding is available for effective mine closure and reclamation. Reclamation, one of the most important aspects in the mine closure process, specifically focuses on restoring mined lands to their original state.

MAC's *Towards Sustainable Mining® (TSM®)* initiative is committed to responsible mining and serves as an example of how resource development can co-exist with environmental conservation, and how partnerships can be fostered between mining companies and communities. *TSM*, first established in 2004 and mandatory for all MAC members, is focused on enabling mining companies to meet society's needs for minerals, metals and energy products in the most socially, economically and environmentally responsible way.

ENVIRONMENTAL STEWARDSHIP

The Canadian mining industry has made significant progress in its environmental performance by participating in a host of sustainability programs and initiatives.

Internationally, an array of sustainability and social license initiatives affect the Canadian mining industry. Companies seeking project financing are required to apply rigorous environmental and social standards set by organizations such as the International Finance Corporation, Export Development Canada, the World Bank and commercial banks that have adopted the Equator Principles, a framework used by financial institutions to determine, assess and manage environmental and social risk in projects. Companies dealing in dangerous substances abide by the Basel Convention and the International Cyanide Management Code (as well as Canada's own *Transportation of Dangerous Goods Act*). The practices of many companies are guided by the United Nations Global Compact, the Extractive Industries Transparency Initiative, the Kimberley Process, ISO 14001 certification and other sustainability programs. For a more detailed overview of how MAC member companies apply international standards and programs, *see Figure 28*.

Domestically, companies are engaged in a variety of stewardship programs, including *TSM*, the Mine Environment Neutral Drainage Program (MEND) and the National Orphaned/Abandoned Mines Initiative (NOAMI).

Towards Sustainable Mining

TSM is MAC's commitment to responsible mining and every member company commits to implementing it for their Canadian facilities as a condition of membership. Several companies also voluntarily apply it at their international sites.

In recent years, *TSM's* positive reputation has been attracting international attention. In 2015, the Finnish Mining Association adopted *TSM* for its members' operations, the first national mining association outside of Canada to do so. Since then, the Cámara Argentina de Empresarios Mineros, the Botswana Chamber of Mines, the Chamber of Mines of the Philippines and Confederación nacional de empresarios de la minería y de la metalurgia, the national mining association in Spain, have adopted *TSM* and are at various stages of implementing the program. In 2019, Instituto Brasileiro de Mineração, the national mining association in Brazil, became the latest national mining association to join *TSM*.

How TSM Works

TSM includes a set of tools and indicators that drive performance and ensure key mining risks are managed responsibly at mining facilities. By adhering to the *TSM* Guiding Principles, mining companies demonstrate leadership by:

- Engaging with and supporting local communities
- Driving world-leading environmental practices
- Committing the resources and leadership to promote the safety and health of employees

TSM's core strengths are focused on:

- **Accountability:** *TSM* reporting at the facility level of their Canadian operations is mandatory for members.
- **Transparency:** Annual reporting is conducted against the *TSM* indicators with independent verification.
- **Credibility:** *TSM* includes ongoing consultation with a national Community of Interest (COI) Advisory Panel to improve industry performance and shape *TSM* for continual advancement.
- **Driving performance:** *TSM* includes a requirement to demonstrate measurable continual sustainability improvement.

Currently, *TSM* sets out performance indicators and targets in eight areas:

- Tailings management
- Energy use and greenhouse gas emissions management
- Indigenous and community engagement
- Crisis management and communications planning
- Biodiversity conservation management
- Safety and health
- Preventing forced and child labour
- Water stewardship

First introduced in 2019, the *TSM Water Stewardship Protocol*, the program's latest addition, provides a set of performance indicators to measure water governance, operational water management, watershed-level planning and water performance and reporting at the mine-site level. This new protocol will be phased-in over the next few years, with public reporting scheduled to begin in 2021.

Each year, MAC produces a *TSM Progress Report* detailing the facility-level performance of participating companies. *TSM* assessments take place at the facility level to ensure that management systems are in place, with results externally verified every three years. In 2018, 64 facilities from 22 companies reported their 2018 results.

Below is a summary of results for three areas that pertain to environmental stewardship: tailings management, biodiversity conservation management, and energy use and greenhouse gas emissions management. For a more complete overview of industry performance, please refer to the *TSM Progress Report*, which is available on the MAC website.

Tailings Management

Tailings facilities are necessary components of mining activity, and it is crucial that they be managed responsibly to protect human safety and the environment. With recent events in Brazil underscoring the urgent need for effective tailings management, it is essential that there be frameworks and guidance in place to provide an even greater level of assurance that this aspect of the mining process being done responsibly.

Tailings management has long been a priority for Canada's mining sector and is a core component of *TSM*. If not properly managed, tailings can pose risks to human health, safety and the environment. Given the critical importance of tailings management, it is essential that guidelines be regularly reviewed and updated to ensure they are effective and reflect current best practices (*see Figure 29* for breakdown in 2018 MAC member performance pertaining to the *TSM Tailings Management Protocol*).

Following the tailings breach at the Mount Polley mine in August 2014, MAC initiated internal and external reviews of its *TSM Tailings Management Protocol* and Guides. Both reviews confirmed the strength of the existing *Tailings Management Protocol* and Guides while also identifying opportunities to incorporate proven and emerging best practices for tailings management. The review has resulted in significant revisions to the *TSM Tailings Management Protocol*, *A Guide to the Management of Tailings Facilities and Developing an Operation*, *Maintenance and Surveillance Manual for Tailings and Water Management Facilities*. Collectively, these documents provide critical guidance on, and assurance for, safe and responsible tailings management. The revised Protocol and Guides were released in the spring of 2019 with reporting against the new Protocol set to begin in 2020.

Beyond *TSM*, oil sands operators are making measured progress in tailings management. *The Oil Sands Tailings Consortium (OSTC)*, now a part of *Canada's Oil Sands Innovation Alliance*, was founded in 2010 when seven of Canada's largest oil sands mining companies agreed to share tailings research and technology in a unified effort to advance tailings management.

Biodiversity Conservation Management

Mining, conducted in consultation with communities of interest, can co-exist with biodiversity conservation. Adopting responsible practices for biodiversity conservation management through all stages of a mine's life cycle is an industry priority. The *TSM Biodiversity Conservation Management Protocol* confirms that mining facilities have made formal commitments to manage biodiversity at their sites, that action plans for significant biodiversity aspects are implemented, and that biodiversity conservation reporting systems are in place to inform decision making and to publicly communicate the performance of facilities (*see Figure 30* for breakdown in 2018 MAC member performance pertaining to the *TSM Biodiversity Conservation Protocol*).

Energy Use and Greenhouse Gas (GHG) Emissions Management

Improving energy efficiency and reducing GHG emissions are priorities for the Canadian mining industry to limit impacts on the environment, address climate change and help reduce operational costs at mine sites.

The *TSM Energy Use and GHG Emissions Management Protocol* confirms whether a facility has established a comprehensive system for energy use and GHG emissions. For this protocol, a facility must show its management system includes assigned accountability from senior management, and that it has a process in place to ensure energy data are reviewed regularly and are well integrated into operator actions. Facilities are also expected to provide energy awareness training and have systems in place to track and report energy use and GHG emissions data for both internal and external reporting. Finally, in *TSM's* spirit of continuous improvement, this protocol seeks to confirm that facilities establish and meet targets for their energy use and GHG emissions performance.

The requirements to obtain a Level A in this *TSM* Protocol are more stringent than those for obtaining ISO 50001 certification. While ISO is a more broadly recognizable program globally, this comparison helps contextualize the extent of the commitment that MAC members make in pursuit of energy and GHG management excellence (*see Figure 31* for breakdown in 2018 MAC member performance pertaining to the *TSM Energy Use and GHG Emissions Management Protocol*).

Since 2015, mining companies pursuing energy management best practices to increase energy efficiency and reduce GHG emissions through the *TSM* initiative became eligible for funding from the Canadian Industry Program for Energy Conservation (CIPEC), a division of Natural Resources Canada. This is a significant endorsement of *TSM* and a powerful recognition of the program's effectiveness in improving energy management practices at Canadian mining operations. Further, MAC has recently commissioned independent research into the effectiveness of the *Energy Use and Greenhouse Gas Emissions Management Protocol* at improving energy efficiency, reducing emissions and saving energy costs compared to other energy management standards. This research will be completed by the end of 2019.

CLIMATE CHANGE AND THE MINING INDUSTRY

MAC and its members are committed to supporting the transition to a lower carbon future and to being a constructive partner with the Government of Canada on this important issue. To assist the government in the development of an effective pan-Canadian climate change policy, MAC developed the following *Principles for Climate Change Policy Design*.

The Principles specifically focused on:

- **Establishing a broad-based carbon price** that is applicable to all sectors of the Canadian economy.

- **Being revenue neutral** by investing revenues generated through carbon pricing into the development of lower emission technologies to manage the transition to a lower carbon future, including climate adaptation, and to ensure a level playing field for trade-exposed industries that are emission intensive.
- **Addressing competitiveness and carbon leakage concerns** across all sectors to prevent declines in investment, employment, tax revenues and trade.
- **Being predictable, flexible and sensitive to changing economic conditions and geographic circumstances** to enable consumers and industry to adapt and to treat regions fairly, particularly Canada's north.
- **Being simple, complementary and effective** to ensure that a national climate change regime works in tandem with existing provincial schemes, avoids duplication, and is simple to understand and administer.
- **Supporting investments in the development and implementation of technologies that lower emissions** through capital investments, which could include public-private partnerships.
- **Recognizing early action** and acknowledging that some companies have been proactive in reducing their climate footprints and that several provinces have already established climate change mitigation regimes.

Mining Sector Emissions Profile

According to the Canadian Energy and Emissions Data Centre, direct emissions from Canada's operating metal and non-metal mines accounted for just 0.8% of the country's total GHG emissions in 2016, the most recent year available (*see Figure 32*).

Despite lacking federally regulated targets, many extraction operations have improved their capabilities in compressed air, ventilation, metering and energy management, and have been doing so for years. Canadian mining companies are also involved in innovative initiatives to find non-diesel alternatives for large mobile equipment (see the Borden Mine case study in Chapter Four). Investment in these areas is a priority for the industry as older and deeper mines require more energy to access and extract the same amount of ore.

Oil sands production has a track record of continuous improvement in emissions reduction. Between 1990 and 2012, GHG emissions associated with every barrel of oil sands crude produced decreased by 28%.

For oil sands mining, GHG emissions reduction has been driven by innovations such as hydrotransport and efficiency improvements in bitumen extraction, upgrading, and natural-gas-fired cogeneration for electricity and steam. Companies have invested more than $1.4 billion collectively into developing new technologies to improve environmental performance through COSIA.

LOW CARBON EXTRACTION AT SUNCOR'S FORT HILLS MINE

While Suncor's Oil Sands Base plant uses a first generation extraction process called Naphthenic Froth Treatment, the company's new Fort Hills mine uses a process called Paraffinic Froth Treatment (PFT). The bitumen product they obtain using this partial upgrading process has been upgraded to a better quality as it removes up to 10% of the asphaltenes — which is essentially composed of low-value heavy hydrocarbon molecules and undesirable particulates. This higher quality oil sands product can be processed at a wider range of refineries. As a result of this technology, their greenhouse gas emissions for the average barrel extracted at Fort Hills are on par with the average crude refined in the US.

Despite reductions in the energy intensity of each barrel of oil produced, the absolute level of GHG emissions has grown as oil sands production volumes have increased.

Federal Climate Change Policy

Over the last four years, MAC has engaged in several concurrent policy and regulatory initiatives pertaining to climate change, including:

- Proposed regulations for a Clean Fuel Standard (CFS)
- Federal Backstop and Output-Based Pricing System (OBPS)
- Proposed Regulations for Stationary Diesel Engines
- Proposed enhanced GHG reporting requirements

While the OBPS has been developed and is now in force, these other regulations are at different phases of the process. While each of these regulatory initiatives require independent consideration, how they interrelate must also be assessed. It is critical that they work harmoniously to create a consistent, complementary and coordinated approach.

In Canada's growing patchwork of climate change initiatives, provincial and federal policies are increasingly likely to target the same GHG emissions. The mining industry is concerned that some of these regulatory initiatives may duplicate or conflict with what provincial governments are already doing. This duplication would increase overall costs, create additional reporting and compliance burden, frustrate private sector innovation, and generally blunt the incentive for corporations to take action, all without achieving significant additional GHG emissions reductions.

MAC believes that carbon pricing is the simplest and most cost-effective way to lower GHG emissions and recommends that the government:

- Make carbon pricing the core of its climate policy, which should be backed by robust protections for EITE sectors and should also be sensitive to remote and northern regions.
- Adopt as a general principle the need for protections for emissions-intensive and trade-exposed industries for any and all policies and regulations that generate a carbon cost on end-users.
- Clearly demonstrate complementarity before adopting non-pricing climate change policies and regulations (such as the CFS) to avoid cumulative effects. This demonstration should include a robust and publicly-disclosed economic impact assessment.

Output-Based Pricing System (OBS)

MAC worked constructively with the federal government on the proposed output-based standards for mining, smelting and iron ore pelletizing. We were pleased to see several of our priorities recognized by Environment and Climate Change Canada (ECCC) in the final regulation, including recognition of the need to treat process emissions differently than combustion emissions in the final stages of the consultation process. Noting the regulation is slated for a review in 2022, MAC has identified several areas where the program can be further strengthened and will continue to work constructively to refine and improve the regulation over time.

Clean Fuel Standard (CFS) Regulation

While MAC supports the federal government's efforts to identify opportunities to meaningfully reduce GHG emissions, elements of the proposed CFS regulation are problematic. MAC recommended the government begin with the transportation sector first – like other jurisdictions where such standards have been deployed – but the decision to proceed with the broader liquid fuels streams first (including industrial consumers) is likely to adversely affect the industry due to a number of different factors.

MAC recognizes that ECCC has been responsive of the need to take time to get the regulation through timeline extensions, as well as on some of our recommendations to enhance credit-generation opportunity for the sector. Despite this, EITE sectors, including mining, have yet to see the type of end-user recognition we are seeking to assure risks of carbon leakage are appropriately taken into account. Noting the CFS will ostensibly increase the cost of fuels for end-users, MAC has recommended a cumulative carbon cost assessment be undertaken so total carbon cost exposure can be identified and appropriate EITE protections incorporated.

Climate Change Policy in the North

Northern energy costs are compounded by the infrastructure deficit in the territories and remote regions of the provinces. The extremely limited reach of transmission and distribution infrastructure means mines and development projects are off-grid and dependent almost exclusively on diesel.



Haul truck at Agnico Eagle's Meadowbank Mine in Nunavut.

Beyond the cost of fuel itself, the cost per unit of delivered fuel is inflated significantly by associated investments essential to supporting the mines' energy supply chain. Fuel-switching opportunities are also limited and are contingent on geographical considerations. High energy costs in the North have long served as a strong incentive to maximize energy and fuel efficiency, but evidence suggests that the proverbial"low-hanging" fruit are gone, meaning future improvements will be incremental and gradual barring a technological breakthrough.

Together, the infrastructure deficit and the state of currently available technologies do not provide sufficient options to displace diesel and its associated emissions in the timeframe needed, nor on the scale required, to avoid companies absorbing the carbon price almost exclusively as a cost of business. Further, extreme temperatures have not demonstrated the viability of the CFS for an industrial application in a pan-Canadian context. The purpose of pricing carbon or establishing a CFS is not to penalize companies, but to price pollution as Canada works to meet its targets. Policies that fail to take into account competitiveness concerns will drive away investment and exacerbate an already challenging business situation for many companies operating in the North.

The federal government has recognized this limited optionality to displace GHG emissions in off-grid industrial situations in recent years:

- The 2019 federal budget focused to a large degree on Canada's North, exemplified through the commitment of over $700 million over the next 10 years in new and focused funding to ensure Arctic communities have the opportunity to grow was welcome news for Canada's mining sector.
- The commitment of a further $18 million over three years, starting in 2019–20, to Crown-Indigenous Relations and Northern Affairs Canada to support planning by the Government of Northwest Territories for its proposed Taltson hydroelectricity expansion project, is a step in the right direction. The proposed expansion would more than double current hydroelectric capacity in the Northwest Territories, reducing reliance on diesel by the city of Yellowknife and the mining sector, as well as providing employment opportunities for Indigenous people and other residents of the territory.

Most recently, the Liberal Party of Canada committed in its 2019 election platform to direct $5 billion from the Canada Infrastructure Bank to electrification, specifically calling out industrial needs in this space. These recent federal commitments will play a positive role in setting the stage for greater focus on climate change action in Canada's North. Any climate change policy must be crafted so as to accommodate for remote and northern limitations.

Mining and Renewable Energy

Renewable energy technologies and their economics continue to improve. Renewable power is appealing to mining companies because it has the potential to reduce energy costs and environmental impacts, enhance energy security and address climate change.

Given the heightened cost of powering mining operations, companies are giving the benefits of renewable energy technologies greater consideration. The levelized cost of electricity (LCOE) for wind, solar photovoltaic, concentrated solar power and some biomass technologies has steadily decreased, enhancing their competitiveness, particularly for off-grid generation.

Just as miners need to go where the viable deposits are located, renewable energy generation is contingent on the strength and reliability of the renewable asset. This restriction prevents renewable energy generation from becoming an industry-wide energy solution, no matter how improved the technology is.

But for mines that have access to a viable renewable asset, diversifying energy portfolios with a reliable intermittent power source that simultaneously offsets their reliance on diesel has benefits that may merit the investment. Recent examples include IAMGOLD's Rosebel Mine in Suriname, Glencore's Raglan Mine in Quebec and Rio Tinto's wind farm at Diavik in the NWT.

THE CLEAN ENERGY ECONOMY

Canada has all the ingredients—sustainably-sourced minerals, metals and energy products—needed for the technologies that are powering imaginations and enabling the transition to a low carbon future.

A report from *Clean Energy Canada* highlights the opportunity that a low carbon economy presents to the mining industry, noting that Canada has rich deposits in many of the minerals and metals needed in renewable energy technologies. For example, Canada is home to 14 of the 19 metals and minerals needed to make a solar PV panel. Clean Energy Canada encourages Canada to become the world's leading supplier of the mining products integral to a low carbon economy.

Clean energy and "green" products require metals and minerals as building blocks. Water purification systems rely on nickel and a host of rare earth elements. Hybrid cars draw energy from nickel hydride batteries and use far more copper than traditional vehicles. Efficient, lightweight vehicles and aircraft need aluminum as well as lighter composites and alloys involving nickel and other metals to reduce weight and improve efficiency. Clean energy sources such as nuclear, solar, wind and hydrogen use a range of minerals and metals in their equipment and processes.

COAL'S ROLE IN A SUSTAINABLE SOCIETY

About 770 kilograms of steelmaking coal (metallurgical coal not thermal coal) are required to produce 1 tonne of steel, and more than 700 million tonnes of steelmaking coal are used each year in global steel production. Steel is used to create the infrastructure and other materials Canadians use every day. For example, steel is crucial for:

- **Public transportation.** Approximately 30,000 tonnes of steelmaking coal was required to build Vancouver's Canada Line. This 19-kilometre rapid transit line currently accommodates more than three million passenger trips through Vancouver per month.
- **Personal recreation.** Approximately 1.1 kilograms of steelmaking coal is required to build the average bicycle frame.
- **Alternative energy.** Approximately 100 tonnes of steelmaking coal is necessary to produce the steel to build the average wind turbine.

Source: Teck Resources Limited

Recycling and E-Waste

E-waste is one of the fastest-growing waste streams in the world and includes items such as mobile devices, computers, monitors, televisions and DVD players, among other electronic equipment. As consumers and businesses favour disposable technology and a shorter life cycle for electronics, the amount of e-waste generated is increasing.

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 re-use potential and would otherwise be disposed of in landfills. From 50,000 mobile phones, Electronics Product Stewardship Canada estimates that approximately 1 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.

For example, Glencore's Horne smelter, located in Rouyn-Noranda, Canada, has been recovering copper and precious metals from end-of-life electronics for over 30 years. The smelter receives end-of-life electronics from North America, Europe, Asia and South America. The materials are sampled for accurate value determination and processed to produce copper anodes. These are shipped to a Montreal refinery for further refinement into saleable products.

While e-waste recycling programs have increased across Canada in recent years, more awareness is needed among Canadians of the options available for recycling old electronics. As well, the future of metal and e-waste recycling in Canada depends partly on how far government regulations go in requiring manufacturers and consumers to take responsibility for the life cycle of the products they use.

INDIGENOUS RELATIONS AND BENEFIT AGREEMENTS

Proportionally, the mining industry is the largest private sector employer of Indigenous peoples in Canada. This can be partly attributed to the nearness of 1,200 Indigenous communities to mining operations with most of these communities located within 200 kilometres of approximately 180 producing mines and more than 2,500 active exploration properties. This geographical proximity serves as a foundation for relationship building between industry and Indigenous communities. (*See Section 4* of this report for more discussion).

Over the past two decades, the Canadian mining industry has increasingly embraced impact benefit agreements (IBAs) or other agreements between mining companies and Indigenous peoples and collectives. Such agreements have helped solidify local support for mining projects, provided a local work force, and facilitated Indigenous participation in the mining sector and the benefits that flow from it. While earlier agreements typically contained provisions for employment and training, more recent IBAs promote business opportunities through set-aside contracts and joint ventures.

They also consider social and cultural matters, provide for environmental monitoring, set up funding arrangements and dispute resolution mechanisms, and include direct payment and resource-sharing arrangements, among other provisions.

Since the groundbreaking 1974 Strathcona Agreement, hundreds of bilateral agreements (IBAs or other agreements at the exploration stage) have been signed, including 455 since the year 2000.

While the relationship between mining companies and Indigenous communities has largely been positive, several public policy issues currently create uncertainty for both groups. Mining companies operating in Canada have seen an increasing level of complexity related to the Crown's duty to consult. This complexity is largely reflected in the different policy responses by federal, provincial and territorial governments as to what the actual "trigger" is for consultation, how the consultation process will unfold, who will lead the process, what procedural aspects are delegated to companies, and what support exists for the parties involved. Added to this is the frequent duplication and lack of coordination of effort by both levels of government on consultation activities for the same project.

The Supreme Court of Canada, in its decision on the Tsilhqot'in First Nation's claim, recognized Indigenous title, a first in Canadian law. It also provided clarity on the criteria needed to demonstrate title and the rights and obligations that flow from that, and, in the process also identified where title was found not to exist. The Court clearly recognizes that, in some circumstances, the right to title can be limited by the Crown. So, there is no absolute veto under Canadian law, even in the case where title has been proven. But for the Crown to place limits on Indigenous title, it has to demonstrate both a compelling public interest for the project and ensure that future Indigenous generations will not be deprived of the benefit of the land were the project to go ahead – a very significant test. At its core, the decision embodies the balancing act between empowering and limiting the authority of both Indigenous peoples and governments. The Canadian mining industry believes it is a significant decision that provides much more clarity going forward.

Best Practice in Community Engagement

The Canadian mining sector has a proven track record of working towards and maintaining positive and respectful relationships with affected Indigenous communities. Building constructive relationships with Indigenous communities, pursuing understanding and shared commitments through formal agreements is of great importance to our industry and is considered a best practice.

Engagement with Indigenous peoples and other communities of interest (COI) is a core component of MAC's *TSM* initiative. Each year, MAC members are evaluated against the *TSM Aboriginal and Community Outreach Protocol*.

In 2019, MAC completed a comprehensive review of this protocol, which resulted in several substantial improvements and renaming the protocol the *TSM Indigenous and Community Relationships Protocol*. Among the many changes introduced as part of this review, there is now a stand-alone indicator designed to measure facility-level performance in the area of effective engagement and dialogue with Indigenous communities.

Implementation of this indicator is to be guided by the principles, norms and standards of the United Nations Declaration on the Rights of Indigenous Peoples (UNDRIP), as well as applicable legal and/or regulatory requirements. Recognizing the duty of governments to consult Indigenous peoples prior to the adoption of measures that may affect them directly, and in particular in relation to projects that affect their traditional territories, companies are not expected, nor should they attempt to replace the government's responsibilities related to consultation. This indicator focuses on evaluating whether facilities are working to build and maintain meaningful relationships, respectful engagement and decision-making processes towards achieving and maintaining the support of affected Indigenous communities.

In the Canadian context, discussions among Indigenous peoples, government and industry related to Indigenous participation in resource development decision making must be rooted in a shared understanding of FPIC and respect Canada's laws and constitutional framework. Similarly, application of FPIC must respect local laws and constitutional framework when being applied outside of Canada.

REGULATORY ENVIRONMENT

Developing and operating a mine in Canada requires compliance with a multitude of federal and provincial or territorial legislative and regulatory requirements. Some of these requirements are specific to mining, while many more apply generally to environmental protection, and the health and safety of workers and the public. To deal with this complexity, Canadian companies, as well as domestic and foreign investors, rely on governments to provide

clear information about requirements, approval processes, timelines and responsibilities.

New mines and major expansions must undergo federal reviews and approvals in addition to the review and permitting requirements of their provincial jurisdiction, which is the primary regulator. Depending on the details of the project and the mine site, they may require approvals under other federal legislation, such as the *Fisheries Act*.

In 2019, the legislative review that began in 2016 culminated in the passing by Parliament of Bill C-68 and Bill C-69. Bill C-68 amended the *Fisheries Act*, while Bill C-69 created the *Impact Assessment Act* (IAA) to replace the *Canadian Environmental Assessment Act*, 2012 (CEAA 2012) and amended the *Navigation Protection Act* (NPA) to become the *Canadian Navigable Waters Act* (CNWA). The changes came into force on August 28th, 2019. MAC participated actively in the legislative review process, and continues to engage with the Impact Assessment Agency, Fisheries and Oceans Canada and Transport Canada in the implementation phase and to assist members in the transition to the new legislative requirements.

For the mining industry to thrive in Canada, the process for reaching a decision on whether a mine can be built, and under what conditions, needs to be determined through a timely, coordinated and seamless process that continues to be grounded in meaningful consultation. In turn, this will help preserve Canada's reputation as an attractive jurisdiction for mineral investment and sustainable mining development. ■



For more than 25 years, Syncrude's reclaimed oil sands land has been home to a Wood Bison herd.

FIGURE 28

MAC MEMBER COMPANY APPLICATION OF INTERNATIONAL STANDARDS AND PROGRAMS

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MAC MEMBER COMPANY APPLICATION OF INTERNATIONAL STANDARDS AND PROGRAMS	Industry Sustainability Initiatives		Management System Standards		International Voluntary Initiatives				Reporting, Disclosure and Transparency Standards					Financing Standards	Listed on Socially Responsible Investing Indices		Commodity Specific Standards		
	ICMM Sustainable Development Framework	WGC Conflict Free Gold Standard	ISO 14001: EMS Standard	OHSAS 18001	UN Global Compact	Extractive Industries Transparency Initiative	Voluntary Principles on Security and Human Rights	OECD Guidelines for Multinational Enterprises	AA 1000	Global Reporting Initiative	Carbon Disclosure Project	Water Disclosure Project	Carbon Pricing Leadership Coalition	IFC Social and Environmental Performance Standards	Dow Jones Sustainability Index	Jantzi Social Index	Responsible Jewellery	International Cyanide Code	Kimberley Process
COMPANIES HEADQUARTERED IN CANADA																			
Agnico Eagle Mines Ltd.		✓					✓			✓	✓	✓			✓		✓	✓	
Barrick Gold Corporation	✓	✓	✓		✓	✓	✓	✓	✓	✓		✓	✓		✓				
Eldorado Gold		✓	✓	✓	✓					✓	✓	✓						✓	
First Quantum Minerals Inc.					✓	✓	✓				✓			✓					
HudBay Minerals Inc.			✓	✓		✓	✓	✓		✓	✓	✓		✓					
IAMGOLD Corporation		✓				✓		✓		✓				✓		✓			
Kinross Gold Corporation		✓	✓	✓	✓	✓	✓			✓	✓	✓		✓		✓		✓	
Lundin			✓	✓	✓		✓	✓	✓	✓	✓	✓							
New Gold Inc.		✓	✓	✓	✓		✓			✓	✓	✓						✓	
Sherritt International					✓	✓	✓	✓		✓				✓					
Teck Resources Limited	✓		✓		✓	✓		✓		✓	✓	✓	✓	✓	✓				
COMPANIES HEADQUARTERED OUTSIDE OF CANADA WITH CANADIAN OPERATIONS:																			
ArcelorMittal Mines Canada			✓	✓		✓				✓									
De Beers Canada Inc.	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓			✓		✓			✓
Glencore Nickel	✓		✓	✓	✓	✓	✓			✓	✓	✓		✓	✓				
Newmont Goldcorp	✓	✓	✓		✓	✓	✓			✓	✓				✓			✓	
Rio Tinto	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Vale			✓	✓	✓	✓	✓			✓	✓	✓	✓	✓					

Note: HudBay Minerals Inc. and Sherritt International apply the IFC Social and Environmental Performance Standards only to select international facilities

FIGURE 29
TSM TAILINGS MANAGEMENT

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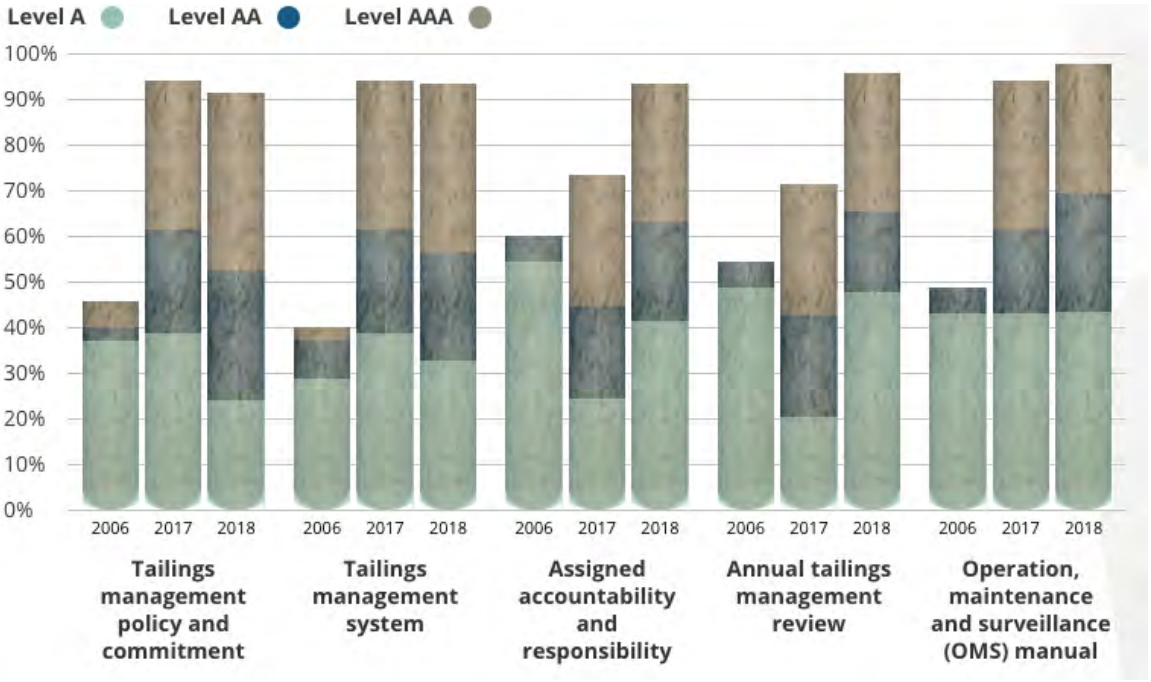
Tailings Management Assessments
Percentage of Facilities at a Level A or Higher 2006, 2017 and 2018

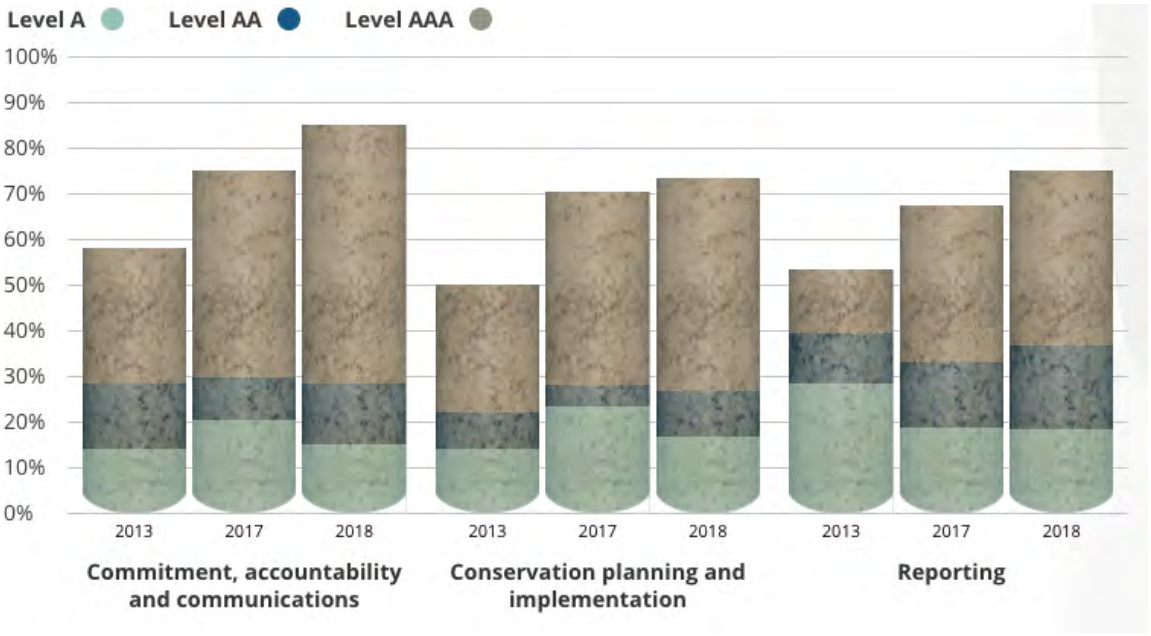


Source: www.mining.ca/towards-sustainable-mining

FIGURE 30
TSM BIODIVERSITY CONSERVATION MANAGEMENT

Return to text

Biodiversity Conservation Management Assessments
Percentage of Facilities at a Level A or Higher 2013, 2016 and 2017

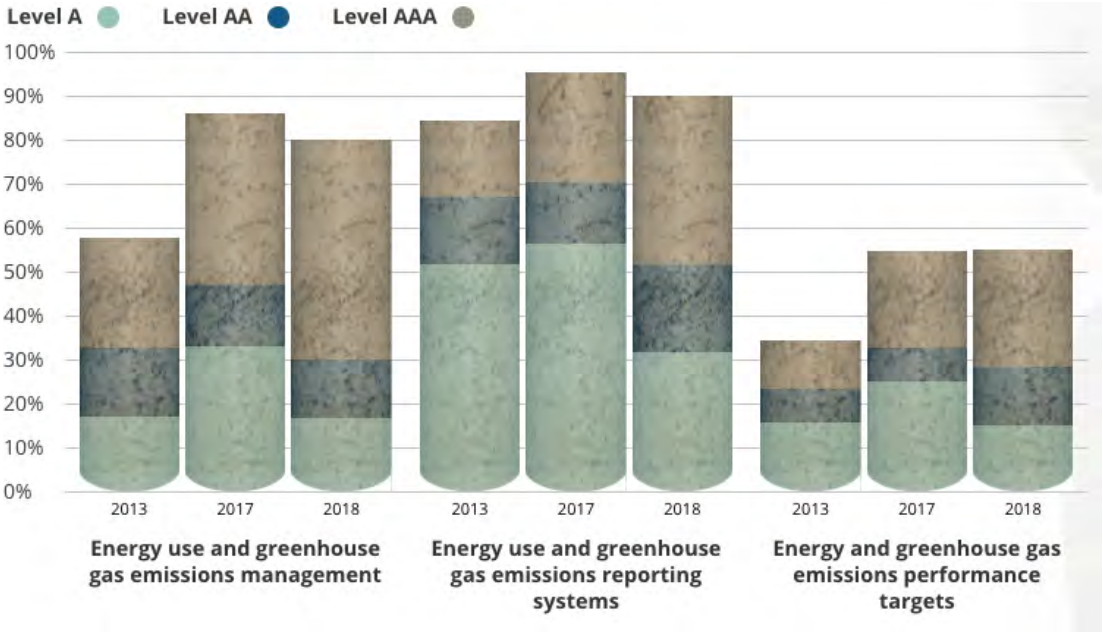


Source: www.mining.ca/towards-sustainable-mining

FIGURE 31
TSM ENERGY USE AND GHG EMISSIONS MANAGEMENT

Return to text

Energy Use and GHG Emissions Management Assessments
Percentage of Facilities at a Level A or Higher 2013, 2017 and 2018



Source: www.mining.ca/towards-sustainable-mining

FIGURE 32

MINING INDUSTRY ENERGY AND GHG EMISSIONS DATA, 1990 AND 2014-2016

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	1990	2014	2015	2016
Canadian economy				
Canadian energy use (PJ)	9,608	11,787	11,924	11,903
Energy used by broader industry (PJ)	2,400	3,614	3,656	3,502
Canadian GHG emissions (mt)	613	732	741	737
Direct GHG emissions by all industries (mt)	104.1	147.8	149.6	143.2
Metal and non-metal mining				
Total energy use (PJ)	143	150	150	153
Share of Canadian energy use (%)	1.48	1.28	1.26	1.28
Total GHG emissions (Mt CO_2e)	5.93	6.1	6.1	6.05
Share of Canadian GHG emissions (%)	0.97	0.83	0.82	0.82

Source: Canadian Industrial Energy End-Use Data Analysis Centre (CIEEDAC) Report, 2017.
Note: Total includes direct and indirect emissions.
MAC has sought to include coal and oil sands mining data into the above calculations to provide a more representative, mining sector-wide statistic; however, CIEEDAC does not have access to oil sands mining or coal mining energy and emissions data to augment the non-metal mining data set.



SECTION 6

THE WORLD: INTERNATIONAL MARKET ACTIVITIES AND DEVELOPMENTS

CANADIAN EXPLORATION AND MINING COMPANIES HAVE A SIGNIFICANT PRESENCE OUTSIDE CANADA'S BORDERS, AND CANADA IS REGARDED AS A GLOBAL LEADER FOR RESPONSIBLE MINING. BEYOND BEST PRACTICES, HOWEVER, WORLD MARKET CONDITIONS SHAPE THE INDUSTRY, AS DO GLOBAL TRADE AND INVESTMENT POLICIES.

CANADIAN MINING'S INTERNATIONAL PRESENCE

Canadian mining companies operate in more than 100 countries around the world. According to Natural Resources Canada, 699 Canadian companies held mining assets abroad (CMAA) valued at $168.7 billion in 2017 – the most recent year for which data is available. By comparison, this figure is nearly twice that of Canadian mining assets at home, which amounted to $91.4 billion. Accounting for two-thirds of total Canadian mining assets this value is up 1.4% year-over-year and represents the second highest year on record as values peaked in 2015 (*see Figure 33*). While a significant figure, context is important. For example, BHP, the world's largest mining company, as a single corporate entity, was in possession of assets totaling $117 billion in 2017.

As a geographic indicator, the majority of CMAA (70%) are located in the Western Hemisphere. Latin America and the Caribbean accounted for 55% of CMAA, with a value of $93.1 billion in 2017. Total value in the region was up 3.6% year-over-year. Notable increases in Panama and the Dominican Republic offset declines in Argentina and Brazil.

The second highest concentration of CMAA is in Africa, where the overall value of Canadian mining assets declined by 3.5% or $954 million in 2017. Two of the top three countries in terms of value (Zambia, Burkina Faso and Mauritania) experienced gains, which were more than offset by a decline in asset values held in Madagascar.

There are significant annual investments associated with these assets. In fact, companies listed on the Toronto Stock Exchange (TSX) and the Venture Exchange (TSX-V) raised $860 million for African mining projects in 2018 and $2.1billion in equity capital for Latin American mining projects for the same year. Despite these investments, Canadian mining companies are facing increased competition from other mining jurisdictions operating internationally, including Australia and China.

Canadian Direct Investment Abroad

Canadian Direct Investment Abroad (CDIA), and mining's share of it, is an indicator of the industry's international presence. CDIA was projected at $1.28 trillion in 2018 (*see Figure 34*). Of that, the mining sector accounted for $80.5 billion, or 6%, of the total. While this total is down modestly year-over-year, it remains a significant contributor, and fluctuations year-over-year are to be expected.

Since 2013, mining CDIA has remained relatively consistent, starting at $77 billion, peaking in 2016 at $86 billion, and declining since then to current projections. Preceding 2013, mining CDIA remained roughly consistent from 1999 to 2008 in the mid-$20 billion range, after which, outward flows of mining investment increased significantly – two and half fold – over the subsequent 10 years. 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 our sector.

Foreign Direct Investment in Canada

Canada relies heavily on foreign direct investment (FDI), and the mining industry and downstream value-added manufacturing activities accounted for approximately $44 billion, or 5%, of FDI in 2018. When isolated from this total, 2018 mining FDI into Canada totalled $24.5 billion, approximately 2.7% of Canada's overall total (*see Figure 34*).

The Value of Company Expenditures in Host Countries

Beyond measuring inflows and outflows of industry capital, the impact of a mine's horizontal value chain on local communities and host countries' national GDP is considerable. This value chain significantly exceeds the taxes and royalties paid to governments and can help reshape the dialogue around resource nationalism by more clearly identifying mining's vast economic contributions.

It has been estimated that approximately 80% of all money spent in building and operating a mine is spent in the host country through wages, local procurement and payments to various levels of government. This estimate is supported by research conducted by MAC in 2018. Using methodology developed by the World Gold Council, MAC surveyed its members on their 2017 expenditures related to mining activities outside of Canada. The purpose of this study was to better understand the Canadian mining sector's overall contributions to economic development around the world, beyond focusing exclusively on taxes and royalties.

Ten MAC member companies – representing 53 producing mines and non-producing operations that together employ 73,500 employees and contractors – provided information on their expenditures related to employee salaries, payments to suppliers, community investments, taxes and royalties, and payments to providers of capital.

The data provided by these 53 operations reveal results similar to those in reporting from World Gold Council which showed that the majority of expenditures associated with mining activities are spent in host countries. For MAC's survey, the reported expenditures totalled US$18.6 billion, with US$16.5 billion (89%) being spent within the host country, though there is a range from 41% expenditure in Mauritania to 98% expenditure in Chile.

The survey also found that the largest beneficiaries within host countries are companies that supply equipment and services to mining operations, accounting for 60% of the total. The second largest beneficiaries are payments to employees, accounting for 26% of the total, followed by combined payments to governments and communities accounting for 9% of the total. *Figure 35* summarizes the consolidated survey data for 24 national jurisdictions and demonstrates that the broader economic contributions mining generates extend far beyond taxes and royalties.

AN ANALYSIS OF NINE MAC MEMBERS' INTERNATIONAL ACTIVITIES – SPANNING 53 OPERATIONS AND DEVELOPMENT PROJECTS – REVEALED THAT 89% OF COMPANY EXPENDITURES WERE SPENT WITHIN THE HOST COUNTRY.

Local Procurement and the Sustainable Development Goals

The positive economic impacts created when Canadian mining companies procure goods and services in their host countries and communities can be game-changers for economic and social development. While civil society and the public at large have tended to focus heavily on the level of tax paid by mining companies, procurement is the single-largest payment type a mining operation will make over its lifespan.

Therefore, recognition of the role that local procurement can play in helping to achieve Sustainable Development Goals (SDGs) is increasing. As discussed in the joint report, *Mapping Mining to the Sustainable Development Goals: An Atlas*, local procurement can contribute meaningfully to a number of SDGs as shown below.

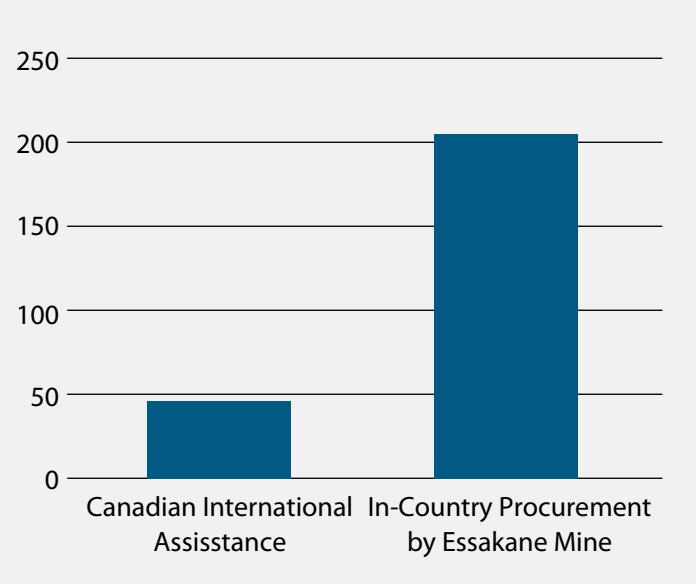
1 NO POVERTY
Local procurement creates revenue and jobs for the countries that host mining.

8 DECENT WORK AND ECONOMIC GROWTH
Local procurement creates jobs with learning opportunities and more balanced growth in host countries.

9 INDUSTRY, INNOVATION AND INFRASTRUCTURE
Local procurement increases skills and transfers technology to less developed countries.

10 REDUCED INEQUALITIES
Local procurement helps ensure the benefits of mining are more shared across the economy.

2017 SPENDING IN BURKINA FASO ($ MILLIONS CAN)



Organizations such as Mining Shared Value – a non-profit initiative of Engineers Without Borders Canada – are promoting awareness of the power of local procurement. For example, a single mine operated by one of MAC's members can spend hundreds of millions of dollars on procurement in a host country. This often represents several times the amount of official development assistance the Canadian government may provide to that country. The example below shows the scale of economic contributions by a single mine – IAMGOLD's Essakane operation in Burkina Faso – compared to Canada's aid contributions to the same country.

This graph was provided by Mining Shared Value, a non-profit initiative of Engineers Without Borders Canada that works to improve the development impacts of mineral extraction by promoting local procurement by the global mining industry.

CANADA'S MINERAL TRADE

Despite showing a trade deficit in the third and fourth stages of mining in 2018, the sector as a whole maintained a surplus of $21.1 billion (*see Figure 36*). Approximately a five-fold increase from a decade earlier, this surplus indicates a healthy global demand for Canadian mineral products.

Exports

At $90.6 billion, exports of mineral products for the first three stages of mining have increased by 8.5% (or more than $7 billion) year-over-year to 2018, indicative of elevated mineral and metal prices. Stage 4 exports totalled $17.7 billion, up 26% (or $3.4 billion) year-over-year. Combined, the exports for the four stages reached $108.5 billion, or 19% of the total value of Canada's exports (*see Figure 36*). The value of Canada's mineral and metal exports increased by approximately 31% between 2010 and 2018 (*see Figure 37*).

THE MINING SECTOR IN CANADA IS ONE OF THE FEW SECTORS THAT CONSISTENTLY MAKES A POSITIVE CONTRIBUTION TO CANADA'S BALANCE OF TRADE.

Over half of Canada's mineral and metal exports by value were destined for the US in 2017, with iron and steel, aluminum, gold, silver, platinum, potash, copper, zinc and nickel holding the largest values (*see Annex 9*). The European Union is a leading destination for Canadian gold, iron ore, nickel and diamonds. Other destinations, including China, buy significant volumes of copper, iron ore, coal and potash.

Imports

Total imports for the first three stages of mining increased by 6% year-over-year, coming in at $48.2 billion. Combined, the four stages totalled $87.3 billion in imports (*see Figure 37*). Of Canada's total mineral imports by value in 2018, nearly half came from the US, which roughly equalized the balance of trade between the two countries for minerals and metals (*see Annex 10*). The reliance on the US market for the import and export of minerals and metals underscores the need to diversify trade.

CANADA'S TRADE POLICIES

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.

However, international agreements do not alone facilitate trade. Trade-enabling transportation infrastructure is essential for companies to get their goods to market. Beyond infrastructure expansion, the efficient operation of Canadian modes of transportation, such as rail, is critical. Further, the efforts of Canada's Trade Commissioner Service, and other outward looking programs, including Export Development Canada, are critical supports for Canadian companies operating aboard.

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. MAC is pleased to see the Government of Canada pursuing a robust trade agenda and supports participation in the following engagements.

Investor State Dispute Settlement (ISDS) Mechanisms

ISDS is a mechanism in a free trade agreement (FTA) or investment treaty that provides foreign investors, including Canadian investors overseas, with the right to access an international tribunal to resolve investment disputes. ISDS protections are critically important to the Canadian mining in-dustry due to unique factors that define mineral investments. First, mining companies must go to where commercially developable mineral and metal deposits are located. While Canada is rich in many minerals and metals, a significant number of our members also have operations overseas, with particularly high concentrations in some countries.

Mining operations are more vulnerable than those of other sectors due to the tremendous up-front capital costs involved with mineral development. It is common for an average mine's initial capital expenditure to exceed $1 billion before any minerals are produced or processed. 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 country.

ISDS mechanisms provide a strong enforcement tool that helps to ensure that Canadian investors, businesses and their workers will be treated fairly overseas and can continue to bring the international dollars home. While a last resort for companies, this mechanism is an essential part of modernized Canadian trade and investment agreements, including Canada's own Foreign Investment Promotion and Protection Agreement (FIPA) model. It is critical that it remains so in agreements going forward.

Canada, US, Mexico Free Trade Agreement

On November 30th, 2018, Canada, the US and Mexico signed the Canada, United States and Mexico Free Trade Agreement (CUSMA). CUSMA is based on the North American Free Trade Agreement which originally came into effect on January 1st, 1994. The present agreement was the result of more than a year of negotiations including threats of tariffs by the US against Canada.

MAC appreciates the negotiations were protracted and welcomed the reduction in business uncertainty that the signing of the agreement brings, as well as the reduction in the adversarial tone the negotiations took on. MAC was disappointed, however, that unlike NAFTA the United States-Mexico-Canada Agreement (USMCA) did not include an ISDS mechanism. ISDS protections are criti-cally important to the Canadian mining industry due to the unique factors that define mineral investments, and MAC supports their continued inclusion in ongoing trade agreements, as well as Canada's continued pursuit of FIPAs with key partners.

While Canadian investors in the US will no longer have recourse to ISDS mechanisms, the signing and subsequent coming into force of the Comprehensive and Progressive Agreement for Trans-Pacific Partnership (discussed below) will have ISDS provisions that Canadian investors will have re-course to for investments in Mexico.

At the time for writing, Mexico was the only country to have ratified the agreement. In the US, Democrats in Congress have outstanding concerns with the text of the agreement that they claim must be resolved before they will vote on the deal. In Canada, the legislation to ratify was introduced in Parliament in May 2019, but Canada has maintained that it will move its ratification process in tandem with the US. The status quo NAFTA agreement has a 3-year lifespan from the signing of the USMCA to ratify and transition to the new agreement.

Comprehensive and Progressive Agreement for Trans-Pacific Partnership (CPTPP)

On December 30th, 2018 the CPTPP entered into force in the first six countries to ratify the agreement – Canada, Australia, Japan, Mexico, New Zealand and Singapore. Vietnam was the seventh country to ratify the agreement on January 30th, 2019.

MAC supported the government's ratification of the agreement as well as its coming into force as it creates greater possibilities for new markets. In the years prior to the agreement's completion, Canada's exports of metals and minerals to CPTPP countries were worth, on average, $6.8 billion per year. Metals and minerals exports currently face tariffs in a number of CPTPP markets, including Australia (up to 5%), Japan (up to 11.7%), Malaysia (up to 50%), New Zealand (up to 10%) and Vietnam (up to 40%). These tariffs will be fully eliminated under the CPTPP.

Trade Relations with China

China is the single largest consumer of raw materials. Recent estimates suggest that China accounts for 54% of aluminum, 48% of copper, 50% of nickel and 45% of all steel (and, therefore, a significant percentage of steelmaking coal) consumed globally. China is also a major consumer of precious metals, buying or mining 23% and 15% of the world's gold and silver supply, respectively. The country also consumes 13% of the world's uranium production, a number poised to increase given the number of nuclear reactors under construction or being commissioned.

China is Canada's third-largest market for the export of minerals and metals after the US and the European Union, with an export value exceeding $5.4 billion in 2018, or approximately 5% of our overall total.

A free-trade agreement (FTA) with China is a significant opportunity for Canada to capture greater share of Chinese market demand for raw materials but it is essential that any agreement must be developed with reciprocity. Further, Canada possesses a North American advantage in that the Ports of Metro Vancouver and Prince Rupert are, on average, three days closer to multiple Asian ports, including Chinese ports, than our American and Mexican competitors.

MERCOSUR

Mercosur is a South American sub-regional common market trade bloc whose current full members are Argentina, Brazil, Paraguay and Uruguay. On March 9th, 2018 in Asuncion, Paraguay, negotiations toward a comprehensive Canada-Mercosur FTA were launched.

MAC has supported the government's efforts to reassess the viability of a FTA with Mercosur and participated in consultations on the matter. Notably, the assets of Canadian companies operating in Brazil and Argentina account exceed $10 billion each.

Beyond investments and assets, MAC and its members are exporting best practices in mining sustainability to



Yamana workers stand at a portal into the company's El Peñón mine in Chile. The underground operation's mine life was originally estimated at five years. This year, it celebrated its twentieth anniversary.

Mercosur countries. The most significant recent example of this is in Argentina and Brazil, where the Cámara Argentina de Empresarios Mineros (CAEM) and the Instituto Brasileiro de Mineração (IBRAM) have adopted MAC's *Towards Sustainable Mining® (TSM®)* initiative, respectively. The adoption of *TSM* by these countries is an important step forward in cooperation on responsible mining standards between Canada and major mining jurisdictions in Latin America.

Pacific Alliance

The Pacific Alliance is a regional initiative created in 2011 by Chile, Colombia, Mexico and Peru that seeks the free movement of goods, services, capital and people. Each of the above countries are significant destinations for Canadian mineral investment, and closer trade-ties with this alliance is something that MAC supports.

With a combined GDP of $2.5 trillion, and 223 million inhabitants, the Pacific Alliance constitutes an important market for Canada. The Alliance's overarching goals are

to foster the free movement of goods, services, capital and people and to promote greater competitiveness and economic growth for member countries.

THE CANADIAN INVESTMENT REGIME

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.

Foreign Investment Promotion and Protection Agreements

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. At the time of writing, Canada had 38 FIPAs in force, had signed two others yet to come into force, concluded negotiations with five additional countries, and remains engaged in ongoing negotiations with 14 other countries.

While the enforcement components of FIPAs are rarely used, such as the ISDS mechanisms discussed above, the mere existence of a FIPA provides foreign governments with a set of rules and expectations for fairness and transparency and gives investors additional confidence. At the time of writing, Global Affairs Canada was reviewing their FIPA program, a component of which includes consulting with stakeholders. MAC will remain engaged in this process and underscores the importance of the continued inclusion of robust ISDS mechanisms in these agreements going forward.

Investment in Latin America

Eight of Canada's 38 active FIPAs are with Latin American countries, reflecting the industry's presence in the region, as well as the continent's mineral wealth and potential. As of 2018, Canadian companies held $74.7 billion in assets in Latin America, more than half of the total value of Canada's overseas mineral assets.

Investment in Africa

Since 2010, the Canadian government has concluded, signed or brought 12 FIPA negotiations into force with African countries. A further three FIPA negotiations are currently ongoing with African countries. In recent years, many African countries have been seeking to benefit from their natural resource endowments and have become more open to new mining investments and the expansion of existing mining projects. Some of the major resources mined in Africa are iron ore, diamonds, gold, platinum, uranium, copper and coal. As of 2017, Canadian companies held $26.3 billion in assets in Africa.

While significant opportunities for strong partnerships exist between mining companies and their host countries, challenges must be overcome to ensure projects can develop in ways that enable the host community, country and company to benefit. ■

FIGURE 33

THE GEOGRAPHICAL DISTRIBUTION OF CANADA'S MINING ASSETS, 2017

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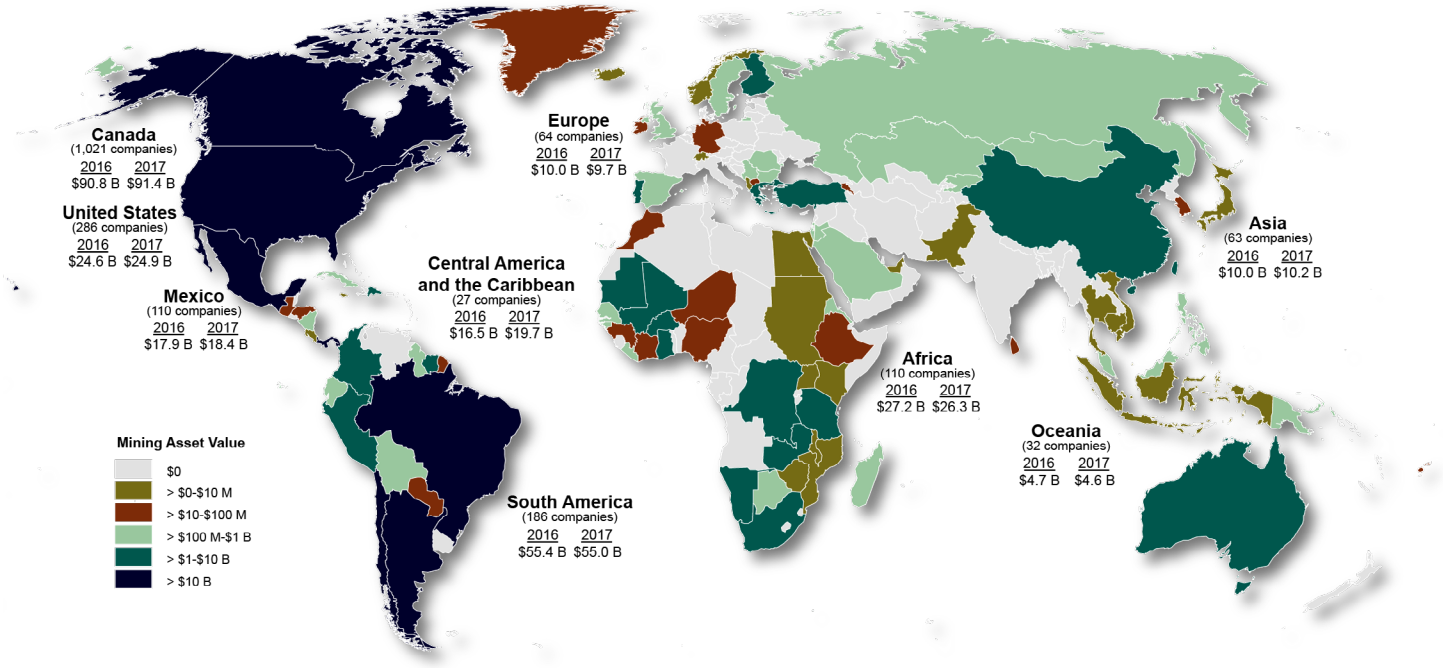

Source: Minerals and Metals Sector, Natural Resources Canada.

FIGURE 34

CANADIAN MINERAL INDUSTRY DIRECT INVESTMENT ABROAD AND FOREIGN DIRECT INVESTMENT STOCKS, 1999-2018[P]

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Year	Total, all industries		Mining (except oil and gas)		Non-metallic mineral product manufacturing		Primary metal manufacturing		Fabricated metal product manufacturing	
	Canadian direct investment abroad	Foreign direct investment in Canada	Canadian direct investment abroad	Foreign direct investment in Canada	Canadian direct investment abroad	Foreign direct investment in Canada	Canadian direct investment abroad	Foreign direct investment in Canada	Canadian direct investment abroad	Foreign direct investment in Canada
1999	290,730	252,563	23,878	5,520	3,048	4,867	9,859	3,732	4,570	2,162
2000	356,506	319,116	23,666	5,535	2,621	5,009	11,662	4,593	4,881	2,214
2001	399,253	340,429	23,666	7,122	3,257	5,425	14,393	4,266	6,091	2,468
2002	435,494	356,819	22,779	6,069	3,028	5,682	13,281	4,064	5,582	2,442
2003	412,217	373,685	22,374	5,666	2,632	6,276	x	4,428	5,464	2,681
2004	448,546	379,450	22,481	8,611	2,105	6,108	x	5,200	4,624	2,748
2005	452,195	397,828	23,025	10,291	2,237	3,659	x	4,484	4,707	2,198
2006	518,839	437,171	23,849	22,375	6,439	6,243	26,255	9,563	4,458	2,941
2007	515,294	512,266	25,045	23,502	5,590	6,525	26,438	29,126	3,251	3,125
2008	641,920	550,539	27,189	9,544	6,787	7,768	30,828	41,879	3,775	2,920
2009	630,818	573,901	38,801	12,219	6,212	8,158	24,132	37,899	3,420	2,473
2010	637,285	592,406	46,706	16,140	5,953	7,276	4,227	34,201	2,293	2,157
2011	675,020	603,455	54,541	14,701	6,384	8,067	5,636	33,784	2,262	2,968
2012	704,335	633,778	63,782	18,622	5,305	7,881	3,172	32,542	2,010	3,153
2013	778,371	688,873	77,108	21,898	5,835	7,092	4,715	27,954	2,270	3,270
2014	845,203	744,671	78,744	36,871	1,155	7,718	7,299	28,986	3,925	3,504
2015	1,043,822	782,912	82,379	21,064	2,867	8,421	4,442	14,923	3,385	2,384
2016	1,083,730	808,738	86,048	24,357	1,669	7,924	5,966	8,803	4,813	1,894
2017	1,167,243	834,757	84,813	24,545	2,869	9,007	5,428	8,662	4,234	2,382
2018[P]	1,288,869	876,856	80,479	24,503	3,225	9,440	5,822	10,554	4,742	2,951

Source: Statistics Canada, Table 36-10-0009-01, International investment position.

[P] Preliminary.

FIGURE 35

MINING COMPANY INVESTMENT IN HOST COUNTRIES - 2017

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Country	Total in-country expenditures (US$m)	Total Expenditure (US$m)[1]	As a % of total expenditures	Payments to governments (US$m)[2]	Payments to Suppliers (US$m)
Argentina Total	$726,122,821.56	$830,837,490.19	87%	$5,260,000.00	$415,068,943.13
Australia Total	$141,513,000.00	$141,513,000.00	100%	$10,928,000.00	$86,542,000.00
Bolivia Total	$58,019,394.94	$58,019,394.94	100%	$21,530,000.00	$17,069,864.70
Brazil Total	$556,220,000.00	$664,520,000.00	84%	$5,320,000.00	$474,500,000.00
Burkina Faso Total	$290,702,560.48	$440,362,560.48	66%	$56,260,000.00	$192,214,625.19
Canada Total	$3,889,418,621.53	$4,085,701,002.90	95%	$334,944,284.00	$2,427,537,282.77
Chile Total	$336,741,001.00	$344,771,001.00	98%	$20,356,666.00	$249,924,335.00
Dominican Republic Total	$392,099,378.77	$608,598,757.55	64%	$53,650,000.00	$181,860,000.00
Finland Total	$239,068,983.23	$253,158,116.00	94%	$16,610,000.00	$190,101,197.23
Ghana Total	$238,580,000.00	$304,780,000.00	78%	$30,080,000.00	$154,500,000.00
Greece Total	$220,747,274.02	$245,725,451.22	90%	$330,000.00	$177,287,390.29
Guatamala Total	$59,955,033.29	$65,398,908.00	92%	$12,881,503.00	$29,268,171.55
Mauritania Total	$271,000,000.00	$660,150,000.00	41%	$13,200,000.00	$215,600,000.00
Mexico Total	$2,742,143,948.72	$2,935,836,911.09	93%	$16,030,000.00	$1,435,183,092.03
Papua New Guinea Total	$256,203,000.00	$376,701,000.00	68%	$3,180,000.00	$74,532,250.00
Peru Total	$621,024,556.67	$636,686,740.67	98%	$29,740,000.00	$456,328,872.66
Romania Total	$21,507,800.57	$24,899,305.71	86%	$230,000.00	$19,085,025.78
Russia Total	$461,520,000.00	$526,820,000.00	88%	$163,620,000.00	$208,200,000.00
Saudi Arabia Total	$127,035,000.00	$143,570,000.00	88%	$-	$63,515,000.00
Suriname Total	$281,936,421.00	$407,655,362.10	69%	$100,290,000.00	$145,000,000.00
Turkey Total	$258,362,000.00	$292,392,000.00	88%	$38,850,000.00	$185,950,000.00
USA Total	$3,627,901,714.00	$3,703,106,714.00	98%	$520,591,000.00	$2,211,464,500.00
Zambia Total	$745,720,000.00	$851,780,000.00	88%	$62,740,000.00	$559,210,000.00
Totals	**$16,563,542,509.79**	**$18,602,983,715.85**	**112%**	**$1,516,621,453.00**	**$10,169,942,550.33**

Source: Mining Association of Canada.
Note:
[1] Includes in-jurisdiction payments to providers of capital.
[2] Includes royalties and land use, income and other taxes, employee taxes, other payments.
[3] Contractor salaries are included as payments to suppliers.
** Information not available.*

FIGURE 35 CONTINUED
MINING COMPANY INVESTMENT IN HOST COUNTRIES - 2017

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Country	Payments to employees	Communities (US$m)	Payments to providers of capital	Total mineral revenue	Number of employees and contractors[3]
Argentina Total	$244,119,811.44	$3,161,352.00	0	$22,178,000,000.00	6,429
Australia Total	$43,955,000.00	$88,000.00	0	$170,500,000.00	329
Bolivia Total	$19,419,530.24	$-	0	$85,887,382.53	596
Brazil Total	$75,000,000.00	$1,400,000.00	0	$447,000,000.00	3,709
Burkina Faso Total	$42,000,000.00	$227,935.29	0	$547,300,000.00	3,234
Canada Total	$1,115,081,758.76	$11,855,296.00	$5,960.80	$4,375,887,837.00	13,673
Chile Total	$64,700,000.00	$1,760,000.00	0	$52,000,000.00	2,787
Dominican Republic Total	$58,974,000.00	$1,614,000.00	0	$1,419,353,915.00	4,793
Finland Total	$31,777,000.00	$580,786.00	0	$249,300,000.00	957
Ghana Total	$53,100,000.00	$900,000.00	0	$317,600,000.00	1,899
Greece Total	$41,252,508.76	$1,877,374.97	0	$53,481,725.04	492
Guatamala Total	$13,666,259.74	$4,139,099.00	0	$87,011,504.00	559
Mauritania Total	$40,400,000.00	$1,800,000.00	0	$298,400,000.00	4,917
Mexico Total	$1,075,032,571.69	$4,812,100.00	0	$2,414,181,486.50	2,950
Papua New Guinea Total	$178,068,000.00	$422,750.00	0	$-	2,862
Peru Total	$80,296,484.01	$8,909,200.00	0	$1,019,715,024.89	2,849
Romania Total	$2,036,780.73	$155,994.06	0	$-	318
Russia Total	$88,900,000.00	$800,000.00	0	$726,900,000.00	2,620
Saudi Arabia Total	$63,515,000.00	$5,000.00	0	$371,000,000.00	216
Suriname Total	$35,846,421.00	$800,000.00	0	$385,610,000.00	1,709
Turkey Total	$32,690,000.00	$872,000.00	0	$337,900,000.00	1,609
USA Total	$894,420,514.00	$1,425,700.00	0	$1,676,800,000.00	9,858
Zambia Total	$120,950,000.00	$2,820,000.00	0	$-	4,211
Totals	**$4,415,201,640.37**	**$50,426,587.32**	**$5,960.80**	**$37,213,828,874.96**	**73,576**

Source: Mining Association of Canada.
Note:
[1] Includes in-jurisdiction payments to providers of capital.
[2] Includes royalties and land use, income and other taxes, employee taxes, other payments.
[3] Contractor salaries are included as payments to suppliers.
** Information not available.*

FIGURE 36
BALANCE OF CANADA'S MINERAL TRADE, 2018

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Stage	Domestic Exports ($000)	Total Exports ($000)	Total Imports ($000)	Balance of Trade ($000)
Stage 1	34,271,564	34,356,595	9,476,017	24,880,578
Stage 2	36,710,733	36,826,729	14,357,508	22,469,221
Stage 3	18,462,092	19,484,985	24,386,789	-4,901,804
Stage 4	15,137,888	17,719,336	39,058,741	-21,339,405
Total	**104,582,277**	**108,387,645**	**87,279,055**	**21,108,590**

Sources: Natural Resouces Canada; Statistics Canada.
Notes: Total exports represents the sum of domestic exports and re-exports. Re-exports are the goods of foreign origin that have not been materially transformed in Canada. This includes foreign goods withdrawn for export from bonded customs warehouses. Totals may not add due to rounding. As of 2014, Natural Resources Canada no longer includes nitrogen within the minerals and metals trade statistics. Historical data have been revised to reflect this change.

FIGURE 37
VALUE OF CANADA'S MINING AND MINERAL PROCESSING INDUSTY TRADE, 2003-2018

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Year	Domestic Exports ($ billions)	Total Exports ($ billions)	Imports ($ billions)	Balance of Trade ($ billions)
2003	45.6	47.0	45.0	2.1
2004	53.7	55.5	51.9	3.6
2005	61.0	63.2	56.3	6.8
2006	71.4	74.2	61.6	12.5
2007	80.1	83.6	62.2	21.4
2008	90.2	93.0	68.7	24.3
2009	62.7	65.0	54.7	10.3
2010	80.2	83.2	66.1	17.1
2011	95.9	100.3	76.7	23.6
2012	88.1	91.1	75.5	15.6
2013	86.9	90.0	73.4	16.6
2014	89.6	93.2	79.9	13.4
2015	92.0	96.2	80.9	15.3
2016	88.7	92.9	77.0	15.9
2017	97.5	101.5	81.6	19.9
2018	104.6	108.4	87.3	21.1

Sources: Natural Resouces Canada; Statistics Canada.
Notes: Total exports represents the sum of domestic exports and re-exports. Re-exports are the goods of foreign origin that have not been materially transformed in Canada. This includes foreign goods withdrawn for export from bonded customs warehouses. Totals may not add due to rounding. As of 2014, Natural Resources Canada no longer includes nitrogen within the minerals and metals trade statistics. Historical data have been revised to reflect this change.

ANNEX 1

PRODUCING MINES IN CANADA, 2018

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COMPANY	MINE SITE	ACTIVITY TYPE	LOCATION	COMMODITY
Newfoundland & Labrador				
Rambler Metals and Mining PLC	Nugget Pond	(C.)	Snook's Arm	Cu, Au
Rambler Metals and Mining PLC	Ming	(U.)	Baie Verte	Cu, Au, Ag, Zn
Anaconda Mining Inc.	Point Rousse	(P., C.)	Baie Verte	Au
Vale Newfoundland and Labrador Limited	Voisey's Bay	(P., C.)	Voisey's Bay	Ni, Cu, Co
Iron Ore Company of Canada (IOC)	Carol Lake	(P., C.)	Labrador City	Fe
Atlantic Minerals Limited	Lower Cove	(P.)	Lower Cove	Limestone, dolomite
Tata Steel Minerals Canada	DSO	(P.)	Schefferville	Fe
Canada Fluorspar Inc	St. Lawrence	(P., C.)	St. Lawrence	Fluorspar
Nova Scotia				
Nova Scotia Power Inc.	Glen Morrison	(P.)	Cape Breton	Limestone
Antigonish Limestone Ltd.	Southside Antigonish Harbour	(P.)	Southside Antigonish Harbour	Limestone
Mosher Limestone Company Limited	Upper Musquodoboit	(P.)	Upper Musquodoboit	Limestone, gypsum
Lafarge Canada Inc.	Brookfield	(P., Plant)	Brookfield	Limestone
National Gypsum (Canada) Ltd.	East Milford	(P.)	Milford	Gypsum
The Canadian Salt Company Limited	Pugwash	(U.)	Pugwash	Salt
Compass Minerals Canada Corporation	Amherst (Nappan)	(Solution mining)	Nappan	Salt
Pioneer Coal Ltd.	Stellarton	(P.)	Stellarton	Coal (thermal)
Maritime Dufferin Gold Corp.	Dufferin	(P., C.)	Port Dufferin	Au
Atlantic Gold Corp.	Moose River Consolidated	(P., C.)	Upper Musquodoboit	Gold
Kameron Collieries ULC	Donkin	(U.)	Cape Breton	Coal (metallurgical, thermal)
Kameron Collieries ULC	Donkin	(U.)	Cape Breton	Coal (metallurgical, thermal)
New Brunswick				
Graymont Inc.	Havelock	(P., Plant)	Havelock	Lime, limestone
Brookville Manufacturing Company	Brookville	(P., Plant)	Saint John	Dolomitic lime
Elmtree Resources Ltd.	Sormany	(P., Plant)	Sormany	Limestone
Trevali Mining Corp.	Caribou	(P., U., C.)	Bathurst	Zn, Pb, Ag, Cu, Au
Quebec				
ArcelorMittal Mines Canada Inc.	Mont-Wright	(P., C.)	Fermont	Fe
ArcelorMittal Mines Canada Inc.	Fire Lake	(P.)	Fermont	Fe
Magris Resources Inc.	Niobec	(U., C.)	Saint-Honoré-de-Chicoutimi	Nb
Glencore Canada Corporation	Raglan	(U., C.)	Katinniq	Ni, Cu, Co, PGM
Tata Steel Minerals Canada Limited	DSO Goodwood	(Fe)	Schefferville	Fe
Canadian Royalties Inc.	Nunavik	(P., U., C.)	Kangiqsujuaq	Ni, Cu, Co, PGM
Goldcorp Inc.	Éléonore	(U., C.)	Opinaca Reservoir	Au
Metanor Resources Inc.	Bachelor Lake	(U., C.)	Desmaraisville	Au, Ag
Nystar NV	Langlois	(U., C.)	Lebel-sur-Quévillon	Zn, Cu, Au, Ag
Monarques Gold Corp.	Beaufor	(U.)	Val-d'Or	Au, Ag
Glencore Canada Corporation	Bracemac-McLeod	(U., C.)	Matagami	Zn, Cu, Au, Ag
Agnico Eagle Mines Limited	Goldex	(U., C.)	Val-d'Or	Au, Ag
Monarques Gold Corp.	Camflo	(C.)	Malartic	Au, Ag
Agnico Eagle Mines Limited and Yamana Gold Inc.	Canadian Malartic	(P., C.)	Malartic	Au, Ag
Agnico Eagle Mines Limited	Lapa	(U.)	Rivière-Héva	Au

COMPANY	MINE SITE	ACTIVITY TYPE	LOCATION	COMMODITY
Agnico Eagle Mines Limited	LaRonde	(U., C.)	Preissac	Au, Zn, Cu, Pb, Ag
IAMGOLD Corporation	Westwood-Doyon	(U., C.)	Cadillac	Au, Cu, Ag, Zn
Hecla Mining Company	Casa Berardi	(U., C.)	north of La Sarre, Casa Berardi Twp.	Au, Ag
K+S Windsor Salt Ltd	Seleine	(U.)	Îles-de-la-Madeleine	Salt
Le Groupe Berger Ltée	Saint-Modeste	(P.)	Saint-Modeste	Vermiculite, perlite
Graymont Inc.	Marbleton	(P., Plant)	Marbleton	Limestone, lime
Graymont Inc.	Bedford	(P., Plant)	Bedford	Limestone, lime
OMYA (Canada) Inc.	Saint-Armand	(P., Plant)	Saint-Armand	Calcium carbonate
CRH plc	Joliette	(P., Plant)	Joliette	Limestone
Graymont Inc.	Joliette	(P., Plant)	Joliette	Lime, limestone
Imerys Mica Suzorite, Inc.	Lac Letondal	(P.)	Parent, Suzor Twp.	Mica
Imerys Graphite and Carbon	Lac-des-Îles	(P., Plant)	Saint-Aimé-du-Lac-des-Îles	Graphite
Abcourt Mines Inc.	Sleeping Giant	(C.)	north of Amos	Au, Ag
Abcourt Mines Inc.	Elder	(U.)	Rouyn-Noranda	Au, Ag
Ciment Québec inc.	Quebec	(P., Plant)	Québec City	Limestone
Ciment Québec inc.	Saint-Basile	(P., Plant)	Saint-Basile	Limestone
Graymont Inc.	Les Carrières Calco	(P., Plant)	St-Marc-des-Carrières	Calcium carbonate
Stornoway Diamond Corporation	Renard	(P., U., C.)	Mistissini	Diamonds
Carrière d'Acton Vale ltée	Acton Vale	(P., Plant)	Acton Vale	Calcium carbonate
Lafarge Canada Inc.	St-Constant	(P., Plant)	St-Constant	Limestone
Demix Agrégats	Laval	(P., Plant)	Laval	Limestone
Ciment Québec inc.	Laval	(P., Plant)	Laval	Limestone
Colacem Canada inc.	Kilmar	(P., Plant)	Calumet	Limestone
Ressources Nottaway Inc.	Vezza	(U.)	north of Amos	Au, Ag
North American Lithium	La Corne	(P)	La Corne	Li
Champion Irons Ltd	Bloom Lake	(P)	Fermont	Fe
Ontario				
Detour Gold Corporation	Detour Lake	(P., C.)	Matagami	Au
Kirkland Lake Gold Ltd.	Holt	(U., C.)	Timmins	Au
Kirkland Lake Gold Inc.	Macassa	(U., C.)	Kirkland Lake area	Au, Ag
McEwen Mining Inc.	Black Fox	(P., U., C.)	Matheson	Au
Kirkland Lake Gold Inc.	Taylor	(U.)	Cochrane	Au
Alamos Gold Inc.	Young-Davidson	(U., C.)	Kirkland Lake area	Au
Glencore Canada Corporation	Nickel Rim South	(U.)	Sudbury	Ni, Cu, Co, PGM, Au
Vale Canada Limited	Garson	(U.)	Sudbury	Ni, Cu, Co, PGM, Au, Ag, Se, Te
Vale Canada Limited	Clarabelle	(C.)	Sudbury	Ni, Cu, Co, PGM, Au, Ag, Se, Te
Vale Canada Limited	Copper Cliff North	(U.)	Sudbury	Ni, Cu, Co, PGM, Au, Ag, Se, Te
Goldcorp Inc.	Hoyle Pond	(U.)	south of Porcupine	Au
Tahoe Resources Inc.	Bell Creek	(U., C.)	Timmins	Au
Vale Canada Limited	Creighton	(U.)	Sudbury	Ni, Cu, Co, PGM, Au, Ag, Se, Te
Goldcorp Inc.	Hollinger	(P.)	Timmins	Au
Vale Canada Limited	Coleman/McCreedy East	(U.)	Sudbury	Ni, Cu, Co, PGM, Au, Ag, Se, Te
Glencore Canada Corporation	Fraser	(U.)	Sudbury	Ni, Cu, Co, PGM
Glencore Canada Corporation	Strathcona	(C.)	Sudbury	Ni, Cu, Co, PGM, Au, Ag, Se, Te
Glencore Canada Corporation	Strathcona	(C.)	Sudbury	Ni, Cu, Co, PGM, Au, Ag, Se, Te
Glencore Canada Corporation	Kidd Creek	(U., C.)	Timmins	Cu, Zn, Ag, Se, Te, In, Cd

COMPANY	MINE SITE	ACTIVITY TYPE	LOCATION	COMMODITY
Vale Canada Limited	Totten	(U.)	Worthington	Ni, Cu, Co, PGM, Au
Tahoe Resources Inc.	Timmins West	(U.)	Timmins	Au
Alamos Gold Inc.	Island Gold	(U., C.)	Dubreuilville	Au
Wesdome Gold Mines Ltd.	Mishi	(P., C.)	Timmins	Au
Wesdome Gold Mines Ltd.	Eagle River	(U., C.)	Wawa	Au
Barrick Gold Corporation	Hemlo (Williams)	(P., U., C.)	Marathon	Au
North American Palladium Ltd.	Lac des Iles	(P., U., C.)	Thunder Bay	PGM, Ni, Au, Cu, Co
Goldcorp Inc.	Musselwhite	(U., C.)	Thunder Bay	Au, Ag
Goldcorp Inc.	Red Lake	(U., C.)	Balmertown	Au, Ag
Canadian Wollastonite	St. Lawrence	(P.)	Kingston	Wollastonite
OMYA (Canada) Inc.	Tatlock	(P.)	Tatlock	Calcium carbonate
Lafarge Canada Inc.	Bath	(P.)	Bath	Limestone
ESSROC Canada Inc.	Picton	(P.)	Picton	Limestone
CRH plc	Ogden Point	(P.)	Ogden Point	Limestone
Unimin Canada Ltd.	Blue Mountain	(P., Plant)	Blue Mountain	Nepheline syenite
St. Marys CBM (Canada) Inc.	Bowmanville	(P.)	Bowmanville	Limestone
CGC Inc.	Hagersville	(U., Plant)	Hagersville	Gypsum
E.C. King Contracting Ltd. (Miller Paving Co.)	Owen Sound	(P.)	Owen Sound	Dolomitic lime
MarFred Minerals Ltd.	Tracey Lake	(U.)	North Williams	Barite
St Marys CBM (Canada) Inc.	St Marys	(P.)	St. Marys	Limestone
Compass Minerals Canada Corporation	Goderich	(U., Plant)	Goderich	Salt
IMERYS Talc	Penhorwood	(P.)	Penhorwood	Talc
K+S Windsor Salt Ltd.	Windsor	(solution mining)	Windsor	Salt
K+S Windsor Salt Ltd.	Ojibway	(U.)	Windsor	Salt
De Beers Canada Inc.	Victor	(P., Plant)	James Bay Lowlands	Diamonds
Miller Minerals (Miller Paving Co.)	Bucke	(P.)	New Liskeard	Limestone
Carmeuse Lime (Canada) Limited	Dundas	(P.)	Dundas	Dolomitic lime
Lafarge Canada Inc.	Dundas	(P.)	Dundas	Limestone
Carmeuse Lime (Canada) Limited	Beachville	(P., Plant)	Ingersoll	Limestone, lime
Compass Minerals Canada Corporation	Goderich	(solution mining)	Goderich	Salt
Boreal Agrominerals Inc.	Spanish River Carbonite	(P.)	northwest of Sudbury	Vermiculite
Lafarge Canada Inc.	Meldrum Bay	(P., Plant)	Manitoulin Island	Limestone, dolomite
New Gold Inc.	Rainy River	(P., U., C.)	Fort Frances	Au, Ag, Ni, Cu, Co
KGHM Polska Miedz S.A	Morrison	(U)	Sudbury	Cu, Ni
Harte Gold Corp	Sugar Zone	(U., C.)	White River	Au
Manitoba				
Tantalum Mining Corporation of Canada Limited	Tanco	(U., C.)	Lac-du-Bonnet	Cs
Vale Canada Limited	Thompson	(P., U., C.)	Thompson	Ni, Cu, Co, PGM
HudBay Minerals Inc.	Snow Lake	Cu, Zn, Au, Ag	Snow Lake	Cu, Zn
HudBay Minerals Inc.	Lalor Lake	(U.)	Snow Lake	Cu, Zn, Au, Ag
HudBay Minerals Inc.	Reed	Cu, Zn, Au, Ag	Snow Lake	Cu, Zn
HudBay Minerals Inc.	777	(U.)	Flin Flon	Cu, Zn, Au, Ag
HudBay Minerals Inc.	Flin Flon	Cu, Zn, Au, Ag	Flin Flon	Cu, Zn
Graymont Inc.	Faulkner	(P., Plant)	Faulkner	Limestone, lime
CertainTeed Gypsum Canada, Inc.	Amaranth	(P.)	Harcus	Gypsum
ERCO Worldwide	Hargrave	(U., Plant)	Virden	Sodium chlorate

COMPANY	MINE SITE	ACTIVITY TYPE	LOCATION	COMMODITY
Saskatchewan				
SSR Mining Inc.	Santoy	(U.)	Santoy Lake	Au
SSR Mining Inc.	Seabee	(U., C.)	Laonil Lake	Au, Ag
Cameco Corporation	Cigar Lake	(U.)	Wollaston Lake	U
Cameco Corporation	McArthur River	(U.)	north of Key Lake	U
Cameco Corporation	Key Lake	(C.)	north of Highrock Lake	U
Potash Corporation of Saskatchewan Inc.	Rocanville	(U., Plant)	Rocanville	Potash
The Mosaic Company	Esterhazy (K-1 and K-2)	(U., Plant)	Esterhazy	Potash, salt
Compass Minerals Canada Corporation	Wynyard (Big Quill)	(P., U., Plant)	Wynyard	Potassium sulphate
The Mosaic Company	Belle Plaine	(U., Plant)	Belle Plaine	Potash, salt
Potash Corporation of Saskatchewan Inc.	Lanigan	(U.)	Lanigan	Potash
The Mosaic Company	Colonsay	(U., Plant)	Colonsay	Potash, salt
Potash Corporation of Saskatchewan Inc.	Allan	(U., Plant)	Allan	Potash
Potash Corporation of Saskatchewan Inc.	Patience Lake	(U., Plant)	Blucher	Potash
Saskatchewan Mining and Minerals Inc.	Chaplin Lake	(P., Plant)	Chaplin	Sodium sulphate
Potash Corporation of Saskatchewan Inc.	Cory	(U., Plant)	Cory	Potash
Agrium Inc.	Vanscoy	(U., Plant)	Vanscoy	Potash, salt
Compass Minerals Canada Corporation	Unity	(solution mining)	Unity	Salt
Westmoreland Coal Company	Estevan	(P.)	Bienfait	Coal (thermal)
Westmoreland Coal Company	Poplar River	(P.)	Coronach	Coal (thermal)
K+S Potash Canada	Bethune	(U., Plant)	Bethune	Potash
Alberta				
K+S Windsor Salt Ltd	Lindbergh	(solution mining)	Elk Point	Salt
Hammerstone Corporation	Steepbank	(P.)	north of Fort McMurray	Limestone
Hammerstone Corporation	Muskeg Valley	(P.)	north of Fort McMurray	Limestone
Rio Petro Ltd.	Sunnynook	(solution mining)	Cessford	Salt
Suncor Energy Inc.	Fort McMurray West	(P.)	Fort McMurray	Limestone
Calcium Incorporated	Calling Lake	(solution mining)	Calling Lake	Salt
Tiger Calcium Services Inc.	Mitsue	(solution mining)	Slave Lake	Salt
Graymont Inc.	Summit	(P., Plant)	Coleman	Limestone, lime
Graymont Inc.	Exshaw (Gap)	(P., Plant)	Exshaw	Limestone, lime
Lafarge Canada Inc.	Exshaw	(P., Plant)	Exshaw	Limestone
Burnco Rock Products Ltd.	Clearwater	(P., Plant)	Clearwater River	Limestone
Lehigh Cement Company	Mcleod	(P.)	Cadomin	Limestone
Westmoreland Coal Company	Sheerness	(P.)	Hanna	Coal (thermal)
Westmoreland Coal Company	Paintearth	(P.)	Forestburg	Coal (thermal)
Westmoreland Coal Company	Genesee	(P.)	Genesee	Coal (thermal)
Transalta Corporation	Highvale	(P.)	Seba Beach	Coal (thermal)
Westmoreland Coal Company	Coal Valley	(P.)	Edson	Coal (thermal)
Teck Resources Limited	Cardinal River (Cheviot)	(P.)	Hinton	Coal (metallurgical)
Suncor Energy Inc.	Millennium and Steepbank	(P.)	Fort McMurray	Upgraded crude oil
Shell Canada Energy	Jackpine	(P.)	Fort MacKay	Upgraded crude oil
Syncrude Canada Ltd.	Aurora North and South	(P.)	Fort MacKay	Upgraded crude oil
Syncrude Canada Ltd.	Mildred Lake	(P.)	Fort MacKay	Upgraded crude oil
Shell Canada Energy	Muskeg River	(P.)	Fort MacKay	Upgraded crude oil
Canadian Natural Resources Ltd.	Horizon	(P.)	Fort MacKay	Upgraded crude oil
Imperial Oil	Kearl	(P.)	Fort McMurray	Upgraded crude oil

COMPANY	MINE SITE	ACTIVITY TYPE	LOCATION	COMMODITY
British Columbia				
New Gold Inc.	New Afton	(U., C.)	Kamloops	Au, Ag, Cu
Copper Mountain Mining Corporation	Copper Mountain	(P., C.)	Princeton	Cu, Au, Ag
Teck Resources Limited	Highland Valley Copper	(P., C.)	Logan Lake	Cu, Mo
Imperial Metals Corporation	Mount Polley	(P., C.)	northeast of Williams Lake	Au, Cu
Taseko Mines Limited	Gibraltar	(P., C.)	north of Williams Lake	Cu, Mo
Centerra Gold Inc.	Mt Milligan	(P., C.)	Fort St. James	Cu, Au
Imperial Metals Corporation	Red Chris	(P.)	Kinaskan Lake	Au, Ag, Cu
Georgia-Pacific Canada, Inc.	4J	(P.)	Canal Flats	Gypsum
Baymag Inc.	Mount Brussilof	(P.)	Mount Brussilof	Magnesite (fused), magnesia (products)
CertainTeed Gypsum Canada, Inc.	Elkhorn	(P.)	Windermere	Gypsum
Lafarge Canada Inc.	Falkland	(P., Plant)	Falkland	Gypsum
Absorbent Products Ltd.	Bud	(P.)	Princeton	Calcium, clay
Absorbent Products Ltd.	Red Lake	(P.)	Kamloops	Diatomite, bentonite, leonardite
Imperial Limestone Co. Ltd.	Van Anda	(P.)	Texada Island	Limestone
Texada Quarrying Ltd. (Lafarge Canada Inc.)	Texada	(P.)	Texada Island	Limestone
Fireside Minerals Ltd.	Fireside	(P.)	Fireside	Barite
Teck Resources Limited	Coal Mountain	(P.)	Sparwood	Coal (metallurgical, thermal)
Teck Resources Limited	Line Creek	(P.)	Sparwood	Coal (metallurgical, thermal)
Teck Resources Limited	Elkview	(P.)	Sparwood	Coal (metallurgical)
Teck Resources Limited	Fording River	(P.)	Elkford	Coal (metallurgical)
Teck Resources Limited	Greenhills	(P.)	Sparwood	Coal (metallurgical)
Conuma Coal Resources Ltd.	Brule	(P.)	Tumbler Ridge	Coal (metallurgical)
Conuma Coal Resources Ltd.	Willowcreek	(P.)	Chetwynd	Coal (metallurgical)
Pretium Resources Inc.	Brucejack	(U., C.)	Stewart	Au, Ag
Conuma Coal Resources Ltd.	Wolverine	(P., U.)	Tumbler Ridge	Coal (metallurgical)
Coeur Mining	Silvertip	(P., U.)	Liard	Ag, Pb, Zn
Quinsam Coal Resources	Quinsam	(U)	Campbell River	Coal (thermal)
Yukon				
Capstone Mining Corporation	Minto	(P., U., C.)	Pelly Crossing	Cu, Au, Ag
Northwest Territories				
Diavik Diamond Mines Inc.	Diavik	(U., Plant)	Lac de Gras	Diamonds
Dominion Diamond Corporation	Ekati	(U., Plant)	Lac de Gras	Diamonds
De Beers Canada Inc.	Gahcho Kue	(P., Plant)	Lac de Gras	Diamonds
Nunavut				
Baffinland Iron Mines Corporation	Mary River	(P.)	Pond Inlet	Fe
Agnico Eagle Mines Ltd.	Meadowbank	(P., C.)	Baker Lake	Au
TMAC Resources Inc.	Hope Bay	(U., C.)	Cambridge Bay	Au

Source: Natural Resources Canada.
(P.) Open-Pit, (U.) Underground, (C.) Concentrator
Note: Excluded operations are clay products, peat, and most construction materials (most stone, sand and gravel). Included are operations that produced during 2018.

ANNEX 2

MINING ESTABLISHMENTS IN CANADA, BY MINERAL, PROVINCE OR TERRITORY, 2017

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	NL	PE	NS	NB	QC	ON	MB	SK	AB	BC	YT	NT	NV	TOTAL
Metals														
Iron Ore	2	-	-	-	1	-	-	-	-	-	-	-	1	4
Gold & Silver Ore	1	-	-	-	12	13	1	1	-	-	-	-	1	29
Lead-zinc ore	-	-	-	1	-	-	-	-	-	-	-	-	-	1
Nickel-copper ore	1	-	-	-	2	3	1	-	-	-	-	-	-	7
Copper, copper-zinc ore	1	-	-	-	2	1	1	-	-	7	1	-	-	13
Uranium	-	-	-	-	-	-	-	4	-	-	-	-	-	4
Other Metals	-	-	-	-	3	1	1	-	-	-	-	-	-	5
TOTAL METALS	**5**	**-**	**-**	**1**	**20**	**18**	**4**	**5**	**-**	**7**	**1**	**-**	**2**	**63**
Non-metals														
Diamonds	-	-	-	-	1	1	-	-	-	-	-	4	-	6
Gypsum	-	-	-	-	-	-	-	-	-	1	-	-	-	1
Peat	1	1	1	20	16	-	5	1	4	1	-	-	-	50
Potash	-	-	-	-	-	-	-	10	-	-	-	-	-	10
Salt	-	-	2	-	1	4	-	3	2	-	-	-	-	12
Sand and gravel	1	1	2	12	65	225	14	60	163	85	1	-	-	629
Stone	2	-	14	9	95	106	8	-	20	17	-	-	-	271
Shale, Clay and other refractory minerals	-	-	1	-	3	2	-	-	1	2	-	-	-	9
Other nonmetals	-	-	-	-	3	2	-	1	-	3	-	-	-	9
Total Nonmetals	**4**	**2**	**20**	**41**	**184**	**340**	**27**	**75**	**190**	**109**	**1**	**4**	**-**	**997**

Sources: Natural Resources Canada; Statistics Canada.
- Nil

ANNEX 3

CANADIAN PRODUCTION OF LEADING MINERALS BY PROVINCE AND TERRITORY, 2018[P]

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	GOLD		COAL		COPPER		POTASH (K_2O)[1]		IRON ORE	
	KILOGRAMS	$000	KILOTONNES	$000	TONNES	$000	KILOTONNES	$000	KILOTONNES	$000
Newfoundland	727	38,071			27,456	230,463			15,748	1,782,996
Prince Edward Island										
Nova Scotia	2,392	125,306	x	x						
New Brunswick					487	4,086				
Quebec	61,694	3,232,336			35,912	301,446			31,692	2,454,755
Ontario	77,681	4,069,964			135,297	1,135,681				
Manitoba	3,808	199,515			33,608	282,103				
Saskatchewan	2,710	141,985	x	x			13,835	5,494,347		
Alberta	42	2,179	x	x						
British Columbia	20,135	1,054,907	x	x	293,468	2,463,367				
Yukon	2,500	130,960			9,282	77,914				
Northwest Territories										
Nunavut	11,359	595,134							4,947	563,981
Canada	**183,047**	**9,590,356**	**54,326**	**6,408,441**	**535,509**	**4,495,060**	**13,835**	**5,494,347**	**52,387**	**4,801,732**

	NICKEL		DIAMONDS		SAND AND GRAVEL[2]		STONE		ZINC	
	TONNES	$000	000 CARATS	$000	KILOTONNES	$000	KILOTONNES	$000	TONNES	$000
Newfoundland	37,651	636,412			x	x	4,714	29,303		
Prince Edward Island					x	x	x	x		
Nova Scotia					4,488	31,680	9,603	103,702		
New Brunswick					1,855	10,180	7,433	60,898	28,788	109,022
Quebec	54,577	922,508	1,204	133,934	18,387	112,851	52,544	608,914	75,400	285,541
Ontario	65,710	1,110,701	915	504,640	80,974	650,614	62,778	642,508	61,766	233,906
Manitoba	17,823	301,266			12,989	95,957	8,154	85,020	100,611	381,013
Saskatchewan					x	x				
Alberta					54,500	598,560	x	x		
British Columbia					x	x	13,259	118,905		
Yukon					x	x	x	x		
Northwest Territories			21,121	2,097,170	x	x	x	x		
Nunavut										
Canada	**175,761**	**2,970,887**	**23,240**	**2,735,744**	**216,707**	**1,938,308**	**166,488**	**1,715,395**	**266,565**	**1,009,482**

Sources: Natural Resources Canada; Statistics Canada.
[P] Preliminary; - Nil; x Confidential.
[1] Excludes shipments to Canadian potassium sulphate plants.
[2] Mineral production of sand and gravel for Nunavut is included in totals for the Northwest Territories.
Note: As of reference year 2017, Statistics Canada has ceased the collection of the cement data.

ANNEX 4

CANADA'S WORLD ROLE AS A PRODUCER OF CERTAIN IMPORTANT MINERALS, 2018[P]

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		WORLD	RANK OF FIVE LEADING COUNTRIES				
			1	2	3	4	5
			Canada	Russia	Belarus	China	Germany
Potash (K_2O equivalent)	000 t	42,000	12,000	7,300	7,100	5,510	2,700
(mine production)	% of world total		28.6	17.4	16.9	13.1	6.4
Tied with Russia			Canada	Russia	Botswana	Angola	South Africa
Gemstones	000 t	87,000	23,000	23,000	16,000	8,500	7,700
	% of world total		26.4	26.4	18.4	9.8	8.9
Tied with China			Canada	China	Australia	Mozambique	S. Africa
Titanium concentrate	000 t	5,400	850	850	700	600	500
(Ilmenite)	% of world total		15.7	15.7	13.0	11.1	9.3
			Kazakhstan	Canada	Australia	Namibia	Niger
Uranium (metal content) (2017)	t	59,462	23,321	13,116	5,882	4,224	3,449
(mine production)	% of world total		39.2	22.1	9.9	7.1	5.8
			Brazil	Canada			
Niobium (mine production)	t	68,000	60,000	7,000			
	% of world total		88.2	10.3			
			South Africa	Russia	Canada	Zimbabwe	United States
Platinum group metals	kg	370,000	178,000	106,000	26,500	26,000	18,100
(metal content)	% of world total		48.1	28.6	7.2	7.0	4.9
			China	South Korea	Canada	Japan	France
Indium	000 t	750	300	230	70	70	50
	% of world total		40.0	30.7	9.3	9.3	6.7
Ukraine tied with Mozambique			China	Russia	Canada	India	Mozambique
Graphite	000 t	930	630	95	40	35	20
	% of world total		67.7	10.2	4.3	3.8	2.2
			Russia	Botswana	Canada	South Africa	Angola
Diamonds (precious)	000 carats	148,430	43,161	24,378	23,194	9,908	8,409
	% of world total		29.1	16.4	15.6	6.7	5.7

			RANK OF FIVE LEADING COUNTRIES				
		WORLD	1	2	3	4	5
			China	Russia	India	Canada	UAE
Aluminum (primary metal)	000 t	60,000	33,000	3,700	3,700	2,900	2,600
	% of world total		55.0	6.2	6.2	4.8	4.3
			China	South Korea	Japan	Canada	Kazakhstan
Cadmium (metal)	t	26,000	8,200	5,600	22,100	1,800	1,500
	% of world total		31.5	21.5	85.0	6.9	5.8
			China	United States	India	Canada	Germany
Salt (mine production)	000 t	300,000	68,000	42,000	29,000	13,000	13,000
	% of world total		22.7	14.0	9.7	4.3	4.3
			China	United States	Russia	S. Arabia	Canada
Sulphur, elemental	000 t	80,000	17,000	9,700	7,100	6,000	5,500
(mine production)	% of world total		21.3	12.1	8.9	7.5	6.9
			China	Australia	Russia	United States	Canada
Gold (mine production)	t	3,260	400	310	295	210	185
	% of world total		12.3	9.5	9.0	6.4	5.7
			China	Finland	United States	Madagascar	Canada
Mica (natural)	000 t	340	80	55	44	23	22
	% of world total		23.5	16.2	12.9	6.8	6.5
Canada 6th			Indonesia	Philippines	Russia	New Caledonia	Australia
Nickel (mine production)	000 t	2,300	560	340	210	210	170
	% of world total		24.3	14.8	9.1	9.1	7.4
Canada 6th			Congo	Russia	Cuba	Australia	Phillipines
Cobalt (mine production)[2]	t	140,000	90,000	5,900	4,900	4,700	4,600
	% of world total		64.3	4.2	3.5	3.4	3.3
Canada tied 6th with Latvia			Finland	Belarus	Germany	Ireland	Sweden
Peat	000 t	28,000	9,900	2,600	2,500	2,500	2,200
	% of world total		35.4	9.3	8.9	8.9	7.9
Canada not on the list			Chile	Peru	China	United States	Congo
Copper (mine production)	000 t	21,000	5,800	2,400	1,600	1,200	1,200
	% of world total		27.6	11.4	7.6	5.7	5.7

			RANK OF FIVE LEADING COUNTRIES				
		WORLD	1	2	3	4	5
Canada tied 8th with the US			Australia	Brazil	China	India	Russia
Iron ore (mine production)	mt	2,500	900	490	340	200	95
	% of world total		36.0	19.6	13.6	8.0	3.8
Canada 8th			China	Russia	United States	India	Indonesia
Nitrogen (fixed)--ammonia	000 t	140,000	44,000	14,000	12,500	11,000	6,000
	% of world total		31.4	10.0	8.9	7.9	4.3
Canada 8th			China	Peru	Australia	India	United States
Zinc (mine production)	000 t	13,000	4,300	1,600	940	800	790
	% of world total		33.1	12.3	7.2	6.2	6.1
Canada 7th			China	Chile	United States	Peru	Mexico
Molybdenum (Mo content)	t	300,000	130,000	61,000	42,000	28,000	15,000
(mine production)	% of world total		43.3	20.3	14.0	9.3	5.0
Canada not on the list			Mexico	Peru	China	Chile	Poland
Silver	t	27,000	6,100	4,300	3,600	1,300	1,300
	% of world total		22.6	15.9	13.3	4.8	4.8
Canada 12th			China	India	United States	Australia	Indonesia
Coal (primary) (2016)	000 t	7,268,552	3,242,479	707,617	671,842	503,274	460,482
	% of world total		44.6	9.7	9.2	6.9	6.3
Canada 13th			China	Russia	United States	Norway	Brazil
Silicon	000 t	6,700	4,000	670	430	380	190
	% of world total		59.7	10.0	6.4	5.7	2.8
Canada 17th			China	United States	India	Russia	Brazil
Lime	000 t	420,000	300,000	19,000	16,000	11,000	8,400
	% of world total		71.4	4.5	3.8	2.6	2.0
Canada 19th			United States	China	Iran	Thailand	Turkey
Gypsum (mine production)	000 t	150,000	21 000	16,000	16,000	9,300	9,000
	% of world total		14.0	10.7	10.7	6.2	6.0
Canada 17th			United States	Netherlands	Turkey	Italy	Malaysia
Sand and Gravel (Industrial)	000 t	300,000	120,000	55,400	15,000	14,000	10,000
	% of world total		40.0	18.5	5.0	4.7	3.3

			RANK OF FIVE LEADING COUNTRIES				
		WORLD	1	2	3	4	5
Canada not on the list			China	Vietnam	Russia	Bolivia	Austria
Tungsten (mine production)	t	82,000	67,000	6,000	2,100	1,000	980
	% of world total		81.7	7.3	2.6	1.2	1.2

Canada not on the list			China	Australia	Peru	United States	Mexico
Lead (mine production)	000 t	4,400	2,100	450	300	260	240
	% of world total		47.7	10.2	6.8	5.9	5.5

Sources: U.S. Geological Survey (USGS); International Energy Association; Kimberley Process.
n.a. Not applicable.

ANNEX 5

MINERAL PRODUCTION OF CANADA, 2010-2018[P]

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METALLIC MINERALS		2010		2011		2012		2013		2014	
	Unit	(quantity)	($000)	(quantity)	($000)	(quantity)	($000)	(quantity)	($000)	(quantity)	($000)
Antimony	t	x	x	x	x	x	x	148	1,562	4	45
Bismuth	t	91	1,759	136	3,346	110	2,370	103	2,006	4	97
Cadmium	t	2,403	9,644	1,516	4,135	247	500	160	316	129	276
Cesium	t	x	x	x	x	x	x	x	x	x	x
Cobalt	t	2,644	125,144	3,741	146,768	3,698	114,604	4,005	118,114	3,907	137,844
Copper	t	507,883	3,941,677	553,725	4,831,801	560,476	4,453,541	620,989	4,695,298	654,468	4,983,772
Gold	kg	102,147	4,143,067	101,975	5,087,438	106,373	5,704,878	131,404	6,141,048	151,472	6,817,154
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	000 t	36,178	5,314,154	35,705	5,505,772	38,892	4,875,068	42,063	5,348,433	43,173	4,173,516
Iron, remelt	000 t	x	x	x	x	x	x	x	x	x	x
Lead	t	62,397	138,022	62,548	166,003	62,014	127,438	22,895	50,506	3,579	8,288
Lithium	t	x	x	-	-	-	-	-	-	x	x
Molybdenum	t	8,524	x	8,543	x	8,936	x	7,956	186,788	9,358	259,876
Nickel	t	156,270	3,509,833	211,417	4,787,323	203,970	3,546,420	218,026	3,372,864	218,233	4,069,165
Niobium (Columbium)	t	4,298	x	4,551	x	4,705	x	4,916	x	5,774	x
Platinum group	kg	9,864	260,304	22,337	749,572	22,490	644,195	25,465	767,363	31,386	1,058,992
Selenium	t	97	8,001	128	17,500	145	16,656	138	10,411	142	8,879
Silver	t	570	381,086	582	658,514	657	659,005	620	489,872	472	320,274
Tantalum	t	-	-	-	-	-	-	40	12,698	-	-
Tellurium	t	8	1,913	9	3,167	10	1,540	8	895	8	1,066
Tungsten	t	364	7,370	2,466	73,707	2,554	88,436	3,017	86,293	2,708	84,331
Uranium	t	9,927	1,230,182	9,017	1,307,174	9,520	1,197,441	7,889	806,418	9,780	933,583
Zinc	t	609,567	1,356,287	591,004	1,281,887	601,514	1,171,147	412,277	811,361	322,605	771,026
Total, Metallic Minerals		**. .**	**21,358,783**	**..**	**25,569,557**	**..**	**23,558,411**	**..**	**23,497,305**	**..**	**24,225,029**

METALLIC MINERALS		2015		2016		2017		2018[P]	
	Unit	(quantity)	($000)	(quantity)	($000)	(quantity)	($000)	(quantity)	($000)
Antimony	t	1	5	0	3	1	11	1	11
Bismuth	t	2	29	2	31	4	59	4	56
Cadmium	t	68	102	60	113	158	381	147	592
Cesium	t	x	x	x	x	x	x	x	x
Cobalt	t	4,339	156,720	4,216	149,145	3,704	290,783	3,524	332,149
Copper	t	697,322	4,905,661	679,524	4,379,532	580,097	4,639,616	535,509	4,495,060
Gold	kg	160,751	7,667,339	161,497	8,590,179	172,877	9,069,125	183,047	9,590,356
Ilmenite	000 t	x	x	x	x	x	x	x	x
Indium	kg	x	x	x	x	x	x	x	x
Iron ore	000 t	46,220	2,854,585	46,731	3,165,022	50,300	4,693,042	52,387	4,801,732
Iron, remelt	000 t	x	x	x	x	x	x	x	x
Lead	t	3,699	8,485	12,020	29,785	13,494	40,589	18,947	54,491
Lithium	t	-	-	-	-	-	-	x	x
Molybdenum	t	2,505	48,846	2,783	53,105	4,765	112,054	4,681	141,136
Nickel	t	225,351	3,408,431	230,210	2,926,428	206,354	2,787,020	175,761	2,970,887
Niobium (Columbium)	t	5,385	x	6,099	x	x	x	x	x
Platinum group	kg	33,248	1,059,512	31,471	947,560	27,342	1,016,402	28,596	1,206,948
Selenium	t	156	6,575	175	3,886	72	3,204	61	2,977
Silver	t	371	239,656	385	282,666	368	261,688	353	227,507
Tantalum	t	-	-	-	-	-	-	-	-
Tellurium	t	10	990	18	870	18	885	x	x
Tungsten	t	2,289	62,339	-	-	-	-	-	-
Uranium	t	13,279	1,609,476	14,133	1,248,600	12,207	876,473	9,078	628,290
Zinc	t	275,410	632,892	301,210	832,545	305,314	1,146,760	266,565	1,009,482
Total, Metallic Minerals		**..**	**23,125,240**	**..**	**23,302,112**		**25,738,171**		**26,200,492**

NONMETALLIC MINERALS		2010		2011		2012		2013		2014	
	Unit	(quantity)	($000)	(quantity)	($000)	(quantity)	($000)	(quantity)	($000)	(quantity)	($000)
Barite	000 t	21	6,500	x	x	x	x	x	x	x	x
Carbonatite	000 t	x	x	x	x	x	x	x	x	x	x
Cement[1]	000 t	11,523	1,512,624	11,914	1,587,136	12,553	1,621,476	12,022	1,618,827	12,136	1,692,131
Chrysotile	000 t	x	x	x	x	x	x	x	x	x	x
Clay products[2]	000 t	..	148,907	..	135,422	..	136,502	..	122,577	..	118,012
Diamonds	000 ct	11,804	2,377,147	10,752	2,509,232	10,529	2,005,764	10,600	1,964,125	12,012	2,236,043
Gemstones	t	35	4,966	42	2,941	178	3,217	554	4,607	6,919	5,991
Graphite	000 t	x	x	x	x	x	x	x	x	x	x
Gypsum[3]	000 t	3,046	47,771	2,449	34,632	1,832	24,987	1,837	25,872	1,793	25,474
Lime	000 t	1,863	288,787	1,937	294,909	1,965	316,322	1,856	308,127	1,995	344,816
Magnesite	000 t	x	x	x	x	x	x	x	x	x	x
Marl	000 t	x	x	-	-	-	-	-	-	-	-
Mica	000 t	x	x	x	x	x	x	x	x	x	x
Nepheline syenite	000 t	603	57,304	602	58,377	586	61,892	646	72,911	654	83,805
Peat	000 t	1,286	260,664	1,139	213,359	1,277	238,018	1,173	213,798	1,178	249,078
Phosphate	000 t	x	x	x	x	x	x	x	x	-	-
Potash (K_2O)[4]	000 t	9,700	5,061,927	10,686	7,569,282	8,976	6,342,562	10,196	5,768,609	10,818	5,581,264
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	1,503	66,372	1,620	84,280	1,517	85,256	2,331	80,064	2,011	90,441
Salt	000 t	10,278	602,607	12,757	697,404	10,820	487,686	12,244	655,848	14,473	752,321
Sand and gravel	000 t	211,342	1,573,968	222,288	1,560,213	239,307	1,822,978	241,113	1,941,867	223,407	1,831,464
Soapstone, talc, pyrophyllite	000 t	100	26,125	116	25,244	130	30,249	175	34,223	90	38,985
Sodium sulphate	000 t	x	x	x	x	x	x	x	x	x	x
Stone[3]	000 t	170,664	1,637,757	161,729	1,591,511	152,977	1,559,358	147,746	1,509,427	147,739	1,541,321
Sulphur, elemental	000 t	6,247	298,990	5,970	637,250	5,594	581,611	5,624	342,937	5,252	326,335
Sulphur, in smelter gas	000 t	610	70,903	638	116,022	665	132,230	677	129,197	590	100,125
Titanium dioxide	000 t	x	x	x	x	x	x	x	x	x	x
Wollastonite	000 t	-	-	-	-	-	-	-	-	-	-
Zeolite	000 t	x	x	x	x	x	x	x	x	-	-
Total, Nonmetallic Minerals (including cement[1])		**. .**	**14,699,276**	**..**	**17,839,820**	**..**	**16,471,421**	**..**	**15,476,804**	**..**	**15,778,620**
Total, Nonmetallic Minerals (excluding cement[1])		**. .**	**13,186,652**	**..**	**16,252,684**	**..**	**14,849,945**	**..**	**13,857,977**	**..**	**14,086,489**

NONMETALLIC MINERALS		2015		2016		2017		2018[P]	
	Unit	(quantity)	($000)	(quantity)	($000)	(quantity)	($000)	(quantity)	($000)
Barite	000 t	x	x	x	x	x	x	x	x
Carbonatite	000 t	x	x	x	x	x	x	-	-
Cement[1]	000 t	12,334	1,689,851	11,820	1,615,674	..	..	..	..
Chrysotile	000 t	x	x	x	x	-	-	-	-
Clay products[2]	000 t	..	124,446	..	140,122	..	147,131	..	139,927
Diamonds	000 ct	11,677	2,148,583	13,315	1,888,732	23,199	2,677,723	23,240	2,735,744
Gemstones	t	8,233	7,953	154	5,852	89	4,612	156	4,199
Graphite	000 t	x	x	x	x	14	20,336	x	x
Gypsum[3]	000 t	1,726	19,675	1,679	17,655	3,001	33,120	2,997	35,306
Lime	000 t	1,852	335,489	1,807	330,366	1,842	336,642	1,805	302,375
Magnesite	000 t	x	x	x	x	x	x	x	x
Marl	000 t	-	-	-	-	-	-	-	-
Mica	000 t	x	x	x	x	x	x	x	x
Nepheline syenite	000 t	614	97,880	571	81,219	612	64,712	575	61,000
Peat	000 t	1,297	257,030	1,452	330,653	1,459	330,991	1,244	261,364
Phosphate	000 t	-	-	-	-	-	-	-	-
Potash (K_2O)[4]	000 t	11,462	6,132,751	10,790	3,735,632	12,563	4,371,065	13,835	5,494,347
Potassium sulphate	000 t	x	x	x	x	x	x	x	x
Pumice	000 t	x	x	5	273	x	x	x	x
Quartz (silica)[3]	000 t	2,053	107,377	2,256	95,614	2,540	99,278	2,778	126,871
Salt	000 t	14,343	791,980	10,252	445,891	11,424	476,674	10,568	461,640
Sand and gravel	000 t	228,030	1,884,531	280,550	2,398,633	231,219	2,095,005	216,707	1,938,308
Soapstone, talc, pyrophyllite	000 t	175	50,335	199	55,513	215	51,754	246	51,560
Sodium sulphate	000 t	x	x	x	x	x	x	x	x
Stone[3]	000 t	158,034	1,687,916	160,016	1,664,188	169,518	1,747,125	166,488	1,715,395
Sulphur, elemental	000 t	5,187	423,452	4,746	193,877	4,803	206,740	4,792	413,915
Sulphur, in smelter gas	000 t	558	114,383	635	110,307	524	72,739	532	91,134
Titanium dioxide	000 t	x	x	x	x	x	x	x	x
Wollastonite	000 t	-	-	x	x	x	x	x	x
Zeolite	000 t	-	-	x	x	1	5	1	9
Total, Nonmetallic Minerals (including cement[1])		**..**	**16,519,513**	**..**	**13,724,154**	**..**	**..**	**..**	**..**
Total, Nonmetallic Minerals (excluding cement[1])		**..**	**14,829,662**	**..**	**12,108,480**	**..**	**13,304,062**	**..**	**14,397,867**

MINERAL FUELS		2010		2011		2012		2013		2014	
	Unit	(quantity)	($000)	(quantity)	($000)	(quantity)	($000)	(quantity)	($000)	(quantity)	($000)
Coal	000 t	68,152	5,540,967	67,113	7,471,408	66,471	5,880,836	68,751	4,886,804	69,035	3,896,746
Total Mineral Fuels		**68,152**	**5,540,967**	**67,113**	**7,471,408**	**66,471**	**5,880,836**	**68,751**	**4,886,804**	**69,035**	**3,896,746**

MINERAL FUELS		2015		2016		2017		2018[P]	
	Unit	(quantity)	($000)	(quantity)	($000)	(quantity)	($000)	(quantity)	($000)
Coal	000 t	61,985	3,126,266	61,332	4,009,353	60,750	6,280,947	54,326	6,408,441
Total Mineral Fuels		**61,985**	**3,126,266**	**61,332**	**4,009,353**	**60,750**	**6,280,947**	**54,326**	**6,408,441**

MINERAL FUELS	2010		2011		2012		2013		2014	
Total Mineral Production (including cement[1])	**..**	**41,599,026**	**..**	**50,880,785**	**..**	**45,910,667**	**..**	**43,860,914**	**..**	**43,900,395**
Total Mineral Production (excluding cement[1])	**..**	**40,086,402**	**..**	**49,293,649**	**..**	**44,289,191**	**..**	**42,242,087**	**..**	**42,208,264**

MINERAL FUELS	2015		2016		2017		2018[P]	
Total Mineral Production (including cement[1])	**..**	**42,771,019**	**..**	**41,035,618**	**..**	**..**	**..**	**..**
Total Mineral Production (excluding cement[1])	**..**	**41,081,168**	**..**	**39,419,944**	**..**	**45,323,180**	**..**	**47,006,800**

Sources: Natural Resources Canada; Statistics Canada.

[P] Preliminary; x Confidential; – Nil; . Not available.

Note: [1]As of reference year 2017, Statistics Canada has ceased the collection of 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. Numbers may not add due to rounding.

ANNEX 6

CANADIAN RESERVES OF SELECTED MAJOR METALS, 1978-2017[P]

Return to text

METAL CONTAINED IN PROVEN AND PROBABLE MINEABLE ORE[1] IN OPERATING MINES[2] AND DEPOSITS COMMITTED TO PRODUCTION

Year	Copper (000 t)	Nickel (000 t)	Lead (000 t)	Zinc (000 t)	Molybdenum (000 t)	Silver (t)	Gold[3] (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
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	11,198	2,673	116	3,532	145	5,212	2,158
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[P]	8,984	2,790	165	2,286	96	5,074	2,813

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 7

EMPLOYMENT COUNT AND ANNUAL COMPENSATION IN THE CANADIAN MINING, SMELTING AND REFINING INDUSTRIES, 2007-2018

Return to text

	NUMBER OF EMPLOYEES	COMPENSATION PER JOB[1]
METAL MINES		
2007	29,375	93,776
2008	31,190	99,114
2009	28,950	105,087
2010	29,560	108,701
2011	31,010	112,272
2012	31,315	121,118
2013	39,235	119,762
2014	37,895	128,331
2015	34,240	131,477
2016	34,760	129,120
2017	38,825	130,760
2018	39,400	136,548
NON-METAL MINES		
2007	17,890	79,518
2008	19,700	85,802
2009	17,490	90,341
2010	19,135	91,478
2011	19,550	97,689
2012	18,740	102,455
2013	21,690	100,375
2014	22,570	105,325
2015	22,690	107,881
2016	25,625	104,311
2017	26,035	106,712
2018	27,255	109,350
COAL MINES		
2007	5,270	103,514
2008	5,445	111,546
2009	5,535	116,055
2010	6,505	104,265
2011	7,355	107,644
2012	7,225	119,171
2013	9,595	118,348
2014	7,740	123,677
2015	6,535	123,149
2016	6,570	121,909
2017	6,405	122,080
2018	6,705	118,721

SMELTING AND REFINING[2]		
2007	61,555	91,532
2008	62,805	89,381
2009	48,415	93,817
2010	52,855	93,847
2011	57,415	94,469
2012	49,620	100,621
2013	49,170	105,285
2014	47,410	105,398
2015	46,940	109,182
2016	45,505	109,919
2017	45,185	117,402
2018	44,855	121,794
TOTAL MINING, SMELTING AND REFINING		
2007	119,140	92,350
2008	100,390	97,687
2009	108,055	98,118
2010	115,330	100,642
2011	106,900	108,200
2012	119,690	110,188
2013	115,615	114,124
2014	110,405	116,656
2015	112,460	115,277
2016	116,450	119,723
2017	118,215	123,668
2018	34,050	130,791

Source: Statistics Canada; Natural Resources Canada.
[1]Compensation for Smelting and Refining and Total based on weighted average.
[2]Comprised of NAICS 3311, NAICS 3313, and NAICS 3314.

ANNEX 8

TOTAL COMPENSATION PER JOB, BY SELECT CANADIAN INDUSTRIAL SECTOR, 2007-2018

Return to text

	FORESTRY ($)	MINING, SMELTING AND REFINING[1] ($)	MANUFACTURING ($)	CONSTRUCTION ($)	FINANCE AND INSURANCE ($)
2007	64,322	90,779	61,503	65,095	64,929
2008	65,878	92,350	63,121	67,044	63,586
2009	65,009	97,687	62,659	66,816	63,606
2010	66,300	98,118	63,217	67,103	64,045
2011	68,864	100,642	65,081	68,944	65,872
2012	72,926	108,200	67,427	71,252	69,776
2013	78,101	110,188	69,278	67,604	71,031
2014	81,124	114,124	71,582	69,863	74,143
2015	82,419	116,656	74,455	71,931	79,360
2016	82,583	115,277	75,511	71,543	82,405
2017	81,708	119,723	75,260	72,305	88,826
2018	86,580	123,668	78,971	72,058	85,585

Sources: Statistics Canada; Natural Resources Canada.
[1]Based on a weighted average of NAICS 212, 3311, 3313, and 3314.

ANNEX 9

DOMESTIC EXPORTS OF MINERALS AND MINERAL PRODUCTS, BY COMMODITY AND COUNTRY OF DESTINATION, 2018

Return to text

METALS	U.S.A. ($)	EUROPEAN UNION (EU-28) ($)	CHINA ($)	JAPAN ($)	OTHER COUNTRIES ($)	TOTAL ($)
Aluminum	10,781,792,515	766,216,320	246,358,871	383,010,575	784,014,500	12,961,392,781
Antimony	204,528	146,196	—	6,390	85,983	443,097
Barium	13,711	—	—	—	—	13,711
Beryllium	70,642	—	—	2,206	984	73,832
Bismuth	196,201	—	7,552	2,962	84,949	291,664
Cadmium	301,666	3,255,982	1,125,884	208,849	938,384	5,830,765
Calcium metals	1,891,938	—	5,790	—	258,165	2,155,893
Chromium	7,741,321	474,830	—	—	237,162	8,453,313
Cobalt	177,294,349	115,020,004	5,644,700	202,740,347	313,367,704	814,067,104
Copper	4,004,523,188	689,000,339	906,359,687	858,849,613	1,093,015,480	7,551,748,307
Gold	2,741,223,145	10,636,700,092	888,015,448	128,151,022	2,895,340,171	17,289,429,878
Iron and steel	14,336,546,577	239,225,439	144,819,292	11,434,718	1,799,660,708	16,531,686,734
Iron ore	126,779,095	2,404,012,151	989,092,709	693,876,511	1,107,493,652	5,321,254,118
Lead	812,491,716	6,240,205	7,211,393	1,522,545	47,286,115	874,751,974
Lithium	—	15,702	88,148,592	—	1,912	88,166,206
Magnesium and magnesium compounds	48,905,579	352,667	212,475	2,361	1,257,763	50,730,845
Manganese	586,384	51,535	—	—	897,568	1,535,487
Mercury	612,384	821,261	—	—	—	1,433,645
Molybdenum	110,215,379	71,017,676	24,317	72,172	879,532	182,209,076
Nickel	1,019,626,889	1,105,569,216	387,499,357	220,153,782	1,486,775,715	4,219,624,959
Niobium	147,178,662	81,396,033	48,841,372	2,941,317	35,625,689	315,983,073
Platinum group metals	1,015,652,144	44,269,849	4,937,261	9,746	154,685,328	1,219,554,328
Rare earth metals	262,037	101,722	—	—	—	363,759
Selenium	2,098,902	2,789,911	4,697,025	—	3,914,600	13,500,438
Silicon	195,601,582	6,731,951	321,926	6,150	12,295,323	214,956,932
Silver	1,043,395,220	64,889,919	10,921,431	14,148,999	21,173,926	1,154,529,495
Tantalum	1,753,230	241,595	79,904	—	72,072	2,146,801
Tin	40,028,328	2,743,679	38,756	—	1,725,242	44,536,005
Titanium metal	44,784,603	41,708,893	5,135,635	3,430,699	12,543,775	107,603,605
Tungsten	18,851,217	7,057,849	199,556	32,109	1,162,579	27,303,310
Uranium and thorium	904,536,969	533,097,172	20,209,747	19,890,595	166,689,850	1,644,424,333
Vanadium	260,603,719	254,053,159	13,456,765	40,350,085	52,749,834	621,213,562
Zinc	2,420,855,751	15,151,151	18,280,157	1,887,077	164,649,813	2,620,823,949
Zirconium	1,623,998	2,629,093	4,530,767	54,426	104,434	8,942,718
Other metals	4,560,986,409	734,043,662	82,921,895	79,847,640	1,039,618,313	6,497,417,919
Grand Total	**44,829,229,978**	**17,829,025,253**	**3,879,098,264**	**2,662,632,896**	**11,198,607,225**	**80,398,593,616**

NON-METALS	U.S.A. ($)	EUROPEAN UNION (EU-28) ($)	CHINA ($)	JAPAN ($)	OTHER COUNTRIES ($)	TOTAL ($)
Abrasives	359,847,045	13,424,312	4,177,882	13,022,221	31,310,789	421,782,249
Barite and witherite	6,992	—	—	—	0	6,992
Boron	1,055,834	584,935	332,502	3,186	1,509,015	3,485,472
Bromine	—	4,704	—	69,009	1,269	74,982
Cement	1,192,894,247	8,710,679	2,795,890	242,031	11,741,269	1,216,384,116
Chlorine and chlorine compounds	163,064,512	560,492	778	101,338	317,344	164,044,464
Chrysotile (Asbestos)	2,360,434	68,015	20	—	1,285,105	3,713,574
Clay and clay products	21,285,036	5,899,504	1,350,770	94,296	8,570,423	37,200,029
Diamonds	88,040,379	1,282,775,771	24,214	183,515	1,514,234,620	2,885,258,499
Dolomite	27,731,593	1,037,847	—	—	1,379,647	30,149,087
Fluorspar	17,549,976	254,673	272,239	766,721	372,823	19,216,432
Glass and glassware products	596,722,047	34,473,095	4,649,737	2,083,889	27,163,945	665,092,713
Granite	34,530,267	410,607	1,659,513	—	1,458,368	38,058,755
Graphite	55,233,638	8,189,139	8,452,218	3,484,405	8,850,359	84,209,759
Gypsum	91,401,519	537,895	87,002	—	1,329,574	93,355,990
Iodine	3,167,767	820,010	64,796	—	1,447,167	5,499,740
Lime	60,627,575	—	19,958	—	3,640	60,651,173
Limestone flux and other limestone	16,674,495	573,279	167,802	—	3,502,006	20,917,582
Marble, travertine and other calcareous stones	29,878,578	737,582	1,439,210	—	657,853	32,713,223
Mica	10,211,569	1,401,929	91,359	1,560,344	3,120,021	16,385,222
Mineral pigments	132,774,447	975,470	691,996	33,040	7,247,342	141,722,295
Nepheline syenite	120,109,735	1,810,716	2,064,379	1,830,574	5,953,910	131,769,314
Pearls	1,737,163	25,166	—	—	471,897	2,234,226
Peat	460,230,018	802,592	710,993	11,113,604	15,167,551	488,024,758
Phosphate and phosphate compounds	83,627,273	1,336,107	416,691	1,027,851	15,396,013	101,803,935
Potash and potassium compounds	3,112,876,158	124,489,120	706,421,079	230,052	2,464,459,375	6,408,475,784
Salt and sodium compounds	626,972,440	10,347,615	2,274,526	31,115,357	27,568,503	698,278,441
Sand and gravel	86,256,427	10,065	—	—	3,898,124	90,164,616
Sandstone	340,610	—	696,967	—	0	1,037,577
Silica and silica compounds	89,614,675	4,939,367	702,385	153,833	2,587,630	97,997,890
Slate	5,336,211	6,955,711	—	127,776	79,281	12,498,979
Sulphur and sulphur compounds	287,348,080	64,805	98,752,235	—	283,657,196	669,822,316
Talc, soapstone and pyrophyllite	54,857,697	2,422,823	839,206	13,198	525	58,133,449
Titanium oxides	308,508,463	17,439,258	1,823,186	—	46,022,661	373,793,568
Other nonmetals	796,296,664	23,376,388	7,585,652	3,459,371	49,751,616	880,469,691
Other structurals	266,547,025	8,916,134	1,244,407	167,297	31,648,858	308,523,721
Total nonmetals	**9,205,716,589**	**1,564,375,805**	**849,809,592**	**70,882,908**	**4,572,165,719**	**16,262,950,613**

MINERAL FUELS	U.S.A. ($)	EUROPEAN UNION (EU-28) ($)	CHINA ($)	JAPAN ($)	OTHER COUNTRIES ($)	TOTAL ($)
Coal	510,834,341	931,992,507	694,484,147	1,841,729,503	3,926,945,556	7,905,986,054
Coke	13,244,022	—	—	—	1,502,623	14,746,645
Total Mineral Fuels	**524,078,363**	**931,992,507**	**694,484,147**	**1,841,729,503**	**3,928,448,179**	**7,920,732,699**
Total Mining Domestic Exports	**54,559,024,930**	**20,325,393,565**	**5,423,392,003**	**4,575,245,307**	**19,699,221,123**	**104,582,276,928**

Sources: Natural Resouces Canada; Statistics Canada.
- Nil.
Note: Stages 1 to 4

ANNEX 10

TOTAL IMPORTS OF MINERALS AND MINERAL PRODUCTS, BY COMMODITY AND COUNTRY OF IMPORT, 2018

Return to text

METALS	U.S.A.	EUROPEAN UNION (EU-28)	CHINA	MEXICO	OTHER COUNTRIES	TOTAL
Aluminum	3,692,070,761	430,074,987	932,268,512	40,633,442	3,344,904,177	8,439,951,879
Antimony	1,384,182	175,910	18,018,432	30,839	2,266,136	21,875,499
Barium	5,006,638	430,745	1,829,676	—	123,271	7,390,330
Beryllium	439,054	50,867	3,087	—	3,796	496,804
Bismuth	2,375,666	80,536	656,551	—	468,459	3,581,212
Cadmium	6,049,142	6,753,967	13,476,552	4,646	58,977,638	85,261,945
Calcium metals	29,152,660	7,427,969	1,459,432	66,301	2,117,058	40,223,420
Chromium	8,036,018	14,491,312	5,320,874	807,106	75,155,811	103,811,121
Cobalt	47,376,742	41,035,483	576,521	—	66,221,341	155,210,087
Copper	2,133,976,017	252,984,944	211,864,616	169,606,096	1,329,551,342	4,097,983,015
Germanium	8,870,633	182,015	337,574	—	5,683,518	15,073,740
Gold	2,455,296,557	28,944,460	1,875,573	183,733,608	5,251,776,934	7,921,627,132
Iron and steel	13,747,447,645	3,149,279,967	3,825,096,388	1,523,937,310	5,324,630,643	27,570,391,953
Iron ore	975,150,957	3,716,026	9,272	629	10,454,866	989,331,750
Lead	238,179,069	21,436,310	9,291,804	38,885,944	141,203,551	448,996,678
Lithium	105,348,929	9,778,019	23,133,683	174,458	50,939,365	189,374,454
Magnesium and magnesium compounds	63,024,036	8,048,886	233,183,826	1,908,637	41,616,443	347,781,828
Manganese	104,042,553	24,994,253	47,619,206	7,606,345	218,194,512	402,456,869
Mercury	449,637	6,606,784	689,598	9,301,892	2,500,952	19,548,863
Molybdenum	51,119,416	1,679,488	8,696,141	18,609,578	34,817,310	114,921,933
Nickel	483,829,329	303,303,103	19,785,990	5,908,474	158,540,602	971,367,498
Niobium	4,350,233	511,703	—	—	55,720,624	60,582,560
Platinum group metals	206,537,031	136,428,608	172,299	1,083,551	349,529,416	693,750,905
Rare earth metals	317,386	170,932	3,406,333	—	11,930	3,906,581
Selenium	34,377	811,186	9,861	77,880	557,185	1,490,489
Silicon	12,011,904	1,334,483	5,554,415	—	80,745,936	99,646,738
Silver	210,796,057	185,650,950	44,147,626	223,748,285	618,698,990	1,283,041,908
Strontium	47,096	327,906	—	259,151	4,700	638,853
Tantalum	441,769	126,566	140,266	—	247,785	956,386
Tellurium	204,299	191,712	14,124,553	—	8,382,532	22,903,096
Thallium	2,211	5,557	—	—	0	7,768
Tin	12,155,438	1,333,171	13,218,776	459,628	54,098,995	81,266,008
Titanium metal	166,372,056	20,708,600	19,696,963	55,234	80,995,217	287,828,070
Tungsten	13,580,444	6,042,993	6,030,236	20	4,172,502	29,826,195
Uranium and thorium	93,212,880	19,295,078	6,404,712	—	317,665,341	436,578,011
Vanadium	6,686,544	39,735,022	39,948,027	—	77,921,734	164,291,327
Zinc	849,458,470	30,220,812	5,035,064	130,530,510	234,541,918	1,249,786,774
Zirconium	56,503,716	2,295,174	268,916	243	3,185,095	62,253,144
Other nonmetals	6,231,353,454	1,652,073,780	2,872,004,693	1,691,607,365	2,603,761,703	15,050,800,995
Grand Total	**32,022,691,006**	**6,408,740,264**	**8,385,356,048**	**4,049,037,172**	**20,610,389,328**	**71,476,213,818**

NONMETALS	U.S.A.	EUROPEAN UNION (EU-28)	CHINA	MEXICO	OTHER COUNTRIES	TOTAL
Abrasives	257,294,050	127,593,660	67,317,088	12,099,837	132,992,386	597,297,021
Arsenic	3,015	10,976	290,645	—	18,727	323,363
Barite and witherite	6,135,790	557,443	1,978,496	—	17,736,919	26,408,648
Boron	37,017,691	530,655	169,861	—	23,243,411	60,961,618
Cement	535,525,225	77,654,115	159,976,674	14,225,466	105,259,309	892,640,789
Chlorine and chlorine compounds	104,777,187	11,722,179	14,111,282	2,390,755	5,808,256	138,809,659
Chrysotile (Asbestos)	144,843,397	8,258,794	9,008,498	1,031,126	17,073,699	180,215,514
Clay and clay products	328,755,054	334,553,639	527,014,243	70,445,694	183,645,677	1,444,414,307
Diamonds	86,924,880	42,738,498	3,397,543	—	373,721,767	506,782,688
Dolomite	25,820,498	3,083	84,538	—	16,916	25,925,035
Feldspar	863,773	2,973	—	—	84	866,830
Fluorspar	24,881,321	4,810,832	28,341,943	27,266,500	20,563,050	105,863,646
Glass and glassware products	2,314,630,959	326,611,566	731,016,689	282,561,822	204,340,223	3,859,161,259
Granite	14,877,863	18,082,672	25,693,967	6,274	52,039,293	110,700,069
Graphite	171,337,234	221,664,840	447,725,570	8,243,653	69,709,844	918,681,141
Gypsum	188,444,912	7,325,459	609,130	3,089,428	242,246	199,711,175
Iodine	4,312,100	625,967	77,241	1,992	13,198,147	18,215,447
Lime	64,178,803	570,812	10,738	—	4,080,352	68,840,705
Limestone flux and other limestone	40,877,958	1,074,320	3,471,448	4	294,407	45,718,137
Marble travertine and other calcareous stones	17,345,126	46,073,173	38,993,595	1,631,072	44,800,953	148,843,919
Mica	3,550,793	1,757,217	720,732	1,065	904,498	6,934,305
Mineral pigments	165,190,016	39,382,608	8,531,545	1,789,357	20,517,566	235,411,092
Nepheline syenite	1,213,832	1,746	167,411	—	20,850	1,403,839
Olivine	3,468,297	1,994,924	15,103,879	173,941	3,808,786	24,549,827
Pearls	12,149,143	5,130,985	28,948,334	145,239	7,150,060	53,523,761
Peat	15,956,578	2,103,161	107,444	64	4,290,822	22,458,069
Perlite	12,851,375	9,724	1,588	—	1,197	12,863,884
Phosphate and phosphate compounds	710,702,123	16,770,355	12,413,810	1,268,346	64,992,018	806,146,652
Potash and potassium compounds	79,127,162	4,426,959	5,811,276	1,011,886	19,016,878	109,394,161
Salt and sodium compounds	589,306,067	44,763,368	80,689,406	24,555,983	195,923,492	935,238,316
Sand and gravel	27,425,517	279,149	556,196	64,619	245,018	28,570,499
Sandstone	1,492,647	758,867	129,494	—	4,236,203	6,617,211
Silica and silica compounds	478,971,868	30,536,823	29,000,556	5,076,959	14,447,078	558,033,284
Slate	1,379,468	318,049	3,488,584	1,629	2,590,563	7,778,293
Sulphur and sulphur compounds	31,730,059	588,439	2,540,941	904	625,652	35,485,995
Talc soapstone and pyrophyllite	15,917,560	1,787,628	109,262	455	517,539	18,332,444
Titanium oxides	220,525,295	35,243,358	40,750,056	28,591,620	23,592,699	348,703,028
Other nonmetals	1,172,011,784	138,572,875	61,035,037	26,055,330	157,608,910	1,555,283,936
Other structurals	129,392,156	21,764,179	68,236,651	3,958,859	43,238,458	266,590,303
Total Nonmetals	**8,041,208,576**	**1,576,656,070**	**2,417,631,391**	**515,689,879**	**1,832,513,953**	**14,383,699,869**

MINERAL FUELS	U.S.A.	EUROPEAN UNION (EU-28)	CHINA	MEXICO	OTHER COUNTRIES	TOTAL
Coal	887,551,916	7,373,247	206,959	535,769	246,536,663	1,142,204,554
Coke	257,012,936	891,234	942	—	19,031,595	276,936,707
Total Mineral Fuels	**1,144,564,852**	**8,264,481**	**207,901**	**535,769**	**265,568,258**	**1,419,141,261**
Total Mining Imports	**41,208,464,434**	**7,993,660,815**	**10,803,195,340**	**4,565,262,820**	**22,708,471,539**	**87,279,054,948**

Sources: Natural Resouces Canada; Statistics Canada.
- Nil.
Note: Stages 1 to 4

THE CANADIAN MINING INDUSTRY AT A GLANCE

	2005	2007	2009	2014	2015	2016	2018
Mining industry GDP ($ billion)	40.0	41.9	32.0	57	55.6	57.6	97[1]
Percentage of total Canadian GDP (%)	3.8	3.4	2.7	3.5	3.4	3.4	3.5
Value of mineral production ($ billion)	27.4	40.6	32.2	44.7	42.8	40.8	47
Synthetic crude production value ($ billion)	9.2	18.0	n/a	35.5	21.5	19.6	28.5
Synthetic crude production (million cubic metres)	21.9	39.9	n/a	55.3	56.6	54.1	61.2
Number of mining establishments	859	766	961	1209	n.a	1201	1060
Mineral extraction employment	47,000	53,000	52,000	60,215	60,565	71,380	70,000
Total direct and indirect mining industry employment	353,000	360,000	308,000	376,000	560,000	596,000	626,000
Mineral exploration/appraisal spending ($ billion)	1.3	2.8	1.9	1.9	1.7	1.6	2.3
Mining industry capital expenditures ($ billion)	7.4	10.1	9.8	15.07	15.3	n.a	12.9
Oil sands capital expenditures ($ billion)	9.8	16.8	10.6	25.1	23.4	n.a	10.7
Stock of foreign mining direct investment ($ billion)	n/a	n/a	n/a	21.1	10.4	35.5	24.5
Stock of Canadian mining direct investment abroad ($ billion)	56.4	57.3	64.5	n/a	62.6	90.8	80.4

n/a—not available
[1]direct and indirect real GDP



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