FACTS & FIGURES OF THE CANADIAN MINING INDUSTRY | 2013

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 2012, though some from prior years and some from 2013. Dollar amounts are expressed in Canadian dollars unless noted otherwise.

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Cu
Fe
GLOBAL. LOCAL.
CANADIAN.
Modern aircraft design is about strength, durability and weight. Minerals and metals allow next generation planes to save fuel, fly further, and improve comfort.
Canada is one of the world's top mining countries, and our minerals and metals are found in products of all kinds.
MINING.CA
A message from the Mining Association of Canada.
CANADIAN MINING
What will they find next?


GLOBAL REACH,
CANADIAN VALUES.
Canadians are leaders in developing successful mines around the world. Our mining companies account for almost 10% of the money Canada invested abroad in the last decade, improving the quality of life for millions of people.
Through individual company actions and partnerships with government and NGOs, Canadian mining helps provide education, skills training, and jobs as well as opportunities for local businesses. We apply and share environmental expertise and help build up local social programs.
Active in more than 100 countries, our members embrace their responsibility to ensure benefits for local populations and to protect the natural environment wherever they operate.
CHOSEN FOR THEIR BIODEGRADABLE PROPERTIES, COCONUT FIBER MATS, WOVEN BY LOCAL WOMEN, ARE PART OF A LAND RECLAMATION PROJECT AT BARRICK'S PUEBLO VIEJO MINE IN THE DOMINICAN REPUBLIC TO PREVENT EROSION AND IMPROVE PLANT GROWTH.
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RIO TINTO'S BUNDER DIAMOND PROJECT IN INDIA IS HELPING YOUNG GIRLS AND WOMEN REALIZE THEIR POTENTIAL IN SCHOOL AND WORK AREAS THAT HAVE TRADITIONALLY BEEN OUT OF REACH.
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Cu
Zn
Ni
METAL. JAZZ. ROCK.
CANADIAN.
When musicians need to bring an audience to its feet, modern mining is instrumental in providing the solutions. Canada is one of the world's top mining countries, and our minerals and metals are found in products of all kinds.
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Au
ANCIENT. MODERN.
VALUABLE. CANADIAN.
Since the beginning of civilization, metals like gold have been precious. Today, astronauts won't leave earth without it.
The visor of an astronaut's helmet is coated with a layer of gold to protect their eyes from the sun's rays and intense heat.
Canada is one of the world's leading mining countries, and our minerals and metals are in demand all around the world.
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U
LIGHTS. CAMERA.
ACTION. CANADIAN.
Electricity is such a common part of our lives, it can be easy to take it for granted. Canada is a major producer of uranium, an essential ingredient in carbon-free nuclear energy.
Canada is one of the world's top mining countries, and our minerals and metals are found in products of all kinds.
Canada's House of Commons draws electricity from the Ontario power grid, which relies on nuclear reactors for 56% of its supply.
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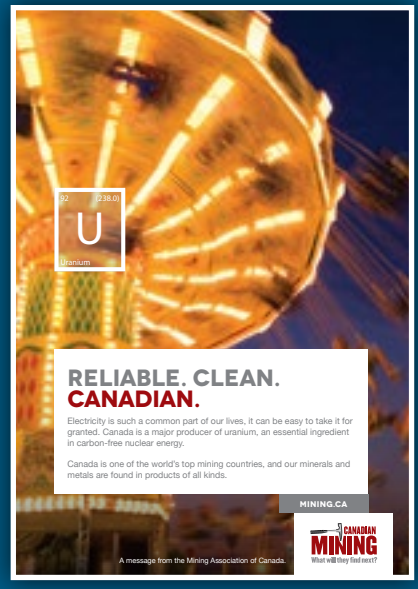
U
RELIABLE. CLEAN.
CANADIAN.
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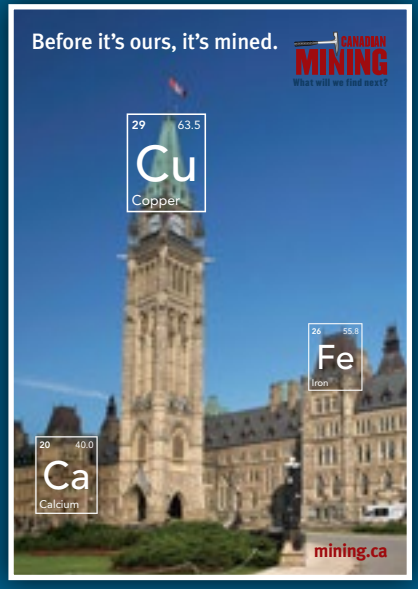
Before it's ours, it's mined.
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Copper
Fe
Iron
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Calcium
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SUMMARY OF ECONOMIC CONTRIBUTION AND KEY ISSUES

ECONOMIC CONTRIBUTION

The mining industry contributes greatly to Canada's economic strength. The industry employs 418,000 workers across the country in mineral extraction, smelting, fabrication and manufacturing. The industry's $52.6 billion contribution to Canada's gross domestic product in 2012 included $20.5 billion in mineral extraction, and over $32 billion in mineral processing and manufacturing.

Internationally, Canada is one of the leading mining countries and one of the largest producers of minerals and metals. The industry accounted for 20.4% of the value of Canadian goods exports in 2012, selling a diversified array of minerals abroad. Exports of aluminum, copper, gold, iron and steel, iron ore, nickel, silver, uranium, zinc, diamonds, potash and coal ranged from $1.5 billion to $17 billion each.

Canada remained the world's top destination for exploration spending in 2012, hosting 16% of global investment. Australia followed at 12%, the United States at 8% and Mexico at 6%. Canadian exploration spending is focused in many regions, with a strong interest in the North. More than 800 Canadian companies are also very active exploring outside Canada in over 100 countries. This has resulted in Canadian firms accounting for the largest share of exploration spending in the United States, Central and South America, Europe and, most recently, Africa.

Other evidence of the industry's vast economic reach is that mining accounts for over one-half of all rail-freight revenues of Canada's railways, CN and CP. As well, more than 3,200 suppliers provide expertise to the industry, including hundreds of engineering, environmental, legal, financial and equipment companies. Proportionally, the mining industry is also the largest private sector employer of Aboriginal people in Canada and employment is poised to increase.

While mining is important to Canada at the local community level, it also contributes to the economy of large cities. Toronto, for example, is the global hub for mining finance. The TSX and TSX Venture handled 70% of the world's mining equity transactions in 2012, and together comprised 70% of the world's mining equity capital that year. 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 global centre for oil sands expertise and Saskatoon for uranium and potash.

Mining and its related industries are important contributors to federal, provincial and territorial coffers. According to a recent MAC study, the industry's payments to governments total $71 billion in taxes and royalties over the last decade. Beyond contributions to governments, the average weekly pay for a mining worker in 2012 was $1,559, which surpassed the earnings of workers in forestry, manufacturing, finance and construction by 57%, 55%, 43% and 36%, respectively.

In 2012, Canadian mining and metals companies invested $638 million in research and development (R&D). Mining's investment surpassed that of the motor vehicles and parts sector, the machinery sector, and the wood products and paper sector. In 2011, the most recent year for which data is available, the industry employed over 5,500 people in R&D. This is more than the pharmaceutical and forestry sectors, both of which receive extensive financial and policy support from the government.

KEY ISSUES FOR THE CANADIAN MINING INDUSTRY

According to recent MAC research, Canada's mining industry plans to invest approximately $160 billion in projects over the next decade, with multiple billions in each of British Columbia, Alberta, Saskatchewan, Ontario, Quebec, Newfoundland and Labrador, Nunavut and the Northwest Territories. These projects may face obstacles and delays, but the figure does suggest the scale of mining-related jobs, supply contracts and tax revenues if these projects come to production. The future of these projects is shaped by many issues, domestic and global, of which five are particularly relevant.

State of the global mining economy. By nature, the mining industry is cyclical. After seven years of record

growth, the 2008 recession sharply reduced mineral demand and prices. Global economic growth, again led by China, resumed in the final quarter of 2009 and has remained reasonably strong to date, notwithstanding certain fluctuations. At the outset of the recovery period, mineral prices increased and remained at favourable levels through to 2013. Recent uncertainty over the short-term global economic outlook—such as concerns over Eurozone contagion, the staying power of emerging economies, uncertainty over the strength of the US economic recovery, and increased supply for some commodities —has caused the buoyant mineral prices of some mined goods to decline in 2013.

Despite challenges, the prevailing view is that the Canadian mining sector's economic prospects are bright. Given the growth projections for China, India and elsewhere, and assuming a positive investment environment, demand for minerals and metals is likely to remain strong over the medium to long term.

Canadian investment competitiveness. While elements of Canada's mining tax regime are attractive, recent changes from Federal Budget 2012 and 2013 will make it more costly for companies to both develop projects and expand existing mines. This is particularly true for remote and northern regions. Innovation and productivity also impact Canadian competitiveness, and the industry faces several challenges in this regard. Challenges discovering new deposits, deeper mines, increasing energy costs and regulatory requirements present obstacles that need to be addressed. The OECD has indicated that lagging productivity is one of Canada's most significant economic hurdles. In response to these challenges, the Canadian Mining Innovation Council (CMIC) was formed with the aim of investing mining industry R&D dollars more strategically. The Canadian government can help address these challenges by ensuring that industry remains competitive for new mining investment, and that CMIC receives the funding needed to help build a portfolio of projects that reflects the industry's needs.

Canadian regulatory burden. New mines and major expansions must undergo federal reviews and approvals in addition to the review and permitting requirements of their provincial or territorial jurisdiction. Most major mining projects in provinces are subject to the *Canadian Environmental Assessment Act* (CEAA) as well as parallel provincial assessments and, depending on the details of the project and the mine site, they may require approvals under other federal legislation, such as the *Fisheries Act* and the *Navigable Waters Protection Act* (NWPA).

All three federal Acts were amended in 2012, and the impacts of these changes are still unclear. It is expected that once fully implemented, there will be an increase in the number of federal approvals required and the number of mining projects subject to federal environmental assessment. The expectation, however, is that these approval processes will be more efficient and timely, with more appropriate and flexible compliance tools, and better coordination with provincial review processes. In the meantime, however, the industry is concerned by the uncertainty surrounding the transition to the new regulatory model for current projects and by the inadequate integration of processes and consultation within the federal government.

The human resources challenge. According to the Mining Industry Human Resources Council (MiHR), the Canadian mining industry will require 145,000 workers over the next decade. This deficit is compounded by the approaching retirement of the industry's skilled core of workers. By 2023, MiHR forecasts more than 67,000 employees will retire from the sector. As Canada's largest proportional private sector employer of Aboriginal people, however, the industry is in a good position to broaden its relationship with this segment of Canadian workers if the right training and skills programs are developed and maintained. Approximately 1,200 Aboriginal communities are located within 200 kilometres of some 180 producing mines and more than 2,500 active exploration properties. Addressing the human resources challenge will take a large and coordinated effort by the industry, educational institutions and all levels of government in the coming years.

Need for strategic infrastructure investment. The mining industry is the largest customer group of Canada's transportation sector. It is, therefore, important that the sector move products to market efficiently, at competitive prices and on modern infrastructure such as ports, highways and railways. Capital spending opens up new regions for development by enhancing the economic viability of a host of projects. The ongoing extension of the Highway 37 transmission line in northeast British Columbia is a good example of long-term strategic infrastructure investment. Lack of infrastructure in northern Canada adds to an already challenging operating environment for companies that face extreme weather conditions. Lack of roads, marine access and power grids can negatively impact the costs and timelines of potential mining projects.

MINING

ONE INDUSTRY, MANY APPLICATIONS

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."

The mining industry is crucial to the everyday life of all Canadians. Mined products are required to build highways, electrical and communication networks, housing, vehicles, electronics and many other items essential to modern life.

Clean energy and "green" products also rely on 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. Clean energy sources such as nuclear, solar, wind and hydrogen use a range of minerals and metals in their equipment and processes.

Because the mining industry is vital to daily life, its opportunities, challenges, investments and needs are inseparable from those of broader society. Thanks to the industry's innovation and investment, Canada has benefited from low-cost mineral and metal products, good jobs, greater wealth and responsible stewardship of natural resources.

SOME CONSUMER PRODUCTS THAT RELY ON MINING

- Batteries (nickel, cadmium, lithium, cobalt)
- Circuitry (gold, copper, aluminum, steel, lithium, titanium, silver, cobalt, tin, lead, zinc)
- Computer and TV screens (silicon, boron, lead, barium, strontium, phosphorus, indium)
- Energy (coal, uranium, oil sands)
- Musical instruments (copper, silver, steel, nickel, brass, cobalt, copper, iron, aluminum)
- Sports equipment (graphite, aluminum, titanium, calcium carbonate, sulphur)
- Vehicles and tires (steel, copper, zinc, barium, graphite, sulphur, bromine, iodine)

MINING AND THE CANADIAN ECONOMY

Like our nation's economy, the Canadian mining industry is not immune to global economic trends. The profitability of companies depends in part on the performance of commodity prices, which are subject to market volatility and driven by global supply and demand. In turn, the extent to which companies contribute to the Canadian economy, be it through direct and indirect employment, taxes and royalties, depends in part on their ability to operate profitably. Economic forecasts help companies plan their business activities.

GLOBAL ECONOMIC TRENDS

According to the Bank of Canada, global economic growth is expected to remain stable at 2.8% in 2013, but advance at a slower pace in 2014 at 3.4 % instead of an earlier estimate of 3.5%. In 2015, projections are for a growth rate of 3.6% instead of 3.7%. Comparable trends are also forecast by the International Monetary Fund (IMF) and the World Bank. Some analysts interpret this as an indication that the global economy is transitioning towards a period of slower, but more stable growth.

EMERGING ECONOMIES

Emerging market demand, having led global economic growth both into and out of the economic downturn, has fluctuated in recent years. From 2010 to 2012, GDP growth from the IMF's Emerging Market and Developing Economies has fallen from 7.6% to 5.1%. For example, the GDP growth rates of Brazil, Russia, India and China—the BRIC economies—have all fallen consecutively over this three-year span.

Despite these trends, China's growth remains strong, and the government-set GDP target of 7.5% has held steady over the course of 2013. While some economists expected the world's second largest economy, and primary consumer of raw materials, to continue decelerating during 2013, reports at the time of writing indicate China may outperform its target with growth of 7.6% for the year. With China accounting for approximately 40% of global base metal demand, and comparable percentages of global demand for other commodities, healthy global demand for many mining products has persisted despite volatility.

The slowing pace of emerging economies is unlikely to continue, closing the gap between retarded growth in advanced economies and global economic growth. Without broader economic revitalization in other leading countries and regions, the slower pace of global economic growth is likely to persist.

PERFORMANCE OF ADVANCED ECONOMIES

Uncertainty over the performance of several of the world's major advanced economies has presented challenges in recent years, affecting the short-term global economic outlook. Concerns over the length of the recession in Europe, a perceived lack of progress from Japanese economic reforms, and uncertainty over the strength of the US economic recovery have contributed to weak market confidence and investor hesitancy.

At the time of writing, however, early signs of improvement have been observed in the European Union. Eurostat—the European Union's statistics office—reported the 27 countries' combined gross domestic product grew 0.4% in the second quarter compared with the previous three-month period, when it shrank 0.1%. Although Europe's unemployment rate remains at 12.1% (with some countries significantly higher), this growth, alongside positive data about greater business optimism and increased manufacturing, is seen by some as important first—if small—steps towards leaving a protracted recession behind.

Recently revised figures indicate that Japan's economy grew at a faster pace in the second quarter than originally

estimated. The cabinet office revised second quarter GDP growth upwards from an initial estimate, released a month ago, of 2.6% to an annualized projection of 3.8%. The advent of "Abenomics"—Japanese Prime Minister Shinzo Abe's policy mix of aggressive monetary easing, fiscal spending and structural reforms—has raised expectations for better times ahead. However, with ballooning debt of more than 200% of GDP, and serious demographic issues, Japan's challenges remain to be overcome.

Meanwhile, economic recovery in the United States remains in part subject to political brinkmanship and the threat of a possible fiscal crisis. The recent political gridlock resulted in a two-week shutdown of the federal government, which, as Standard & Poor's estimates, cost the US economy $24 billion, or a 0.6% decrease, at the least, in annualized fourth-quarter growth. The agreement enabling the government to resume only runs through mid-January, when, yet again, negotiations over the debt ceiling will occur with the potential of sending adverse ripple effects through the global economy.

IMPACTS ON CANADIAN INDUSTRY

The Canadian mining industry is impacted by the ongoing global economic uncertainty. Access to capital, for example, has been particularly challenging for junior mining companies (see Section 3 of this report for more information).

Major companies are being challenged on some fronts, too. Some have experienced write-downs, and several of Canada's big mining firms have altered their metals price assumptions to reflect this new reality. With a shift in focus, many companies are re-evaluating their stated positions on the development of new projects and are adopting strategies to reduce costs and maximize cash flows. Despite these adjustments, the prices of many mined products remain above historical averages, enabling companies to operate profitably.

Looking forward, the Canadian mining industry's economic prospects will likely be strong over the medium and long term. The prevailing view is that the longer-term fundamentals are solid, and that the current period of heightened volatility will pass. 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 is likely to return.

This opportunity cannot be taken for granted. Decisions regarding regulatory, tax and mineral policy made now will significantly affect Canada's readiness to capitalize and benefit from these opportunities when they arrive.

MINING'S CONTRIBUTION TO THE CANADIAN ECONOMY

Mining contributes significantly to the Canadian economy. The wages and employment of 418,000 people across the country, taxes and royalties collected by governments, and the capital expenditures required for project development and operation are only some examples of its contribution. Beyond its direct economic impact, the industry also supports many firms and sectors that supply mining with the goods and services it needs to function.

CONTRIBUTION TO CANADA'S GDP

Over the past 20 years, the value of minerals and metals to Canada's economy has ranged between 2.7% and 4.5% of the country's GDP. In 2012, the industry's contribution remained within this range, at 3.4%.

2012 CONTRIBUTION

The extractive industry, which combines mineral extraction with oil and gas extraction, contributed $119 billion, or nearly 7.7%, to Canada's GDP in 2012 (see Figure 1). By this measure, the extractive industry is the fourth largest of Canada's 18 industries, surpassed only by the services , real estate and manufacturing sectors, which rank first, second and third, respectively.

The mining industry as a whole goes beyond extraction to include mineral manufacturing. The mining industry's 2012 contribution to GDP is detailed in Figure 2, which divides industry activity into four stages:

- **Stage 1**, extraction of minerals (metals, non-metals and coal): $20.5 billion
- **Stage 2**, primary metal manufacturing (smelting, refining, rolling, extruding, alloying and casting of primary metals): $13.2 billion
- **Stage 3**, non-metallic mineral product manufacturing (abrasives, lime, cement, glass, ceramics): $5.7 billion
- **Stage 4**, fabricated metal product manufacturing (forging, stamping and heat-treating to produce reinforcing bars, fabricated wire, cutlery, tools, hardware): $13.2 billion

The output of these four stages in 2012 totalled $52.6 billion. By comparison, according to Statistics Canada, the oil and gas extraction sector contributed $95.3 billion to the GDP. The Canadian Association of Petroleum Producers indicated that on a per-barrel basis, approximately 56% of oil extracted in 2012 was from oil sands, the extractive process for which is essentially a surface mining operation. Support activities for mining and oil and gas contribute an additional $10.7 billion to GDP.

MINING IN THE PROVINCES AND TERRITORIES

Mineral production values were down in seven of Canada's 13 provinces and territories. For example, the 2012 value of mineral production in Newfoundland and Labrador was $4.4 billion. Although a decrease of nearly $800 million over 2011, this value represents a fivefold increase over the last decade, indicating significant and trending growth over time. Similar growth was experienced by Ontario, Saskatchewan and British Columbia.

CANADIAN MINES IN 2012

Total mining establishments: 1,264
- Metals: 76
- Non-metals: 1,188

PROVINCES WITH THE MOST METAL MINES
- Quebec: 22
- Ontario: 19
- British Columbia: 10

MAIN TYPES OF NON-METAL MINES
- Sand and gravel quarries: 789
- Stone quarries: 277
- Peat mines: 74

REGIONAL DISTRIBUTION OF MINING

Figure 3 illustrates the geographical location of Canada's mining expertise (details in Annex 1). The Northwest Territories is the country's dominant source of diamonds. Leading in the production of gold are Ontario and Quebec. Saskatchewan produces all of Canada's uranium, having world-class potash reserves, and British Columbia is prominent in metallurgical coal production. Newfoundland and Labrador and Quebec produce virtually all of Canada's iron ore. Several provinces have strong copper and nickel production. For detailed mineral production by province and territory, see Annex 2 and Annex 3.

Mining also has significant ties to Canada's major cities. Some of the nation's largest companies are headquartered in urban centres such as Vancouver (Goldcorp, Teck), Saskatoon (Cameco, PotashCorp), Toronto (Barrick, Vale, Glencore) and Montreal (ArcelorMittal, Iron Ore Company of Canada, Rio Tinto Alcan).

Vancouver is the global centre of expertise for mineral exploration. Some 1,200 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 lists 57% of the world's public mining companies, and the city itself is home to several dozen mining company head offices, and several hundred mining suppliers, consulting firms and service providers.

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

The global emergence of the oil sands over the past two decades has transformed Edmonton 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

Canadian mineral production decreased in 2012—by 7%—from the 2011 record high as world mineral prices fell.

Over the past decade, Newfoundland and Labrador, Saskatchewan and British Columbia have seen their respective shares of Canada's production value grow most significantly (see Figure 4). The national share of the Northwest Territories, an important diamond producer, has also risen almost twofold, but has now levelled off, reflecting production volumes and diamond prices.

VALUE OF MINING IN 2012

Canada-wide: $46.9 billion

TOP 4 PROVINCES

1. Ontario: $9.2 billion
2. British Columbia: $8.3 billion
3. Saskatchewan: $8.2 billion
4. Quebec: $8.2 billion

A correlation exists between production values and expenditures on resource development. The top four provinces in terms of production values in 2012—Ontario, British Columbia, Saskatchewan and Quebec—also led in expenditures on mineral resource development (see Figure 5). Of the $15.5 billion invested in mine complex development in Canada, spending in each of these provinces ranged from $2.7 to $4.1 billion, with Saskatchewan in the lead at $4.1 billion. This suggests that these four provinces will remain vital to Canada's mineral production well into the future.

The three territories together received 20% of total 2012 Canadian spending on exploration and deposit appraisal (the first two columns of Figure 5). This amount, over three times the territories' share of production value (6.1%), reflects global interest in Canada's northern mineral potential. Despite such interest, however, overall territorial exploration investment decreased significantly in 2012, by 25% year over year. This decrease reflects market realities, and has implications for junior mining firms and their ability to obtain capital for exploration projects.

TAXES AND OTHER PAYMENTS TO GOVERNMENTS

Each year, Canadian governments receive considerable payments, in the form of taxes and royalties, as a result of mining activity—specifically the first three stages of activity—extraction, smelting and processing—shown in Figure 2. The payments detailed below and in Figure 6 do not reflect the fourth stage of activity (fabricated metal product manufacturing) because some of its outputs, such as cutlery, fixtures and boilers, fall outside the logical boundaries of the mining industry.

2012 PAYMENTS

In 2012, the mining industry, including oil sands mining, paid an estimated $6.6 billion to federal and provincial/territorial governments (see Figure 6). This total consisted of:

- $3.1 billion in royalties
- $1.2 billion in corporate income tax
- $2.3 billion in personal income tax

Around 40% of this amount went to the federal government and 60% to provincial/territorial governments.

As noted, these payments do not reflect the fourth stage of mining shown in Figure 2. Including this stage would add another $1.9 billion to the amount industry paid governments in 2011, bringing the total to $8.5 billion.

IN 2012, THE MINING INDUSTRY, INCLUDING OIL SANDS MINING, PAID AN ESTIMATED $6.6 BILLION IN TAXES AND ROYALTIES TO CANADIAN GOVERNMENTS.

It is also worth noting that the oil sands industry pays the Alberta government large sums, as high as $2 billion in some years, in the form of land sales payments. These sums are not included in Figure 6.

Finally, these payments do not include the significant revenues that governments receive from mining suppliers. By some estimates, adding these suppliers would multiply payments by as much as 2.5.

PAYMENT TRENDS

Total mineral sector payments to governments peaked in 2008, reaching $10.5 billion. This was 2.6 times the level in 2003. In 2009, the situation changed dramatically. As a result of the US financial crisis, and generally collapsing

metals, oil and potash prices, revenues to governments plummeted by more than one-half, to $4.9 billion. Total payments to governments recovered to $7.5 billion in 2010 and continued to increase to more than $8.3 billion in 2011. The primary reasons for the increase in 2011 were economic. Buoyed by generally higher metals prices and increased production, the value of non-oil sands mineral production rose about 21% in 2011. Corporate pre-tax profits correspondingly increased about 24%.

This recovery trend was broken in 2012. Overall payments to governments fell by 20.7%, or $1.7 billion, from $8.3 billion in 2011 to $6.6 billion in 2012. Most of the loss in corporate income tax revenue appears to be concentrated in the extractive components of the sector: mining and quarrying and oil sands mining. Royalties and mining taxes were lower by 21%, or $820 million. About half of the decrease occurred in Alberta as a result of the growing price discount on bitumen (see Section 2 of this report for more discussion).

Another factor affecting payments to governments from oil sands mining has been the increased spending on various new and expanded oil sands projects. Company investments generally reduce corporate income taxes and provincial royalties when capital deductions and allowances are claimed. It was estimated by the Canadian Association of Petroleum Producers that overall spending on oil sands mining projects increased by over 30% in 2012 to a total of almost $11 billion. While these expenditures will eventually generate additional revenues and additional payments to both levels of governments in future years, they can reduce payments in the near term.

Beyond oil sands, British Columbia, Quebec and Ontario also experienced large percentage reductions in royalty/mining tax receipts.

INDIRECT CONTRIBUTIONS TO MINING INDUSTRY SUPPLIERS

The mining industry's economic impact goes far beyond its direct contribution to GDP. For instance, mining accounts for approximately half of Canada's rail-freight revenues and tonnage annually (details in Section 2). Organizations such as CN Rail, CP Rail, the Ports of Montreal, Quebec and Vancouver depend on a vibrant mining industry.

Supply relationships like these create mutual synergies. For instance, supplier companies play a crucial role in introducing and spreading innovative technologies and ideas within the mining industry.

InfoMine, a mining database, reported in 2013 that 3,205 Canadian firms provide technical, legal, financial, accounting, environmental and other expertise to the mining industry. Most of these suppliers are located in Ontario and British Columbia, followed by Alberta, Quebec, Saskatchewan and Manitoba.

From 2008 to 2012, 39% of global mining equity and over 70% of all global mining equity financings were handled through the Toronto Stock Exchange and the TSX Venture Exchange—more than through any other stock exchange in the world. Several thousand Canadian brokers, analysts, exchange workers, consultants, trade finance experts and securities lawyers both support and benefit from the mining industry (see Section 3 of this report for a discussion of the Canadian investment services sector as a mining supplier).

NUMBER OF MINING SUPPLIERS IN LEADING COUNTRIES

United States: 5,343
Brazil: 3,280
Canada: 3,205
Chile: 1,856
Australia: 1,669

Source: InfoMine

TAX POLICY

The Canadian mining industry supports the federal government's reduction of the federal corporate tax rate

to 15%. A recent report from the University of Calgary School of Public Policy suggests that Canada has the lowest corporate tax rates in the G7, thus increasing Canada's global attractiveness as a business destination.

Industry is also pleased with the extension of both the Mineral Exploration Tax Credit and the super-flow-through share provision in the 2013 federal budget. Both measures will positively assist financing and exploration efforts and are key to addressing Canada's declining base metal reserves.

Other recent federal mining tax reforms, however, will make it more costly for companies to both develop projects and operate, particularly in remote and northern regions, and might push investment to more competitive jurisdictions. The 2012 and 2013 federal budgets indicate a trend in reduced government tax support to the Canadian mining industry as result of the following measures:

- The elimination of the corporate Mineral Exploration and Development Tax Credit
- The elimination of the Atlantic Investment Tax Credit for resources
- The elimination of the Accelerated Cost of Capital Allowance
- The reduction of the Scientific Research and Experimental Development Tax Incentive Program
- The unintended consequences of the foreign affiliate dumping rules
- The rendering of pre-production expenses ineligible for Canadian Exploration Expenses deductions

On the backdrop of a volatile commodities market, and given the already heightened level of remote and northern exploration, development and operational costs, these measures will undoubtedly tip the balance of some projects, rendering them economically unviable. Knowing that any reduction in mining and mineral-related investment will be associated with a reduction in regional and national social and economic benefits, these tax reforms will arguably make it more difficult for government to achieve certain stated policy objectives. Given the federal government's publicly stated policy objectives for Canada's north and Arctic, it is important to assess the full extent of the impact that these reforms will have not just for Canada, but for remote and northern social and economic development especially.

FIGURE 1
CANADA'S REAL GROSS DOMESTIC PRODUCT BY INDUSTRY, 2007-2012

($ millions)	2007	2008	2009	2010	2011	2012
All industries	1,466,802	1,481,327	1,435,990	1,484,210	1,522,143	1,548,668
Agriculture	17,888	19,944	19,014	18,837	18,906	19,091
Forestry and logging	4,207	3,950	3,030	3,553	3,881	3,769
Fishing, hunting and trapping	1,046	1,088	1,083	1,097	1,128	1,167
Mining (including milling) and quarrying, and oil and gas extraction	**122,279**	**120,124**	**108,094**	**113,018**	**118,969**	**119,108**
Support activities for mining and oil and gas extraction	9,240	9,944	7,311	10,090	11,900	10,742
Electric power, gas and water utilities	35,228	36,937	35,454	35,937	37,489	37,600
Construction	95,353	98,960	95,226	102,863	105,912	110,883
Manufacturing	186,210	176,288	152,791	161,958	165,899	168,388
Trade, wholesale	80,076	79,651	74,553	78,984	81,812	83,173
Trade, retail	77,837	80,416	78,105	81,213	82,826	84,519
Transportation and warehousing	62,452	63,022	59,890	62,166	64,542	66,086
Information and cultural industries	48,717	49,207	49,244	49,688	50,423	51,100
Finance and insurance	98,639	97,231	95,997	98,120	99,980	101,757
Real estate and rental and leasing	168,501	172,460	177,369	181,930	187,414	192,526
Community, business and personal services	199,433	203,833	200,380	202,614	206,451	209,483
Public administration	96,715	100,195	103,616	105,912	107,203	106,860
Health care and social assistance	96,834	99,937	102,730	105,117	107,292	109,472
Educational services	75,387	78,084	79,417	81,206	82,016	83,681

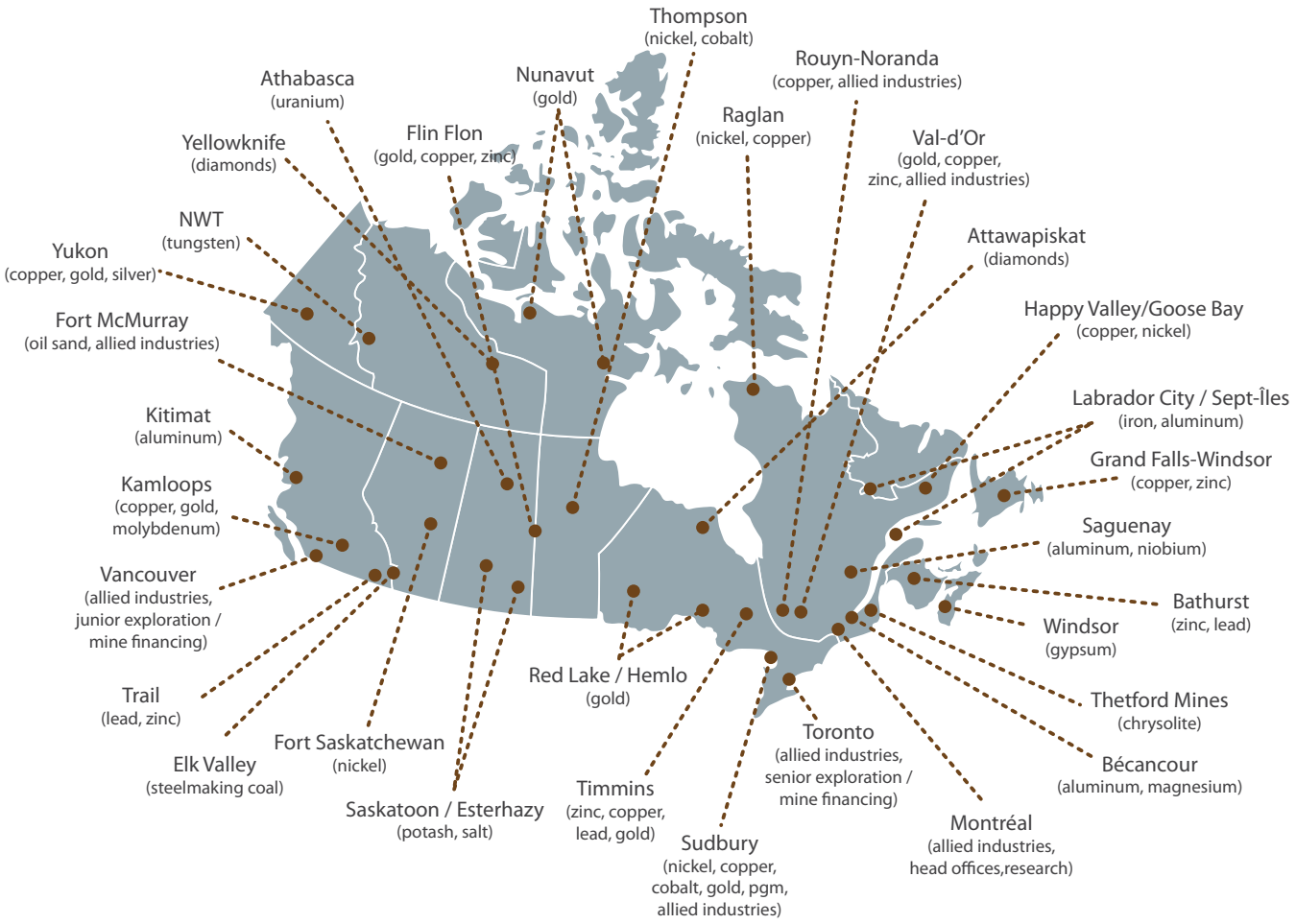
Source: Statistics Canada.
Note: Values at basic prices in 2007 constant dollars.
In all figures, dollar amounts are expressed in Canadian dollars unless noted otherwise.

FIGURE 2
REAL GROSS DOMESTIC PRODUCT, MINING AND MINERAL MANUFACTURING, 2007-2012

($ millions)	2007	2008	2009	2010	2011	2012
Metal mines	16,456	16,999	13,299	14,034	15,455	14,932
Non-metal mines	5,332	5,037	3,369	4,047	4,166	3,855
Coal mines	1,615	1,705	1,446	1,715	1,700	1,749
Total Mining	**23,403**	**23,741**	**18,117**	**19,796**	**21,321**	**20,536**
Primary metal manufacturing	15,399	14,972	11,456	12,813	13,162	13,176
Fabricated metal product manufacturing	14,317	13,082	11,019	11,806	12,514	13,155
Non-metallic mineral product manufacturing	6,455	6,206	5,246	5,794	5,871	5,738
Total Mineral Manufacturing	**36,171**	**34,260**	**27,721**	**30,413**	**31,547**	**32,069**
Oil and gas extraction	89,636	86,439	82,666	83,129	85,748	87,835
Petroleum and coal products manufacturing	7,019	6,995	7,415	7,601	7,262	7,501
Support activities for mining and oil & gas	9,240	9,944	7,311	10,090	11,900	10,742
Total	**165,469**	**161,379**	**143,230**	**151,029**	**157,778**	**158,683**

Source: Statistics Canada.
Note: Values at basic prices in 2007 constant dollars.

FIGURE 3
CANADIAN MINING INDUSTRY CLUSTERS



Source: Natural Resources Canada

FIGURE 4

VALUE OF CANADIAN MINERAL PRODUCTION BY PROVINCE AND TERRITORY, 2002 AND 2012

Province/Territory	2002 ($ millions)	2002 (%)	2002 Rank	2012[P] ($ millions)	2012[P] (%)	2012[P] Rank
Ontario	5,937.3	29.7	1	9,162.8	19.5	1
British Columbia	2,863.6	14.3	3	8,312.3	17.7	2
Saskatchewan	2,493.0	12.5	4	8,247.5	17.6	3
Quebec	3,742.0	18.7	2	8,187.1	17.5	4
Newfoundland and Labrador	872.8	4.4	7	4,449.4	9.5	5
Alberta	1,094.4	5.5	5	2,706.1	5.8	6
Northwest Territories	874.2	4.4	6	1,721.8	3.7	7
Manitoba	850.5	4.3	8	1,512.4	3.2	8
New Brunswick	653.5	3.3	9	1,146.4	2.4	9
Nunavut	271.6	1.4	10	604.7	1.3	10
Yukon	43.1	0.2	12	509.6	1.1	11
Nova Scotia	258.6	1.3	11	313.2	0.7	12
Prince Edward Island	5.3	…	13	4.1	…	13
Total Canada	**19,959.8**	**100.0**		**46,877.5**	**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.

FIGURE 5

TOTAL CAPITAL EXPENDITURES FOR MINERAL RESOURCE DEVELOPMENT, BY PROVINCE AND TERRITORY, 2012[P]

Province/Territory / ($)	Exploration	Deposit Appraisal	Mine Complex Development	Total Expenditures
Newfoundland and Labrador	110,985,953	90,366,306	990,443,954	1,191,796,213
Nova Scotia	7,744,522	3,561,000	5,173,949	16,479,471
New Brunswick	17,169,166	6,643,825	366,064,141	389,877,132
Quebec	353,675,123	347,024,502	3,503,679,384	4,204,379,009
Ontario	563,180,168	491,047,930	2,735,745,467	3,789,973,565
Manitoba	91,674,060	2,251,605	347,098,531	441,024,196
Saskatchewan	290,160,898	111,096,399	4,084,992,142	4,486,249,439
Alberta	17,529,901	20,302,857	182,647,531	220,480,289
British Columbia	400,649,730	385,747,566	2,717,308,887	3,503,706,183
Yukon	175,726,985	51,825,122	95,008,397	322,560,504
Northwest Territories	25,226,010	93,780,312	431,217,752	550,224,074
Nunavut	247,993,624	237,164,553	90,695,060	575,853,237
CANADA	**2,301,716,140**	**1,840,811,977**	**15,550,075,195**	**19,692,603,312**

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, pre-feasibility, feasibility, and environmental studies, and land access costs. Also includes machinery and equipment and non-residential construction.

FIGURE 6

DIRECT REVENUES TO CANADIAN GOVERNMENTS FROM THE MINERAL SECTOR, 2003–2012

Revenues ($ millions)	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	Total
Royalties/Mining Taxes	586	1,336	1,576	2,640	3,967	5,279	2,187	3,176	3,880	3,060	27,687
Corporate Income Tax	1,773	1,943	2,393	4,005	4,213	3,204	1,083	2,408	2,437	1,244	24,702
Personal Income Tax	1,732	1,732	1,731	1,784	1,970	2,047	1,687	1,861	1,987	2,277	18,808
TOTAL	**4,090**	**5,011**	**5,700**	**8,429**	**10,150**	**10,529**	**4,957**	**7,445**	**8,304**	**6,581**	**71,197**
-of which federal	2,609	2,760	2,799	3,707	4,005	3,547	1,905	2,963	3,045	2,471	29,811
-of which provincial	1,481	2,251	2,901	4,722	6,145	6,982	3,052	4,482	5,259	4,110	41,385
Provincial share (%)	36.2	44.9	50.9	56.0	60.5	66.3	61.6	60.2	63.3	62.5	58.1

Source: ENTRANS Policy Research Group study for the Mining Association of Canada.
Notes: Most royalty estimates are provided on a fiscal year basis, while the estimates for corporate and personal income taxes are for calendar (taxation) years. The federal share includes federal corporate income and capital taxes, federal personal income taxes paid by mining employees and mining royalties generated in the Northwest Territories and Nunavut. The provincial share includes all royalties and mining taxes to provinces and to the Yukon, provincial corporate income and provincial personal income taxes paid by mining employees.

THE ACTIVITIES
PRODUCTION, PROCESSING AND TRANSPORTATION

CANADA'S STRENGTH IN MINING RESTS ON THE 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 11 major minerals and metals (details in Annex 4):

- First in potash
- Second in uranium
- Third in aluminum, cobalt, titanium and tungsten
- Fourth in cadmium, diamonds, platinum group metals and sulphur
- Fifth in nickel

Canada no longer holds a top five position in the production of gold, silver, zinc, copper, molybdenum, or chrysolite, having been surpassed by other countries, including Australia, Russia, the United States, China, Mexico and Peru. However, for these and other major minerals and metals, Canada still remains in the top 10 countries in global production.

PRODUCTION VALUES

In 2012, the value of Canadian mineral production retreated from its record high of $50.9 billion in 2011, decreasing by a modest 7.8% to $46.9 billion (see Figure 7). For the first time since the recession, metal, non-metal and coal production values all dropped by 8%, 5% and 15%, respectively. To underscore the extent to which Canadian mining companies are subject to market behaviours, 2012 coal production values decreased despite a 12% increase in production volume. At $23.6 billion and $16.9 billion for metal and non-metal production, respectively, the 2012 totals recall values seen in pre-recession years.

CANADIAN MINERAL PRODUCTION IN 2012

Metals: $23.6 billion
Non-metals: $16.9 billion
Coal: $6.4 billion
TOTAL: $46.9 billion

Canada's top 10 minerals and metals (see Figure 8) each had production values of more than $1.5 billion in 2012, with five over $4 billion. Values for potash, coal, nickel, diamonds and copper fell year over year, while the value for iron ore remained virtually the same. Gold showed growth of 17% in 2012. This value increase was largely due to a greater production volume of the metal: 5.5 million grams more than in 2011 (details in Annex 5). Together, the top 10 minerals and metals represented $39 billion in 2012—83% of Canada's total mineral production value.

The following paragraphs discuss market developments surrounding a few key minerals.

URANIUM

Damage to Japanese nuclear reactors from the 2011 earthquake and tsunami, and resulting complications in containing the meltdown, have cast a negative light on nuclear energy in several jurisdictions. Many countries, particularly in the OECD group, have shifted their energy policies away from nuclear power. In Japan, for example, all 50 nuclear reactors have been idled, most for intensified safety checks following the disaster. Whether Japan returns to its traditional reliance on nuclear power for power generation, and to what extent, is uncertain.

As of January 2013, 31 countries were operating 437 nuclear power plants, while 15 countries were constructing an additional 68 new nuclear plants, 31 of which are in China. Some analysts have suggested that 260 new reactors could be built worldwide by 2030. This trend is reinforced by concern over air pollution, the carbon friendly nature of nuclear power, and concerns over energy security.

World Energy Outlook 2012 projects that nuclear power will supply 12% of the world's electricity in 2035, roughly its current global share of generation. Rising to over 580 gigawatts in 2035, with non-OECD countries accounting for 94% of the almost 200-gigawatt increase, demand for nuclear power is forecast to grow. China will see the biggest increase, rising from almost 12 gigawatts of capacity in 2011 to 128 gigawatts in 2035, followed by Korea, India and Russia.

Canada, notably Saskatchewan, is a major player in the world uranium industry. The McArthur River mine in northern Saskatchewan is the world's largest and highest-grade uranium deposit, with an average ore grade of 21% and annual production of around 8,200 tonnes of uranium oxide. A positive outlook in world uranium demand bodes well for Canada's prominence in this mining sector. Further bolstering Canada's uranium miners was the recent coming into force of the Canada-India Nuclear Cooperation Agreement. The agreement enables Canadian companies to export nuclear items for peaceful uses, in accordance with Canada's nuclear non-proliferation policy.

OIL SANDS

The development of the western Canadian oil sands is one of the world's biggest economic stories in recent decades. Technological advances, combined with elevated crude oil prices made the oil sands economically viable to develop, boosting production from 100,000 barrels a day in 1980 to over 1.8 million barrels a day in 2012.

Canada has the third-largest oil reserves in the world, and 97% (168 billion barrels) of Canada's reserves (173 billion barrels) are in the oil sands. The majority (80%) of world oil reserves are owned or controlled by national governments. Only 20% of total world oil reserves are accessible for private sector investment, 55% of which are found in Canada's oil sands. Given this ratio, foreign direct investment in this sector has been increasing and is anticipated to continue in the coming years.

Some of this investment in new oil sands development will add to the anticipated $2.1 trillion (2010 dollars) contribution to the Canadian economy over the next 25 years—about $84 billion per year. According to the Canadian Energy Research Institute, employment in Canada as a result of new oil sands investment could grow from 75,000 jobs in 2010 to 905,000 jobs in 2035, with 126,000 jobs sourced in provinces other than Alberta.

Synthetic crude oil accounted for nearly 28% of Canada's crude oil production volume (30% by value) in 2012, up from 10% a decade earlier (see Figure 9). The absolute value of this increase is considerable: from $6.5 billion in 2002 to $30.9 billion in 2011. However, 2012 saw a drop in this value of nearly 8% compared to 2011. The decrease

OIL SANDS PROJECTIONS

- Alberta's deposits are believed to contain 2.5 trillion barrels of bitumen—five times more than the conventional oil reserves in Saudi Arabia. With current technologies, that would yield 300 billion barrels of synthetic crude.
- Alberta ranks third, after Saudi Arabia and Venezuela, in terms of proven global crude oil reserves.
- Oil sands investment will generate $2.1 trillion in economic activity across Canada over the next 25 years (2010 to 2035).
- Alberta's oil sands production is projected to increase from some 1.8 million barrels a day in 2012 to 5.2 million barrels a day in 2030. New oil sands investment is expected to grow employment from 75,000 jobs in 2010 to 905,000 in 2035.
- For each oil sands-related job created in Alberta, approximately one indirect job and one induced job will be created in the rest of Canada.

in production can be attributed, in part, to unplanned maintenance at major production facilities and to the effects of cold weather. Currently, all of this crude oil production is in Alberta, though reserves in Saskatchewan are now attracting interest after the provincial government announced its intent to sell oil sands rights on Crown land in late 2012.

POTASH

Potash plays a central role in helping feed the world's growing population, as approximately 95% of world potash production is used as fertilizer. According to the OECD, agricultural production needs to increase by 60% over the next 40 years to meet the rising demand for food. This rising food demand is linked to projections of global population surpassing 9 billion by 2050. These trends indicate that fertilizer made from potash will play an even greater role in increasing crop yields to meet this demand.

Since Russia's Uralkali quit the Belarusian Potash partnership in July 2013 , uncertainty in the global trade in potash has increased, causing speculation about what market impacts may result. Uralkali has adopted a strategy of prioritizing volumes over price, which could lead to an over-supplied market that would drive prices down. Some analysts have anticipated a drop of 20 to 25%, with the price leveling out near US$300 a tonne. At the time of writing spot market prices had eased to US$310 a tonne.

With 10 world-class potash mines in production, Saskatchewan is among the world's largest producers and exporters of the product. Saskatchewan's position as a world leader will likely be reinforced by the emergence of BHP Billiton as a major player in the province, with its three-year commitment of an additional US$2.6 billion to develop the Jansen Potash Project. Analysts estimate that after spending $3.8 billion by the end of 2016, another $10 or $11 billion will be required for construction. Robust mining investments such as these contribute significantly to the local, provincial and national economies.

PROCESSING OF MINERALS

Canada has a large mineral-processing industry, with 31 non-ferrous metal smelters, refineries and conversion facilities in six provinces (see Figure 10). Some of these facilities contain both a smelter and a refinery.

Canada's integrated smelters and refineries were built in proximity to world-class mines, located inland, without access to low-cost marine transport. As local ore reserves increasingly become depleted (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 imported from other countries. Additionally, they are also using more secondary raw materials and scrap feed.

CANADA'S MINERAL-PROCESSING FACILITIES

- New Brunswick: 1 smelter
- Quebec: 11 smelters, 3 refineries, 1 smelter/refinery
- Ontario: 2 smelters, 3 refineries, 2 smelter/refineries, 1 smelter/processor, 1 conversion facility
- Manitoba: 1 smelter/refinery
- Alberta: 1 refinery
- British Columbia: 2 smelters, 1 smelter/refinery, 1 processing plant

The quantity and value of refined metal production in Canada have become irregular due to the depletion of reserves and greater dependence on imported concentrates. Over the past five years, the production volume of refined lead has held steady, while those of copper, aluminum and zinc have decreased (see Figure 11). Refined nickel production has remained consistent over the last two years.

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 gone into decline. 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 is essential.

Other factors 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 and competing fiercely for raw materials. As well, the age of some Canadian operations, and their ability to meet potential regulatory requirements, also affects viability. For instance, Hudbay Minerals closed its 80-year-old copper smelter in Manitoba in mid-2010. In the face of these combined factors, the downstream Canadian mining industry risks being left behind unless strategic actions are taken to ensure its longevity.

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. By some measures, 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.

The fallout of the Lac-Mégantic disaster, however, may be a watershed in rail management and regulation. The response to the derailment may result in additional restrictions (beyond those already recommended by the Transportation Safety Board) on the transportation of dangerous goods, which will affect both railways and shippers. As well, awareness of the movement of dangerous goods through communities has increased, and concerns over safety and the potential consequences of future accidents have taken centre stage.

The mining industry recognizes that it has a role to play in ensuring the accurate classification and stewardship of its products. The industry and MAC members, notably through commitments made in the Towards Sustainable Mining initiative, invest considerably in emergency response, crisis management and material stewardship.

The industry has responsibilities beyond classification, however. Mining companies are responsible for ensuring mineral products are securely loaded on rail cars while the cars are in their custody. This requires companies to undertake appropriate loading procedures to ensure the cargoes are safe for transit when a railway takes charge of the cars.

The Canadian mining industry prides itself on its safety culture, and will participate in the review of any policies and procedures that may impact the transportation elements of our business. A fact-based and historical analysis is required to ensure that any reforms undertaken are proportional to risk.

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 2012, shipments of coal and processed minerals represented 51% of total Canadian rail freight revenue (see Figure 12). In terms of volume, rail became more dependent on mining in 2011, with 52% of its commodity volume coming from mining compared to 44% in 2009—a two-year increase of 15%.

The 2007 strike of CN engineers and the 2012 strike of CP conductors, engineers and rail traffic controllers highlighted how important rail is to the mining industry. After less than a week in each instance, mine sites and processing operations were seriously hampered in their ability to move raw materials and finished products out to customers. At the time of writing, the Teamsters union was warning of a potential strike or lockout at CN in the fall of 2013.

TOP COMMODITIES CARRIED BY CANADIAN RAIL IN 2011 (BY VOLUME)

1. Minerals and metals: 52%
2. Grain: 13%
3. Forest products: 11%
4. Chemicals: 5%

Source: Transport Canada, Transportation in Canada: An Overview (2011).

Canada's rail freight system operates primarily as a dual monopoly, shared by CN and CP—Canada's only Class I railways. Communities and businesses are often served by only one of these companies, which gives shippers little competitive choice. This is frequently the case for many mining operations given their remote locations.

In 2008, the *Canada Transportation Act* was amended to better protect shippers from potential abuse of market power by railways. The changes, supported by MAC and the Canadian mining industry, balanced shippers' interests (lower rates, better service) with those of rail companies (higher rates, more profit) by strengthening the ability to arbitrate disputes over rail fees and ancillary charges.

As a follow-up to the legislative changes, the federal government recently reviewed rail service by CN and CP, aiming to identify service problems, examine best practices and recommend remedies to improve service. Despite the Rail Freight Service Review panel's 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 Bill C-52, the *Fair Rail Freight Service Act*. The impending statutory review of the *Canada Transportation Act* in 2015 gives MAC an opportunity to engage further on this important issue and monitor the implementation of the new legislation.

TRUCKING

Trucking plays a smaller yet still 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 report, *Transportation in Canada* (2011), trucks carried $153 billion in Canadian exports in 2011, 10% of which ($15.3 billion) was base metals and articles of base metal. Trucks carried $213 billion in imports to Canada, 8% of which ($18 billion) was base metals and articles of base metal.

Only small amounts of ores and concentrates are traded by truck—around 0.4% of total truck exports and 0.2% of imports.

Note: There is no detailed information about domestic truck shipments by commodity.

MARINE

Mining is also a leading customer of Canadian ports. In 2012, the Port of Montreal handled large volumes of iron ore, gypsum, fertilizer and zinc ore, among other mined products such as coal, salt and sand. Total mined products accounted for 2.7 million tonnes, or 42% 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.

The mining industry is also a major contributor to Canada's St. Lawrence Seaway. According to the 2012 *Traffic Report*, prepared jointly by the Seaway's management and development corporations, shipments of iron ore, coke and coal represented 42.5% of total seaway traffic in 2012, with total mining products accounting for nearly 55% of total volume.

Coal accounted for 39% of the total volume handled at the Port of Vancouver in 2012, which moves shipments to China, Japan and other Asian markets. Fertilizer/potash represents another 10% of the port's volume, and minerals and ores another 10%. All told, mining products account for 49.5 million metric tonnes, or nearly 60% of the port's volume.

Mining also accounts for a sizeable amount of the value of Canadian exports moved by ship to international markets. According to *Transportation in Canada* (2011), Canada transported $60.5 billion in industrial exports by ship to non-US countries in 2010. Of that, non-ferrous products and alloys ($7.3 billion), coal ($5.7 billion), iron ore ($2.7 billion), non-ferrous metals ($2.1 billion) and potash ($2 billion) were the most valuable mining products.

Internationally, the International Maritime Organization (IMO) regulates conventions that govern pollution and safety practices at sea. Recent changes to the IMO's MARPOL Convention and the International Maritime Solid Bulk Cargoes Code will have implications for the way mining companies ship their products (more discussion in Section 6).

PIPELINE

The North American energy landscape is changing rapidly. Historically, Canadian oil companies have shipped the majority of their product to US markets because the United States was reliant on imports to meet oil demand.

Using hydraulic fracturing to produce oil and gas from shale and tight rock formations is transforming the United States from a net energy importer to a self-sufficient energy producer, with a rapidly declining import burden. Meanwhile, growth in global oil demand has shifted to Asia, with China surpassing the United States as the world's largest oil importer.

This shift in demand presents a challenge for Canadian oil companies, as existing oil transportation infrastructure does not offer opportunities to access global markets.

There are costs associated with the inadequacy of Canada's existing pipeline network to meet the global demand shift to Asia. 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. A 2013 Canada West Foundation report estimates that this crude oil "discount" is costing the Canadian economy between $30 and $70 million a day in foregone economic activity.

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.

FIGURE 7
VALUE OF CANADIAN MINERAL PRODUCTION, 1999-2012[P]

($ billions)	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012[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
Non-metals	7.3	7.4	7.6	7.9	8.9	10.3	10.5	10.3	11.6	19.4	11.6	14.7	17.8	16.9
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	6.4
Total Mineral Production	**18.5**	**19.8**	**19.6**	**19.9**	**20.1**	**24.4**	**28.0**	**34.2**	**40.6**	**47.0**	**31.4**	**41.6**	**50.9**	**46.9**

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.

FIGURE 8
CANADA'S TOP TEN METALLIC AND NON-METALLIC MINERAL PRODUCTS BY VALUE OF MINERAL PRODUCTION, 2002 AND 2012[P]

		2002		2012[P]	
	Unit of Measure	Quantity (millions)	$ Value (millions)	Quantity (millions)	$ Value (millions)
Potash (K_2O)[1]	t	8.4	1,627	9.0	6,981
Coal	t	66.6	1,642	66.9	6,389
Gold	g	151.9	2,377	103.7	5,560
Iron ore	t	30.9	1,278	39.4	5,319
Copper	kg	584.2	1,440	563.3	4,478
Nickel	kg	179.8	1,927	196.5	3,418
Diamonds	ct	4.9	792	10.4	2,005
Cement[2]	t	13.7	1,437	12.8	1,702
Sand and Gravel	t	238.1	1,054	225.2	1,639
Stone	t	124.7	1,004	151.8	1,515

Sources: Natural Resources Canada; Statistics Canada.
[P] Preliminary.
Notes: [1]Shipments of potash to Canadian potassium sulphate plants are not included in this table.
[2]Includes exported clinker minus imported clinker. Data include shipments by producers regardless of their industrial classification.

FIGURE 9

PRODUCTION OF SYNTHETIC CRUDE OIL BY OIL SANDS MINING PLANTS, ALBERTA AND CANADA, BY QUANTITY AND VALUE, 1998-2012

	Synthetic Crude Oil (000's of m^3)	Total Crude Oil and Equivalents (000's of m^3)	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	45,917.6	122,081.0	37.6	23,375,070	55,028,049	42.5
2011	50,042.4	130,045.0	38.5	30,930,600	69,572,385	44.5
2012	52,455.2	143,873.9	36.5	28,588,084	69,346,737	41.2
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	17.0
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	45,917.6	167,774.9	27.4	23,375,070	76,165,360	30.7
2011	50,042.4	175,701.8	28.5	30,930,600	95,686,517	32.3
2012	52,455.2	189,129.9	27.7	28,588,084	94,074,453	30.4

Source: Statistics Canada

FIGURE 10
NON-FERROUS SMELTERS AND REFINERIES IN CANADA, 2012

Owner	Operation	Type of facility	Location	Outputs
New Brunswick				
Xstrata Zinc Canada (Brunswick)*	Brunswick	(Sm.)	Belledune	Pb, Ag, Bi
Quebec				
Alcoa Inc.	Baie-Comeau	(Sm.)	Baie-Comeau	Al
Alcoa Inc.	Deschambault	(Sm.)	Deschambault	Al
Alcoa Inc./Rio Tinto Alcan Inc.	Bécancour	(Sm.)	Bécancour	Al
Newalta Income Fund	Sainte-Catherine	(Ref.), (Sec. Sm.)	Sainte-Catherine	Recycled Pb
Rio Tinto Alcan Inc.	Alma	(Sm.)	Alma	Al
Rio Tinto Alcan Inc.	Arvida	(Sm.)	Arvida	Al
Rio Tinto Alcan Inc.	Grande-Baie	(Sm.)	Grande-Baie	Al
Rio Tinto Alcan Inc.	Laterrière	(Sm.)	Laterrière	Al
Rio Tinto Alcan Inc.	Shawinigan	(Sm.)	Shawinigan	Al
Rio Tinto Alcan Inc. (Vaudreuil)	Vaudreuil	(Ref.)	Jonquière	Alumina
Rio Tinto Alcan Inc./Aluminium Austria Metall Québec/Hydro Aluminum a.s./Société générale de financement du Québec/Marubeni Québec Inc. (Alouette)	Alouette	(Sm.)	Sept-Îles	Al
Xstrata Copper Canada (CCR) *	CCR	(Ref.)	Montréal-Est	Cu, Au, Ag, Se, Te, Ni, PGM
Xstrata Copper Canada (Horne) *	Horne	(Sm.)	Noranda	Cu, Au, Ag
Xstrata Zinc Canada * (General Smelting Company of Canada)	General Smelting Company of Canada	(Sec. Sm.)	Lachine	Recycled Pb
Xstrata Zinc Canada * Noranda Income Fund (Canadian Electrolytic Zinc Limited - CEZinc)	Canadian Electrolytic Zinc Limited (CEZinc)	(Ref.)	Valleyfield	Zn, Cd, S*
Ontario				
Cameco Corporation	Fuel Services Division	(Con. Fac.)	Port Hope	U
Cameco Corporation	Fuel Services Division	(Ref.)	Blind River	U
Johnson Matthey Limited	Brampton	(Sm.), (Ref.)	Brampton	Au, Ag, Recycled Pb
Royal Canadian Mint	Ottawa	(Ref.)	Ottawa	Au, Ag, Cu, PGM
Vale	Copper Cliff complex	(Sm.), (Ref.), (Pl.)	Sudbury	Ni, Cu, Au, Ag, Se, Te, PGM, S*
Vale	Port Colborne	(Ref.)	Port Colborne	Electrolytic Co, PGM, Co oxide
Aleris International, Inc.	Mississauga	(Sec. Sm.)	Mississauga	Recycled Zn
Xstrata Nickel Canada *	Sudbury	(Sm.), (Pl.)	Sudbury	Ni, Cu, Co, Au, Ag, PGM
Tonolli Canada Ltd.	Mississauga	(Sec. Sm.)	Mississauga	Recycled Pb

FIGURE 10
NON-FERROUS SMELTERS AND REFINERIES IN CANADA, 2012

Owner	Operation	Type of facility	Location	Outputs
Manitoba				
Vale	Manitoba	(Sm.), (Ref.)	Thompson	Ni, Cu, Co
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				
Thompson Creek Mining Limited/Sojitz Moly Resources Inc. (Endako)	Endako	(Pl.)	Fraser Lake	Mo trioxide
Rio Tinto Alcan Inc.	Kitimat	(Sm.)	Kitimat	Al
Metalex Products Ltd.	Richmond	(Sec. Sm.)	Burnaby	Recycled Pb
Teck Resources Limited	Trail	(Sm.), (Ref.), (Pl.)	Trail	Zn, Pb, Bi, Cd, In, Ge, Au, Ag, S*

Source: Natural Resources Canada.
Notes: Included are operations that produced in 2012.
(Sm.) Smelter
(Ref.) Refinery
(Sec. Sm.) Secondary smelter
(Pl.) Plant
(Con. Fac) Conversion facility
S Sulphuric acid*
** Xstrata was acquired by Glencore in May 2013.*

FIGURE 11
CANADIAN PRODUCTION OF SELECTED REFINED METALS, 2004-2012[P]

Metals	2004	2005	2006	2007	2008	2009	2010	2011	2012[P]
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	2,780,556
Cadmium	1,880	1,727	2,090	1,388	1,409	1,299	1,357	1,240	1,286
Cobalt	4,673	4,618	4,555	4,883	4,899	4,358	4,145	5,317	5,308
Copper	526,955	515,223	500,463	453,453	442,050	335,896	319,618	273,761	270,651
Lead	241,169	230,237	250,464	236,688	259,094	258,854	273,017	282,589	280,627
Nickel	151,518	139,683	146,899	153,647	167,732	116,909	105,413	142,445	141,828
Zinc	805,438	724,035	824,464	802,103	764,310	685,504	693,014	662,151	641,997

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

FIGURE 12
CRUDE MINERALS AND PROCESSED MINERAL PRODUCTS TRANSPORTED BY CANADIAN RAILWAYS, 2002-2012

(million tonnes)	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Total Freight Volume[1]	238.7	235.1	251.2	260.7	258.7	255.7	244.4	212.9	235.4	250.3	253.5
Total Crude Minerals	108.0	107.1	106.9	112.8	108.0	112.0	111.9	85.0	79.9	84.5	81.3
Total Processed Mineral Products	24.8	23.3	27.2	27.3	27.9	27.7	27.6	21.7	52.4	51.4	49.1
Total Crude and Processed Minerals	**132.8**	**130.3**	**134.0**	**140.0**	**135.9**	**139.8**	**139.4**	**106.7**	**132.3**	**135.9**	**130.4**
(%)											
Crude Minerals and Processed Mineral Products as a Percentage of Revenue Freight	55.6	55.4	53.4	53.7	52.5	54.7	57.1	50.1	56.2	54.3	51.4

Source: Statistics Canada.
Notes: [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.

THE MONEY
RESERVES, PRICES, FINANCING, EXPLORATION AND INVESTMENT

THE FIVE MAIN MONETARY ASPECTS OF THE CANADIAN MINING INDUSTRY—RESERVES, PRICES, FINANCING, EXPLORATION AND CAPITAL INVESTMENT—ARE BY NATURE INTERRELATED. GLOBAL PRICES INFLUENCE COMPANY CONFIDENCE AND, THEREFORE, EXPLORATION AND CAPITAL INVESTMENT. COMPANIES NEED SUITABLE FINANCING TO BACK THEIR EXPLORATION AND INVESTMENT PROGRAMS.

CANADIAN RESERVES

The past 30 years have seen a marked decline in proven and probable Canadian mineral reserves in all major base metals (see Figure 13 and Annex 6). Since 1980, the most dramatic decline has been in lead (95%), zinc (85%) and silver (80%) reserves, while copper (47%) and nickel (63%) reserves have fallen significantly as well.

Gold reserves rebounded significantly in 2010 (up nearly 40% over 2009) to levels not seen since 1995. Copper reserves for the same year, despite significant decline over the long term, were up 17% over 2009 levels.

This recovery in proven and probable gold and copper reserves correlates to an increase in buoyant metal prices for certain commodities and corresponding increases in targeted exploration, factors that are discussed further below. While improvement in reserve levels of certain metals is a welcome change, it is too early to determine if this is the beginning of a longer-term trend that will broaden to include a greater variety of metals and minerals. For the moment, significant concern over the depletion of proven and probable reserves for the majority of Canada's deposits remains unabated.

Consistent investment over an extended period is needed to reverse the long-term decline in proven and probable reserves for a variety of key metals. To ensure the Canadian mining industry maintains its competitive advantage in this crucial area, the federal government should continue to strengthen policies that provide incentives for exploration spending, capital investment in new mines and expansion and modernization of existing mines.

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 40% of the world's base metals, up from just 5% in the 1980s. As well, as a means of controlling exports of key commodities, China stockpiles iron ore, aluminum, copper, nickel, tin, zinc and oil when prices are low, making it difficult for analysts to forecast prices for minerals and marine shipping.

Figure 14 illustrates the strong growth in mineral prices from 2000 to 2007, the dramatic decline for most metals in late 2008 and the robust rebound of prices through 2011. Recent pricing trends for some commodities reflect market volatility, and have been trending downward, while others have trended upward. The price of iron ore, for example, remains strong at nearly twice the value of pre-recession levels. Figure 14 also shows some downward pressure on the price of aluminum, copper, uranium and zinc, a sharper decline in the price of nickel, and a steep retreat in the price of gold through 2013. Gold's retreat has caused companies such as Barrick Gold to revise their internal price assumptions to US$1,300 per ounce for gold and US$3.25 per pound for copper. Despite some downward pressure,

prices, generally speaking, remain favourable for these metals and mining companies are still operating profitably.

The general consensus is that demand for mineral products should be favourable over the medium to long term. Rising incomes and increased prosperity in developing countries associated with industrialization and urbanization will continue to drive global demand. 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.

Another factor influencing these projections is the per capita consumption of goods in emerging economies relative to developed Asian and Western economies. Analysis demonstrates that although 1,200 cars are added to Beijing streets every day, there are only about 10 cars per 100 people in China, versus 76 in the United States. India's

COMMODITY-SPECIFIC PRICE TRENDS

Gold. In 2013, gold had its worst start in a quarter century. Investors sold more of the precious metal than ever before, increasing concern that bullion's longest rally since the end of World War I was coming to a close. After 11 consecutive years of strong performance, and a one-day high of US$1,923 per ounce in September 2011, the price of gold has steadily declined. From a monthly average of $1,744.81 per ounce in September 2012, to $1,276.40 per ounce on October 14, 2013, gold has decreased 27% over the past year. Contributing to this downward pressure is the US Federal Reserve's anticipated tapering of its quantitative easing stimulus program. This event will result in increased interest rates, enhancing the competitiveness of other investment options relative to gold.

Nickel. The price of nickel has fallen over the past two years. From a monthly average of $12.88 per pound in February 2011, the price of the base metal dropped more than half to $6.30 per pound on October 14, 2013. Despite this decrease, the price of nickel remains well above the $2-a-pound trough of a decade earlier. Higher levels of nickel production, particularly in China, and reports of a possible oversupply of nickel globally have subdued sentiment for the metal. On the demand side, though, global stainless steel production—for which nickel is commonly used—continues to grow in 2013. This increase in production is driven mainly by expansions and ramp-ups in China; traditional stainless steel production outside China has not kept pace.

Potash. Spot prices of potash bound for overseas markets have fallen from US$417.50 per pound (prior to Uralkali's exit from their marketing partnership with the Belarusian Potash Company) to US$370 in September, to US$305–US$310 in late October 2013. Uralkali's announcement that it would maximize sales at the expense of prices has had the predictable impact: international buyers, expecting lower prices, have delayed purchases and inventory building. According to the Scotiabank Commodity Price Index, potash prices will likely drift downward over the rest of the year. However, most of the decline has already occurred, as the global cost curve shows, and prices are near bottom (at least on a sustainable basis). Belarus would like to restore the marketing arrangement with Uralkali. That partnership would bode well for global potash prices in the future.

Iron ore. Prices for iron ore were traditionally set through contractual agreements between lead suppliers and customers. However, in recent years, this system has largely been replaced by spot market pricing. The shift brings greater transparency and is more aligned with the steel system where prices are reset daily. According to Index Mundi, iron ore prices have risen 10-fold over the past 12 years, and, despite volatility and declines from record highs, remain strong today. In fact, iron ore remained virtually unscathed by the economic downturn, dipping only $1 below the pre-recession highs in April 2009. Since then, iron ore prices have charted a volatile course, peaking at a monthly average of $187 in February 2011, and retreating to $99 per metric tonne in September 2012. Despite this volatility, iron ore remains at more than twice its pre-recession price peak, resting at $134 per metric tonne in September 2013. In Canada, this has led to investment—through increased exploration and project development—in the Labrador Trough, the iron ore belt that extends through northern Quebec and Labrador.

commercial vehicle manufacturing industry, sixth in the world at 3.9 million units in 2011, is speculated to increase to 5 million units by 2015, and 9 million units by 2020.

FINANCING

Canada is the leading global centre for mining finance. The Toronto Stock Exchange (TSX) is home to 57% of the world's public mining companies and traded more than $280 billion of mining stock in 2012. Of the firms listed on the TSX, 364 are mining companies. These firms, together valued at $381.1 billion, raised $7.5 billion in equity capital in 2012. TSX-listed mining companies mainly deal in gold, potash, uranium, copper, silver, nickel, iron ore, coal and diamonds.

The TSX is also home to the Venture Exchange (TSX-V), which gives emerging companies efficient access to capital while offering investors a regulated market for venture investments. The 1,309 mining companies listed on the TSX-V in 2012 were valued at $19.3 billion, and together they raised $2.8 billion in equity capital in the same year—just under one-third of the overall total of equity raised. This represents a significant decline from 2011, when the value of junior mining companies was $28.4 billion, and the capital raised was $5.9 billion. Junior mining companies are currently facing challenges in raising capital, which is further discussed below.

LISTED MINING COMPANIES (END OF 2012)

On the TSX—Toronto: 1,673
- Senior TSX companies: 364
- Venture Exchange companies: 1,309

On the ASX—Australia: 708
On the LSE-AIM—London: 145

GLOBAL FINANCING

The global mining industry raised $14.8 billion in equity in 2012, less than half of the $31.7 billion raised worldwide in 2011 (see Figure 15). This decline reflects the challenges of raising capital in the current global economic environment. Although the recession's effects on the global mining industry were relatively short-lived in many respects, the effects on the investment environment, particularly for junior companies, have persisted.

From 2008 through 2012, the TSX and the TSX-V accounted for 39% of the value of global mining equity financings, raising nearly $72 billion. In 2012 alone, 70% of all global mining equity financings were done on the TSX and the TSX-V, and together these comprised 70% of the equity capital raised globally for the same year (see Figure 16).

BREAKDOWN OF TSX AND TSX-V MINING PROJECTS BY LOCATION

Canada: 52%–4,674 projects
Latin America: 17%–1,571 projects
United States: 13%–1,197 projects
Africa: 7%–652 projects
Asia: 4%–313 projects
Australia: 4%–339 projects
UK and Europe: 3%–295 projects

Sources: InfoMine, TSX/TSX-V Market Intelligence Group

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

TSX-listed mining companies have a strong global focus. As of December 2012, TSX companies, including those listed on the TSX-V, were involved in 9,736 mineral projects worldwide (see Figure 17), about half of them in Canada and half elsewhere. 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.

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 for 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—including smelting, refining and manufacturing—will diminish over time, and national and

regional economies that benefit from strength in these sectors 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, 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."

Exploration investment reached $3.9 billion in 2012, but recent estimates (see Figure 18) indicate a decline in Canadian exploration investment. Spending intentions for 2013 anticipate investment levels of $3.3 billion for the year—a near 14% decrease over 2012 levels. While overall investment intentions for 2013 remain high, exploration's share of the pie is shrinking relative to deposit appraisal. Exploration spending intentions for 2013 are estimated at $1.8 billion, down 38% (or $1.1 billion) from 2011 levels. Deposit appraisal expenditures for 2013 are expected to hold at $1.6 billion, the record high set in 2012.

As for the companies that undertake exploration, junior firms have historically accounted for 50% to 60% of spending. The consistency of these pre-recession spending levels suggests that federal and provincial flow-through share programs were successful in stimulating investment by firms that can take advantage of them. Recent data, however, show this trend is fluctuating downward as the share of junior firm spending has decreased over the past six years. In 2012, junior firms sunk below their historic threshold for the second consecutive year to $1.7 billion, or 44% of exploration dollars (see Figure 19). Spending intentions for 2013 indicate a moderate increase to 46%, but a further decrease in monetary value to $1.5 billion.

The decline in exploration investment can be partially attributed to the challenges faced by junior firms in raising capital. Although also true for some major firms, access to capital has been particularly hard for junior companies. Quarterly cash balances show that as of March 31, 2013, more than 600 companies on the TSX-V reported less than $250,000 in cash; a nominal sum barely enough to cover the costs of being a public company. More than 340 companies had cash balances of less than $50,000, with 11 of these companies reporting negative cash positions. Risk-averse sentiment among investors is likely to endure until the ongoing economic fluctuations stabilize, restoring investor confidence.

ALLOCATION OF INVESTMENT BY MINERALS AND METALS

Precious metals attracted the lion's share of Canadian exploration spending in 2012, accounting for 49% overall (see Figure 20). However, recent and significant price fluctuations for gold, which began in late 2012, are likely to impact the share of expenditures allocated to precious metals in the future.

Between 2002 and 2012, iron ore saw the most dramatic jump in exploration spending, rising 195-fold over the decade, with many projects located in Newfoundland and Labrador and northern Canada.

Base metal exploration's share of total investment, despite having grown in monetary terms, has shrunk from 24% in 2002, to 17% in 2012, reflecting the depletion of Canadian base metal reserves already discussed. Currently, the replenishment of reserves is not keeping pace with global demand for these highly important metals. Without sustained and effective exploration, Canadian base metal production will outstrip reserve additions, with profound implications for the communities and people who benefit from the economic opportunities the industry directly and indirectly generates.

Coal exploration has also seen dramatic increases over the past decade, a large percentage of which has taken place

in British Columbia, with its high-quality metallurgical coal deposits. The "Ring of Fire" region in northern Ontario, west of James Bay, is attracting large exploration investment for a variety of minerals and metals. In Quebec, the North for Everyone plan (formerly the Plan Nord) aims to attract over $80 billion of new mineral development investment in the northern regions of the province. Such development would enhance the economic viability of significant nickel, cobalt, platinum group metals, zinc and iron ore developments. These factors help explain why Ontario, Quebec and British Columbia were host to more than 60% of exploration expenditures in 2012.

INTERNATIONAL EXPLORATION

Globally, Canada has been the top destination for mineral exploration investment for 20 of the past 34 years. Canada dropped to second place in 1992, surpassed by Australia, but regained the top position in 2004 and has remained there ever since.

The SNL Metals Economic Group (SNL) has tracked world mineral exploration since 1989. Based on data from nearly 3,500 companies, SNL determined that worldwide exploration investment in 2012 reached US$20.53 billion—a 13% increase from 2011—and nearly 2.5 times the 2009 low of US$8.4 billion. Exploration figures for iron ore are excluded from the above figures, and would have increased the 2012 total by an estimated US$970 million.

SNL analysis shows that although Canada led in global exploration investment in 2012, our share of the global pie shrank from 18% to 16%. Latin American and African countries saw the largest growth in exploration investment, while Canada's allocations—up only 4% year over year—was the smallest percentage and dollar increase of any region (see Figure 21).

In spite of high global exploration spending, only a handful of major discoveries and projects will come into production within the next five years. There are various reasons for this predicament. The industry is still paying for the period of low exploration spending in the 1990s and early 2000s. The dramatic rise in this spending through the 2000s was offset to some extent by the rising costs of drilling, assaying, geosciences expertise, fuel and other inputs. As well, environmental and infrastructure challenges are lengthening the time it takes for new discoveries to develop into producing mines.

This gap is slowly closing, however, as a strong cohort of projects, from the start of a pre-feasibility study to a production commitment, are in the pipeline. More than 100 of these advanced projects have been identified in Canada since 2011. These projects and others, contribute to the $160 billion in potential mining investment Canada could see over the next five to 10 years.

CANADA'S ROLE IN GLOBAL EXPLORATION SPENDING IN 2013

- Canadian companies account for approximately 31% of global exploration spending budgets, the largest share of all nations.
- More than 800 Canadian companies are actively exploring outside Canada in over 100 countries.
- Canadian firms account for the largest share of exploration spending in Canada, the United States, Central and South America, Europe and, most recently, Africa.

Sources: SNL Metals Economic Group, Natural Resources Canada

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 opens up new regions for development. The ongoing extension of the Highway 37 transmission line in northeast British Columbia is a good example of 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 project now in construction—the $450 million, 300-person Red Chris mine owned by Imperial Metals. Similarly, the planned extension of the

Monts Otish Highway in northern Quebec would improve future prospects for the development of gold, diamond and copper projects in the surrounding region.

In 2012, capital spending in the Canadian mining industry totalled $22.4 billion, up 22% from the previous year (see Figure 22). More than $18 billion in capital investment is projected for 2013, reflecting weakening prices for several commodities.

Although capital spending covers all four stages of the industry, some 90% is typically invested in the first two stages, extraction and smelting/refining. Within Stage 1, around 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 22. The data available for expenditures on repairs also lags capital expenditure data by one year. As an approximation, adding repair costs (which in 2011 were about $3.5 billion) to the above capital ($22.4 billion) and exploration ($3.9 billion) spending produces roughly $29.8 billion in Canadian mineral development investment in 2012.

Figure 22 also shows capital investment in the oil sands, where spending was $25.2 billion in 2012 and is projected to reach $27.6 billion in 2013. These levels of investment surpass pre-recession peaks. One interpretation is that some of the announced oil sands projects and expansions that were affected by the recession have come back online. Inadequate pipeline capacity for the movement of both oil and diluents to and from the oil sands may, however, inhibit planned expansions of bitumen production (see Section 2 of this report for more discussion).

Combining hard rock and oil sands mining capital investments, the Canadian mining industry invested $55 billion in capital and repair expenditures in 2012.

CURRENT AND FUTURE INVESTMENTS

Saskatchewan produces one-third of the world's potash, drawing on mines that are over 40 years old. Several new projects, however, are either in development or on the radar for future development. Despite having postponed the project in August 2012, Vale Potash Canada continued consultations through the summer of 2013 on its proposed $3 billion Kronau potash project east of Regina. In August 2013, BHP Billiton announced that it would invest US$2.6 billion in its Jansen project over the next three years, signalling a stronger project development commitment.

In New Brunswick, Atlantic Potash Corp. signed a two-year agreement at the end of 2011 to explore the Millstream potash deposit and investigate development opportunities in the province. Meanwhile, exploration for the valuable mineral continues province-wide. Canada holds 50% of the world's known potash reserves, and only New Brunswick and Saskatchewan currently produce it.

In northern Saskatchewan, Cameco's Cigar Lake project is the world's second largest high-grade uranium deposit, with grades 100 times the world average. With proven and probable reserves of more than 216.7 million pounds of U_3O_8, at an average grade of 18.3%, the mine is currently in development with a target to begin production in 2014.

There is still potential in the Canadian diamonds sector, despite the decline in exploration spending in recent years. Stornoway's Renard Diamond Project, located near the Otish Mountains in north-central Quebec is well on track to becoming Quebec's first diamond mine. The Chidliak project on Baffin Island offers promise, while the Gahcho Kué project in the Northwest Territories recently received environmental assessment approval (see Section 5 of this report for more discussion on Canada's regulatory regime).

Recent mine openings in Canada include Detour Gold's Detour Lake gold mine in Ontario and Thompson Creek Metals' Mt. Milligan gold-copper mine in British Columbia. Detour Lake mine began producing in February 2013, and is projected to produce an average of 657,000 ounces of gold annually over a period of 21.5 years. The Mt. Milligan mine is designed to process 60,000 tonnes per day of copper concentrate, averaging an estimated annual production of

81 million pounds of copper and 194,500 ounces of gold over a 22-year mine life.

All together, nearly$160 billion worth of mining-related projects have been proposed for Canada in the coming years (see Annex 7). These include billions of dollars in proposed projects for British Columbia, Alberta, Saskatchewan, Ontario, Quebec, Newfoundland and Labrador, Nunavut and the Northwest Territories. Of particular note is the high interest in northern Canada. Several gold and iron ore projects are proposed for Nunavut, and gold, diamond and rare earth projects are in the works for the Northwest Territories.

GOVERNMENT INVESTMENT IN GEOSCIENCE

Mineral exploration is like looking for a needle in a haystack. Government investment in geological surveying helps the industry determine where the haystacks may be.

For companies conducting exploration, it makes sense to spend their high-risk dollars in areas where good geological data is available. It is estimated that every dollar invested in a basic geological survey triggers five dollars in exploration spending by the private sector and boosts the likelihood of discovering commercial-scale deposits. For those reasons, government investment in geoscience today will pay economic dividends in the future.

In recent years, MAC has worked with governments to support federal reinvestment in geoscience that would be matched at the provincial level. In August 2013, the federal government renewed the Geo-mapping for Energy and Minerals (GEM) program for the next seven years, building on its $100 million, five-year commitment of 2008. This continued investment in surveying will help the industry better determine where mineral deposits are located and, ultimately, where the next generation of Canadian mines can be developed.

Roughly three-quarters of the GEM spending is directed towards investment in the three territories and one-quarter towards the provinces. The program is guided by the National Geological Surveys Committee, which represents the federal, provincial and territorial governments. The federal Targeted Geoscience Initiative (TGI) is a parallel, though smaller, program aimed at geoscience for base metals around existing camps. In 2011, the government extended this program's funding of $25 million over five years to focus on developing new ways of exploring for deeper mineral deposits. Ideally, the TGI would be rolled into the GEM to create a permanent geoscience investment.

FIGURE 13
CANADIAN RESERVES OF SELECTED MAJOR METALS, 1980–2010

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 (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	8,851	3,074	400	4,133	195	6,480	1,470

Source: Natural Resources Canada, based on company reports and the federal-provincial/territorial survey of mines and concentrators.
Note: One tonne (t) = 1.1023113 short tons = 32 150.746 troy oz.
[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.

FIGURE 14
METAL PRICES, 2000 TO SEPTEMBER 2013

Metal Prices	2000	2007	2008	2009	2010	2011	2012	Sept/2013	00-13 (%)
Aluminium ($/lb)	0.70	1.20	1.17	0.76	0.98	1.09	0.80	0.80	14
Copper ($/lb)	0.82	3.23	3.15	2.34	3.40	4.00	3.61	3.25	296
Gold ($/oz)	279.00	697.00	872.00	973.00	1225.00	1,568.31	$1,688.00	1,348.60	383
Uranium ($/lb)	8.29	98.81	63.17	47.00	48.00	56.26	48.90	34.75	319
Nickel ($/lb)	3.92	16.88	9.57	6.50	9.85	10.39	7.95	6.26	60
Zinc ($/lb)	0.51	1.47	0.85	0.75	0.98	1.00	0.88	0.84	65
Iron Ore ($/t)	12.45	36.60	61.57	125.90	128.53	153.00	128.53	134.19	977

Source: Index Mundi
Notes: Table denotes yearly prices as well as actual price as of September 2013. The final column indicates percent growth in prices between 2000–2013.

FIGURE 15
MINING EQUITY RAISED—TORONTO STOCK EXCHANGE, 2000–2012

(value in US$ billions)

Equity Raised	2000	2006	2007	2008	2009	2010	2011	2012
Worldwide	3.1	26.5	50.3	46.6	65.9	29.6	31.7	14.8
TSX exchanges	1.1	10.1	17.6	8.3	22.2	17.8	12.5	10.3
Percentage of worldwide total on TSX	36	38	35	18	34	60	39.4	70

Source: Gamah International, compiled by Toronto Stock Exchange.
Note: All values as at December 31, 2012.

FIGURE 16
GLOBAL MINING FINANCE, 2012

Exchange	TSX/TSX-V	LSE–AIM London	ASX Australia	HKEx Hong Kong	NYSE New York
Mining equity financings	1,700	147	559	1	4
Capital raised ($ billions)	10.3	0.954	2.1	0.142	0.710
Market value ($ billions)	400.4	430.1	437.7	207.9	1,024.9
New listings	139	17	37	4	2
Mining issuers listed	1,673	185	708	57	128

Source: Gamah International, compiled by the Toronto Stock Exchange.
Note: All values as at December 31, 2012.

FIGURE 17
GEOGRAPHIC REACH OF TSX-LISTED COMPANIES, DECEMBER 2012

Location of Mineral Projects	Number	Percent
Canada	4,674	52
Latin America	1,571	17
United States	1,197	13
Africa	652	7
Asia	313	4
Australia	339	4
United Kingdom and Europe	295	3
Total	**9,041**	**100**

Sources: InfoMine, TSX/TSX-V Market Intelligence Group, compiled by the Toronto Stock Exchange.

FIGURE 18
MINERAL EXPLORATION AND DEPOSIT APPRAISAL EXPENDITURES BY PROVINCE AND TERRITORY, 2005-2013

Province / Territory / ($ millions)	2005	2006	2007	2008	2009	2010	2011	2012[P]	2013[I]	% Change From 2012 to 2013
Newfoundland and Labrador	48.7	100.8	148.0	146.7	54.9	105.2	156.8	192.2	172.1	- 10.5
Nova Scotia	6.5	11.0	23.5	21.4	9.0	16.7	13.7	11.3	19.0	68.3
New Brunswick	10.1	13.4	35.8	32.7	8.1	17.1	27.1	23.8	47.3	98.6
Quebec	205.1	295.1	476.4	526.1	379.3	511.6	833.9	696.4	691.7	- 0.7
Ontario	294.0	346.5	571.7	799.3	536.2	853.4	1,067.7	902.9	754.8	- 16.4
Manitoba	52.9	52.9	102.6	152.1	97.8	83.5	140.0	93.9	73.2	- 22.0
Saskatchewan	133.9	235.6	314.0	430.7	311.0	299.4	334.6	396.9	411.5	3.7
Alberta	6.6	18.7	11.8	20.8	8.3	15.2	47.3	37.7	19.9	- 47.2
British Columbia	218.1	344.2	470.6	435.4	217.1	374.4	645.1	746.5	652.1	- 12.6
Yukon	54.0	106.4	144.7	134.0	90.9	156.9	331.7	226.7	111.9	- 50.6
Northwest Territories	96.3	176.2	193.7	147.7	44.1	81.7	93.8	114.5	81.0	- 29.3
Nunavut	178.7	210.6	338.0	432.6	187.6	256.7	535.7	443.0	312.7	- 29.4
Total	**1,304.8**	**1,911.5**	**2,830.8**	**3,279.5**	**1,944.4**	**2,771.9**	**4,227.4**	**3,885.8**	**3,347.4**	**- 13.9**

Source: Natural Resources Canada, based on the Federal-Provincial-Territorial Surveys 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. Numbers may not add due to rounding.

FIGURE 19

MINERAL EXPLORATION AND DEPOSIT APPRAISAL EXPENDITURES BY TYPE OF COMPANY, 2005 - 2013[i]

Type of Co.	2005	%	2006	%	2007	%	2008	%	2009	%	2010	%	2011	%	2012[p]	%	2013[i]	%
Junior	801	61	1,238	65	1,904	67	2,118	65	1,111	57	1,547	56	2,049	48	1,725	44	1,532	46
Senior	504	39	674	35	927	33	1,161	35	834	43	1,225	44	2,178	52	2,161	56	1,816	54
Total	**1,305**		**1,912**		**2,831**		**3,279**		**1,944**		**2,772**		**4,227**		**3,886**		**3,347**	

Source: Natural Resources Canada, based on the Federal-Provincial-Territorial Surveys 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

CANADIAN EXPLORATION AND DEPOSIT APPRAISAL SPENDING BY TARGET, 2002 AND 2012[P]

	2002		2012[p]	
	$ millions	% of Total	$ millions	% of Total
Precious metals	212.8	37.1	1,918.0	49.4
Base metals	138.8	24.2	630.0	17.4
Iron Ore	1.6	0.3	311.7	8.3
Non-metals (excluding diamonds)	10.1	1.8	299.1	6.2
Other metals	14.0	2.4	213.2	6.1
Uranium	30.1	5.2	197.6	5.0
Coal	4.3	0.8	237.3	2.6
Diamonds	161.6	28.2	78.9	2.4
Total	**573.4**	**100.0**	**3,885.8**	**100.0**

Source: Natural Resources Canada, based on the Federal-Provincial-Territorial Surveys 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.

FIGURE 21
TOP COUNTRIES/REGIONS BY NON-FERROUS EXPLORATION BUDGETS, 2012

Country/Region	%
Canada	16
Australia	12
Sub-Saharan Africa	9
United States	8
West Africa	7
Mexico	6
Pacific Islands	6
Chile	5
Peru	5
China	4
Europe	4
Russia	3
Brazil	3
Former Soviet Union/Mongolia	3
Argentina	3
Colombia	2
Rest of the world	4
Total	**100**

Source: SNL Metals Economic Group.

FIGURE 22
CAPITAL EXPENDITURES IN THE CANADIAN MINING INDUSTRY, 2007 - 2013[i]

($ millions)	2007	2008	2009	2010	2011	2012[p]	2013[i]
Stage 1 - Total Mineral Extraction	6,832	8,587	7,078	10,015	13,566	16,884	13,454
Metal ore mineral extraction	3,874	5,244	4,204	6,260	9,246	10,930	7,416
Non-metallic mineral extraction	2,553	2,533	2,453	2,985	3,232	4,938	4,873
Coal mining	405	810	422	770	1,088	1,016	1,164
Stage 2 - Primary Metal Manufacturing	1,558	1,918	1,176	2,087	3,221	3,643	3,466
Stage 3 - Non-Metallic Mineral Product Manufacturing	969	787	671	868	764	918	785
Stage 4 - Fabricated Metal Product Manufacturing	793	846	896	720	824	965	1,052
Total Mining and Mineral Processing	**10,152**	**12,138**	**9,821**	**13,690**	**18,375**	**22,410**	**18,757**
Non-conventional oil extraction (oil sands)	16,816	20,663	10,551	17,155	22,591	25,154	27,627

Source: Statistics Canada
Note: Totals may not add due to rounding.
[p] Preliminary
[i] Intentions

THE PEOPLE
EMPLOYMENT, COSTS AND INNOVATION

THE CANADIAN MINING INDUSTRY IS A GLOBAL LEADER IN CAPITAL INVESTMENT, FINANCING AND INNOVATION. THOUGH CAPITAL IS EASIER TO ALLOCATE IN BOOM TIMES, THE INDUSTRY HAS ALSO INVESTED DURING LESS PROSPEROUS PERIODS. IN THE 1990s, FOR EXAMPLE, MINING INVESTED IN NEW, AUTOMATED TECHNOLOGIES THAT ENHANCED THE ECONOMIC VIABILITY OF PROJECTS BY LOWERING PRODUCTION COSTS. THE KEY TO MAXIMIZING INVESTMENTS LIKE THESE IS A READY SUPPLY OF SKILLED, WELL-PAID INDUSTRY WORKERS.

MINING INDUSTRY EMPLOYMENT

According to Natural Resources Canada definitions, the mining industry employed 418,115 people in 2012, accounting for one in every 41 Canadian jobs (see Figure 23). Prior to 2012, Natural Resources Canada relied on Statistics Canada's Survey of Employment, Payrolls and Hours for employment data. Statistics Canada now publishes a more comprehensive measure of employment that includes self-employment and employment in the territories. This change results in a truer reflection of the number of Canadians employed in the mining industry, and the significant increase in the number reported compared to previous years.

OVERALL EMPLOYMENT NUMBERS

More than 73,500 of the 418,115 people directly employed by mining in 2012 worked in Stage 1, mineral extraction (see Figure 23). This group included approximately 41,000 in metal mining, 23,000 in non-metal mining and just under 9,000 in coal mining (see Figure 24).

The decade leading up to 2007 saw a steep decline in smelting and refining jobs of Stage 2, primary metal manufacturing, which has levelled off over the past five years (see Figure 23). This is due to technological advancements, aging Canadian facilities and more foreign competition for feedstock to process.

In the oil sands extraction sector (not shown in Figures 23 or 24), data for 2012 show that Suncor and Syncrude directly employed over 13,900 and 5,500 people, respectively, in mining and oil and gas activities. These figures do not include indirect employees. Additionally, Shell employs 8,000 employees across Canada, a significant portion of whom work in the company's oil sands operations.

Employment statistics for mining and oil sands change rapidly because of industry growth, globalization and other trends. Recent mergers and acquisitions have changed the landscape of Canadian mining; various companies have been acquired or no longer report separate employment figures.

As noted in Section 1 of this report, over 3,200 companies supply goods and services to the mining industry, adding many more indirect jobs. According to Statistics Canada definitions, support activities for mining employed 16,800 people across Canada in 2012. These low numbers do not paint a true picture of mining supply employment, and do not reflect the many mining support services that are crucial to the mining sector. Due to the lack of reliable data, the Conference Board of Canada describes mining supply

MINING COMPANIES THAT EMPLOY MORE THAN 5,000 PEOPLE

Barrick: 26,140
Teck: 10,500
Kinross: 9,000
First Quantum: 8,663
Goldcorp: 8,573
Sherritt: 8,231
Eldorado Gold: 7,024
IAMGOLD: 5,892
PotashCorp of Saskatchewan: 5,779
Agnico Eagle: 5,723
Yamana Gold: 5,085

Note: Includes employees at international operations.
Source: Globe and Mail, Report on Business Magazine, July/August 2013.

as one of the largest "invisible" industries in the country. The studies that are available suggest mining supply has a significant economic impact. According to the Canadian Association of Mining Equipment and Services for Export, there are two to four jobs in mining supply for every direct job in mining extraction.

A study prepared for the Ontario North Economic Development Corporation estimates that northern Ontario's mining supply sector provided 22,000 jobs in 2010. Another study by PwC found that the mining sector in British Columbia supported 21,000 jobs in 2010. The indirect impacts of the mining supply sector added another 16,500 jobs to that province.

WOMEN IN MINING

Gender-specific statistics are difficult to obtain, but available reports indicate that women are underrepresented in the industry. The Mining Industry Human Resources (MiHR) Council's 2013 Labour Force Survey found that female participation in mining grew by 60% from 1996 to 2012. Women now account for 16% of the mining workforce. These numbers are still well below women's current labour force participation rate, which is 48%. Still, mining outperformed other resource sectors in the employment of women. In 2012, women represented just 7% of the forestry sector workforce and 14% of the fishing industry workforce. However, mining continues to lag behind other resource sectors in this respect, with women representing 30% of the total workforce in the oil and gas sector and 24% in the utilities sector.

Many mining companies are making gender diversity a priority. Eight employers engaged in strategic goal setting and took action on diversity during an 18-month project called SHIFT: Take Action for Diversity, which was coordinated by MiHR. During that time, the number of women executives at one company increased by two. In the same company, women's representation in some management categories also increased from 25% to 28%, already surpassing that firm's 2015 goal.

In June 2013, MAC was pleased to announce its first female chair in the organization's 78-year history. Zoë Yujnovich, President and CEO of Canada's largest iron ore producer, the Iron Ore Company of Canada, was elected as Chair of MAC for a two-year term.

While mining companies are taking positive steps towards diversity, more work in this area is needed. The continuing disparity in women's representation rates across certain occupations within the mining industry is concerning. Less than 5% of positions in trades, production, science and management are occupied by women. Whereas, most clerical and support roles (95%) and corporate services positions (60%) are held by women.

EMPLOYMENT OF ABORIGINAL PEOPLE

Proportionally, the mining industry is the largest private sector employer of Aboriginal Canadians. According to Statistics Canada, between 2007 and 2012, the number of Aboriginal Canadians employed in the mining sector increased by 14%, from 9,039 to 10,300.

There are also significant opportunities for Aboriginal workers in the oil sands. According to the Oil Sands Developers Group, as of 2010 more than 1,700 Aboriginal people held permanent jobs in oil sands operations in northeast Alberta—a number that excludes Aboriginal employment in the construction sector on which oil sands projects heavily rely. From 2002 to 2011, Aboriginal companies earned more than $6 billion through business development with the oil sands industry. As an example, the Fort McKay Group of six companies—completely owned by the Fort McKay First Nations—works extensively with oil sands companies, resulting in more than $100 million in annual revenue.

Potential for increased Aboriginal employment opportunities remains strong. Approximately 1,200 Aboriginal communities are located within 200 kilometres of some 180 producing mines and more than 2,500 active

exploration properties. Aboriginal people across the country are, therefore, ideally situated to access employment opportunities in the mining industry. Further, approximately half of all Aboriginal people are under the age of 25. By 2017, the number of Aboriginal men and women aged 20 to 29 is expected to increase by more than 40%—four times higher than the growth rate for the same age group in the general population. Training to develop the requisite skills is critical to access well-paying mining jobs.

According to the Centre for the Study in Living Standards, the cumulative economic benefit of closing the education and labour market gap between Aboriginal and non-Aboriginal youth by 2026 would be $400.5 billion in additional output. On this point, industry is encouraged by the 2013 federal budget's investment of $241 million over five years to support training-to-employment programs for Aboriginal youth. This investment will help fill the gap created from the recent discontinuation of the Aboriginal Skills and Employment Partnership program.

Companies are proactive in their pursuit of Aboriginal talent. In 2013, the Matawa First Nations Kiikenomaga Kikenjigewen Employment and Training Services (KKETS), Noront Resources, and Confederation College of Applied Arts and Technology signed a Memorandum of Understanding to offer training and employment opportunities to participants in the nine Matawa communities near Ontario's Ring of Fire region. The agreement will provide long-term, sustainable career pathways for participants and will remain in place for at least five years.

NEED FOR WORKERS AND SKILLS

The mining industry, both in Canada and abroad, faces a serious human resources challenge in the next decade. MiHR's 2013 report *Canadian Mining Industry Employment and Hiring Forecasts* estimates that the Canadian mining industry's hiring requirements will exceed 14,500 new workers each year for the next decade. These 145,000 workers represent more than half of the current workforce, according to MiHR's definitions, and stem from the need to replace existing workers and fill new positions to meet baseline production targets (see Figure 25).

This deficit is compounded by the approaching retirement of the industry's skilled core of workers. By 2023, MiHR forecasts more than 67,000 employees will retire from the sector, or nearly 30% of the industry's current workforce. This represents a significant loss of industry knowledge and experience.

The mining industry comprises 66 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, heavy equipment operation and other areas. Because today's mining industry relies on advanced technologies, much of the demand is for highly educated and skilled workers.

THE HUMAN RESOURCES CHALLENGES OF THE CANADIAN MINING INDUSTRY ARE REACHING A POINT OF CRISIS. TO ADDRESS THIS CRITICAL ISSUE, A LARGE AND COORDINATED EFFORT BY THE INDUSTRY AND ALL LEVELS OF GOVERNMENT IS NEEDED.

Additional hurdles on the supply side need to be overcome as mining has historically had difficulty recruiting women, visible minorities and immigrants. As well, 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 employment issue in Canada:

- Promote the industry to youth, Aboriginal people and non-traditional worker groups.
- Develop programs that bring back retired workers, retain older workers and increase mentoring.
- Improve education 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 this problem. The 2013 federal budget introduced the Canada Job Grant program to help meet training needs in high-demand fields. On the immigration front, the government has introduced an expression of interest system for the Federal Skilled Worker category and has moved to a "just-in-time" approach for recruiting and fast-tracking the applications of skilled workers. Both are positive steps towards meeting Canada's labour market needs.

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 and safety inspectors to reach the goal of "zero harm."

All mine sites have on-site management 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 Towards Sustainable Mining, for example, make specific commitments in both safety and health management and crisis management (see Section 5 of this report for more discussion on Towards Sustainable Mining). The safety and health protocol helps MAC members assess their current safety and health management practices at the site level and consists of five performance indicators that measure safety and health policy, commitment and accountability; planning, implementation and operation; training, behaviour and culture; monitoring and reporting; and performance. The performance indicators for the crisis management protocol help companies leverage best practices and critically assess business performance. MAC has established three key performance indicators for this protocol: crisis management preparedness; review; and training.

THE JOHN T. RYAN TROPHIES

Mining Safety Appliances (MSA) Canada began sponsoring a mine safety trophy in 1941. Named the John T. Ryan Trophy in honour of the company's co-founder, the 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 by the Canadian Institute of Mining, Metallurgy and Petroleum to the Canadian metalliferous mine, coal mine and select mine that had the lowest accident frequency per 200,000 hours worked during the previous calendar year.

CANADIAN SAFETY STATISTICS

The International Labour Organization's most recent national statistics show a significant decline in the rate of

2013 JOHN T. RYAN TROPHY NATIONAL WINNERS

Canada Trophy for Metal Mines: Glencore Canada, Kidd Operations, Timmins, Ontario
The Kidd Operations, which includes a mine and a concentrator, is renowned for its outstanding safety record. With over four million person-hours since its last lost time injury incident and 10 John T. Ryan Canada Trophies for Metal Mines under its belt, the operation's approach of setting high standards from the top down, making sure all staff are involved in the culture, and investing in safety programs and technology has paid off.

Canada Trophy for Select Mines: PotashCorp, New Brunswick Division, Sussex, New Brunswick
PotashCorp's underground potash mine and processing facility in Sussex, New Brunswick, has been undergoing significant changes lately. Along with its planned $21-billion expansion, which includes the development of a new mine and an expansion of the mill, the company has also introduced 90 new employees over the past year at its existing operation. But one thing has stayed the same: the operation continues to set the standard for safety, earning the John T. Ryan Canada Trophy for Select Mines for the fourth time since the facility opened in 1983.

Canada Trophy for Coal Mines: Prairie Mines & Royalty Ltd., Genesee Mine, Warburg, Alberta
When the Genesee mine broke ground in 1988, the operation had the opportunity to start building a strong safety culture. Fuelled by a workforce committed to working safely, this culture flourished, resulting in a safety record with no lost time injury incidents in over 24 years of operation. In that time, the mine has continuously invested in new technology, as well as in safety and training programs to maintain its safety excellence record.

Source: Canadian Institute of Mining, Metallurgy and Petroleum

fatal injuries in the Canadian mining sector between 1998 and 2010, falling from 47.1 per 100,000 employees to 9.3 per 100,000 employees, respectively. The mining sector's non-fatal injury rates were among the lowest across industrial sectors for the same time period. Additionally, mining and quarrying compares very favourably to other industrial sectors when it comes to safety. In 2010, construction, fishing, transport, and health and social work all had much higher rates of non-fatal injury. Despite a positive performance, there is always room for improvement, and the industry remains in pursuit of a perfect record.

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 not only that existing figures and analyses are made easily accessible, but that the people and organizations compiling the statistics understand the information needs of safety professionals.

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 8 and 9 for details). The average weekly pay for a mining worker in 2012 was $1,559, which surpassed the earnings of workers in forestry, manufacturing, finance and construction by 57%, 55%, 43% and 36%, respectively.

This wage gap has remained relatively consistent in recent years. In remote regions or in situations where workers rotate—both often the case with mining—higher wages help to attract and retain the required workforce.

WORK STOPPAGES

A total of nine strikes and lockouts affected the mining industry in 2012 (see Annex 10). This was down by two over 2011, and marks a significant 77% reduction in lost person days over 2010. This reduction in lost person days correlates to the resolution of labour disputes at Vale's Sudbury and Voisey's Bay operations—both of which were resolved in 2011.

OVERALL PRODUCTION COSTS

Mining operations incur significant production costs. To put them into perspective, Leighton Holdings notes that a single mining truck tire on the spot market costs more than a Porsche or a Miami condo.

The industry's three main production costs—wages, energy (fuel and electricity), and materials and supplies—totalled $3.3 billion, $2.2 billion and $6.2 billion, respectively, in 2011, the most recent year for which data are available (see Figure 26). Wages accounted for 9% of the industry's total 2011 production value, energy for 6%, and materials and supplies for 17%.

INNOVATION

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. The industry is increasing its productivity using advanced technologies and investing in research and development (R&D).

If Canada is to remain a world leader in mining innovation and research, however, the industry must push the innovation envelope. In particular, R&D needs to increase and become more consistent and coordinated throughout the country.

PRODUCTIVITY

Productivity is a measure of the efficiency of inputs—people, capital and natural resources—that go into creating an output. In Canada, from 1997 to 2006, productivity growth in the first three stages of mining exceeded that

of Canadian industries overall (see Figure 27). In Stage 2, primary metal manufacturing, productivity grew at more than twice the rate of Canadian manufacturing as a whole. Based on available data, when mining is compared to other industries within Canada, industry performance is noteworthy. When Canada's productivity performance is compared to competing nations, however, the story begins to change.

The OECD has indicated that lagging productivity is one of Canada's most significant economic hurdles. Specifically, a recent study explains that Canada's multifactor productivity (MFP) has been stagnant for decades, and has been declining since 2002. MFP infers technological advancement by holding that innovation improvements account for the increase in output from a fixed level of labour and capital inputs. Since 1980, the United States has improved its MFP by 40%, while Canada's has decreased by 4%.

The extent to which the Canadian mining industry's performance compares to competing mining nations is challenging to assess with certainty. A 2009 study by the Centre for the Study of Living Standards shows that labour productivity in mining grew faster in Canada than in the United States during the 1990s. However, it declined in Canada from 2000 to 2006 but continued to grow in the United States. Based on this measure, labour productivity per worker in mining in the United States has been higher than in Canada since 1995.

TECHNOLOGY

The various stages of mining require different levels and types of technology:

- **Exploration**. The main challenge is to locate large, high-grade reserves while limiting disturbance to the ground and the environment. Technologies such as GPS surveying, three-dimensional data maps, airborne technologies and down-hole seismic imaging are enabling companies to find deposits they could not have discovered using traditional methods. Together with the Canadian Mining Innovation Council, a number of companies and researchers have begun an R&D strategy dedicated to improving exploration technologies.
- **Extraction**. Much of Canada's remaining base metals is likely located two kilometres or more beneath the surface. This situation presents cost and operational challenges. In response, the industry has invested in remote-operated equipment, automated loading and transportation systems, robotics and seismic mapping. With these technologies, companies can mine at a greater depth and keep mines open that would otherwise close. Tailings management is another vital technological area for oil sands companies, and for base metal miners and processors (discussed in Section 5).
- **Smelting and refining**. There have been no transformative technological advances in this area over the past 20 years. Traditional pyrometallurgical operations, which draw on thermal treatment, and newer hydrometallurgical operations, which draw on electricity and chemistry, continue to be adjusted and improved. The aim is to extract the most metal using the least energy and producing the fewest emissions possible. Similar gradual improvements have occurred in iron ore pelletizing. ArcelorMittal Mines, for example, is making its Quebec pelletizing operations more energy efficient and hopes to cut greenhouse gas emissions (GHG) by 30%. As for particulate matter emissions, established technologies such as baghouses and electrostatic precipitators are still being used.

In the coming years, the industry will continue to focus on energy management and carbon emissions. This trend will be driven by higher energy costs and by the anticipated introduction of new GHG regulations for the industry by the federal government. New regulations could affect the viability of some older processing facilities in Canada.

RESEARCH AND DEVELOPMENT

In 2012, Canadian mining and metals companies invested $638 million in R&D (see Figure 28). Mining's investment surpassed that of the motor vehicles and parts sector, the

WHO IS INVESTING IN R&D?

RE$EARCH Infosource, a corporate R&D database, ranked six mining and oil sands companies among the top 100 private sector R&D investors in Canada in 2013:

- No. 18: Syncrude—$157.2 million
- No. 20: Vale Canada—$132 million
- No. 50: Novelis Inc.—$43 million
- No. 69: Molycorp Canada—$22.9 million
- No. 78: Teck—$19 million
- No. 83: Rio Tinto Iron & Titanium—$17 million
- No. 85: ArcelorMittal Dofasco—$16.9 million

machinery sector, and the wood products and paper sector. In 2011, the most recent year which data is available, the industry employed 5,562 people in R&D (see Figure 29). This is more than the pharmaceutical and forestry sectors, which both receive extensive financial and policy support from the government.

Canadian mining must address a number of challenges if it is to remain a world leader in innovation and research:

- Canadian research efforts are often ad hoc, lacking the focus, coordination and efficient use of resources needed to support pan-industry developments.
- Support from federal entities, such as the Natural Sciences and Engineering Research Council and Sustainable Development Technology Canada, remains under-explored.
- Support through the signature federal initiative, the Scientific Research and Experimental Development (SR&ED) tax incentive program, is modest.

In response to these challenges, the Canadian Mining Innovation Council (CMIC) was formed with the aim of investing mining industry R&D dollars more strategically. A non-profit organization comprised of a unique partnership between industry, academia and government, CMIC is Canada's national mining innovation ecosystem. With more than 80 members, CMIC is designed to enhance industry's global competitiveness through collaboration and alignment of resources in education, research, innovation and commercialization, and recognizes the mining industry's need to compete more intelligently in the global market.

CMIC is in discussions with government agencies on how best to support the industry's innovation priorities, especially in the areas of tailings management, energy efficiency and effective exploration. CMIC recently received funding from the Natural Sciences and Engineering Research Council. These funds, in addition to industry contributions, will help facilitate crucial exploration research. The organization is also seeking funding from the federal government to help build a portfolio of projects that more fully reflects the industry's needs.

FIGURE 23
EMPLOYMENT IN THE CANADIAN MINING AND MINERAL MANUFACTURING INDUSTRIES, 2007-2012

(Number of Employees)

Year	Mining and Quarrying NAICS 212	Support Activities for Mining NAICS 21311B	Nonmetallic Mineral Product Manufacturing NAICS 327	Primary Metal Manufacturing NAICS 331	Fabricated Metal Product Manufacturing NAICS 332	Total Mining, Support Activities, and Mineral Processing
2007	53,660	16,495	58,025	86,900	210,945	426,025
2008	55,385	21,035	55,185	87,480	194,470	413,555
2009	50,610	13,165	53,070	66,545	173,520	356,910
2010	61,785	15,105	54,935	82,935	181,040	395,800
2011	66,340	15,945	56,855	83,745	183,825	406,710
2012	73,590	16,800	56,780	83,740	187,205	418,115

Source: Statistics Canada, System of National Accounts Labour Statistics.
NAICS: North American Industry Classification System.
Notes: Previously, Natural Resources Canada relied on Statistics Canada's Survey of Employment, Payrolls and Hours (SEPH) for employment data. Statistics Canada now publishes a more comprehensive measure of employment that includes self-employment and employment in the territories. Part of the System of National Accounts – Labour Statistics, this value is based on raw data from SEPH, the Labour Force Survey (LFS), and Administrative Databases (T-4, Five-year census).

FIGURE 24
EMPLOYMENT IN THE MINERAL EXTRACTION STAGE, 2007-2012

Year	Metal Mines	Non-metal Mines	Coal	Total
2007	28,005	20,175	5,480	53,660
2008	28,465	21,150	5,770	55,385
2009	24,990	20,160	5,460	50,610
2010	31,685	22,265	7,835	61,785
2011	34,775	23,000	8,565	66,340
2012	41,425	23,200	8,965	73,590

Source: Statistics Canada, System of National Accounts Labour Statistics.
Notes: Previously, Natural Resources Canada relied on Statistics Canada's Survey of Employment, Payrolls and Hours (SEPH) for employment data. Statistics Canada now publishes a more comprehensive measure of employment that includes self-employment and employment in the territories. Part of the System of National Accounts – Labour Statistics, this value is based on raw data from SEPH, the Labour Force Survey (LFS), and Administrative Databases (T-4, Five-year census).

FIGURE 25
CANADIAN MINING INDUSTRY EMPLOYMENT AND HIRING FORECAST SCENARIOS, 2013-2023

	Net Change in Employment	Retirement	Non-Retirement Separation	Cumulative Hiring Requirements
Contractionary	3,910	62,550	50,410	116,850
Baseline	24,600	67,180	54,100	145,870
Expansionary	47,820	79,010	72,340	199,150

Sources: Mining Industry Human Resources Council; Canadian Mining Industry Employment and Hiring Forecasts, 2013.

FIGURE 26
SELECTED COSTS OF PRODUCTION IN THE MINERAL INDUSTRY[1], 2011

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	70	2,076,891	1,330,880	4,420,459	24,668,987
Non-metallic Mining and Quarrying	1,004	1,133,629	786,933	1,736,428	14,193,670
Coal	21	626,047	629,512	760,224	6,597,891
Total Mineral Industry	**1,130**	**3,291,738**	**2,209,531**	**6,177,717**	**36,991,923**

[1] Excludes the oil and gas extraction industry
Notes: 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.
Sources: Natural Resources Canada; Statistics Canada - Cat. No. 26-201-X

FIGURE 27
ANNUAL PRODUCTIVITY GROWTH, 1997–2006

	Canada (%)
All industries	1.5
Manufacturing sector	2.1
Stage 1—Mineral extraction	1.8
Stage 2—Primary metal manufacturing	4.8
Stage 3—Non-metallic mineral product manufacturing	1.6
Stage 4—Fabricated metal product manufacturing	1.2

Sources: Centre for the Study of Living Standards; Statistics Canada; US Bureau of Labor Statistics.

FIGURE 28
R&D EXPENDITURES BY MINING AND SELECTED INDUSTRIES, 2009–2013[P]

($ millions)	2009	2010	2011[P]	2012[P]	2013[P]
Mining–extraction	109	F	126	165	120
Primary metals–ferrous	63	F	41	42	42
Primary metals–non-ferrous	202	150	163	158	165
Fabricated metal products	285	222	194	201	206
Non-metallic mineral products	83	77	74	72	73
Total	**742**	**449**	**598**	**638**	**606**
Other sectors:					
Oil and gas extraction	929	959	966	885	757
Motor vehicles and parts	310	312	259	266	267
Wood products and paper	691	370	174	226	153
Machinery	576	565	618	566	566
Aerospace products and parts	1107	1,226	1,306	1,327	1,373
Pharmaceutical and medicine	671	669	517	545	508
Total manufacturing	**7,764**	**7,222**	**7,368**	**7,560**	**7,349**
Total all industries	**16,038**	**15,467**	**15,960**	**16,063**	**15,621**

Source: Statistics Canada, Catalogue no. 88-202-X.
Note: The projected figures in the Catalogue are revised annually by Statistics Canada and can therefore differ year over year.
F denotes "too unreliable to be published."
[P] Preliminary

FIGURE 29
NUMBER OF PERSONS ENGAGED IN R&D, 2011[P]

	Professionals	Technicians	Other	Total
Mining–extraction	226	232	F	470
Primary metals–ferrous	160	90	11	261
Primary metals–non-ferrous	395	186	103	684
Fabricated metal products	1,711	1,427	313	3,451
Non-metallic mineral products	420	230	45	696
Total	**2,912**	**739**	**472**	**5,562**
Other sectors				
Oil and gas extraction	939	328	77	1,344
Motor vehicles and parts	1,241	810	250	2,301
Wood products and paper	777	578	137	1,582
Machinery	4,272	2,476	467	7,217
Aerospace products and parts	3,938	1,756	473	6,167
Pharmaceutical and medicine	1,645	770	692	3,108
Total manufacturing	**37,525**	**16,198**	**4,472**	**58,164**
Total all industries	**93,443**	**37,912**	**9,067**	**140,423**

Source: Statistics Canada, Catalogue no. 88-202-X.
[P] Preliminary
F - Too unreliable to be published

THE ENVIRONMENT

SUSTAINABLE DEVELOPMENT AND SOCIAL RESPONSIBILITY

REMOVING ORE FROM ROCK AND PROCESSING AND REFINING IT INTO PURE METAL POSES SIGNIFICANT TECHNICAL AND ENVIRONMENTAL CHALLENGES. THE CANADIAN MINING INDUSTRY ASPIRES TOWARDS THE HIGHEST ENVIRONMENTAL STEWARDSHIP, AND CONTINUALLY SEEKS METHODS TO IMPROVE PROCESSES, REDUCE FOOTPRINTS AND ENHANCE SOCIAL AND ENVIRONMENTALLY RESPONSIBLE PRACTICES.

Environmental and social considerations are increasingly well integrated into mine planning and management. Furthermore, resource development and environmental conservation are not mutually exclusive, but can be achieved by effective regulation and responsible resource management. For example, a mine built today is obligated by Canadian law to provide financial assurance that it can be reclaimed when operations cease, and mine closure plans must be prepared and accepted by government authorities before construction. While mining has a relatively small, localized footprint, the impacts on the local area are significant and can and should be managed responsibly over the life of the mine. MAC's Towards Sustainable Mining (TSM) initiative is an example of how resource development can co-exist with environmental conservation, and how partnerships can be fostered between the mining industry and conservationists.

In recent decades, the industry has made great strides in reducing mining's environmental impacts through the actions of individual companies, government regulations and standards like TSM. Together, corporate social responsibility, progressive regulations and the adherence to a host of voluntary standards have earned Canadian mining a global reputation for leading social and environmental practices.

ENVIRONMENTAL STEWARDSHIP

The Canadian mining industry has made significant progress in its environmental performance by participating in a host of domestic and international initiatives. MAC member companies, which account for the majority of Canada's mining production, have dramatically reduced their releases to the environment over the past 15 to 20 years (see Figure 30). Releases of major substances such as mercury, nickel and copper have dropped between 77% and 98%, a result of companies investing in cleaner processes in response to voluntary initiatives and regulations.

Internationally, an array of sustainability and social licence initiatives affect the Canadian mining industry. Companies seeking project financing are now 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. Firms 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 31.

Domestically, companies are engaged in a variety of environmental 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 commits to implement it. TSM includes a set of tools and indicators to drive performance and ensure that key mining risks are managed responsibly at our members' facilities. By adhering to the principles of TSM, our members demonstrate leadership through:

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

Established in 2004, TSM's main objective is to enable mining companies to meet society's needs for minerals, metals and energy products in the most socially, economically and environmentally responsible way. The program's core strengths are:

- **Accountability**—TSM reporting at the facility level of their Canadian operations is mandatory for members.
- **Transparency**—Annual reporting is conducted against 23 indicators with independent verification.
- **Credibility**—TSM includes ongoing consultation with a national Community of Interest Advisory Panel to improve industry performance and shape TSM for continual advancement.

TSM is an award-winning, industry-wide performance system that helps mining companies evaluate and manage their environmental and social responsibilities. In essence, TSM ensures companies are operating in a way that aligns with evolving societal priorities and expectations as they relate to community engagement, safety and health, energy use and the environment. Each year, MAC produces a *TSM Progress Report* detailing the facility-level performance of participating companies. The report is available on the MAC website.

TSM assessments take place at the facility level to ensure that management systems are in place, with results externally verified every three years. In 2013, 60 facilities were assessed.

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

- Tailings management
- Energy use and greenhouse gas emissions management
- Aboriginal and community outreach (formerly external outreach)
- Crisis management planning
- Biodiversity conservation management
- Safety and health

Below are the results for the 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 *2013 TSM Progress Report*, which is available on the MAC website.

TAILINGS MANAGEMENT

Tailings impoundments are necessary components of mining activity, and it is crucial that they be managed responsibly to protect human safety and the environment.

TSM's tailings management protocol goes beyond adherence to technical standards and contains five performance indicators. These indicators are designed to confirm whether a facility has implemented a system for responsible tailings management. This protocol seeks to ensure that facilities have a formal policy in place, have developed and implemented a tailings management system, have assigned accountability to the company's CEO or COO, and have developed operation, maintenance and surveillance manuals for all tailings impoundments. Facilities must also conduct annual reviews of their management systems and report the results of this evaluation to their accountable executive officer to meet the requirements of this protocol.

Since 2006, significant improvement has been made across all indicators (see Figure 32). The Canadian mining industry

PROMISING TECHNOLOGY FOR OIL SANDS TAILINGS

Managing tailings in the oil sands is a key environmental concern for the mining industry. Thanks to a promising new technology for tailings management, reclamation times could be greatly reduced—by some estimates, from 40 years to seven. The technology, referred to as Technology Reduction Operation (TRO_{TM}), involves adding a polymer flocculent to fine tailings, which allows water to be released and tailings to dry more quickly. The technology has been in use at Suncor since mid-2010, and other firms are now partnering with Suncor in this area.

The TRO_{TM} process is expected to significantly accelerate the rate of land and tailings reclamation, eliminate the need for new tailings ponds at existing mine operations and, in the years ahead, reduce the number of tailings ponds at its present mine site. The current approach has allowed Suncor to cancel plans for five additional tailings ponds. Moreover, Suncor is sharing some proprietary rights to its TRO_{TM} process through its collaboration with groups like the Oil Sands Tailings Consortium, the Oil Sands Leadership Initiative and the Canada's Oil Sands Innovation Alliance.

is recognized as a leader in tailings management. With our members, MAC developed guides that are used around the world. These guides outline how mining companies can safely operate tailings facilities by adhering to best practices in tailings management.

Beyond TSM, oil sands operators are making measured progress in tailings management. The Oil Sands Tailings Consortium (OSTC) 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. In March 2012, the OSTC became part of Canada's Oil Sands Innovation Alliance (COSIA), which is discussed in more detail below.

BIODIVERSITY CONSERVATION MANAGEMENT

Mining conducted in consultation with communities of interest can co-exist with biodiversity conservation. Conserving biodiversity through all stages of a mine's life cycle is an industry priority and helps to maintain a company's privilege to operate.

The biodiversity conservation management protocol consists of three indicators that set out expectations for mining companies with respect to conserving biodiversity. The protocol seeks to confirm 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 communicate the performance of facilities publicly.

MAC members started reporting on this protocol in 2012, and the reporting was undertaken at an aggregate level. Beginning in 2014, reporting on this protocol will be undertaken at the facility level. There are many elements that make up a biodiversity conservation management system, and MAC members are still working to understand the requirements of this new TSM protocol. The 2012 aggregate results indicate that there is work to be done to improve performance in this area (see Figure 33).

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 and to help reduce operational costs at a mine site.

The energy use and GHG emissions management protocol has three indicators[1] that seek to confirm 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. Since 2006, marked improvement has been seen across all indicators, particularly over the past year (see Figure 34).

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

[1] Recently, MAC commissioned an independent consultant to review the TSM results for energy use and GHG emissions management to help us understand why performance results were improving more slowly than expected. Because of this review, MAC revised the protocol to ensure that it was a tool to drive performance improvements. This led to the development of a set of revised indicators (three rather than six), which the membership implemented in 2013.

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.

ENERGY EFFICIENCY AND GHG EMISSIONS

Energy and GHG emissions policy issues are visible and important to Canadians. Dramatic climate events and the extensive media coverage that follows them have made this issue top of mind for many people around the world. The following offers a whole-of-industry perspective on energy use and GHG emissions that extends beyond TSM reporting.

MINERAL EXTRACTION

According to the Canadian Industrial Energy End-Use Data and Analysis Centre, direct emissions from Canada's operating metal and non-metal mines accounted for just 0.91% of the country's total GHG emissions in 2011 (see Figure 35).

Despite having no federally regulated targets, many extraction operations are improving their capabilities in compressed air, ventilation, metering and energy management. Canadian mining companies are also actively involved in innovation initiatives to find fuel efficiencies for large mobile equipment, such as a project currently being undertaken by Shell Canada and Caterpillar to develop a liquefied natural gas engine for haul trucks. 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. Mines in northern Canada face a special energy challenge because of the lack of electrical grid capacity, making them more reliant on more expensive fossil fuel. As a result, some mines are less able to lower their carbon emissions due to the remoteness of their locations and the infrastructure challenges they face. Although mines are designed with energy efficiency in mind, infrastructure challenges frequently create a reliance on carbon-heavy fuels to power operations.

METAL SMELTING AND REFINING

Processing minerals and metals is an energy-intensive activity. The industry's base metal smelters, iron ore pellet plants and oil sands operations have generally been categorized as "large emitters" in past federal policies.

The most energy-intensive players in the mining sector, smelting and refining facilities, have greatly improved their energy use and GHG intensity over the past two decades. Despite volatility, the primary metal smelting and refining sector brought down the energy required per unit produced from 50.4 terajoules per kilotonne of output in 1990 to 47 in 2011—a 6.7% improvement (see Figure 35). The sector cut its total direct GHG emissions from 3 megatonnes of CO_2 equivalent in 1990 to 2.6 megatonnes in 2011, a 14% reduction.

CANADA'S OIL SANDS INNOVATION ALLIANCE

The recent formation of Canada's Oil Sands Innovation Alliance (COSIA) is a good example of industry collaboration on environmental issues. COSIA brings together 13 of the largest companies involved in Canada's oil sands, representing almost 90% of oil sands production, and focuses on performance improvements for four key environmental challenges: tailings, water, land and greenhouse gas emissions. Member companies have agreed to break down some of the barriers of funding, intellectual property and human resources that sometimes impede the discovery and implementation of breakthrough technologies in these areas. COSIA is building and expanding on the progress made in recent years by several industry research and development organizations. By setting clear environmental goals, and working together to achieve real solutions, this new and larger alliance is taking collaboration and sustainable development to the next level.

OIL SANDS

About 20% of the oil sands reserves are close enough to the surface to be mined, while about 80% are accessible through in-situ treatment. While mining causes a larger land disturbance, in-situ methods are generally more energy intensive. According to a 2012 IHS CERA report, well-to-wheels GHG emissions from oil sands crude oil average 11% higher than the average crude oil refined in the United States, with oil sands mining in the lower range and in-situ processes in the higher range. Well-to-wheels emissions include those produced during crude oil extraction, processing, distribution and combustion in an engine.

Despite significant advances in energy efficiency, the oil sands face particular GHG challenges. Production from oil sands alone—excluding conventional production in western Canada—is projected to increase from 1.8 million barrels a day in 2012 to 5.2 million in 2030. Assuming

current technology, this could increase GHG emissions significantly.

Oil sands production, however, has a track record of continuous improvement in this area. Since 1990, the GHG intensity of oil sands mining and upgrading operations has fallen by 37% on a well-to-tank basis. For oil sands mining, GHG emissions reductions have been driven through innovations such as hydrotransport and efficiency improvements in bitumen extraction, upgrading, and natural gas-fired cogeneration for electricity and steam. With the advancement of steam-assisted gravity drainage about a decade ago, technical improvements have continually enhanced the steam-to-oil ratio, increasing the efficiency of this process.

Other options for lowering emissions attracting attention include the potential application of nuclear power to supply electricity and steam and the implementation of large-scale carbon capture and sequestration (CCS). While benefits from each of these options could render a significant reduction in GHG emissions, there are challenges. Alberta has no experience with nuclear power and no infrastructure, and the oil sands projects are located far away from each other, making it difficult to transport steam. CCS technology is in its infancy, with only a couple of operations in the world. Moreover, the cost of developing controlled underground repositories, while currently unknown, could be extremely high. Still, the technology is being examined in Canada, the United States and elsewhere, and governments are allocating significant funding towards the idea.

Technology improvements and efforts to find alternative power will continue into the future as individual companies and the industry as a whole focuses on reducing its environmental footprint. 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.

MINING AND NATURAL GAS

Recent developments in natural gas have caught the attention of miners. Technological advances in gas extraction have boosted supply through new finds and increased access to known deposits. Due to market developments in North America, gas prices remain low on average. And the fuel has a smaller GHG footprint relative to diesel. This positions natural gas well to assist miners in reducing both their energy costs and carbon emissions.

In the North American market, the price of natural gas closed at approximately $4 per million BTU in 2012—the same price the fuel opened at in 2000. The fuel had an average price in 2012 of $2.75 per million BTU based on Henry Hub—the pricing point for natural gas futures traded on the New York Mercantile Exchange. The price of diesel, on the other hand, more than doubled—from $16 to $34 per million BTU—over the same time period, and had an average price in 2012 of $34.88 per million BTU. To appreciate this price increase, consider a mining company that consumes an average of 2.2 million litres of diesel each month at a single operation. On a strict price comparison, given approximately 36,500 BTU per litre of diesel, by switching to natural gas, the energy cost savings for this one operation would exceed $2.5 million per month (more than $30 million annually) at 2012 average prices.

Stornoway Diamond Corporation's Renard Diamond Project is a recent example of a mining company embracing the natural gas opportunity. On October 21, 2013, the company announced positive results from a feasibility study on the viability of a power plant fuelled by liquefied natural gas, demonstrating substantial benefits in terms of annual operating costs and environmental emissions compared to a diesel genset option. Highlights of the study include:

- Annual operating cost reductions of between $8 million and $10 million over the initial 11-year mine life, representing a mine-life cost savings of $89 million, or 6.6%
- Incremental capital cost of only $2.6 million over the cost of diesel gensets, representing a net payback of four months
- An estimated reduction in GHG emissions of 43%, with significant reductions in NO_2 and SO_2

For many mines, however, there are other considerations. Given that natural gas prices are subject to volatility—such

as the 2013 winter price spikes in northeastern United States—questions over the viability of switching require detailed analysis. In many situations, miners face similar challenges in accessing natural gas as they do with other diesel-replacing alternatives. In remote areas, particularly in the north, no direct transmission or distribution pipeline network exists—and building one would be a capital-intensive investment. Maritime transportation of natural gas is also expensive as it requires ships, unloading and storage facilities—a compounded challenge as very little port infrastructure currently exists and all-weather road systems are scarce.

Natural gas technologies, however, continue to improve, and incrementally enhance the fuel's usability for miners. Some natural gas generation technologies have been designed to retrofit existing diesel systems, making a fuel switch less capital intensive. From an end-use perspective, progress has been made towards the development of liquid natural gas engines for heavy vehicles. As well, partnerships have formed to co-develop natural gas technology for off-road equipment, such as mining trucks, enhancing the viability of fuel switching for a mining fleet.

MINING AND RENEWABLE ENERGY

Renewable energy technologies and the economics of their deployment have improved and will likely continue to do so. Renewable power is appealing to miners because it has the potential to reduce energy costs and environmental impacts while enhancing energy security and strengthening a company's social licence to operate in communities.

From 1999 to 2011, the annual bill for energy required for mining processes more than doubled, costing Canadian miners $2.2 billion in 2011. This cost increase can largely be explained by the remote location of many Canadian mines, the lack of regional energy infrastructure, and the resulting dependence on diesel generation. From 1999 to 2013, the average price of oil increased tenfold, from roughly US$10 to more than US$100 per barrel. Heightened transportation costs have also increased the price per unit of delivered fuel, pushing the cost of generation for some remote mines up to $0.30 per kilowatt hour.

With the price of oil forecasted to continue inching upward, miners are giving the benefits of renewable technologies greater consideration. The levelized cost of electricity (LCOE) for wind, solar photovoltaic, concentrated solar power and some biomass technologies has steadily decreased, enhancing competitiveness relative to conventional technologies, particularly for off-grid generation. An International Renewable Energy Agency report released in January 2013 noted that the average LCOE for wind, solar and biomass technologies in North America was $0.08, $0.16 and $0.08 per kilowatt hour, respectively.

These average prices do not account for additional capital costs associated with remote development. They also vary based on the quality of the renewable resource. Just as miners need to go where the viable deposits are located, renewable generation is contingent on the strength and reliability of the renewable asset. This restriction prevents renewable 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.

MINERS PUT ENERGY INTO RENEWABLE POWER

The development of a wind farm at Rio Tinto and Dominion Diamond Corporation's jointly owned Diavik diamond mine is a good example of miners putting energy into renewable power. Largely dependent on an ice road for resupply, the warm winter of 2006 exposed the remote mine's vulnerability to varying climate conditions. The ice road opened late, closed early, and ice thickness did not reach full load capacity, requiring tens of millions of dollars of supplies—namely diesel—to be flown in at significant expense.

The construction of four 2.3-megawatt wind turbines is expected to reduce annual diesel consumption by 10%, saving $6 million every year. Additionally, offsetting diesel consumption cuts the mine's carbon footprint by 6%—equivalent to 12,000 tonnes of carbon dioxide emissions—and eliminates the need for 100 fuel truck resupply trips each year, reducing supply risk.

GHG EMISSIONS TRENDS AND POLICIES

According to the International Energy Agency (IEA), the world is not on track to meet the target to limit the long-term rise in the average global temperature to 2º Celsius. In May 2013, CO_2 levels in the atmosphere exceeded 400 parts per million for the first time in several hundred millennia. Despite positive developments in some countries, the IEA

holds that global energy-related carbon emissions have increased by 1.4% to reach 31.6 gigatonnes in 2012 (a historic high), and that non-OECD countries now account for 60% of global emissions, up from 45% in 2000.

In recent years, it has become unclear whether the world will see any real progress on climate change. Geopolitics, significant concerns over the economic recovery of national economies, and the cost associated with addressing climate change have proven to be obstacles to an effective policy framework.

As inscribed in the Copenhagen Accord, Canada's current GHG emissions reduction targets are aligned with the United States, and commit Canada to an economy-wide target of a 17% reduction in emissions from 2005 levels. A recent report by Environment Canada, *Canada's Emissions Trends*, cast uncertainty as to whether this target is obtainable or not. With current measures in place, the report forecasts emissions to be 734 megatonnes in 2020—122 megatonnes higher than Canada's target of 612 megatonnes in the Copenhagen Accord.

Given Canada's turbulent history with climate change policy, it is questionable whether a price will eventually be attached to carbon emissions in Canada and the United States, either through a cap and trade program or through a carbon tax, even though there has been a great deal of talk about the merits and demerits of both approaches.

More likely for Canada are smaller, more targeted actions. Recent examples of these include steps to reduce GHG emissions from heavy-duty vehicles and regulations to reduce carbon dioxide emissions from the coal-fired generation of electricity. The proposed vehicle regulations will reduce emissions from a range of on-road, heavy-duty vehicles and engines, including large pickup trucks, short- or long-haul tractors, cement and garbage trucks, and buses, starting with 2014 models. The objective of the coal regulations is to phase out high-emitting coal-fired generation and promote a transition towards lower or non-emitting types of generation. As a component of these targeted actions, it is expected that regulations will be developed for both the oil and gas sector and the mining sector.

Regardless of the scope of the Canadian climate change policies being implemented, or the shape they may take, it is important for any federal policy on GHG emissions to engage all Canadians in the solution and avoid overlap with existing or developing provincial policies. Otherwise, complicated regulatory and reporting systems could result, causing unnecessary duplication. Industry needs clear and consistent regulatory processes if it is to make the right investments in abatement technologies and emissions management systems. The federal government should also avoid a "one size fits all" approach, and should focus on the facilities and regions that will deliver real environmental benefits.

THE CLEAN ENERGY ECONOMY

Around the world, demand for environmental goods and services is on the rise, reflecting concerns over climate change. Promising technology areas include low-carbon energy, energy storage, carbon capture and storage, green buildings and materials, clean vehicles and renewable energy.

COAL'S ROLE IN A SUSTAINABLE SOCIETY

Coal is required to make steel. About 770 kilograms of steelmaking coal are required to produce one 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 are 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.

This cleaner society depends on metals and minerals as building blocks. Hybrid vehicles, for example, draw energy from nickel hydride batteries. Catalytic converters, which reduce air pollution from vehicles, require platinum, rhodium and cerium. Rechargeable batteries are made from lithium, and solar cells require gallium, indium and

germanium. Water purification systems rely on nickel and rare earth elements. The fuel efficiency of aircraft has improved by 70% over the past 40 years because of materials like aluminum, and next-generation technologies will be based on even lighter composites.

Minerals and metals are essential for developing clean energy, whether the source is nuclear, wind or hydrogen. Wind turbines, for example, are made from nickel alloys. So are the gas turbines, shafts and fuel injectors used in small biogas projects (including some Clean Development Mechanism projects in India). Because nickel is strong and resists corrosion, it is well suited to air pollution reduction hardware and renewable energy infrastructure.

Despite debates over the scale of global oil supply—ranging from "peak oil" at one end of the spectrum to "800-year supply" at the other—projections for coal and shale gas supply extend centuries into the future. As for oil shale, there are hundreds of known deposits across dozens of countries, and estimated reserves approach three trillion barrels. Therefore, while the world may well move towards cleaner energy in the coming decades, the change will not necessarily be driven by lack of traditional energy supply.

RECYCLING AND E-WASTE

E-waste includes items such as mobile devices, computers, monitors, televisions and DVD players among other electronic equipment. E-waste is one of the fastest-growing waste streams in the world. The lifespan of computers, for example, in developing countries has dropped significantly in recent years, and mobile devices frequently have a lifespan of less than two years. As consumers and businesses favour disposable technology and a shorter life cycle for electronics, the amount of e-waste generated is increasing. In 2011, for example, Canadians possessed over 31 million electronic devices.

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 one kilogram of gold, 400 grams of palladium, 10 kilograms of silver, and 420 kilograms of copper can be recycled. By this estimate, the market value of these metals at the time of writing was nearly $70,000—a significant figure considering many people simply discard their electronic products. 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.

E-WASTE RECYCLING IN CANADA

RECYCLABLES

- Electronic waste—TVs, desktop and portable computers, mobile phones and devices, certain medical and monitoring devices, stereos, printers, DVD players, cameras, and audio and video game consoles.

URBAN ORE:

- Metals—Zinc, lead, germanium, indium, cadmium, arsenic, mercury, copper, gold and silver.

COMPANY IN THE FOREFRONT:

- Glencore's Horne smelter in Rouyn-Noranda, Quebec, is Canada's only remaining copper smelter. The operation processed more than 127,000 tonnes of recycled material in 2010, yielding over 35,000 tonnes of metals. The smelter uses precious metal-bearing recyclables as feedstock to make 99% anode copper. The Horne smelter recently doubled its e-waste recycling capacity.

It is estimated that the world's supply of end-of-life electronics offers a material resource of 40 million tonnes annually, from which a variety of component materials can be recycled. Propelling these efforts internationally is the Basel Convention, which controls the export of hazardous waste and requires e-waste to be treated as close to its origins as possible. The Convention, which entered into force on May 5, 1992, now has 180 parties, 53 of which are signatories, including Canada and the European Union.

While e-waste recycling programs have increased across Canada in recent years, increased awareness is needed among Canadians of the options available for recycling old electronics. Beyond raising awareness about consumer responsibility, 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 consume.

ABORIGINAL RELATIONS AND BENEFIT AGREEMENTS

Mining companies have developed progressive relationships with Aboriginal communities. Given the proximity of many Aboriginal communities to mining operations, and the large number of Aboriginal youth, there is significant potential to create stronger and mutually beneficial partnerships between Aboriginal Canadians and the mining industry.

Proportionally, the mining industry is the largest private sector employer of Aboriginal people in Canada. This can be partly attributed to the nearness of 1,200 Aboriginal communities to mining operations: most communities are located within 200 kilometres of approximately 180 producing mines and more than 2,500 active exploration properties. This geographical proximity makes for strong connections, but more can be done to enhance relationships between industry and Aboriginal communities (see Section 4 in this report for more discussion).

Over the past decade, the Canadian mining industry has increasingly embraced the signing of benefit agreements (also referred to IBAs, community and impact benefit agreements, or community benefit agreements) between mining companies and Aboriginal people. Whether concluded on a voluntary basis or as a result of a legal obligation, IBAs have helped proponents garner local support for their projects. While earlier agreements typically contained provisions for employment and training, more recent IBAs have also tended to address business opportunities through set-aside contracts and joint ventures, social and cultural considerations, environmental monitoring, funding arrangements, dispute resolution mechanisms, and direct payment and resource-sharing provisions, among other arrangements.

Since the groundbreaking 1974 Strathcona Agreement, Natural Resources Canada estimates that 335 bilateral agreements (IBAs or other agreements at the exploration stage) have been signed for 198 mining projects in Canada, and that 260 of them remain active.

Progressive agreements, such as the EKATI mine project agreement in the Northwest Territories and the Raglan agreement in Quebec, can provide Aboriginal communities with jobs, skills training, profit sharing and environmental benefits. Agreements between Vale and Labrador's Innu and Inuit people include sections on training, employment, contracting, financial benefits, environmental matters and dispute settlement. The partnership between the government of British Columbia, the Stk'emlupsemc of the Secwepemc Nation (SSN) and New Gold will see the provincial government share revenues from the New Afton mine directly with the SSN. This agreement broke new ground in Aboriginal and natural resources public policy, providing the confidence and mutual benefit needed for mining projects to move forward. Since then, revenue-sharing agreements have been struck between the government of British Columbia and the following: the McLeod Lake Indian Band and the Nak'azdli First Nation to share mineral tax royalties from the Mount Milligan mine; the Upper Similkameen Indian Band and Lower Similkameen Indian Band to benefit from the Copper Mountain mine; and the Williams Lake Indian Band and Xatúûll First Nation (Soda Creek Indian Band) to share mineral tax revenues collected by the BC government from the expansion of the Mount Polley mine.

While the relationship between mining companies and Aboriginal Canadians 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 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.

ABORIGINAL PERSPECTIVE ON BENEFIT AGREEMENTS

Aboriginal economic development corporations (EDCs) are the economic and business development arm of a First Nations, Métis or Inuit government, and are a major economic driver in Aboriginal communities. In 2011, the Canadian Council for Aboriginal Business published a survey of 50 EDCs across Canada. Of those surveyed, 32% of respondents stated they had benefited from IBAs through community-negotiated provisions for contracting and subcontracting to local Aboriginal businesses. Participants in the survey noted that IBAs ensured that members of their communities could gain access to employment and training opportunities, and that EDCs gained first access to all contracting opportunities.

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 are generic requirements governing 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 jurisdiction. Mining projects in provinces are subject to the *Canadian Environmental Assessment Act* (CEAA) and, depending on the details of the project and the mine site, they may require approvals under other federal legislation, such as the *Fisheries Act* and the *Navigable Waters Protection Act* (NWPA).

All three federal Acts were amended in 2012. The *Canadian Environmental Assessment Act*, 2012 (CEAA 2012), came into force in July 2012. Amendments to the *Fisheries Act* came into force in November 2013. Amendments to the *Navigable Waters Protection Act*, changing it to the *Navigation Protection Act*, are expected to come into force in 2014. The impacts of these changes are still unclear. It is expected that once fully implemented, there will be an increase in the number of federal approvals required and the number of mining projects subject to federal environmental assessment. In the first year of CEAA 2012, for example, the number of mining projects requiring environmental assessments compared to other industries' projects was substantial (see Figure 36). The expectation, however, is that these approval processes will be more efficient and timely, with more appropriate and flexible compliance tools, and better coordination with provincial review processes.

In the meantime, however, the industry is concerned by the uncertainty surrounding the transition to the new regulatory model for current projects and by the inadequate integration of processes and consultation within the federal government.

To achieve efficiency, the Canadian Environmental Assessment Agency and key departments, such as Environment Canada, Fisheries and Oceans Canada and Transport Canada, must work together to ensure mining projects are reviewed once, and that the various federal requirements, along with Aboriginal and public considerations, are integrated into a robust and timely process with meaningful consultation.

To assist in all aspects of this process, departments must have the capacity and expertise to work with the mining industry on expeditiously and clearly interpreting the new regulations, and provide effective guidance on the implementation of their requirements in a reasonable and timely way.

To ensure the intended outcomes are achieved, officials within relevant federal, provincial and territorial government departments must work closely together and, where applicable, with industry and stakeholders. Better collaboration among these parties will ensure a smooth, efficient and effective transition to the new regulatory model.

The Major Projects Management Office (MPMO) was set up to coordinate the many agencies and departments that review major resource projects. Funding for the MPMO was renewed at $54 million over two years in the 2012 federal budget, with an additional $13.6 million over two years to support consultations with Aboriginal people.

Given Canada's declining mineral reserves, it is important that governments consider economic issues before removing large areas of land from potential development. The ability to explore large tracts of land is fundamental to Canada's success in exploration and mining. Additionally, the extent to which the land base is available for exploration directly influences how often new mine-worthy deposits are found. Challenges remain with ill-defined land use plans, unclear decision-making processes, and a lack of understanding of the economic benefit and relatively light environmental footprint associated with mineral exploration.

FIGURE 30
MINING INDUSTRY RELEASE OF SUBSTANCES TO THE ENVIRONMENT, BASE YEAR TO 2011

	Base Year	2003	2005	2008	2009	2011	% Change Base- 2011
Cadmium	130.1	27.8	30.9	19.9	23.4	5.5	96%
Arsenic	319.5	133.0	81.0	110.0	66.4	38.5	88%
Copper	976.0	274.5	352.6	313.9	270.3	222.8	77%
Lead	1,843.9	296.8	198.8	214.5	194.1	115.3	94%
Mercury	28.2	1.4	1.8	2.5	1.1	0.4	98%
Nickel	1,372.0	259.8	392.8	212.9	119.8	138.3	90%
Zinc	3,014.6	467.3	405.3	403.9	554.1	257.6	91%

Sources: MAC Member Companies, TSM Progress Report 2013.
Notes: The air/water pollutant releases are tonnes per year and are primarily associated with the operation of metal smelters and oil sands upgraders. Data is drawn from industry submissions to the federal government's National Pollutant Release Inventory (NPRI). Base year varies by company though it is generally around 1993.

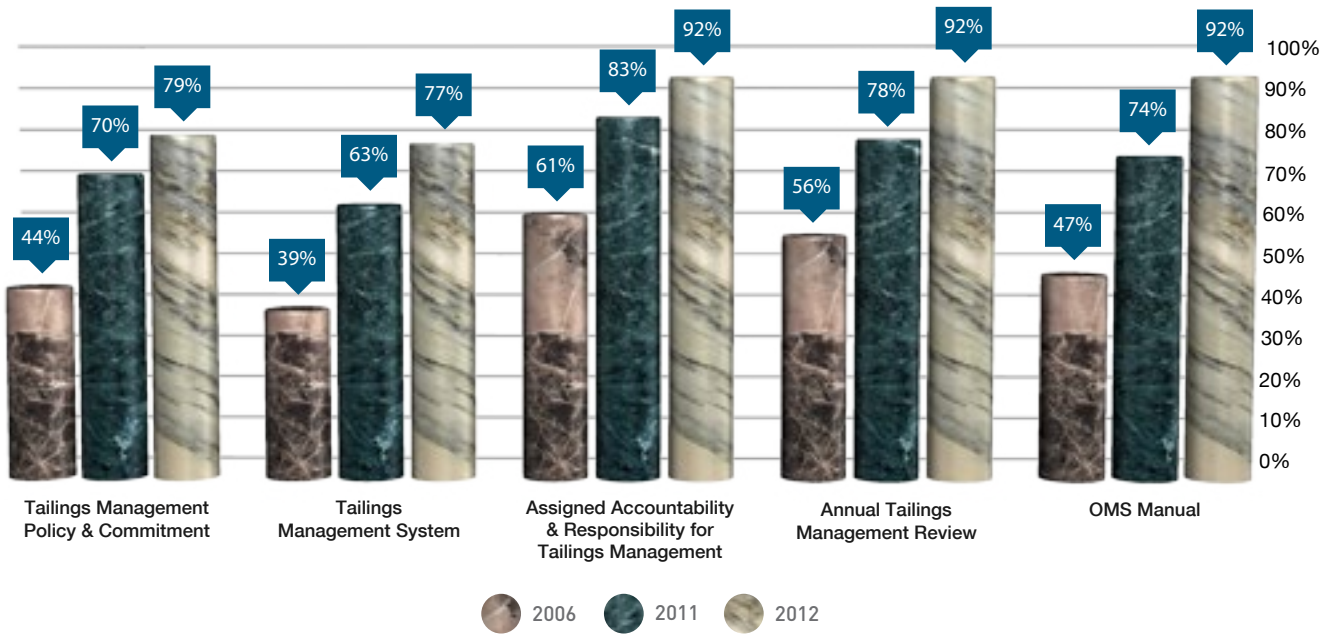
FIGURE 31
MAC MEMBER COMPANY APPLICATION OF INTERNATIONAL STANDARDS AND PROGRAMS

	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		
	MAC Towards Sustainable Mining*	ICMM Sustainable Development Framework	PDAC e3 Plus	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	IFC Social and Enviornmental Performance Standards	Dow Jones Sustainability Index	Jantzi Social Index	Responsible Jewellery	International Cyanide Code	Kimberley Process
COMPANIES/BUSINESS UNITS HEADQUARTERED IN CANADA WITH INTERNATIONAL OPERATIONS																			
Agnico-Eagle Mines	X		X								X	X			X		X	X	NA
Barrick Gold Corporation		X	X	X		X	X	X	X		X	X	X	X	X			X	NA
IAMGOLD Corporation	X		X	X			X	X	X		X	X		X		X		X	NA
Kinross Gold Corporation						X	X	X			X	X			X	X		X	
HudBay Minerals Inc. **	X			X	X			X			X	X	X	X			NA	NA	NA
First Quantum Minerals	X					X	X	X				X		X			NA	NA	NA
Teck Resources Limited **	X	X	X	X		X	X		X		X	X	X	X	X	X	NA	NA	NA
Vale (Base Metals)		X				X	X				X	X	X				NA	NA	NA
New Gold				X	X	X					X	X					X	X	NA
COMPANIES HEADQUARTERED OUTSIDE OF CANADA WITH CANADIAN OPERATIONS																			
Glencore							X	X				X	X		X		NA	NA	NA
De Beers Canada **	X	X	X	X	X	X	X	X		X	X	X		X			X	NA	X
Newmont		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	NA	X	NA
ArcelorMittal				X	X		X				X								

Sources: MAC Member Companies, TSM Progress Report 2013.
** Applied at international operating facilities.*
*** TSM is applied at international facilities, but results are not reported publicly.*

FIGURE 32
TSM TAILINGS MANAGEMENT

TAILINGS MANAGEMENT
PERCENTAGE OF FACILITIES AT LEVEL A OR HIGHER

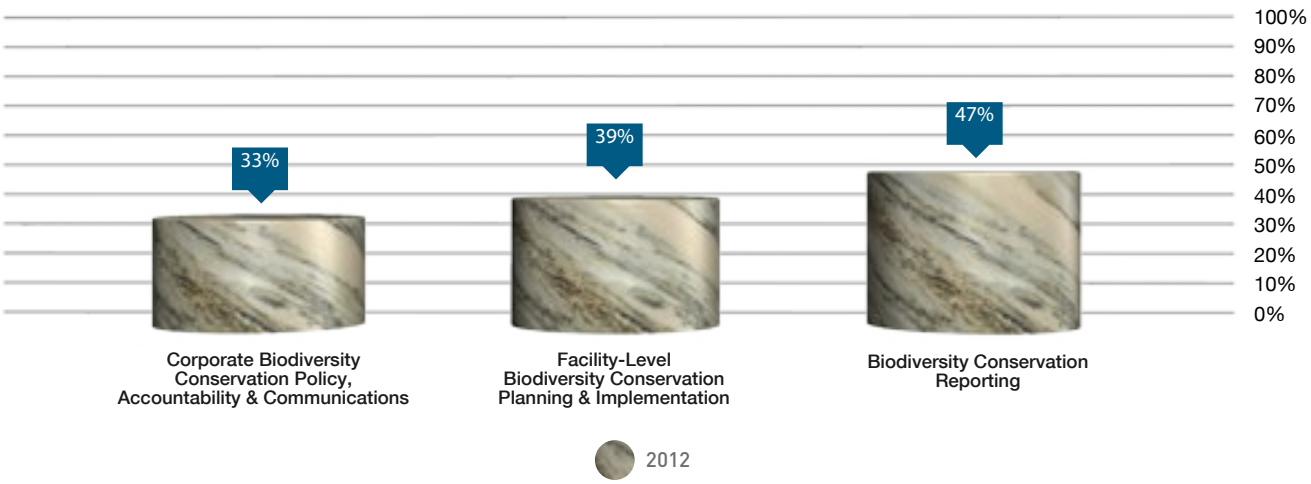


Indicators	Purpose
Tailings Management Policy & Commitment	To confirm that companies have established a policy and commitment that expresses intention, commitments and principles in relation to tailings management.
Tailings Management System	To confirm that companies have a tailings management system in conformance with the tailings management framework in MAC's A Guide to the Management of Tailings Facilities to provide a formal systematic structure for the assessment of risks, setting of goals and objectives, consultation with COI, implementing activities to achieve goals, assignment of responsibilities, and assurance processes to ensure that tailings facilities are managed effectively.
Assigned Accountability & Responsibility for Tailings Management	Executive accountability for tailings management is necessary to signal the importance of tailings facilities to our business and the adverse impacts improper tailings management practices have on the environment and our reputation. This indicator confirms that companies have an executive officer (CEO or COO) who has overall accountability to ensure that an appropriate management structure is in place to provide assurance to the corporation and its COIs that tailings are managed responsibly. It is expected that the executive officer will delegate responsibility for tailings management, budgetary issues and other tailings-related functions to operations and/or corporate personnel, while retaining ultimate accountability for the management of tailings and its outcomes.
Annual Tailings Management Review	To confirm there is an annual corporate review of tailings management that is reported to the accountable executive officer to ensure that the corporation is satisfied that the tailings management structure and systems are effective and continue to meet the needs of the organization.
OMS Manual	To confirm that the facility has developed and implemented a tailings OMS manual in conformance with Developing an Operation, Maintenance and Surveillance Manual for Tailings and Water Management Facilities.

Sources: MAC Member Companies, TSM Progress Report 2013.

FIGURE 33
TSM BIODIVERSITY CONSERVATION MANAGEMENT

BIODIVERSITY CONSERVATION MANAGEMENT
PERCENTAGE OF FACILITIES AT LEVEL A OR HIGHER

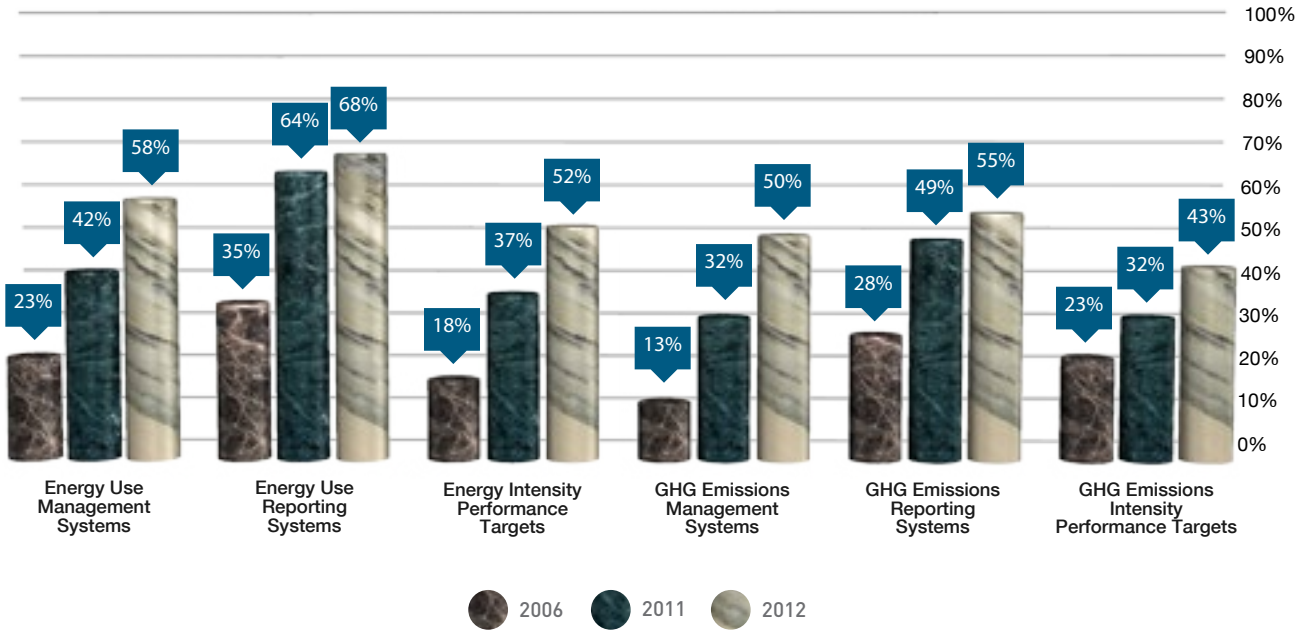


Indicators	Purpose
Corporate biodiversity conservation commitment, accountability and communications	To confirm that corporate commitment and accountabilities are in place and communicated to relevant employees to support the management of biodiversity conservation issues.
Facility-level biodiversity conservation planning and implementation	To confirm that effective plans and management systems are implemented at the facility-level in order to manage significant biodiversity aspects.
Biodiversity conservation reporting	To confirm that biodiversity conservation reporting systems are in place to inform decision-making and to communicate performance publicly. Biodiversity conservation reporting includes elements such as policy, monitoring and conservation initiatives.

Sources: MAC Member Companies, TSM Progress Report 2013.

FIGURE 34
TSM ENERGY USE & GHG EMISSIONS MANAGEMENT

ENERGY USE & GHG EMISSIONS MANAGEMENT
PERCENTAGE OF FACILITIES AT LEVEL A OR HIGHER



Indicators	Purpose
Energy Use Management Systems	To confirm that systems are in place to manage energy use.
Energy Use Reporting Systems	To confirm that energy use tracking and reporting systems are in place for internal use and for public reporting.
Energy Intensity Performance Targets	To confirm that energy intensity performance targets have been established at each facility.
GHG Emissions Management Systems	To confirm that systems are in place to manage greenhouse gas emissions.
GHG Emissions Reporting Systems	To confirm that greenhouse gas emissions tracking and reporting systems are in place for internal use and for public reporting.
GHG Emissions Intensity Performance Targets	To confirm that greenhouse gas emissions intensity performance targets have been established at each facility.

Sources: MAC Member Companies, TSM Progress Report 2013.

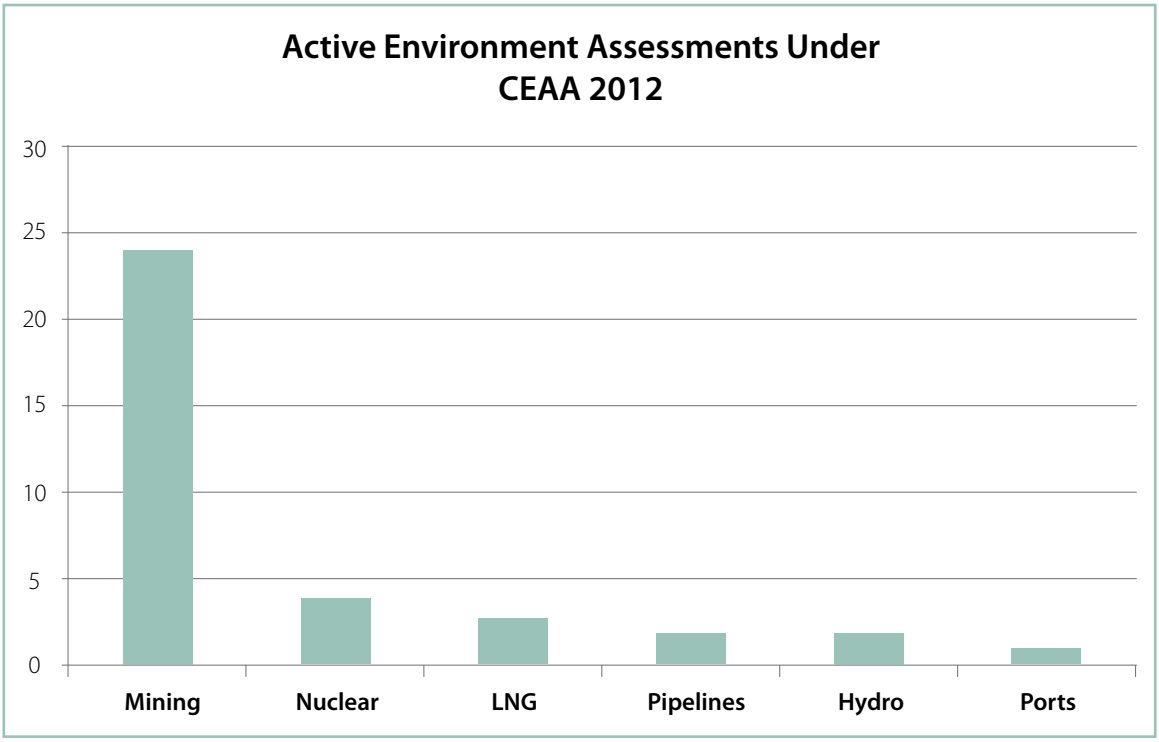
FIGURE 35
MINING INDUSTRY ENERGY AND GHG EMISSIONS DATA, 1990 AND 2011

	1990	2011
Canadian economy		
Canadian energy use (PJ)	9,608	11,453
Energy used by broader industry (PJ)	2,400	2,451
Canadian GHG emissions (mt)	592	653
Direct GHG emissions by all industries (mt)	99.1	110.0
Metal and non-metal mining		
Total energy use (PJ)	143	141
Share of Canadian energy use (%)	1.48	1.24
Direct GHG emissions (Mt CO_2e)	5.63	5.91
Direct share of Canadian GHG emissions (%)	0.95	0.91
Primary metal smelting and refining		
Total energy use (PJ)	77	69
Share of Canadian energy use (%)	0.8	0.6
Energy per unit (TJ/kt)	50.4	47
Direct GHG emissions (Mt CO_2e)	3.04	2.61
Direct share of Canadian GHG emissions (%)	0.51	0.4

Source: Canadian Industrial Energy End-Use Data Analysis Centre (CIEEDAC) Report, 2013.
Notes: Smelting and refining data are for non-ferrous metals. Also does not include aluminum.

FIGURE 36
ACTIVE ENVIRONMENTAL ASSESSMENTS UNDER CEAA 2012[1]

Project Category	Active Environmental Assessments Under CEAA 2012
Mining	24
Nuclear	4
LNG	3
Pipelines	2
Hydro	2
Ports	1



Source: Canadian Environmental Assessment Agency
Note: [1] The Canadian Environmental Assessment Act, 2012, came into force in July 2012. The above is accurate as at December, 2013.

THE WORLD

INTERNATIONAL MARKET ACTIVITIES AND DEVELOPMENTS

CANADIAN EXPLORATION AND MINING COMPANIES ABROAD HAVE A SIGNIFICANT PRESENCE BEYOND CANADA'S BORDERS. 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, the value of Canadian mining assets abroad reached $146.2 billion in 2011, equivalent to a 16% increase over 2010 and accounting for almost 70% of total Canadian mining assets (see Figure 37). By comparison, the value of Canadian mining assets abroad in 2011 was more than double that of Canadian mining assets at home, $146.2 billion versus $69.1 billion.

As a geographic indicator, four of the top 10 locations for Canada's international assets were Latin American countries, and three were African countries. While some countries attract more mining investment than others, in 2011, Canadian companies had a presence in 48 of Africa's 55 countries, and in every Latin American country.

As an indication of the annual investments associated with these assets, the Toronto Stock Exchange (TSX) and the Venture Exchange (TSX-V) reported that companies listed on their exchanges raised $1.9 billion in equity capital for Latin American mining projects in 2012, and $1.7 billion for African mining projects for the same year. Yet despite these large numbers, Canadian mining companies are facing increasing competition from other mining jurisdictions operating internationally, such as Australia and China.

CANADIAN MINING ASSETS ABROAD IN 2011

CANADIAN MINING ASSETS ABROAD IN 2011

- Latin America—More than 230 companies hold over $50 billion in assets
- Africa—More than 150 companies hold over $31 billion in assets

The combined value of these assets ($81 billion) exceeded the total value of Canadian mining assets ($69.1 billion) for the year.

Together, Latin America and Africa accounted for 55% of Canada's total international asset value.

Source: Natural Resources Canada.

CANADIAN DIRECT INVESTMENT ABROAD

Canadian direct investment abroad (CDIA), and mining's share of that, is an indicator of the industry's international presence. CDIA totalled $712 billion in 2012, a 4% increase over 2011 (see Figure 38). Of that, the metallic minerals and metal products sector accounted for $62.7 billion, or 9%. It is telling that the annual outward flow of the metallic minerals and metal products sector is comparable to the value of domestic Canadian mining assets.

The sector's share of CDIA has held steady at about 10% over the past decade, down from 15% in the 1990s. In the last three years, the percentage has dropped below the 10% threshold. Given the fairly consistent level of CDIA from the metallic minerals and metal products sector over the past decade, the relative decline can be attributed to large CDIA increases by other sectors.

HOST COUNTRY INVESTMENT

Beyond measuring inflows and outflows of industry capital, the federal government and the Canadian mining sector should work together to quantify and communicate the impact of a mine's horizontal value chain on local communities and host countries' national GDP. This value chain significantly exceeds the taxes and royalties generally paid to governments, and could help reorient the dialogue around resource nationalism by more clearly identifying mining's economic contributions (see below for more discussion on resource nationalism).

It has been estimated that between 60% and 80% of all money spent in building and operating a mine remains in the host country through wages and local procurement. This estimate is supported by a 2013 World Gold Council report, Responsible Gold Mining and Value Distribution, which found similarly high levels of spending remaining in the country. The report surveyed almost 100 gold mines around the world, including several from Canada, and found that out of $55.6 billion in total expenditures, at least $44.7 billion (or 80%) was paid out in the country where the operation was situated.

INTERNATIONAL TRADE STATISTICS

Despite showing a trade deficit in the third and fourth stages of mining in 2012, the sector maintained a surplus of $16.7 billion. While down 32% from 2011, the surplus has increased nearly sixfold from a decade earlier, indicating a healthy global demand for Canadian mineral products (see Figures 39 and 40). The mining sector in Canada is one of the few sectors that consistently makes a positive contribution to Canada's balance of trade, totalling over $152.3 billion since 2001.

EXPORTS

The value of Canada's minerals and metals exports increased by 121.5% between 1998 and 2011, before falling in 2012. Despite falling 11% over the previous year, exports of mineral products for the first three stages of mining remained robust in 2012, at $79 billion, which is on par with pre-recession highs. Stage 4 exports came in at $13.1 billion, up nearly 4% over 2011, for a combined total of $92.5 billion for all four stages, or 20.4% of the total value of Canada's exports (see Figure 41).

CANADIAN MINING INDUSTRY—EXPORTS AT A GLANCE IN 2012

Total industry exports: $92.5 billion

- Metals: $69.6 billion
- Non-metals: $16.1 billion
- Coal: $6.8 billion

Percentage of total Canadian goods exported: 20.4%

Top Five Mineral Exports	1998 ($billions)
Iron and steel	10.0
Aluminum	7.1
Gold	3.4
Coal	2.5
Copper	2.5

Top Five Mineral Exports	2012 ($billions)
Gold	17.0
Iron and steel	13.6
Aluminum	8.7
Coal, thermal and metallurgical	6.8
Potash and potassium	6.1

Source: Natural Resources Canada. More information in Annex 11.

Approximately half of Canada's mineral and metal exports by value were destined for the United States in 2012, with iron and steel, aluminum, gold, silver, potash, copper, zinc and nickel holding the largest values (see Annex 11). The European Union is a leading destination for Canadian gold, iron ore, nickel, uranium and diamonds. Other destinations, including China, buy significant exports of copper, iron ore, coal and potash.

IMPORTS

Imports for all four stages of mining remained high in 2012, totalling $75.8 billion, down only slightly from 2011's record high of $77.2 billion. Stage 1 and Stage 2 moved slightly downward, but Stage 3 and Stage 4 inched upward. Of Canada's total mineral imports by value in 2012, approximately 50% came from the United States, which equalized the balance of trade between the two countries for minerals and metals. Other regions such as South

America, Russia and Africa accounted for about 27% of imports (see Annex 12).

THE CANADIAN TRADE REGIME

The Canadian mining industry boasts a significant international presence. Its reliance on international market demand for many of its products makes the industry a major stakeholder in the programs and services Canada's Department of Foreign Affairs, Trade and Development offers to companies operating abroad. But Canadian mining operations also require a consistent and predictable domestic investment regime so they can plan their business strategies and finance their projects.

BEHRE DOLBEAR'S RANKING OF COUNTRIES FOR MINING INVESTMENT IN 2013

Behre Dolbear highlights countries whose policies and business conditions promote investment growth in the mining sector. Ranking is based on seven criteria:

- The country's economic system
- The country's political system
- The degree of social issues affecting mining in the country
- Delays in receiving permits due to bureaucratic and other issues
- The degree of corruption prevalent in the country
- The stability of the country's currency
- The competitiveness of the country's tax policy

The top five countries in 2013 are:

Ranking	2013 Rating	2012 Rating	Difference
1. Australia	56.3	57.0	-0.7
2. Canada	54.3	52.0	2.3
3. Chile	51.0	51.0	0.0
4. Brazil	45.6	45.0	0.6
5. Mexico	43.1	43.0	0.1

While Canada remains among the world's most open countries in terms of trade and investment in mining, recent high-profile acquisitions, and failed attempts, have caused some to question the predictability of Canada's investment regime (more discussion below). Apart from this concern, Canada has no notable barriers except for some foreign ownership restrictions in uranium, which have typically been waived in cases where reciprocal openness is seen.

THE CANADIAN TRADE AGENDA

The Canadian trade regime is expanding aggressively, giving Canadian miners greater flexibility to expand into new and emerging markets, or export their products more freely to an increasing number of destinations. MAC and the mining industry support the following policy developments, and, where appropriate, provide input to Canadian policy makers and negotiators.

Comprehensive Economic and Trade Agreement (CETA) with the European Union. In October 2013, the Canadian government announced an agreement in principle for a free trade agreement with the European Union. Upon implementation, the new agreement will eliminate 98% of Canadian and EU tariffs and phase out most remaining tariffs over time. Of specific interest to the Canadian mining industry is the elimination of the following tariffs:

- Aluminum and aluminum products, from rates averaging 6.3%, with peaks of 10%
- Nickel and nickel products, from rates of up to 3.3%
- Non-ferrous metals, including copper, zinc, lead and tin, from rates averaging 3.1%, with peaks of 9%
- Iron and steel and iron or steel products, from rates of up to 7%

Beyond the reduction of tariffs for metal products, the agreement expands into areas of investment, labour mobility and enhanced regulatory cooperation, as well as lifts ownership restrictions on uranium. CETA is the first bilateral trade agreement in which Canada has included provisions on regulatory cooperation. By fostering cooperation earlier in the regulatory process, differences in approaches between Canada and the European Union may be reduced, resulting in fewer barriers to trade once regulations are in place.

Freer trade with Central and South America. Canadian mining's presence in this region is one reason why Canada is moving towards more liberal trade relations. Since 2006, free trade agreements with Panama (2009), Peru (2009) and Colombia (2011) have come into force, while negotiations remain ongoing with Guatemala, Nicaragua, El Salvador and the Dominican Republic.

Strategic Free Trade Agreements. Canada has recently entered into three bilateral or multilateral free trade negotiations with India, Japan and the Trans-Pacific

Partnership (TPP), which have the potential to significantly augment the Canadian trade landscape. If successfully concluded, these three agreements combined would connect Canada in a trade and investment capacity with approximately two billion people. Given the scope of the TPP, the size of Japan's economy, and the long-term growth projected for India, these partnerships will help diversify Canada's current heavy reliance on US markets.

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. Facilitating safeguards for industry investment abroad while enabling foreign investment into Canada is 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 25 FIPAs in place, has concluded negotiations with 14 additional countries, and remains engaged in ongoing negotiations with 11 other countries.

While the enforcement components of FIPAs are rarely used, 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. The speed with which the government has negotiated these agreements has helped facilitate industry investment in key destinations.

INVESTMENT IN AFRICA

Since 2010, the Canadian government has concluded 13 FIPA negotiations, nine of which are with African countries. A further three of the 10 FIPA negotiations the government is currently pursuing are with African countries. In recent years, many African countries have been seeking to benefit from their country's 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.

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 (for more discussion, see Corporate Social Responsibility below).

FOREIGN DIRECT INVESTMENT

Foreign direct investment in Canada (FDIC), the amount invested in the metallic minerals and metals products sector, jumped in 2007 from $38 to $60.6 billion and has stayed in that range ever since (see Figure 38). In 2012, the sector's share of FDIC edged downward to $58.5 billion, comprising 9% of the Canadian total, but up from the 5–7% seen through the 1990s. This increase reflects foreign acquisitions in the sector in recent years and Canada's openness to foreign direct investment.

The advent of state-owned enterprises (SOEs), however, and the publicly and politically charged nature of certain business transactions are of concern because of the way investments beyond a certain threshold are decided. Under the *Investment Canada Act*, the Minister of Industry can block transactions if the deal does not provide a "net benefit" to the country, based on factors such as output and employment levels.

Announced in December 2012, and enacted in June 2013, amendments to the Act increased the threshold at which a net benefit review of a transaction is triggered. The increase from $299 million to $1 billion in enterprise value will be phased in over a four-year period. The amendments also introduced special provisions for dealing with bids from SOEs and extended the timelines for national security reviews.

The mining industry welcomes the increase in the threshold that triggers a net benefit review, and understands that there can be unique public policy concerns associated

with large-scale investments from SOEs. However, these concerns need to be balanced with measures that enable businesses to operate with consistency and predictability. According to the United Nations Conference on Trade and Development, China was the third-largest source of foreign direct investment in 2012 behind the United States and Japan. This presents a significant opportunity for the Canadian mining industry, given that China accounts for more than half of global demand for a host of minerals and metals.

A key link between foreign direct investment in Canada and the federal government's aggressive trade expansion is that both require an "open for business" attitude, reputation and track record. Given projected trends in the global economy and the growing importance of Asia, maintaining this reputation is a high priority of the federal government. Inconsistencies between the government's stated goals and actions could lead investors to question whether Canada "walks the talk" when it comes to investment.

RECENT CANADIAN TRADE DEVELOPMENTS

THE GLOBAL MARKETS ACTION PLAN

In November 2013, the federal government announced the Global Markets Action Plan, which includes several elements that will help strengthen Canadian mining abroad by:

- Reconfirming the Canadian government's focus on completing trade agreements with priority markets, including free trade agreements and foreign investment promotion and protection agreements
- Enhancing the reach of the Trade Commissioner Service's network to further support Canadian business abroad
- Establishing a new extractive sector strategy that complements Canada's corporate social responsibility (CSR) strategy, *Building the Canadian Advantage: A CSR Strategy for the Canadian International Extractive Sector*
- Creating an advisory board for natural resources to provide strategic insight, advice and real-world perspectives on what Canadian business needs to stay competitive globally

During the fall of 2013, the Honourable Ed Fast, Minister of International Trade, consulted with mining industry stakeholders as part of a broad review of the programs and policies in the Department of Foreign Affairs, Trade and Development that support the extractive sector operating abroad. This review is a part of the Global Markets Action Plan, and was intended to inform the new extractive sector strategy mentioned above. In addition to an online submission, MAC and several member companies participated in the roundtable component of the review. Very broadly, MAC highlighted three key areas for guiding collaborative discussion, encouraging the Department of Foreign Affairs, Trade and Development to:

- Continue enhancing industry competitiveness by enabling Canadian companies to efficiently access new markets, and the existing markets where they both operate and export to
- Address the current lack of economic and corporate social responsibility data available for mining companies operating abroad
- Support companies' efforts to develop and maintain the industry's social licence to operate in international jurisdictions

Some of the targeted recommendations MAC supports include expanding Canada's trade and investment regime to new Asian and African countries; linking the extractive sector trade strategy with the next iteration of the federal CSR strategy; appointing a new CSR counsellor to fill the vacancy resulting from Dr. Marketa Evans' departure; and focusing development efforts on building host country capacity building.

UNITING INTERNATIONAL SOCIAL AND ECONOMIC DEVELOPMENT

The 2013 federal budget merged the functions of the Canadian International Development Agency and the Department of Foreign Affairs and International Trade to create the Department of Foreign Affairs, Trade and Development. This restructuring is likely to result in greater alignment between development assistance and Canada's trade and foreign policy objectives.

From a capacity-building perspective, efforts that focus on helping to raise the capacity in host countries are important, and the industry welcomes the opportunity to have constructive partnerships with development organizations to this end. By better equipping host countries to effectively and independently manage their natural resources, both communities and Canadian mining companies will benefit through more conducive investment climates, stable regulatory and fiscal regimes, and better relationships. The industry views these capacities in host countries as advantageous for Canadian companies, as miners prefer to operate where there is regulatory and fiscal stability, strong values of transparency, robust anti-corruption regimes, and a willingness to collaborate with communities of interest.

CORPORATE SOCIAL RESPONSIBILITY

Over the past decades, developing countries have opened up their economies to mineral exploration and development. In the process, Canadian mining companies have often encountered challenging circumstances, such as weak national and local governments, corruption and poverty.

Healthy dialogue continues over the need for more effort to ensure that mining projects in the developing world respect human rights, the environment, and public health and safety. As one of the world's most successful mining countries, Canada has an important role to play in this area.

The Canadian mining industry has actively sought new skills and developed new partnerships in order to improve its performance in the face of these challenges. The result is a very different industry now than existed 20 years ago. By acknowledging its challenges and devoting resources to learning how to address them, the industry is changing the way it does business.

In some instances, local conflicts have turned violent. When conflicts arise, too often they emerge as a consequence of weak in-country governance. While some may argue that the federal government should regulate Canadian companies operating in other countries, this approach is fraught with difficulties, and reflects a new form of colonialism that many Canadians would find offensive if such approaches were imposed within Canada's borders.

Instead, the Canadian government should continue to work with other governments to promote stronger social responsibility in mining developments. Initiatives such as the Intergovernmental Forum on Mining, Minerals, Metals and Sustainable Development, the government's CSR strategy for the Canadian international extractive sector, the Canadian International Institute for Extractive Industries and Development and the government's recent decision to adopt mandatory disclosure for the reporting of payments to governments by extractive companies are all examples of how the Canadian government is contributing to constructive solutions.

For its part, MAC, in partnership with governments and other stakeholders, has made important contributions to global mining practices. Canada has led global research on acid rock drainage research, bringing solutions to one of the industry's most significant environmental challenges. We are recognized leaders in tailings management, pioneering the development of best practices in this area.

It is significant that there are international developments for MAC's Towards Sustainable Mining (TSM) initiative (see Section 5 of this report for more information). Beyond being a condition of MAC membership and mandatory for domestic mining sites, several MAC members have decided to proactively adopt TSM for their international operations. Specifically, IAMGOLD Corporation, Inmet Mining Corporation (now First Quantum Minerals), and Agnico Eagle Mines are publicly reporting on TSM indicators and using them to drive performance improvement in areas such as environmental stewardship and community engagement on the international stage. Furthermore, individual countries are beginning to express interest in TSM as a means of enhancing the responsible mining practice of their respective national mining industries.

MAC members themselves subscribe to as many as 17 different international standards, addressing issues such as human rights, climate change, labour, environment, anti-corruption and community development (see Figure 31 in Section 5 of this report). These include the United Nations Global Compact, Voluntary Principles on Security and Human Rights, the International Finance Corporation's Performance Standards on Environmental and Social Sustainability, the Global Reporting Initiative and the Extractive Industries Transparency Initiative. Each of these standards requires public reporting and independent

assurance to verify that what the company reports is accurate.

In 2012, MAC published three studies to advance the dialogue around international CSR:

- An assessment of the status of recommendations from the National Roundtables on Corporate Social Responsibility and the Canadian Extractive Industry in Developing Countries
- A comparison of legislation that holds mining companies accountable between Canada and four developing countries: Papua New Guinea, Peru, Tanzania and Guatemala
- A detailed analysis of all transparency initiatives that could be applied directly or indirectly to Canadian mining companies

MAC also participated in the Resource Revenue Transparency Working Group, along with the Prospectors & Developers Association of Canada, Publish What You Pay–Canada and the Revenue Watch Institute to develop a framework for the disclosure of payments to governments derived from extractive activities. In June 2013, the working group released for public comment draft recommendations on implementing mandatory reporting standards for Canadian mining companies. The final framework was approved by the participating organizations in the fall of 2013. This work led to the Canadian government's pre-G8 announcement that Canada will establish new transparency standards for this type of disclosure. These developments are significant given that approximately 60% of the world's mining companies are registered in Canada, and more than 800 Canadian exploration companies are active in over 100 countries.

INTERNATIONAL MARKET AND POLICY DEVELOPMENTS

Mineral products are strategically important to countries with large or growing infrastructure and manufacturing sectors. Many countries and governments earn needed revenues from the industry. Recent years have brought some interesting developments in the world market for mining and its products.

STRONG GLOBAL DEMAND, WITH CYCLICAL REALITIES

The cyclical nature of the mining industry is never far from the surface, even during strong economic times. Companies try to even out the cycles by seeking quality properties, managing their risks and keeping a balanced mix of opportunities to provide some flexibility in the face of market fluctuations.

Ups and downs in market demand, despite being perennial in the world of mining, present challenges for mining companies trying to decide where, when, how much and how quickly to invest in exploration, project development or mine expansions.

Cyclical realities aside, demand for metals and minerals is expected to grow in the medium and long term. China and India are the most populous nations in the world, and the second and ninth largest economies globally by nominal GDP. They are also the second- and third-largest economies, respectively, based on purchasing power parity. Over the past decade, these two economies grew on an annual average of 10.3% and 7.6%, respectively. Even though it has moderated in recent years, growth remains strong in both countries. They continue to have an appetite for minerals and metals that will only increase, especially because their per capita usage of many metal-intensive products is still relatively low.

BY 2025, ANNUAL CONSUMPTION IN EMERGING MARKETS WILL REACH $30 TRILLION—THE BIGGEST GROWTH OPPORTUNITY IN THE HISTORY OF CAPITALISM.

— MCKINSEY GLOBAL INSTITUTE

Automobile consumption, for example, serves as a measure of demand for mining products because of its metal intensity. According to the most recently available World Bank data (2010), there are only 58 motor vehicles (including cars, buses and freight vehicles) for every 1,000 people in China, and only 18 for every 1,000 people in India. By comparison, the United States has 797 motor vehicles for every 1,000 people, with comparable numbers for other western industrialized countries. In 2012, the populations of China and India were 1.35 billion and 1.24 billion, respectively. Using the above indicator as an approximation, both China and India combined possess 196.8 million motor vehicles, compared to the 250 million vehicles in the United States. Should China and India approach US vehicle density, an additional 1.87 billion vehicles would be required between the two countries to make up the difference.

Ducker Worldwide observes that the average light vehicle in 2010 weighed 3,863 pounds, and was composed of 65.5%

(2,530 pounds) ferrous metal, 8.5% (328 pounds) aluminum, 4% (154 pounds) other metals and 22% (849 pounds) non-metallic materials. By this benchmark, if China and India reached one-third of the vehicle density of the United States, their automobile manufacturing sectors would need 1.57 trillion pounds of ferrous metal, 204 billion pounds of aluminum, and 95 billion pounds of other metals such as lead, zinc, tin and nickel. According to a recent McKinsey report, in 2010, China became the largest single-country automotive market in the world, and is poised to surpass both North American and European markets by 2020, with annual sales forecast to reach 22 million units.

A CHALLENGING CAPITAL ENVIRONMENT

Capital allocation and access to capital were the top business risks facing mining and metals companies in 2013, according to Ernst & Young. Threatening the long-term growth prospects of major companies and the short-term survival of junior firms, this capital dilemma affects both ends of the mining spectrum.

Beginning in late 2012, mining companies witnessed volatile markets that continued through most of 2013. Softer prices for some commodities and rampant cost inflation, in tandem with massive capital expenditures on growth projects, have challenged many miners' balance sheets and anticipated profits. The short-term investment horizons of many industry investors have put pressure on companies to aggressively manage cash flows and minimize capital expenditures on longer-term project development.

Meanwhile, juniors are crunched for cash. Since the economic downturn, investors have generally sought low-risk, short-term yields, rejecting the higher risk nature of exploration investment. These capital challenges have resulted in juniors being restricted from accessing capital, whereas majors have a significantly reduced appetite to deploy it.

GOVERNMENTS SEEKING MORE REVENUES

With mineral prices generally up during the past decade, and a quick rebound from the economic downturn, the global mining industry became a target for debt-laden governments seeking fast cash. So pervasive is this issue that resource nationalism topped Ernst & Young's risk radar for mining and metals companies around the world for two years in a row—2011 and 2012—before falling to third spot in 2013.

The past five years have witnessed incidents of the four main forms of resource nationalism: mandated beneficiation, government ownership, restriction of exports and increased taxes and royalties. Instances of resource nationalism have increased globally, with a growing number of countries or jurisdictions either implementing or considering implementing policy reforms designed to maximize the return on natural resource development.

The Mongolian government, for example, proposed legislation in December 2012 that would give the state a free stake in a host of mineral projects and the right to specify production targets regardless of market demand. Lawmakers have also sought unsuccessfully to renegotiate the development accord for Rio Tinto Group's Oyu Tolgoi copper and gold mine twice in recent years. Once operational, the mine will account for approximately 30% of Mongolia's gross domestic product. In Argentina, pending legislation caused Pan American Silver to halt investment in its Navidad project, the richest undeveloped silver deposit in the world. In July 2013, the company issued a warning to its shareholders that if the reform of mining law in Argentina's Chubut Province is approved, the Navidad project will become uneconomic by any reasonable estimate of long-term silver prices. Also in 2013, the government of the Dominican Republic seized gold shipments from the Pueblo Viejo mine jointly owned by Barrick and Goldcorp, forcing the companies to renegotiate the royalty rate.

POLICY ENVIRONMENTS FOR MINING INVESTMENT

An annual Fraser Institute survey, released in February 2013, asked 742 mineral exploration and development companies which regions (of 96 listed) have the best policy environments for mining investment. Here are some of the results:

- Canadian jurisdictions placed among the world leaders with political stability and security being important variables.
- The top 10 jurisdictions were Finland, Sweden, Alberta, New Brunswick, Wyoming, Ireland, Nevada, Yukon, Utah and Norway.
- Quebec (11), Nova Scotia (12), Saskatchewan (13), Ontario (16), and Newfoundland and Labrador (18) were in the top 20 spots.
- The bottom 10 scorers were Indonesia, Vietnam, Venezuela, Democratic Republic of Congo, Kyrgyzstan, Zimbabwe, Bolivia, Guatemala, Philippines and Greece.

The desire to capture more revenues from mining is not limited to the governments of developing nations. In 2012, the Australian government introduced a tax levied on 30% of the "super profits" from the mining of iron ore and coal in the country. The tax was to be imposed on approximately 320 companies, and paid on profits exceeding $75 million. Analysts forecast that the tax would collect $3 billion in government revenue for the fiscal year. That figure was reduced to $2 billion in October 2012, and, on May 14, 2013, revenue targets were downgraded to $200 million—significantly less than the original investment. Recently elected Prime Minister Tony Abbott campaigned strongly against the tax, claiming that it has undermined confidence in Australia as an investment destination and as a secure supplier of resources.

In May 2013, the Quebec government tabled a new tax and royalty regime (Bill 43) that would require any mining operation to pay the higher of two fees: (1) a royalty on production (with a 1% tax on the first $80 million on the value of the mineral output, increasing to 4% after that point); or (2) a graduated tax based on a firm's profit margin (starting at 16% and rising to a top rate of 28%). Bill 43 would have also obliged companies to do more processing of minerals in the province, giving municipalities the right to veto mining projects and the natural resources minister the power to terminate mining leases. While Bill 43 was voted down by opposition parties on October 30, 2013, another version of the Bill has since been tabled and adopted.

INTERNATIONAL MARINE SHIPPING

The International Maritime Organization (IMO) is the United Nations' special agency responsible for the safety of life at sea and the protection of the marine environment. The International Convention for the Prevention of Pollution from Ships (MARPOL) is the main international convention covering prevention of pollution of the marine environment by ships from operational or accidental causes. Annex V of MARPOL, "Prevention of Pollution by Garbage from Ships," and associated guidelines, specify waste management requirements and disposal methods for cargoes. In July 2011, the IMO adopted extensive amendments to Annex V, which came into force internationally on January 1, 2013. The revised Annex V prohibits the discharge of all garbage into the sea, except as provided otherwise, under specific circumstances. The new rules will affect the disposal of some lead, nickel, zinc and copper concentrates.

The current practice for cleaning a bulk cargo ship once unloaded is to spray it down, collect the wash water (and any cargo residues contained in it), travel 12 nautical miles off the coast line and then discharge the collected wash water. This practice will be prohibited if the cargo residues are excluded by the new rules. The challenge is that many ports around the world do not have adequate reception facilities to deal with the wash water, and bulk cargo ships are not equipped to store the volumes of water that are generated through the washing process. As a result, trade disruption and increased congestion at ports may occur. Given the global nature of the mining industry, and industry's reliance on the global supply chain, significant uncertainty exists among all stakeholders about the implications of this issue.

The position of the Canadian mining industry is that these changes will improve the environment, but should be implemented in a manner that enables all stakeholders to adapt to the new rules without undue interruptions to the global trade of mineral commodities.

GLOBAL TRADE AND INVESTMENT POLICY

The Doha Round or Doha Development Agenda, which began in November 2001, is the current trade-negotiation round of the World Trade Organization. Its objective is to lower trade barriers around the world, which will help facilitate the increase of global trade. Since 2009, revived talks have pushed for a simplified deal. In November 2013, Director-General Roberto Azevêdo explained that while there had been progress in the round-the-clock negotiations to solidify an agreement for upcoming meetings in Bali, the risk of failure is still present. He said that "it is all or nothing now—we must tie the package up once and for all in the next few days." Given the status of negotiations, now approaching their 13th year, the time frame for overcoming differences to achieve measureable progress remains unclear.

CARBON TARIFFS

One trade policy measure under discussion is the carbon tariff, where a country applies the tariff against imports from other countries with allegedly weaker greenhouse gas emission requirements. Such measures would impose import tariffs or bans on fuels with higher carbon footprints (oil from oil sands being cited most frequently).

One glaring example is the European Union's attempt, as part of its ambitious efforts to cut carbon emissions, to classify crude produced from oil sands as much dirtier than other fuels.

The European Union's Fuel Quality Directive (FQD) aims to reduce greenhouse gas (GHG) emissions of fuels by 6% by 2020, compared to 2010 levels. The FQD treats unconventional crudes as higher GHG intensity "feedstocks,"

with separate GHG values for oil sands crude oil and select other sources. All other crude oils, including heavy crude, are bundled together as "conventional" crude oil. Oil sands "natural bitumen feedstock" is assigned a GHG value 22% higher than conventional crude oils.

On October 9, 2013, ICF International released its *Independent Assessment of the European Commission's Fuel Quality Directive's "Conventional" Default Value*. The report challenges aspects of the methodology that underlie the FQD's categorization of fuels relative to GHG intensity. Specifically, the report states that "some light and heavy conventional crudes have GHG intensities that are similar or even higher than those of crudes derived from natural bitumen," or oil sands oil. The report's conclusions "do not support the current FQD categorization of feedstock by conventional, natural bitumen and oil shale crude oils." In other words, the implications of FQD's inaccurate characterization of oil sands crude relative to other global petroleum and fuel products may prove to be severe.

To use oil sands crude under the FQD, refineries in the European Union will have to reduce their fuel's GHG intensity much more than if they used oil from other sources. Treating oil sands crude as a unique "feedstock" when other global fuels have comparable or greater GHG intensities discriminates against Canadian oil sands and unfairly reduces the competitiveness of its oil and derivative products in the EU market.

SOVEREIGN WEALTH FUNDS

The Sovereign Wealth Fund Institute ranks SWFs in its regular analysis. The largest in terms of assets are:

- Norway Pension Fund: $803.9 billion
- Saudi Arabia's SAMA: $679.5 billion
- Abu Dhabi Investment Authority: $627 billion
- China Investment Corporation: $575.2 billion
- China's SAFE: $567.9 billion

While the European Commission's objective of reducing GHG emissions for transportation fuels is admirable, the current policy structure shifts the burden of reducing GHG emissions away from the European Union to feign the appearance of progress. In February 2012, the vote by government representatives from the 27 nations of the European Union resulted in a temporary stalemate over the controversial policy. The motion, having passed from the bureaucratic to the ministerial levels of governments, has been delayed, but a vote is anticipated in the near future.

One of the complicated issues that the FQD does not discuss is the geopolitical dynamic of energy production. Out of the top 10 countries ranked by oil reserves, Canada, which ranks third, is the only Western liberal democracy. Some have argued that a more holistic set of ethical considerations that encompass variables beyond climate change should be taken into account when deciding the merit of a particular fuel product, or the region from which it is imported.

SOVEREIGN WEALTH FUNDS

Arguably the biggest investment policy trend in recent years is the massive spread of sovereign wealth funds (SWFs), investment funds that are owned by governments. Fuelled by record oil prices and earnings, SWFs have become critical sources of investment funding.

According to the Sovereign Wealth Fund Institute, more than 60 countries now have SWFs. As of November 2013, those assets were valued at more than $6 trillion—an $800 billion increase year over year from 2012. Some SWFs, such as the Alberta Heritage Savings Trust Fund, which is currently valued at $16.4 billion, are at the sub-national level.

There is considerable policy debate over SWFs. Some analysts are concerned about the funds' transparency and political orientation, while others support their ability to provide the global economy with liquidity and stability. The Santiago Principles were developed in 2008 to guide SWF practice, although they have been called weak and ineffective.

CHINA'S TRADE AND INVESTMENT POLICY

Many recent trade and investment policy activities in China are affecting Canada's mining industry.

TRADE MEASURES

In recent years, China has implemented permitting and export duty systems as an industrial policy tool to encourage the domestic processing of these materials. The United States, the European Union and Mexico challenged the legitimacy of China's export restrictions in nine mineral categories. In July 2011, the World Trade Organization (WTO) found China's restrictions inconsistent with its commitments as a WTO member. China appealed in January 2012, but the

ruling that China bring its export duty and export quota measures into conformity with its WTO obligations was upheld. As of January 1, 2013, China had implemented the WTO's recommendations and had removed the protectionist export duties and export quotas for those specific minerals and metals.

More recently, in October 2013, in a case brought forward by Japan, the United States and the European Union, the WTO judged that China's export restrictions on rare earth minerals are also incompatible with its rules. Over the past two decades, Chinese organizations have cornered 97% of the global rare earth market. In July 2010, China reduced its export quota for the minerals by 72%, causing a supply shortage and sharp price increases for the elements used in the manufacture of disk drives, wind turbines and battery technologies for diverse applications. This marks the second time that country's export quotas and duties have been successfully challenged. While China is likely to appeal, the WTO's ruling on the October 2013 case may serve as a precedent against these protectionist measures.

FOREIGN INVESTMENT

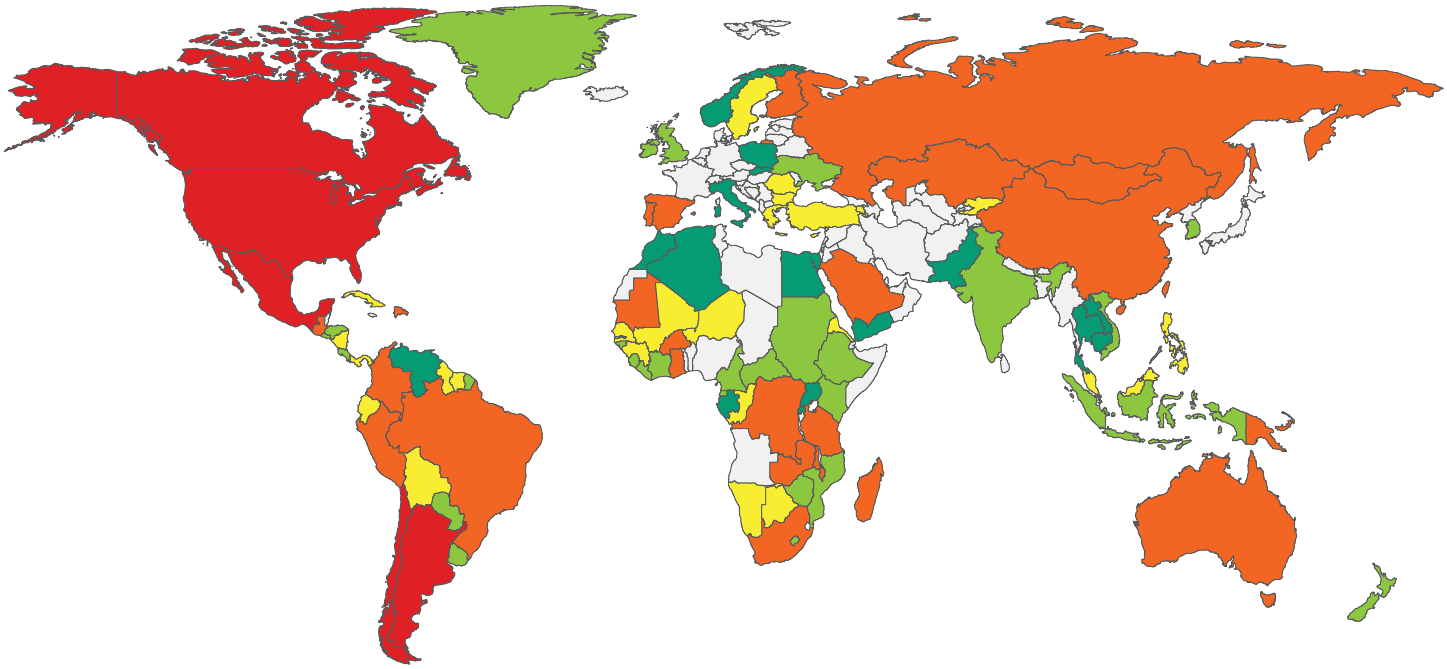
Investment abroad was once discouraged by Chinese authorities, but this is no longer the case. According to the Wall Street Journal, China held US$3.66 trillion in foreign exchange reserves as of October 2013. By consistently selling more goods than it buys and accepting more inbound investment than it sends abroad, China's foreign exchange reserves have steadily increased.

In an effort to diversify and seek higher returns on this cash accumulation, China created the China Investment Corporation (CIC) in 2007. As part of its mandate to invest directly in materials producers to offset China's costs, the CIC has invested in Canadian mining companies, including Kinross Gold, PotashCorp of Saskatchewan and Teck Resources.

Heritage Foundation has detailed the available information of more than 900 attempted Chinese transactions—both failed and successful—valued at more than $100 million in all industries, including energy, mining, transportation and finance. This analysis indicates that North America jumped to the forefront of Chinese business activity in 2012. Canada has been host to $37.6 billion of Chinese investment since 2009, with the lion's share targeting the energy and metals sectors. In 2012, Canada accounted for over $20 billion of China's investment total for the year, the largest single share of which was derived from China National Offshore Oil Corporation's acquisition of Nexen Inc.

FIGURE 37

THE GEOGRAPHICAL DISTRIBUTION OF CANADA'S MINING ASSETS, 2011



MINING ASSET VALUE

- $0 M
- $0.1 — 10 M
- $10.1 — 100 M
- $100.1 — 1,000 M
- $1000.1 — 10,000 M
- > $10,000 M

CANADA
(1162 Companies)

2010	2011
$60.8 B	$69.1 B

UNITED STATES
(298 Companies)

2010	2011
$15.5 B	$17.3 B

CENTRAL AMERICA AND THE CARIBBEAN
(30 Companies)

2010	2011
$7.1 B	$7.9 B

EUROPE
(67 Companies)

2010	2011
$6.6 B	$7.4 B

ASIA
(78 Companies)

2010	2011
$10.8 B	$15.1 B

MEXICO
(164 Companies)

2010	2011
$17.2 B	$19.5 B

SOUTH AMERICA
(231 Companies)

2010	2011
$37.4 B	$42.1 B

AFRICA
(155 Companies)

2010	2011
$26.9 B	$31.6 B

OCEANIA
(44 Companies)

2010	2011
$4.7 B	$5.7 B

Sources: Minerals and Metals Sector, Natural Resources Canada.
Notes: M Millions; B Billions. All amounts are in Canadian dollars. Company counts are for the 2011 reference year and do not add to totals since companies can be active in multiple jurisdictions.

FIGURE 38
METALLIC MINERALS AND METAL PRODUCTS—DIRECT INVESTMENT STOCKS, 1990–2012[P]

Direct Investment ($ millions)	1990	1995	2000	2005	2006	2007	2008	2009	2010	2011	2012[P]
All industries											
Canadian direct investment abroad	98,402	161,237	356,506	452,195	518,839	515,294	641,920	629,717	639,911	684,496	711,621
Foreign direct investment in Canada	130,932	168,167	319,116	397,828	437,171	512,266	550,539	572,842	585,107	607,497	633,915
Metallic minerals and metal products											
Canadian direct investment abroad	13,524	24,466	42,436	56,384	58,877	60,831	66,692	73,907	60,420	58,616	62,747
Foreign direct investment in Canada	9,829	9,553	17,425	21,174	38,299	60,672	65,114	59,400	57,681	60,930	58,546
Percentage of total											
Canadian direct investment abroad	14%	15%	12%	12%	11%	12%	10%	12%	9%	9%	9%
Foreign direct investment in Canada	8%	6%	5%	5%	9%	12%	12%	10%	10%	10%	9%

Source: Statistics Canada, CANSIM Table 376-0052.
Note: The table denotes the amount of outward and inward foreign direct investment in the metallic minerals and metal products sector and the portion this represents of the Canadian total.
[P] Preliminary

FIGURE 39
BALANCE OF CANADA'S MINERAL TRADE, 2012

Stage	Domestic Exports ($)	Total Exports ($)	Total Imports ($)	Balance of Trade ($)
Stage I	29,158,553,787	29,211,622,296	8,307,819,370	20,903,802,926
Stage II	32,299,510,138	32,602,831,684	14,257,602,295	18,345,229,389
Stage III	16,561,468,527	17,602,959,364	22,110,083,693	-4,507,124,329
Stage IV	11,529,491,790	13,128,987,952	31,183,702,690	-18,054,714,738
Total	**89,549,024,242**	**92,546,401,296**	**75,859,208,048**	**16,687,193,248**

Sources: Natural Resouces Canada; Statistics Canada.

FIGURE 40
VALUE OF CANADA'S MINING AND MINERAL PROCESSING INDUSTY TRADE, 2002-2012

Year	Imports ($ billions)	Exports ($ billions)	Balance of Trade ($ billions)
2002	50.5	48.2	2.4
2003	48.0	45.2	2.8
2004	56.7	52.1	4.6
2005	64.6	56.6	8.0
2006	75.5	61.8	13.7
2007	85.1	62.6	22.5
2008	95.1	69.3	25.9
2009	66.4	55.0	11.4
2010	84.4	66.5	17.9
2011	101.9	77.2	24.7
2012	92.5	75.9	16.7

Sources: Natural Resouces Canada; Statistics Canada.

FIGURE 41
MINERAL AND MINERAL PRODUCT IMPORTS AND EXPORTS, 2006-2012

($ millions)	2006	2007	2008	2009	2010	2011	2012	2012 Percentage of Total
Mineral and Metal Imports								
Stage I	7,125	7,778	9,147	6,984	7,713	8,964	8,308	1.8
Stage II	7,763	7,674	9,362	7,742	12,378	15,716	14,258	3.1
Stage III	19,924	19,555	22,002	15,276	18,746	21,994	22,110	4.8
Stage IV	27,037	27,598	28,784	25,020	27,733	30,554	31,184	6.7
Stage I - IV	61,849	62,605	69,295	55,022	66,570	77,228	75,860	16.4
Metals	51,992	52,509	57,379	45,412	55,971	65,694	63,828	13.8
Non-metals	8,332	8,763	9,993	8,397	9,237	10,337	10,818	2.3
Coal & Coke	1,526	1,332	1,924	1,212	1,361	1,198	1,213	0.3
Total Imports of Goods	**397,044**	**407,301**	**433,999**	**365,359**	**403,750**	**446,442**	**462,059**	
Mineral and Metal Exports								
Stage I	16,935	18,171	28,799	19,911	24,626	32,518	29,212	6.4
Stage II	25,315	32,570	31,128	22,052	32,445	38,301	32,603	7.2
Stage III	18,427	19,746	20,419	13,157	15,609	18,414	17,603	3.9
Stage IV	14,851	14,616	14,799	11,302	11,852	12,655	13,129	2.9
Stage I - IV	75,527	85,103	95,146	66,422	84,531	101,888	92,547	20.4
Metals	60,449	69,407	69,395	49,123	63,984	76,497	69,617	15.3
Non-metals	11,642	12,521	19,290	12,095	14,298	16,992	16,161	3.6
Coal & Coke	3,437	3,174	6,461	5,205	6,250	8,398	6,769	1.5
Total Exports of Goods	**440,365**	**450,321**	**483,488**	**359,754**	**399,300**	**447,502**	**454,377**	

Sources: Natural Resouces Canada; Statistics Canada.

ANNEX 1
PRODUCING MINES IN CANADA, 2012

COMPANY	MINE SITE	ACTIVITY TYPE	LOCATION	COMMODITY
Newfoundland & Labrador				
Beaver Brook Antimony Mine Inc.	Beaver Brook	(U., C.)	Glenwood	Sb
Rambler Metals and Mining PLC	Nugget Pond	(C.)	Snook's Arm	Au
Rambler Metals and Mining PLC	Ming	(U)	Baie Verte	Cu, Au
Anaconda Mining Inc.	Pine Cove	(P., C.)	Baie Verte	Au
Teck Resources Limited	Duck Pond	(U., C.)	Millertown	Cu, Zn
Vale Newfoundland and Labrador Limited	Voisey's Bay	(P., C.)	Voisey's Bay	Ni, Cu, Co
Labrador Iron Mines Holdings Limited	James	(P., C.)	Schefferville	Fe
Wabush Mines (Cliffs Natural Resources Inc.)	Scully	(P., C.)	Wabush	Fe
Iron Ore Company of Canada (IOC)	Carol Lake	(P., C.)	Labrador City	Fe
Tata Steel Minerals Canada	DSO (Timmins)	(P.)	Schefferville	Fe
Atlantic Minerals Limited	Lower Cove	(P.)	Lower Cove	Limestone, dolomite
Iron Ore Company of Canada (IOC)	Plateau Dolomite	(P.)	Labrador City	Dolomite
Nova Scotia				
Nova Scotia Power Inc.	Glen Morrison	(P.)	Cape Breton	Limestone
Scotia Limestone Limited	New Campbellton	(P.)	New Campbellton	Limestone
CGC Inc.	Little Narrows	(P.)	Little Narrows	Gypsum
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
Sifto Canada Inc.	Nappan	(Solution mining)	Nappan	Salt
Pioneer Coal Ltd.	Point Aconi	(P.)	Point Aconi	Coal
Pioneer Coal Ltd.	Stellarton	(P.)	Stellarton	Coal
New Brunswick				
Xstrata Zinc Canada *	Brunswick	(U., C.)	Bathurst	Pb, Zn, Cu, Ag, Au
Trevali Mining Corporation	Halfmile Lake	(P.)	Bathurst	Cu, Pb, Zn, Ag
Graymont Inc.	Havelock	(P., Plant)	Havelock	Lime, limestone
Potash Corporation of Saskatchewan Inc.	New Brunswick	(U., Plant)	Sussex	Potash, salt
Brookville Manufacturing Company	Brookville	(P., Plant)	Saint John	Dolomitic lime
Elmtree Resources Ltd.	Sormany	(P., Plant)	Sormany	Limestone
Quebec				
Cliffs Natural Resources Inc.	Bloom Lake	(P., C.)	Labrador City	Fe
ArcelorMittal Mines Canada Inc.	Mont-Wright	(P., C.)	Fermont	Fe
ArcelorMittal Mines Canada Inc.	Fire Lake	(P.)	Fermont	Fe
IAMGOLD Corporation	Niobec	(U., C.)	Saint-Honoré-de-Chicoutimi	Nb
Xstrata Nickel Canada *	Raglan	(P., U., C.)	Katinniq	Ni, Cu, Co, PGM
Metanor Resources Inc.	Bachelor Lake	(P., C.)	Desmaraisville	Au, Ag
Nystar NV	Langlois	(U., C.)	Lebel-sur-Quévillon	Zn, Cu, Au, Ag

COMPANY	MINE SITE	ACTIVITY TYPE	LOCATION	COMMODITY
Richmont Mines Inc.	Beaufor	(U.)	Val-d'Or	Au, Ag
QMX Gold Corporation	Lac Herbin	(U., C.)	Val-d'Or	Au, Ag
White Tiger Gold Ltd.	Lamaque	(U., C.)	Val-d'Or	Au, Ag
Xstrata Zinc Canada *	Perseverance	(U., C.)	Matagami	Zn, Cu, Au, Ag
Wesdome Gold Mines Ltd.	Kiena	(U., C.)	Val-d'Or	Au, Ag
North American Palladium Ltd.	Sleeping Giant	(C.)	North of Amos	Au, Ag
Richmont Mines Inc.	Camflo	(C.)	Malartic	Au, Ag
Osisko Mining Corporation	Canadian Malartic	(P., C.)	Malartic	Au, Ag
Agnico Eagle Mines Limited	Lapa	(U.)	Val-d'Or	Au
Agnico Eagle Mines Limited	LaRonde	(U., C.)	Cadillac	Au, Zn, Cu, Pb, Ag
IAMGOLD Corporation	Mouska	(U.)	Cadillac	Au, Cu, Ag
Aurizon Mines Ltd.	Casa Berardi	(U., C.)	North of La Sarre, Casa Berardi Twp.	Au, Ag
Richmont Mines Inc.	Francoeur	(U.)	Rouyn-Noranda	Au
Rocmec Mining Corporation	Rocmec 1	(C.)	Rouyn-Noranda	Au
The Canadian Salt Company Limited	Seleine	(U.)	Îles-de-la-Madeleine	Salt
QIT-Fer et Titane inc.	Tio	(P.)	Hâvre-Saint-Pierre	Ilmenite
Le Groupe Berger Ltée	Saint-Modeste	(P.)	Saint-Modeste	Vermiculite, perlite
Elkem Metal Canada Inc.	Sitec Inc.	(P.)	Petit lac Malbaie	Silica, silicon carbide
9184-6808 Québec inc. (LAB Chrysotile)	Black Lake	(P., Plant)	Thetford Mines	Chrysotile
Graymont Inc.	Marbleton	(P., Plant)	Marbleton	Limestone, lime
Junex inc.	Bécancour	(Solution Mining)	Bécancour	Salt
Graymont Inc.	Bedford	(P., Plant)	Bedford	Limestone, lime
OMYA (Canada) Inc.	Saint-Armand	(P., Plant)	Saint-Armand	Calcium carbonate
Holcim (Canada) Inc.	Joliette	(P.)	Joliette	Limestone
Graymont Inc.	Joliette	(P., Plant)	Joliette	Lime, limestone
Silco Sands Inc.	Sainte-Clotilde	(P.)	Sainte-Clotilde-de-Châteauguay	Silica, ferrosilicon
Suzorite Mica Products Inc.	Letondal	(P.)	Parent, Suzor Twp.	Mica
Timcal Canada Inc.	Saint-Aimé-du-Lac-des-Îles	(P., Plant)	Saint-Aimé-du-Lac-des-Îles	Graphite
Ontario				
Armistice Resources Corp.	McGarry	(U., C.)	Kirkland Lake area	Au
St. Andrew Goldfields Ltd.	Holt	(U., C.)	Timmins	Au, Ag
St. Andrew Goldfields Ltd.	Holloway	(U.)	Timmins	Au, Ag
Kirkland Lake Gold Inc.	Macassa	(U., C.)	Kirkland Lake area	Au, Ag
St. Andrew Goldfields Ltd.	Hislop	(P., U.)	Matheson	Au
Brigus Gold Corp.	Black Fox	(P., U., C.)	Matheson	Au
Aurico Gold Inc.	Young-Davidson	(P., C.)	Kirkland Lake area	Au
Xstrata Nickel Canada *	Nickel Rim South	(U.)	Sudbury	Ni, Cu, Co, PGM, Au
Canadian Arrow Mines Ltd.	Kelex	(U.)	Timmins	Ni, Cu, Co, PGM, Au
Vale	Garson	(U.)	Sudbury	Ni, Cu, Co, PGM, Au, Ag, Se, Te
KGHM Polska Miedz S.A.	Podolsky	(U.)	Norman Twp.	Cu, Ni, PM
Vale	Stobie	(U.)	Sudbury	Ni, Cu, Co, PGM, Au, Ag, Se, Te
Vale	Clarabelle	(C.)	Sudbury	Ni, Cu, Co, PGM, Au, Ag, Se, Te
Liberty Mines Inc.	McWatters	(P., U.)	Southeast of Timmins	Ni
Vale	Copper Cliff North	(U.)	Sudbury	Ni, Cu, Co, PGM, Au, Ag, Se, Te
Goldcorp Inc.	Hoyle Pond	(U.)	South of Porcupine	Au, Ag

COMPANY	MINE SITE	ACTIVITY TYPE	LOCATION	COMMODITY
Liberty Mines Inc.	Redstone	(U., C.)	Southeast of Timmins	Ni
Lake Shore Gold Corp.	Bell Creek	(U. C.)	Timmins	Au
Vale	Creighton	(U.)	Sudbury	Ni, Cu, Co, PGM, Au, Ag, Se, Te
Goldcorp Inc.	Dome	(U., C.)	Timmins	Au
First Nickel Inc.	Lockerby	(U.)	Sudbury	Ni, Cu, Co, PGM, Au, Ag, Se, Te
Vale	Coleman/McCreedy East	(U.)	Sudbury	Ni, Cu, Co, PGM, Au, Ag, Se, Te
Xstrata Nickel Canada *	Fraser	(U.)	Sudbury	Ni, Cu, Co, PGM
Xstrata Nickel Canada *	Strathcona	(C.)	Sudbury	Ni, Cu, Co, PGM, Au, Ag, Se, Te
Xstrata Zinc Canada *	Kidd Creek	(U., C.)	Timmins	Cu, Zn, Ag, Se, Te, In, Cd
KGHM Polska Miedz S.A.	Levack/Morrison	(U.)	Sudbury	Cu, Ni, PM
KGHM Polska Miedz S.A.	McCreedy West	(U.)	Sudbury	Cu, PGM, Au, Ag
Lake Shore Gold Corp.	Timmins	(U.)	Timmins	Au
Prophecy Platinum Corp.	Shakespeare	(P.)	Sudbury	Ni, Cu, PGM, Au, Co
Richmont Mines Inc.	Island Gold	(U., C.)	Dubreuilville	Au
Wesdome Gold Mines Ltd.	Eagle River	(U., C.)	Wawa	Au
Barrick Gold Corporation	David Bell	(U., C.)	Marathon	Au
Barrick Gold Corporation	Williams	(U., P., 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
OMYA (Canada) Inc.	Tatlock	(P.)	Tatlock	Calcium carbonate
Lafarge Canada Inc.	Bath	(P.)	Bath	Limestone
ESSROC Canada Inc.	Picton	(P.)	Picton	Limestone (cement)
Holcim (Canada) Inc.	Ogden Point	(P.)	Ogden Point	Limestone (cement)
Unimin Canada Ltd.	Blue Mountain	(P., Plant)	Blue Mountain	Nepheline syenite
Unimin Canada Ltd.	Nephton	(P., Plant)	Toronto	Nepheline syenite
St. Marys CBM (Canada) Inc.	Bowmanville	(P.)	Bowmanville	Limestone
CGC Inc.	Hagersville	(U.)	Hagersville	Gypsum
E.C. King Contracting Ltd.	Owen Sound	(P.)	Owen Sound	Dolomitic lime
Lafarge Canada Inc.	Woodstock	(P.)	Woodstock	Limestone
Extender Minerals of Canada Limited	North Williams	(U.)	North Williams	Barite
St Marys CBM (Canada) Inc.	St Marys	(P.)	St. Marys	Limestone (cement)
Sifto Canada Inc.	Goderich	(U.)	Goderich	Salt
Rio Tinto Minerals Inc.	Penhorwood	(P.)	Penhorwood	Talc
Agrium Inc.	Kapuskasing	(P.)	Kapuskasing	Phosphate
The Canadian Salt Company Limited	Windsor	(Solution Mining)	Windsor	Salt
The Canadian Salt Company Limited	Ojibway	(U.)	Windsor	Salt
De Beers Canada Inc.	Victor	(P., Plant)	James Bay Lowlands	Diamonds
Manitoba				
Tantalum Mining Corporation of Canada Limited	Tanco	(U., C.)	Lac-du-Bonnet	Cs
San Gold Corporation	Hinge	(U., C.)	Rice Lake	Au
San Gold Corporation	Rice Lake	(U., C.)	Bissett	Au
Vale	Thompson	(U., P., C.)	Thompson	Ni, Cu, Co, PGM
Vale	Birchtree	(U.)	Thompson	Ni, Cu, Co, PGM
CaNickel Mining Limited	Bucko	(U., C.)	Wabowden	Ni, Cu, Co, PGM

COMPANY	MINE SITE	ACTIVITY TYPE	LOCATION	COMMODITY
HudBay Minerals Inc.	Snow Lake	(C.)	Snow Lake	Cu, Zn
HudBay Minerals Inc.	Lalor Lake	(U.)	Snow Lake	Cu, Zn, Au, Ag
HudBay Minerals Inc.	Trout Lake	(U.)	Flin Flon	Cu, Zn, Au, Ag
HudBay Minerals Inc.	777	(U.)	Flin Flon	Cu, Zn, Au, Ag
Graymont Inc.	Faulkner	(P., Plant)	Faulkner	Limestone, lime
CertainTeed Gypsum Canada, Inc.	Amaranth	(P.)	Harcus	Gypsum
ERCO Worldwide	Hargrave	(U., Plant)	Hargrave	Sodium Chlorate
Lehigh Cement Company	Mafeking	(P.)	Mafeking	Limestone
Saskatchewan				
Claude Resources Inc.	Santoy 8	(U.)	Naolin Lake	Au
Claude Resources Inc.	Seabee	(U., C.)	Naolin Lake	Au, Ag
Cameco Corporation	Rabbit Lake	(U., C.)	Rabbit Lake	U
Golden Band Resources Inc.	Komis	(P.)	Brabant Lake	Au
Golden Band Resources Inc.	Jolu	(C.)	Brabant Lake	Au
Golden Band Resources Inc.	Roy Lloyd/Bingo	(U.)	Brabant Lake	Au
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
Big Quill Resources Inc.	Wynyard	(P., U., Plant)	Wynyard	Potassium sulphate
Canadian Clay Products Inc.	Wilcox	(P.)	Wilcox	Clay, bentonite
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 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
Sifto Canada Inc.	Unity	(U., Plant)	Unity	Salt
Prairie Mines & Royalty Limited	Bienfait	(P.)	Bienfait	Coal
Prairie Mines & Royalty Limited	Boundary Dam	(P.)	Estevan	Coal
Prairie Mines & Royalty Limited	Poplar River	(P.)	Coronach	Coal
Alberta				
The Canadian Salt Company Limited	Lindbergh	(Solution Mining)	Elk Point	Salt
Hammerstone Corporation	Steepbank	(P.)	North of Fort McMurray	Limestone
Hammerstone Corporation	Aurora	(P.)	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
Canexus Chemicals Canada Ltd.	Bruderheim	(Solution Mining)	Bruderheim	Salt
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

COMPANY	MINE SITE	ACTIVITY TYPE	LOCATION	COMMODITY
Graymont Inc.	Exshaw	(P., Plant)	Exshaw	Limestone, lime
Prairie Creek Quarries Ltd.	Cougar Ridge	(P., Plant)	Rocky Mountain House	Limestone
Lafarge Canada Inc.	Exshaw	(P., Plant)	Exshaw	Limestone
Burnco Rock Products Ltd.	Clearwater	(P., Plant)	Clearwater River	Limestone
Graymont Inc.	Fish Creek	(P., Plant)	Nordegg	Limestone
Lehigh Cement Company	Mcleod	(P.)	Cadomin	Limestone
Prairie Mines & Royalty Limited	Sheerness	(P.)	Hanna	Coal
Prairie Mines & Royalty Limited	Vesta	(P.)	Cordel	Coal
Prairie Mines & Royalty Limited	Paintearth	(P.)	Forestburg	Coal
Prairie Mines & Royalty Limited	Genesee	(P.)	Genesee	Coal
Keephills Aggregate Company Ltd.	Burtonsville	(P.)	Burtonsville	Coal
Transalta Corporation	Highvale	(P.)	Seba Beach	Coal
Sherritt International Corporation	Coal Valley	(P.)	Edson	Coal
Teck Resources Limited	Cardinal River	(P.)	Hinton	Coal
Sherritt International Corporation	Obed Mountain	(P.)	North of Hinton	Coal
Grande Cache Coal Corporation	Grande Cache	(P., U.)	Grande Cache	Coal
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
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
Craigmont Mines Ltd.	Craigmont	(C.)	Merritt	Fe
Huldra Silver Inc.	Merritt	(C.)	Merritt	Ag, Pb, Zn
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
Bralorne Gold Mines Ltd.	Bralorne-Pioneer	(C.)	Whistler	Au
Thompson Creek Mining Limited	Endako	(P., C.)	Fraser Lake	Mo
Nystar NV	Myra Falls	(U., C.)	Buttle Lake	Zn, Cu, Au, Ag
Imperial Metals Corporation	Huckleberry	(P., C.)	Houston	Cu, Mo, Au
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
Imasco Minerals Inc.	Crawford Bay	(U.)	Crawford Bay	Dolomite, limestone
Imasco Minerals Inc.	Lost Creek	(U.)	Lost Creek	Limestone
Mighty White Dolomite Ltd.	Rock Creek	(P., Plant)	Rock Creek	Dolomite
Lafarge Canada Inc.	Falkland	(P., Plant)	Falkland	Gypsum
Lafarge Canada Inc.	Harper Ranch	(P., Plant)	Kamloops	Limestone
Absorbent Products Ltd.	Bud	(P.)	Princeton	Calcium, clay
Heemskirk Canada Limited	Bromley Creek/Zeo	(P.)	Bromley Creek	Zeolite
Absorbent Products Ltd.	Red Lake	(P.)	Kamloops	Diatomite, bentonite, leonardite

COMPANY	MINE SITE	ACTIVITY TYPE	LOCATION	COMMODITY
Industrial Mineral Processors	Z-2	(P.)	Cache Creek	Zeolite
Graymont Inc.	Pavilion Lake	(P., Plant)	Pavilion Lake	Limestone, lime
Lightweight Advanced Volcanic Aggregates Inc.	Mount Meager	(P.)	Mount Meager	Pumice
Imperial Limestone Co. Ltd.	Van Anda	(P.)	Texada Island	Limestone
Texada Quarrying Ltd. (Lafarge Canada Inc.)	Gillies Bay	(P.)	Texada Island	Limestone
Ash Grove Cement Company	Blubber Bay	(P.)	Texada Island	Limestone
Fireside Minerals Ltd.	Fireside	(P.)	Fireside	Barite
Imasco Minerals Inc.	Benson Lake	(P.)	Benson Lake	Limestone
Teck Resources Limited	Coal Mountain	(P.)	Sparwood	Coal
Teck Resources Limited	Line Creek	(P.)	Sparwood	Coal
Teck Resources Limited	Elkview	(P.)	Sparwood	Coal
Teck Resources Limited	Fording River	(P.)	Elkford	Coal
Teck Resources Limited	Greenhills	(P.)	Sparwood	Coal
Peace River Coal Partnership	Trend	(P.)	Tumbler Ridge	Coal
Walter Energy, Inc.	Wolverine-Perry Creek	(P., U.)	Tumbler Ridge	Coal (metallurgical)
Walter Energy, Inc.	Brule	(P.)	Tumbler Ridge	Coal
Walter Energy, Inc.	Willow Creek	(P.)	Tumbler Ridge	Coal (metallurgical)
Peace River Coal Partnership	Quinsam	(U.)	Campbell River	Coal
Yukon				
Yukon Zinc Corp.	Wolverine	(U., C)	Ross River, Watson Lake	Zn, Ag, Cu, Pb, Au
Alexco Resource Corp.	Bellekeno	(U., C.)	Keno Hill	Ag, Pb, Zn, Au
Capstone Mining Corporation	Minto	(P., C.)	Pelly Crossing	Cu, Au, Ag
Northwest Territories				
North American Tungsten Corporation Ltd.	CanTung	(U., C.)	Cantung	W
Diavik Diamond Mines Inc.	Diavik	(P., U., Plant)	Lac de Gras	Diamonds
BHP Billiton Diamonds Inc.	Ekati	(U., Plant)	Lac de Gras	Diamonds
De Beers Canada Inc.	Snap Lake	(U., Plant)	Snap Lake	Diamonds
Nunavut				
Agnico Eagle Mines Ltd.	Meadowbank	(P., C.)	Baker Lake	Au

Source: Natural Resources Canada.
(P.) Open-Pit, (U.) Underground, (C.) Concentrator
** Xstrata was acquired by Glencore in May 2013.*
Notes: Excluded operations are clay products, peat, and most construction materials (most stone, sand and gravel). Included are operations that produced during 2012.

ANNEX 2

MINING ESTABLISHMENTS IN CANADA, BY MINERAL, PROVINCE OR TERRITORY, 2012

	NL	PE	NS	NB	QC	ON	MB	SK	AB	BC	YT	NT	NV	TOTAL
METALS														
Iron Ore	3	-	-	-	3	-	-	-	-	1	-	-	-	7
Gold & Silver Ore	1	-	-	-	14	12	1	2	-	1	-	-	1	32
Lead-zinc ore	-	-	-	1	-	-	-	-	-	-	2	-	-	3
Nickel-copper ore	1	-	-	-	1	5	2	-	-	-	-	-	-	9
Copper, copper-zinc ore	2	-	-	-	2	1	1	1	-	7	1	-	-	15
Molybdenum	-	-	-	-	-	-	-	-	-	1	-	-	-	1
Uranium	-	-	-	-	-	-	-	3	-	-	-	-	-	3
Other Metals	1	-	-	-	2	1	1	-	-	-	-	1	-	6
TOTAL METALS	**8**	**0**	**0**	**1**	**22**	**19**	**5**	**6**	**0**	**10**	**3**	**1**	**1**	**76**
NON-METALS														
Chrysotile	-	-	-	-	0	-	-	-	-	-	-	-	-	0
Diamonds	-	-	-	-	-	1	-	-	-	-	-	3	-	4
Gypsum	-	-	3	-	-	-	1	-	-	1	-	-	-	5
Peat	1	1	1	25	32	1	5	1	6	1	-	-	-	74
Potash	-	-	-	1	-	-	-	9	-	-	-	-	-	10
Salt	-	-	2	-	1	4	-	3	1	-	-	-	-	11
Sand and gravel	1	-	8	11	103	265	20	65	221	94	1	-	-	789
Stone	3	-	17	7	93	101	9	-	22	25	-	-	-	277
Shale, Clay and other refractory minerals	-	-	1	-	2	2	-	1	2	1	1	-	-	9
Other nonmetals	-	-	-	-	3	2	-	1	-	3	-	-	-	9
TOTAL NON-METALS	**5**	**1**	**32**	**44**	**231**	**374**	**35**	**79**	**252**	**122**	**2**	**3**	**0**	**1188**

- Nil

Sources: Natural Resources Canada; Statistics Canada.

ANNEX 3

CANADIAN PRODUCTION OF LEADING MINERALS BY PROVINCE AND TERRITORY, 2012[P]

	COAL		POTASH (K_2O)[1]		GOLD		IRON ORE		COPPER	
	KILOTONNES	$000	KILOTONNES	$000	TONNES	$000	KILOTONNES	$000	KILOTONNES	$000
Newfoundland & Labrador	-	-	-	-	535	28,699	18,642	2,645,018	57,832	459,764
Prince Edward Island	-	-	-	-	-	-	-	-	0	0
Nova Scotia	-	-	-	-	-	-	-	-	0	0
New Brunswick	x	x	-	-	221	11,853	-	-	8,917	70,891
Quebec	-	-	-	-	28,619	1,534,238	20,734	x	24,724	196,552
Ontario	-	-	-	-	48,013	2,573,982	-	-	184,993	1,470,693
Manitoba	-	-	-	-	5,550	297,513	-	-	41,125	326,947
Saskatchewan	x	x	x	x	2,469	132,359	-	-	147	1,170
Alberta	-	-	x	x	71	3,791	-	-	0	0
British Columbia	-	-	28,578	5,059,642	4,529	242,801	51	x	226,794	1,803,015
Yukon	-	-	-	-	2,550	136,686	-	-	18,181	144,538
Northwest Territories	-	-	-	-	-	-	-	-	579	4,605
Nunavut	-	-	-	-	11,157	598,125	-	-	0	0
Canada	8,984	6,981,374	66,942	6,388,951	103,713	5,560,047	39,427	5,318,858	563,293	4,478,176

	NICKEL		DIAMONDS		CEMENT [2]		SAND AND GRAVEL [3]		ZINC	
	KILOTONNES	$000	000'S OF CARATS	$000	KILOTONNES	$000	KILOTONNES	$000	TONNES	$000
Newfoundland & Labrador	63,458	1,103,979	-	-	-	-	3,440	14,847	19,545	37,918
Prince Edward Island	-	-	-	-	-	-	72	669	-	-
Nova Scotia	-	-	-	-	x	x	4,387	33,932	-	-
New Brunswick	-	-	-	-	-	-	2,694	14,494	172,762	335,159
Quebec	28,127	489,321	-	-	2,819	390,226	22,281	123,268	206,161	399,953
Ontario	79,071	1,375,599	721	386,645	5,310	598,199	81,226	496,303	71,024	137,786
Manitoba	25,815	449,104	-	-	-	-	15,964	83,385	78,731	152,739
Saskatchewan	-	-	-	-	-	-	14,323	98,228	1,110	2,154
Alberta	-	-	-	-	x	x	53,353	528,475	-	-
British Columbia	-	-	-	-	x	x	25,524	231,114	30,566	59,299
Yukon	-	-	-	-	-	-	1,371	10,172	28,392	55,080
Northwest Territories	-	-	9,670	1,614,897	-	-	575	4,414	-	-
Nunavut	-	-	60	3,670	-	-	-	-	-	-
Canada	196,471	3,418,003	10,451	2,005,212	12,784	1,702,463	225,208	1,639,303	608,292	1,180,087

Sources: Natural Resources Canada; Statistics Canada.
Notes: [P] Preliminary; (-) Nil; x Confidential
[1] Excludes shipments to Canadian potassium sulphate plants.
[2] Includes exported clinker minus imported clinker.
[3] Mineral production of sand and gravel for Nunavut is included in totals for the Northwest Territories.

ANNEX 4

CANADA'S WORLD ROLE AS A PRODUCER OF CERTAIN IMPORTANT MINERALS, 2012[p]

			Rank of Five Leading Countries				
		World	1	2	3	4	5
			Canada	Russia	Belarus	China	Germany
Potash (K_2O equivalent)	000 t	34,000	9,000	6,500	5,650	3,900	3,000
(mine production)	% of world total		26.5	19.1	16.6	11.5	8.8

			Kazakhstan	Canada	Australia	Niger	Namibia
Uranium (metal content)	t	54,610	19,451	9,145	5,983	4,351	3,258
(mine production) (for 2011)	% of world total		35.6	16.7	11.0	8.0	6.0

			China	Russia	Canada	United States	Australia
Aluminum (primary metal)	000 t	44,900	19,000	4,200	2,700	2,000	1,900
	% of world total		42.3	9.4	6.0	4.5	4.2

			Congo	China	Canada	Russia	Australia
Cobalt (mine production)	t	110,000	60,000	7,000	6,700	6,200	4,500
	% of world total		54.5	6.4	6.1	5.6	4.1

			South Africa	Australia	Canada	China	India
Titanium concentrate	000 t	6,200	1,030	940	700	700	550
(Ilmenite)	% of world total		16.6	15.2	11.3	11.3	8.9

			China	Russia	Canada	Austria	Bolivia
Tungsten (mine production)	t	73,000	62,000	3,500	2,000	1,100	1,100
	% of world total		84.9	4.8	2.7	1.5	1.5

			China	Korea	Japan	Canada	Mexico
Cadmium (metal)	t	23,000	7,000	4,100	2,130	1,780	1,610
	% of world total		30.4	17.8	9.3	7.7	7.0

			Russia	Botswana	D.R.C.	Canada	Zimbabwe
Diamonds (precious) (2011)	000 carats	122,829	35,140	22,905	19,249	10,795	8,502
	% of world total		28.6	18.6	15.7	8.8	6.9

			Rank of Five Leading Countries				
		World	1	2	3	4	5
			South Africa	Russia	Zimbabwe	Canada	United States
Platinum group metals	kg	379,000	200,000	108,000	20,400	19,500	15,900
(metal content)	% of world total		52.8	28.5	5.4	5.1	4.2

			China	United States	Russia	Canada	Saudi Arabia
Sulphur, elemental	000 t	70,000	9,700	9,050	7,300	6,600	4,600
(mine production)	% of world total		13.9	12.9	10.4	9.4	6.6

			Philippines	Indonesia	Russia	Australia	Canada
Nickel (mine production)	000 t	2,100	330	320	270	230	220
	% of world total		15.7	15.2	12.9	11.0	10.5

			China	United States	Chile	Peru	Mexico
Molybdenum (Mo content)[1]	t	250,000	105,000	57,000	35,300	19,500	10,900
(mine production)	% of world total		42.0	22.8	14.1	7.8	4.4

			China	United States	Germany	India	Australia
Salt (mine production)[2]	000 t	280,000	73,000	40,200	18,500	1,700	11,700
	% of world total		26.1	14.4	6.6	0.6	4.2

			China	Australia	Peru	United States	India
Zinc (mine production)[3]	000 t	13,000	4,600	1,490	1,270	748	690
	% of world total		35.4	11.5	9.8	5.8	5.3

			China	Australia	United States	Russia	South Africa
Gold (mine production)[4]	t	2,700	370	250	230	205	170
	% of world total		13.7	9.3	8.5	7.6	6.3

			Chile	China	Peru	United States	Australia
Copper (mine production)[5]	000 t	17,000	5,370	1,500	1,240	1,150	970
	% of world total		31.6	8.8	7.3	6.8	5.7

			Rank of Five Leading Countries				
		World	1	2	3	4	5
			China	Australia	Brazil	India	Russia
Iron ore (mine production)[6]	000 t	3,000	1,300	525	375	245	100
	% of world total		43.3	17.5	12.5	8.2	3.3
			Mexico	China	Peru	Australia	Russia
Silver[7]	t	24,000	4,250	3,800	3,450	1,900	1,500
	% of world total		17.7	15.8	14.4	7.9	6.3
			China	Australia	United States	Mexico	Peru
Lead (mine production)	000 t	5,200	2,600	630	345	245	235
	% of world total		50.0	12.1	6.6	4.7	4.5
			China	Iran	Spain	Thailand	United States
Gypsum (mine production)	000 t	150,000	48,000	14,000	11,500	10,000	9,900
	% of world total		32.0	9.3	7.7	6.7	6.6

Sources: U.S. Geological Survey (USGS); World Nuclear Association; Kimberley Process
Notes: [P] Preliminary
[1,2,3] Canada ranked 6th.
[4] Canada ranked 7th.
[5] Canada ranked 8th.
[6] Canada ranked 9th.
[7] Canada ranked 10th.

ANNEX 5

MINERAL PRODUCTION OF CANADA, 2008-2012[P]

		2008		2009		2010		2011		2012[P]	
	Unit	(quantity)	($000)	(quantity)	($000)	(quantity)	($000)	(quantity)	($000)	(quantity)	($000)
METALLIC MINERALS											
Antimony	t	111	731	54	318	x	x	x	x	x	x
Bismuth	t	71	1,918	87	1,615	91	1,759	136	3,346	121	2,650
Cadmium	t	313	1,976	322	1,055	2,403	9,644	1,516	4,135	203	416
Calcium	t	-	-	-	-	-	-	-	-	-	-
Cesium	t	x	x	x	x	x	x	x	x	x	x
Cobalt	t	4,809	440,913	2,275	102,241	2,644	125,144	3,741	146,768	3,652	115,305
Copper	t	584,003	4,329,801	470,347	2,766,112	507,883	3,941,677	553,725	4,831,801	563,293	4,478,176
Gold	kg	94,909	2,835,318	96,573	3,448,639	102,147	4,143,067	101,975	5,087,438	103,713	5,560,047
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	32,102	4,063,452	31,728	2,673,757	36,178	5,314,154	35,705	5,505,772	39,427	5,318,858
Iron, remelt	000 t	x	x	x	x	x	x	x	x	x	x
Lead	t	87,127	236,115	71,377	140,041	62,397	138,022	62,548	166,003	60,905	123,333
Lithium	t	x	x	x	x	x	x	x	x	x	x
Magnesium	t	-	-	-	-	-	-	-	-	-	-
Molybdenum	t	8,229	x	9,116	x	8,524	x	8,543	x	9,005	x
Nickel	t	246,197	5,713,003	132,471	2,213,597	156,270	3,509,833	211,417	4,787,323	196,471	3,418,003
Niobium (Columbium)	t	4,400	x	4,169	x	4,298	x	4,551	x	4,819	x
Platinum group	kg	22,764	618,547	10,925	258,242	9,864	260,304	22,337	749,572	19,873	574,030
Selenium	t	191	13,933	131	7,633	97	8,001	128	17,500	144	16,879
Silver	t	709	364,295	609	328,201	570	381,086	582	658,514	663	663,975
Tantalum	t	53	x	29	x	-	-	-	-	-	-
Tellurium	t	20	4,526	16	2,817	8	1,913	9	3,167	11	1,636
Tungsten	t	2,795	61,862	2,506	48,378	364	7,370	2,466	73,707	2,505	94,733
Uranium	t	8,703	953,858	10,133	1,358,144	9,927	1,230,182	9,017	1,307,174	9,661	1,040,910
Zinc	t	704,780	1,408,149	669,879	1,265,402	609,567	1,356,287	591,004	1,281,887	608,292	1,180,087
TOTAL, METALLIC MINERALS		..	**22,594,378**	..	**15,474,941**	..	**21,358,783**	..	**25,569,557**	..	**23,608,486**

		2008		2009		2010		2011		2012[P]	
	Unit	(quantity)	($000)	(quantity)	($000)	(quantity)	($000)	(quantity)	($000)	(quantity)	($000)
NON-METAL MINERALS											
Barite	000 t	9	3,344	16	4,443	21	6,500	x	x	x	x
Carbonatite	000 t	x	x	x	x	x	x	x	x	x	x
Cement [1]	000 t	13,604	1,733,146	10,831	1,413,826	11,523	1,512,624	11,914	1,587,136	12,784	1,702,463
Chrysotile	000 t	x	x	x	x	x	x	x	x	x	x
Clay products [2]	000 t	..	187,774	..	132,902	..	148,907	..	135,422	..	135,921

		2008		2009		2010		2011		2012[P]	
	Unit	**(quantity)**	**($000)**	**(quantity)**	**($000)**	**(quantity)**	**($000)**	**(quantity)**	**($000)**	**(quantity)**	**($000)**
Diamonds	000 ct	14,523	2,369,266	10,946	1,684,304	11,804	2,377,147	10,752	2,509,232	10,451	2,005,212
Gemstones	t	51	5,851	22	2,759	35	4,966	42	2,941	36	2,798
Graphite	000 t	x	x	x	x	x	x	x	x	x	x
Gypsum [3]	000 t	5,819	83,023	3,568	55,749	3,046	47,771	2,449	34,632	2,550	37,337
Lime	000 t	2,046	273,316	1,613	238,508	1,863	288,787	1,937	294,909	1,955	319,962
Magnesite	000 t	x	x	x	x	x	x	x	x	x	x
Marl	000 t	x	x	x	x	x	x	-	-	-	-
Mica	000 t	x	x	x	x	x	x	x	x	x	x
Nepheline syenite	000 t	646	54,864	527	53,354	603	57,304	602	58,377	592	63,817
Peat	000 t	1,231	238,510	1,214	266,634	1,286	260,664	1,139	213,359	973	186,246
Phosphate	000 t	x	x	x	x	x	x	x	x	x	x
Potash (K_2O) [4]	000 t	10,379	7,662,373	4,297	3,431,147	9,700	5,061,927	10,686	7,569,282		
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	1,938	74,872	1,192	47,661	1,503	66,372	1,620	84,280	1,593	85,823
Salt	000 t	14,224	537,273	14,676	578,618	10,278	602,607	12,757	697,404	10,740	564,441
Sand and gravel	000 t	241,591	1 690,944	201,678	1,361,664	211,342	1,573,968	222,288	1,560,213	225,208	1,639,303
Serpentine	000 t	-	-	-	-	-	-	-	-	-	-
Soapstone, talc, pyrophyllite	000 t	64	22,314	56	19,701	100	26,125	116	25,244	154	28,174
Sodium sulphate	000 t	x	x	x	x	x	x	x	x	x	x
Stone [3]	000 t	153,556	1,488,290	153,038	1,503,455	170,664	1,637,757	161,729	1,591,511	151,838	1,514,941
Sulphur, elemental	000 t	6,880	2,116,017	6,435	16,499	6,247	298,990	638	116,022	638	122,868
Sulphur, in smelter gas	000 t	746	148,456	543	77,817	610	70,903	5,970	637,250	5,545	611,411
Titanium dioxide	000 t	x	x	x	x	x	x	x	x	x	x
Tremolite	000 t	-	-	-	-	-	-	-	-	-	-
Zeolite	000 t	x	x	x	x	x	x	x	x	x	x
TOTAL, NON-METALLIC MINERALS		..	**19,372,019**	..	**11,552,034**	..	**14,699,276**	..	**17,839,820**	..	**16,880,014**

		2008		2009		2010		2011		2012[P]	
	Unit	**(quantity)**	**($000)**	**(quantity)**	**($000)**	**(quantity)**	**($000)**	**(quantity)**	**($000)**	**(quantity)**	**($000)**
MINERAL FUELS											
Coal	000 t	67,750	4,985,956	62,935	4,406,365	68,152	5,540,967	67,113	7,471,408	66,942	6,388,951
TOTAL MINERAL FUELS		**67,750**	**4,985,956**	**62,935**	**4,406,365**	**68,152**	**5,540,967**	**67,113**	**7,471,408**	**66,942**	**6,388,951**
TOTAL MINERAL PRODUCTION		..	**46,952,353**	..	**31,433,340**	..	**41,599,026**	..	**50,880,785**	..	**46,877,451**

Sources: Natural Resources Canada; Statistics Canada.
Notes: [P] Preliminary; x Confidential; (–) Nil; . . Not available
[1] Includes exported clinker.
[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, 1978–2010

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	801
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	534	5,005	222	5,665	947
2009	7,290	3,301	451	4,250	215	6,254	918
2010	8,851	3,074	400	4,133	195	6,480	1,470

Source: Natural Resources Canada, based on company reports and the federal-provincial/territorial survey of mines and concentrators.
Note: One tonne (t) = 1.1023113 short tons = 32 150.746 troy oz.
[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.

ANNEX 7

PROPOSED CAPITAL INVESTMENTS BY THE CANADIAN MINING INDUSTRY

Company	Project	Province	($ millions) Capital Investment
Coal Valley Resources Inc.	Robb Trend Coal Mine Expansion	AB	85
MAXIM Power Corp.	Development of #14 Coal Mine	AB	50
Coalspur Mines Ltd.	Vista Thermal Coal Mine	AB	500
Grande Cache Coal Corporation	Development of #8 Surface Mine and #12 South B2 Underground Mine	AB	180
Canadian Natural Resources Ltd. (CNRL)	Kirby Expansion Phase 1 Oil Sands Project	AB	1,200
Canadian Natural Resources Ltd. (CNRL)	Project Horizon	AB	1,080
Fort Hills Energy Corp. (Suncor Energy Inc. / Total SA / Teck)	Fort Hills Oil Sands Mine	AB	9,600
Imperial Oil Resources / ExxonMobil Canada	Kearl Lake Oil Sands Mine Phase 1	AB	8,900
Shell Canada	Athabasca Oil Sands Project Debottleneck Phase 1 (withouth Pierre River Mine Cap Cost)	AB	2,000
SilverBirch Energy/Teck Resources	Equinox Oil Sands Mine (Lease 14)	AB	2,500
SilverBirch Energy/Teck Resources	Frontier Oil Sands Mine Phase 1	AB	14,500
Suncor Energy Inc. / Total SA	Voyageur	AB	11,600
Syncrude Canada Ltd.	Mildred Lake	AB	3,600
Syncrude Canada Ltd.	Aurora	AB	2,335
Total E&P Canada Ltd. / Suncor Energy Inc.	Joslyn North Mine	AB	6,000
KGHM Ajax Mining Inc.	Ajax Copper-Gold Mine	BC	795
Skyline Gold Corporation	Bronson Slope Metal Mine	BC	258
TTM Resources Inc.	Chu Molybdenum Mine	BC	1,180
Burnco	Aggregate Project	BC	60
Pretivim	Bruce Jack Gold-Silver Mine	BC	664
Canadian Dehua	Gething Coal	BC	1,360
Cardero	Carbon Creek	BC	839
Centremount Coal	Bingay Main Coal Proejct	BC	480
New Gold	Blackwater Gold	BC	1,800
Yellowhead Mining Inc.	Harper Creek Copper-Gold-Silver Mine	BC	759
AuRico Gold	Kemess Underground Project	BC	683
Avanti Mining Inc.	Kitsault Molybdenum Mine	BC	794
Seabridge Gold Inc.	KSM (Kerr-Sulphurets-Mitchell) Copper-Gold Mine	BC	5,310
Capstone Mining Corp.	Kutcho Copper-Zinc-Silver-Gold	BC	187
Teck Coal Ltd.	Line Creek Coal Mine Expansion	BC	140
Pacific Booker Minerals Inc.	Morrison Copper-Gold Mine	BC	517
Fortune Minerals	Arctos Anthracite Project (formerly known as Mount Klappan Anthracite Metallurgical Coal Project)	BC	788
HD Mining	Murray River Underground Coal Mine	BC	400
Taseko Mines Ltd.	New Prosperity Gold-Copper Mine	BC	1,000
Teck Coal Ltd.	Quintette Coal Mine	BC	858
Compliance Coal Corp.	Raven Underground Coal Mine	BC	219
Imperial Metals Corp.	Red Chris	BC	320
Anglo American	Peace River Coal	BC	320
Imperial Metals Corp.	Ruddock Creek Zinc Lead Mine	BC	100

Company	Project	Province	($ millions) Capital Investment
Copper Fox Metals	Schaft Creek	BC	3,256
Pan Pacific Aggregates Ltd.	Sechelt Carbonate Mine	BC	100
Spanish Mountain Gold Ltd.	Spanish Mountain	BC	756
Columbia Yukon Explorations	Storie molybdenum Mine	BC	390
Hard Creek Nickel	Turnagain Nickel Project	BC	1,357
Western Coal Corp.	Willow Creek Expansion	BC	294
Cline Mining Corporation	Crown Mountain Coal Project	BC	100
Mustang Minerals Corp	Makwa Project	MB	123
Victory Nickel	Minago Nickel Mine	MB	596
HudBay Minerals	Lalor	MB	704
Winston Resources Inc.	Elmtree Property Gold Mine	NB	8
Trevali	Halfmile Mine	NB	338
Northcliff Resources Ltd.	Sisson Tungsten-Molybdenum Mine	NB	579
Vale	Long Harbour Hydromet Plant	NL	2,800
IOC (Rio Tinto operator)	Carol Expansion, phase 1 and 2 only	NL	677
Labrador Iron Mines Holdings	Schefferville area DSO project	NL	140
Rambler Metals and Mining	Ming mine	NL	231
New Millennium/Tata Steel	Schefferville area DSO project	NL	300
Canada Fluorspar	St. Lawrence fluorspar mine reactivation	NL	100
Alderon Resources Corp.	Kami Iron Ore Project	NL	1,270
Glencore *	Donkin Coal Project	NS	500
Baffinland Iron Mines	Mary River	NU	750
Mountain Province Diamonds Inc. and De Beers	Gahcho Kue	NWT	550
Canadian Zinc Corporation	Prairie Creek	NWT	160
Avalon Rare Metals	Thor Lake - Nechalacho	NWT	1,200
Fortune Minerals	Nico	NWT	441
Tyhee Resources	Yellowknife Gold	NWT	174
Osisko	Hammond Reef Gold Mine	ON	881
Noront Resources Inc.	Eagle's Nest Multi-metals Mine	ON	609
Vale	Sudbury	ON	3,400
Vale	Clarabelle Mill	ON	200
Vale	Totten Mine	ON	360
Cliffs	chromite mine/smelter	ON	3,300
Kirkland Lake Gold	Expansion	ON	250
Bending Lake Iron Ore	Josephine Cone Mine	ON	900
Rubicon	Gold Lake	ON	214
New Gold	Rainy River Gold Mine	ON	713
Goldcorp	Red Lake	ON	420
Goldcorp	Porcupine	ON	335
Goldcorp	Musselwhite	ON	390
Treasury Metals	Goliath Gold Project	ON	190
Lake Shore	Timmins West gold mine	ON	90

Company	Project	Province	($ millions) Capital Investment
Northern Iron	Griffith Iron	ON	900
Glencore *	Fraser Morgan Project	ON	119
Glencore *	Nickel Rim South	ON	920
Glencore *	Errington and Vermillion	ON	350
KGHM International	Victoria Mine	ON	750
North American Palladium	Lac des Iles Mine expansion	ON	100
Stillwater Mining Company	Marathon PGM-Cu Project	ON	351
Goldcorp	Éléonore	QC	1,750
Adriana Resources Inc.	Lac Otelnuk Iron Mine	QC	8,500
Matamec	Kipawa	QC	316
Arriane Resources	Lac à Paul	QC	814
Critical Elements Corp	Rose Tantalum Mine	QC	287
Canada Lithium Corp	Quebec Lithium Mine	QC	202
Mines Aurizon Ltée	Joanna Gold Mine	QC	154
Royal Nickel Corp.	Dumont Nickel Project	QC	1,200
Agnico Eagle Mines Limited	Lapa expansion	QC	6
Stornoway Diamond Corporation	Renard Diamond Mine	QC	752
Champion Iron Mines	Fire Lake North	QC	1,600
Ungava	Hopes Advance Iron Mine	QC	2,850
Mine Arnaud Inc.	Arnaud Apatite Mine	QC	750
Western Troy Capital Resources Inc.	MacLeod Lake Molybdenum-Copper	QC	210
Strateco Resources Inc.	Matoush Project	QC	342
Métaux BlackRock Inc.	BlackRock Vanadium Iron Titanium Mine	QC	600
BHP Billiton	Jansen Potash Mine	SK	14,000
AREVA Resources Canada Inc.	Midwest Uranium Mining and Milling	SK	435
First Potash Ventures	Muskowekwan Potash Mine	SK	2,418
Shore Gold Inc.	Star-Orion South Diamond Mine	SK	2,500
		Total	**157,281**

Note: The information in this table refers to investments proposed over the coming decade and is drawn from government web sites, company sites and press releases, and is accuate as of July 2013. The progress that will be made on these projects will be affected by market forces. Some will likely be delayed or cancelled, and others perhaps accelerated. Therefore, this list is a work in progress.
** Xstrata was acquired by Glencore in May 2013.*

ANNEX 8

AVERAGE WEEKLY WAGES AND SALARIES IN THE CANADIAN MINING, SMELTING AND REFINING INDUSTRIES[1], 1999-2012

	Number of Employees (000)	Average Weekly Earnings ($)	Total Weekly Wages for Group ($)
Metal Mines			
1999	29.56	1,123.25	33,197,654
2000	29.47	1,168.98	34,447,503
2001	25.56	1,180.02	30,166,031
2002	22.59	1,140.29	25,753,450
2003	21.81	1,194.46	26,051,173
2004	21.37	1,244.41	26,598,019
2005	21.20	1,240.90	26,302,116
2006	22.01	1,262.54	27,784,718
2007	23.85	1,362.87	32,504,450
2008	28.07	1,428.19	40,095,006
2009	24.29	-	-
2010	23.31	1,536.62	35,820,149
2011	26.92	1,546.05	41,615,028
2012	31.69	1,682.51	53,325,472
Non-metal Mines			
1999	19.99	882.64	17,641,326
2000	20.03	944.20	18,913,270
2001	19.52	976.88	19,072,605
2002	19.50	907.65	17,696,452
2003	20.22	1,000.39	20,231,887
2004	19.91	1,040.27	20,708,655
2005	20.46	1,067.16	21,829,825
2006	21.49	1,023.00	21,981,201
2007	23.18	1,203.68	27,904,913
2008	23.99	1,246.76	29,907,279
2009	21.78	1,243.30	27,072,858
2010	22.05	1,310.88	28,906,215
2011	22.87	1,347.92	30,826,930
2012	22.97	1,466.31	33,682,607
Coal Mines			
1999	7.81	1126.95	8,803,733
2000	7.20	1204.74	8,672,923
2001	6.14	1160.01	6,992,147
2002	5.81	1104.25	6,294,681
2003	5.36	1197.45	5,775,555
2004	4.71	1295.86	5,880,595

ANNEX 8
AVERAGE WEEKLY WAGES AND SALARIES IN THE CANADIAN MINING, SMELTING AND REFINING INDUSTRIES[1], 1999-2012

	Number of Employees (000)	Average Weekly Earnings ($)	Total Weekly Wages for Group ($)
2005	5.04	1,291.55	6,505,537
2006	5.34	1,269.39	6,773,465
2007	5.84	1,427.52	8,342,427
2008	6.44	-	-
2009	6.37	-	-
2010	7.17	-	-
2011	6.88	-	-
2012	8.75	-	-
Smelting & Refining			
1999	21.42	1,033.71	22,136,900
2000	23.09	1,035.31	23,902,202
2001	18.85	1,054.75	19,878,873
2002	16.70	1,095.92	18,301,864
2003	14.72	1,128.16	16,608,772
2004	14.30	1,201.95	17,185,481
2005	14.43	1,204.58	17,379,680
2006	16.22	1,158.34	18,789,433
2007	16.85	1,274.35	21,472,798
2008	13.17	1,299.66	17,112,623
2009	13.15	1,274.60	16,763,539
2010	13.74	1,349.43	18,545,216
2011	15.26	1,315.75	20,073,082
2012	15.49	1,388.88	21,506,807
Total Mining, Smelting and Refining			
1999	78.77	1,038.22	81,779,612
2000	79.79	1,077.09	85,935,898
2001	70.08	1,087.82	76,109,656
2002	64.59	1,055.28	68,046,447
2003	62.11	1,114.78	68,667,387
2004	60.28	1,170.50	70,372,751
2005	61.12	1,178.35	72,017,159
2006	65.05	1,158.01	75,328,817
2007	69.73	1,293.97	90,224,587
2008	71.67	-	-
2009	65.58	-	-
2010	66.28	-	-
2011	71.92	-	-
2012	78.90	-	-

Source: Statistics Canada.
Notes: (-) Unavailable
Numbers may not add due to rounding.
[1]Number of employees is based on the North American Industry Classification System (NAICS)

ANNEX 9

AVERAGE WEEKLY EARNINGS, BY CANADIAN INDUSTRIAL SECTOR, 1995–2012

($)	Forestry	Mining, Smelting and Refining [1]	Manufacturing	Construction	Finance & Insurance
1995	697.64	980.13	711.97	748.83	719.52
1996	745.69	1,007.19	733.06	767.56	769.49
1997	786.46	1,003.95	751.95	786.91	801.64
1998	766.33	1,043.64	770.47	781.44	820.45
1999	773.42	1,038.22	781.99	782.63	824.82
2000	810.15	1,077.10	796.25	808.06	845.54
2001	815.52	1,087.98	799.33	789.37	x
2002	809.81	1,055.35	818.51	818.94	851.73
2003	847.06	1,115.81	838.15	847.22	877.81
2004	894.01	1,170.94	862.53	845.85	887.39
2005	883.89	1,178.35	896.28	877.34	921.2
2006	902.28	1,157.99	904.63	900.08	951.42
2007	907.41	1,293.98	940.61	961.01	998.71
2008	935.84	1,347.90	949.57	1,014.44	1,001.44
2009	853.28	1,353.08	917.07	1,048.51	1,036.36
2010	948.38	1,425.06	960.43	1,066.08	1,049.21
2011	974.12	1,436.44	981.85	1,091.42	1,064.52
2012	996.17	1,559.84	1,005.18	1,144.23	1,092.96

Source: Statistics Canada
Notes: (x) Confidential
[1] Based on a weighted average of Mining (Except Oil and Gas) and Non-Ferrous Metal (except Aluminum) production and processing, North American Industry Classification System (NAICS) codes 212 and 3314.

ANNEX 10

STRIKES AND LOCKOUTS IN CANADIAN MINING AND MINERAL MANUFACTURING INDUSTRIES, 2008-2012

	Work Stoppages	Workers	Person Days Not Worked	Average Duration
2008	**15**	**2,142**	**65,200**	**57.6**
Mineral Manufacturing	14	1,507	47,960	59.7
Non-Metalic Mineral Products	6	548	26,810	54.3
Primary Metals	8	959	21,150	63.8
Mining	1	635	17,240	28.0
Metals	1	635	17,240	28.0
Mineral Fuels	.	.	.	.
Non-Metals	.	.	.	.
Support Activities	.	.	.	.
2009	**11**	**4,874**	**568,580**	**120.1**
Mineral Manufacturing	10	4,749	559,890	121.3
Non-Metalic Mineral Products	3	163	23,080	109.3
Primary Metals	7	4,586	536,810	126.4
Mining	1	125	8,690	108.0
Metals	1	125	8,690	108.0
Mineral Fuels	.	.	.	.
Non-Metals	.	.	.	
Support Activities	.	.	.	.
2010	**17**	**6,022**	**567,390**	**96.8**
Mineral Manufacturing	14	5,649	540,500	95.9
Non-Metalic Mineral Products	7	344	27,020	65.0
Primary Metals	7	5,305	513,480	126.9
Mining	3	373	26,890	101.0
Metals	1	125	19,530	255.0
Mineral Fuels	1	168	6,720	40.0
Non-Metals	1	80	640	8.0
Support Activities	.	.	.	.
2011	**11**	**2,167**	**210,735**	**79.0**
Mineral Manufacturing	9	1,342	173,540	88.6
Non-Metalic Mineral Products	3	137	8,380	61.3
Primary Metals	6	1,205	165,160	102.2
Mining	2	825	37,195	36.0
Metals	1	125	2,895	23.0
Mineral Fuels	1	700	34,300	49.0
Non-Metals	.	.	.	.
Support Activities	.	.	.	.
2012	**9**	**1,701**	**128,240**	**58.1**
Mineral Manufacturing	8	1,340	117,800	61.8
Non-Metalic Mineral Products	.	.	.	.
Primary Metals	8	1,340	117,800	61.8
Mining	1	361	10,440	29.0
Metals	.	.	.	.
Mineral Fuels	.	.	.	.
Non-Metals	1	361	10,440	29.0
Support Activities	.	.	.	.

Source: Workplace Information Division, Labour Program, ESDC, November 14, 2013
Note: (.) Nil

ANNEX 11

TOTAL EXPORTS OF MINERALS AND MINERAL PRODUCTS, BY COMMODITY AND COUNTRY OF DESTINATION, 2012

($)	United States	European Union	China	Japan	Other Countries	Total	TPP[1] Member Countries
METALS							
Aluminum	6,992,717,676	541,863,878	211,198,294	126,390,803	787,270,109	8,659,440,760	7,266,413,195
Antimony	710,757	61,745	10,311,268	17,059	114,272	11,215,101	710,757
Barium	55,240	—	—	—	—	55,240	55,240
Beryllium	101,544	7,725	—	—	432	109,701	101,544
Bismuth	522,383	553,451	—	1,851	21,402	1,099,087	522,383
Cadmium	694,625	828,187	1,274,278	—	795,087	3,592,177	1,462,985
Calcium metals	462,465	10,638	8,100	576	184,531	666,310	463,208
Chromium	10,857,054	164,324	—	—	895,805	11,917,183	10,924,084
Cobalt	46,850,088	68,003,298	3,137,645	57,121,725	105,121,494	280,234,250	57,169,080
Copper	2,673,308,511	554,124,695	1,033,864,771	844,256,557	825,134,256	5,930,688,790	2,759,617,836
Gold	3,861,428,799	11,737,577,226	79,070,781	108,315,123	1,181,409,993	16,967,801,922	3,994,909,187
Iron and steel	11,501,822,732	295,779,600	163,952,122	17,353,069	1,633,999,723	13,612,907,246	12,127,239,859
Iron ore	576,947,285	1,029,335,716	1,821,051,070	157,602,990	550,715,275	4,135,652,336	576,947,285
Lead	574,977,487	17,064,583	51,024,386	24,851,132	29,669,182	697,586,770	575,424,434
Lithium	140,512	720,023	178,829	—	2,843	1,042,207	140,512
Magnesium and magnesium compounds	49,974,169	2,867,145	4,089,201	138,965	223,004	57,292,484	49,981,500
Manganese	5,544,302	22,083	171,754	9	762,899	6,501,047	5,556,533
Mercury	1,939,515	—	—	—	543,838	2,483,353	1,940,639
Molybdenum	102,028,696	92,795,300	503,346	49,438,193	40,022,205	284,787,740	125,559,270
Nickel	1,131,441,781	1,287,677,544	491,703,522	135,713,729	2,202,192,438	5,248,729,014	1,218,896,847
Niobium	45,526,645	90,206,739	18,280,667	8,293,476	14,977,119	177,284,646	45,526,645
Platinum group metals	222,182,715	86,474,187	15,077	16,799,198	23,639,984	349,111,161	223,383,349
Rare earth metals	42,537,374	13,030,977	—	—	364,126	55,932,477	42,688,553
Selenium	11,988,930	29,654,388	22,195,902	158,607	12,928,158	76,925,985	12,773,896
Silicon	149,596,022	38,900,815	1,394,254	264,000	15,483,080	205,638,171	160,746,351
Silver	2,044,902,948	228,910,486	34,632,861	32,505,615	42,502,437	2,383,454,347	2,065,670,034
Tantalum	849,167	120,037	—	—	126,216	1,095,420	871,321
Tellurium	4,397,793	20,069,491	2,893,937	488,917	4,299,514	32,149,652	5,006,922
Tin	54,483,919	6,055,634		993	816,925	61,357,471	54,526,521
Titanium metal	23,638,279	5,584,344	1,312,778	350,813	8,926,006	39,812,220	27,796,918
Tungsten	20,639,779	56,274,170	46,017,252	4,645,585	1,468,438	129,045,224	21,981,712
Uranium and thorium	229,986,924	1,429,101,431	11,756,260	16,992,855	106,172,388	1,794,009,858	242,035,993
Vanadium	235,876,192	295,627,016	—	83,523,912	129,929,608	744,956,728	266,038,621
Zinc	1,135,889,028	185,690,318	38,960,669	706,330	166,088,009	1,527,334,354	1,153,322,130
Zirconium	4,056,413	4,408,321	1,635,291	426,954	1,344,370	11,871,349	4,183,011
Other metals	4,026,760,745	1,108,197,669	111,403,998	60,928,031	805,722,606	6,113,013,049	4,283,824,973
TOTAL METALS	**35,785,838,494**	**19,227,763,184**	**4,162,038,313**	**1,747,287,067**	**8,693,867,772**	**69,616,794,830**	**37,384,413,328**
NON-METALS							
Abrasives	244,828,214	27,903,538	14,129,105	6,261,584	28,344,457	321,466,898	251,748,225
Barite and witherite	207,613	48,227	—	—	—	255,840	207,613

ANNEX 11
TOTAL EXPORTS OF MINERALS AND MINERAL PRODUCTS, BY COMMODITY AND COUNTRY OF DESTINATION, 2012

($)	United States	European Union	China	Japan	Other Countries	Total	TPP[1] Member Countries
Boron	2,234,874	148,287	52,300	—	1,088,232	3,523,693	2,406,872
Bromine	9,891	440	—	—	8,666	18,997	9,891
Cement	540,744,890	4,014,651	1,054,120	447,569	9,821,289	556,082,519	542,114,553
Chlorine and chlorine compounds	156,969,744	897,831	70,088	23,701	23,563,835	181,525,199	177,531,972
Chrysotile (Asbestos)	3,868,624	522,751	73,062	3,666	1,620,739	6,088,842	4,435,526
Clay and clay products	80,849,845	16,860,203	619,088	55,342	8,485,822	106,870,300	83,409,818
Diamonds	186,758,615	1,966,867,029	943,893	487,862	251,667,733	2,406,725,132	222,095,817
Dolomite	18,669,372	—	—	—	4,654,282	23,323,654	18,669,372
Feldspar	—	—	—	—	340	340	—
Fluorspar	49,563,644	1,105,940	199,102	14,197	3,380,435	54,263,318	49,607,024
Glass and glassware products	483,557,080	26,655,285	5,148,026	1,683,170	30,519,913	547,563,474	489,743,222
Granite	35,961,586	2,515,560	4,063,863	131,445	1,137,506	43,809,960	36,157,441
Graphite	178,540,536	12,307,517	1,432,888	994,924	25,846,759	219,122,624	180,746,650
Gypsum	57,488,008	482,061	—	2,500	6,442,910	64,415,479	59,877,309
Iodine	4,853,972	436,168	4,472	—	1,627,094	6,921,706	5,155,587
Lime	54,596,190	—	22,615	118	4,487	54,623,410	54,596,190
Limestone flux and other limestone	13,080,139	1,181,490	204,541	—	7,155,841	21,622,011	13,455,489
Marble, travertine and other calcareous stones	57,140,452	196,273	3,657,392	—	253,978	61,248,095	57,168,028
Mica	6,723,340	763,074	1,137,133	2,451,046	1,125,089	12,199,682	6,945,202
Mineral pigments	146,387,077	3,486,478	2,970,803	3,272,365	11,070,012	167,186,735	148,465,668
Nepheline syenite	59,026,651	7,827,829	895,861	964,088	2,875,358	71,589,787	59,631,689
Nitrogen	1,889,391,349	847,250	11,459	1,259	9,663,815	1,899,915,132	1,898,776,198
Pearls	1,614,775	1,603	2,863	10,724	212,661	1,842,626	1,617,883
Peat	255,136,293	2,449,185	470,748	11,565,077	17,558,736	287,180,039	260,450,402
Phosphate and phosphate compounds	100,173,007	374,463	119,039	2,147,079	4,235,789	107,049,377	102,485,941
Potash and potassium compounds	3,289,224,683	32,655,499	366,175,229	126,688	2,387,731,069	6,075,913,168	3,708,595,078
Salt and sodium compounds	572,861,093	4,100,848	3,288,580	25,920,269	67,467,022	673,637,812	605,225,215
Sand and gravel	49,212,240	64,683	—	—	3,809,857	53,086,780	49,217,964
Sandstone	667,554	—	—	—	—	667,554	667,554
Silica and silica compounds	53,398,646	1,659,198	322,047	368,257	4,972,249	60,720,397	54,037,743
Slate	4,738,731	7,820,687	—	62,749	322,980	12,945,147	5,058,402
Sulphur and sulphur compounds	338,755,651	277,151	182,215,601	1,193	385,933,459	907,183,055	539,907,741
Talc, soapstone and pyrophyllite	27,189,995	35,485	29,601	191,931	18,029	27,465,041	27,189,995
Titanium oxides	291,032,683	2,817,408	916,852	13,592	4,640,020	299,420,555	291,113,912
Other nonmetals	561,029,623	37,983,695	11,408,247	2,613,210	43,942,003	656,976,778	568,893,161
Other structurals	132,400,767	11,499,098	1,936,897	122,625	20,602,876	166,562,263	146,735,564
TOTAL NON-METALS	**9,948,887,447**	**2,176,806,885**	**603,575,515**	**59,938,230**	**3,371,805,342**	**16,161,013,419**	**10,724,151,911**
MINERAL FUELS							
Coal	442,902,440	687,506,070	1,537,480,106	1,846,697,738	2,101,423,110	6,616,009,464	523,061,510
Coke	151,636,525	—	—	—	947,058	152,583,583	151,636,525
TOTAL MINERAL FUELS	**594,538,965**	**687,506,070**	**1,537,480,106**	**1,846,697,738**	**2,102,370,168**	**6,768,593,047**	**674,698,035**
TOTAL MINING EXPORTS	**46,329,264,906**	**22,092,076,139**	**6,303,093,934**	**3,653,923,035**	**14,168,043,282**	**92,546,401,296**	**48,783,263,274**

Sources: Natural Resouces Canada; Statistics Canada.
Notes: (-) Nil
[1] Trans-Pacific Partnership Countries
Total exports are the sum of domestic exports and re-exports.

ANNEX 12

TOTAL IMPORTS OF MINERALS AND MINERAL PRODUCTS, BY COMMODITY AND COUNTRY OF ORIGIN, 2012

($)	United States	European Union	China	Japan	Other Countries	Total	TPP[1] Member Countries
METALS							
Aluminum	3,015,800,739	233,843,677	377,094,636	11,067,877	1,432,291,160	5,070,098,089	3,139,770,562
Antimony	1,795,260	282,195	16,172,021	22,826	308,812	18,581,114	1,951,349
Barium	2,221,728	2,417,987	1,839,330	8,768	134,644	6,622,457	2,283,232
Beryllium	498,178	3,257	—	—	3,064	504,499	498,178
Bismuth	784,738	333,706	812,376	—	4,561	1,935,381	784,738
Cadmium	5,254,029	12,037,567	32,463,818	6,895	203,771	49,966,080	5,375,646
Calcium metals	58,725,649	2,149,261	612,908	108,939	1,579,025	63,175,782	59,010,029
Chromium	6,959,565	13,437,546	2,087,481	20,399	49,619,886	72,124,877	7,104,019
Cobalt	14,381,851	6,149,842	1,122,324	103,940	18,662,594	40,420,551	25,052,475
Copper	2,280,139,375	170,121,084	143,436,840	23,556,953	422,217,663	3,039,471,915	2,483,477,331
Gallium	199,551	102,544	—	2,472	163	304,730	199,551
Germanium	13,887,966	2,427,383	5,267,372	5,594,562	1,829,434	29,006,717	13,890,005
Gold	2,291,678,552	606,608,810	1,943,093	15,416	8,736,289,937	11,636,535,808	6,247,724,536
Hafnium	23,931	2,624	5,741	—	544	32,840	23,931
Indium	93,504	2,815	9,311	2,910	3,837	112,377	93,504
Iron and steel	14,545,442,224	2,314,825,074	2,641,031,517	725,585,131	3,868,247,294	24,095,131,240	15,753,155,602
Iron ore	874,764,851	4,226,063	5,309	—	21,357,612	900,353,835	896,101,703
Lead	348,652,952	25,578,071	43,674,546	3,180,603	169,750,351	590,836,523	484,937,488
Lithium	27,655,893	8,768,399	9,594,268	3,218,504	23,298,343	72,535,407	36,722,075
Magnesium and magnesium compounds	42,725,423	10,428,910	160,264,452	2,342,176	12,246,366	228,007,327	44,122,023
Manganese	135,238,695	4,568,946	27,297,975	351,990	149,596,976	317,054,582	145,262,648
Mercury	5,900,410	5,562,514	3,631,641	577,531	16,393,589	32,065,685	19,648,248
Molybdenum	87,992,550	5,153,884	350,509	200	8,734,208	102,231,351	96,365,298
Nickel	231,821,307	132,617,067	10,309,255	37,917,888	390,707,980	803,373,497	592,054,988
Niobium	5,213,309	2,287,532	613,262	—	41,913,143	50,027,246	5,213,309
Platinum group metals	153,170,099	57,572,716	37,005	1,176,324	141,114,574	353,070,718	153,332,731
Rare earth metals	352,179	135,530	4,483,127	71	6,318,864	11,289,771	6,664,585
Rhenium	19,738	—	—	—	—	19,738	19,738
Selenium	667,678	4,387,094	2,911	7,552,532	939,184	13,549,399	1,142,414
Silicon	26,473,262	1,869,798	57,366,703	16,521	19,239,535	104,965,819	26,862,369
Silver	964,867,932	266,242,929	41,946,726	1,057,595	1,449,756,887	2,723,872,069	1,882,850,409
Strontium	25,745	398,712	390	—	287,445	712,292	291,128
Tantalum	842,253	13,211	153,151	—	82,729	1,091,344	842,253
Tellurium	201,720	5,060,944	8,134,052	3,863,632	11,164,230	28,424,578	7,176,013
Thallium	5,597	—	—	—	10	5,607	5,607
Tin	20,011,693	1,063,345	7,382,486	1,712,700	55,919,368	86,089,592	69,422,128
Titanium metal	81,428,986	12,295,461	7,506,901	1,688,926	82,215,086	185,135,360	81,687,407
Tungsten	17,078,917	1,362,343	5,132,509	19,991	1,360,961	24,954,721	17,120,861
Uranium and thorium	143,096,936	17,769,561	356,741	739	776,795,308	938,019,285	374,250,426

ANNEX 12
TOTAL IMPORTS OF MINERALS AND MINERAL PRODUCTS, BY COMMODITY AND COUNTRY OF ORIGIN, 2012

($)	United States	European Union	China	Japan	Other Countries	Total	TPP[1] Member Countries
Vanadium	7,325,270	2,961,165	8,376,792	—	10,545,540	29,208,767	7,347,185
Zinc	235,375,622	16,306,849	5,528,677	1,985	141,567,417	398,780,550	321,142,944
Zirconium	38,947,912	914,982	412,851	45,818	4,478,639	44,800,202	40,344,600
Other metals	5,248,267,053	1,143,943,294	2,076,550,158	266,473,219	2,928,541,892	11,663,775,616	6,844,617,845
TOTAL METALS	**30,936,010,822**	**5,096,234,692**	**5,703,011,165**	**1,097,296,033**	**20,995,722,626**	**63,828,275,338**	**39,895,943,111**
NON-METALS							
Abrasives	202,435,536	131,241,203	53,014,506	19,227,085	83,152,872	489,071,202	211,144,416
Arsenic	27,876	6,804	68,277	8,639	1	111,597	27,876
Barite and witherite	12,493,926	285,596	17,453,042	—	1,420,807	31,653,371	12,493,929
Boron	23,593,651	731,162	1,263,140	570,195	15,365,202	41,523,350	24,345,168
Bromine	—	—	—	—	—	—	—
Calcium (Industrial minerals)	2,354,176	51,781	2,823	11,128	494,000	2,913,908	2,847,048
Cement	424,992,691	33,384,389	47,991,792	2,626,293	70,146,527	579,141,692	435,487,714
Chlorine and chlorine compounds	89,589,113	8,481,133	6,403,688	130,970	21,082,212	125,687,116	94,004,397
Chrysotile (Asbestos)	91,640,029	3,679,695	7,241,726	3,553,234	19,216,824	125,331,508	98,684,005
Clay and clay products	292,185,121	216,207,387	383,322,807	15,222,535	205,843,883	1,112,781,733	369,246,604
Diamonds	118,915,526	65,597,297	2,127,663	92,846	490,493,784	677,227,116	146,959,074
Dolomite	13,513,658	29,469	126	—	29,929	13,573,182	13,513,658
Feldspar	762,621	6,361	—	—	145	769,127	762,756
Fluorspar	14,579,718	13,018,482	14,643,277	90,147	42,199,113	84,530,737	44,059,324
Glass and glassware products	1,630,727,570	183,255,507	331,715,881	27,600,937	213,019,209	2,386,319,104	1,772,027,494
Granite	19,335,026	29,583,078	34,279,885	—	84,213,249	167,411,238	19,668,352
Graphite	307,528,597	98,520,224	76,611,272	40,936,969	41,995,310	565,592,372	311,223,720
Gypsum	156,526,832	1,137,386	394,350	24,154	2,276,649	160,359,371	158,436,403
Iodine	5,998,755	12,171	2,826	3,936,004	14,915,752	24,865,508	20,800,410
Lime	20,147,982	106,144	19,534	6,191	51,983	20,331,834	20,147,982
Limestone flux and other limestone	22,687,603	545,826	424,764	—	540,492	24,198,685	22,710,695
Marble, travertine and other calcareous stones	11,513,046	51,251,470	32,331,675	1,572	45,978,696	141,076,459	13,758,383
Mica	5,341,399	2,547,149	261,296	12,006	1,285,381	9,447,231	5,343,512
Mineral pigments	121,503,663	31,251,674	5,496,087	2,605,002	9,724,005	170,580,431	125,021,389
Nepheline syenite	224,595	—	—	—	3,582	228,177	224,655
Nitrogen	342,336,582	153,561,377	6,062,975	68,991	285,919,081	787,949,006	349,706,606
Olivine	577,195	133,976	27,473	8,367	760,574	1,507,585	581,725
Pearls	7,799,110	2,090,871	11,211,008	1,743,041	4,291,012	27,135,042	8,471,943
Peat	4,821,411	439,994	120,401	54	3,814,588	9,196,448	4,822,990
Perlite	15,159,585	2,797,663	15,323	—	3,238	17,975,809	15,162,823
Phosphate and phosphate compounds	634,446,320	15,773,060	6,890,022	66,335	54,576,981	711,752,718	647,762,276
Potash and potassium compounds	62,316,136	7,529,740	2,823,317	469,201	9,496,377	82,634,771	63,010,523
Salt and sodium compounds	389,297,454	31,209,681	33,990,691	6,523,231	98,596,663	559,617,720	416,390,041
Sand and gravel	17,731,676	228,986	610,639	2,154	450,748	19,024,203	17,958,795

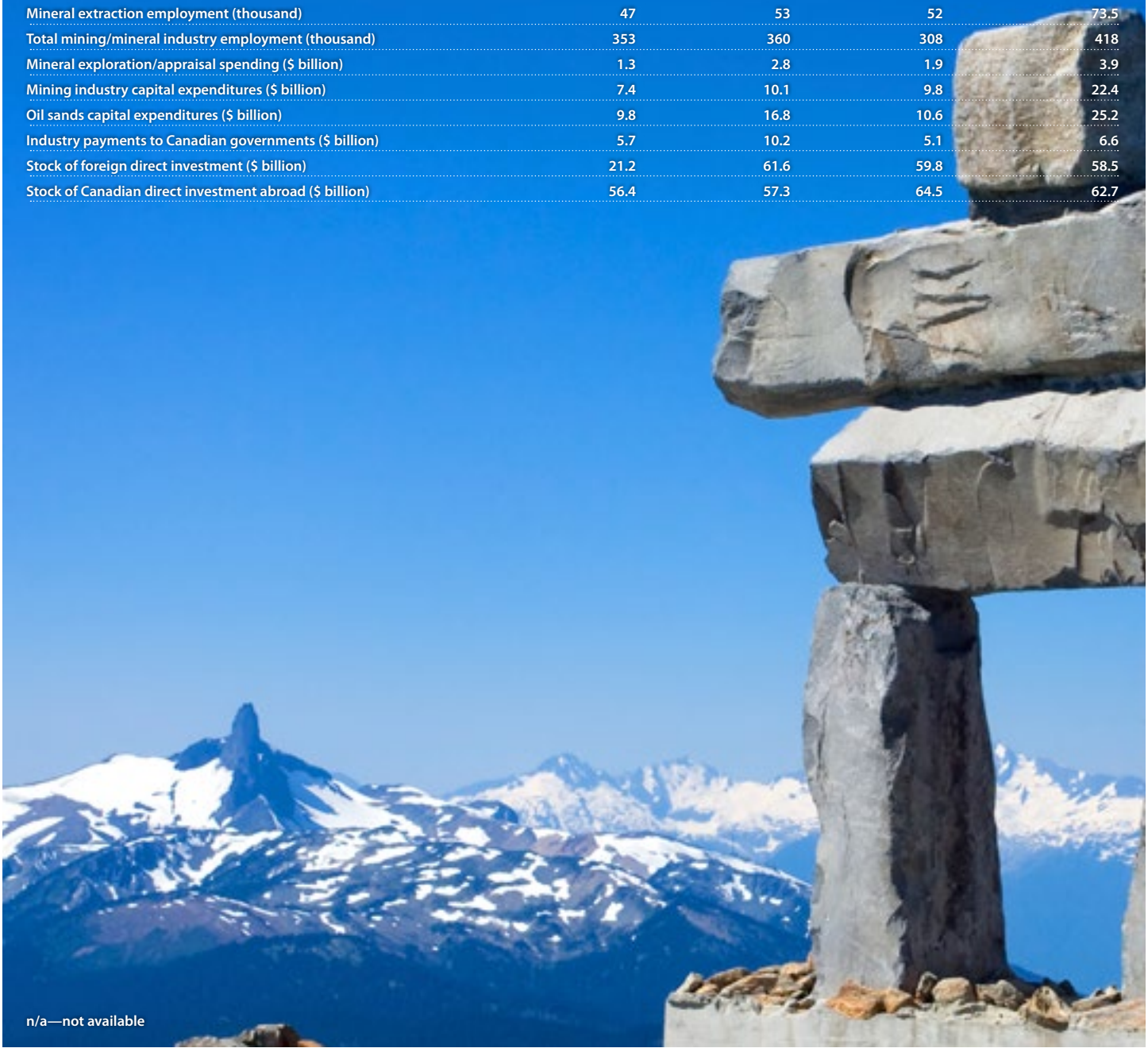
ANNEX 12
TOTAL IMPORTS OF MINERALS AND MINERAL PRODUCTS, BY COMMODITY AND COUNTRY OF ORIGIN, 2012

($)	United States	European Union	China	Japan	Other Countries	Total	TPP[1] Member Countries
Sandstone	1,864,954	328,892	154,373	—	3,363,750	5,711,969	1,864,954
Silica and silica compounds	176,077,844	16,478,973	10,402,146	2,484,074	9,210,636	214,653,673	177,378,753
Slate	2,482,641	161,517	5,840,098	—	3,297,859	11,782,115	2,499,577
Sulphur and sulphur compounds	26,962,686	912,404	714,518	17,557	124,675	28,731,840	26,969,344
Talc, soapstone and pyrophyllite	11,825,993	755,469	83,378	149,190	207,514	13,021,544	11,829,930
Titanium oxides	216,086,913	26,010,611	7,623,873	2,702,248	21,441,172	273,864,817	218,447,896
Vermiculite	1,348,922	31,218	50,652	745	1,342,166	2,773,703	1,348,922
Other nonmetals	771,794,405	70,675,566	25,711,829	9,253,763	65,734,240	943,169,803	785,643,943
Other structurals	74,335,460	19,873,027	35,366,665	3,592,442	19,107,243	152,274,837	79,227,518
TOTAL NON-METALS	**6,345,883,997**	**1,219,924,413**	**1,162,769,818**	**143,737,300**	**1,945,188,124**	**10,817,503,652**	**6,752,017,523**
MINERAL FUELS							
Coal	932,372,286	1,613,068	6,937,135	259,068	177,850,587	1,119,032,144	933,880,662
Coke	83,401,931	764,755	6,276	—	10,223,952	94,396,914	83,401,931
TOTAL MINERAL FUELS	**1,015,774,217**	**2,377,823**	**6,943,411**	**259,068**	**188,074,539**	**1,213,429,058**	**1,017,282,593**
TOTAL MINING IMPORTS	**38,297,669,036**	**6,318,536,928**	**6,872,724,394**	**1,241,292,401**	**23,128,985,289**	**75,859,208,048**	**47,665,243,227**

Sources: Natural Resouces Canada; Statistics Canada.
Notes: (-) Nil
[1] Trans-Pacific Partnership

THE CANADIAN MINING INDUSTRY AT A GLANCE

	2005	2007	2009	2012
Mining industry GDP ($ billion)	40.0	41.9	32.0	52.6
Percentage of total Canadian GDP (%)	3.8	3.4	2.7	3.4
Value of mineral production ($ billion)	27.4	40.6	32.2	46.9
Synthetic crude production value ($ billion)	9.2	18.0	n/a	38.6
Synthetic crude production (million cubic metres)	21.9	39.9	n/a	52.4
Number of mining establishments	859	766	961	1,264
Mineral extraction employment (thousand)	47	53	52	73.5
Total mining/mineral industry employment (thousand)	353	360	308	418
Mineral exploration/appraisal spending ($ billion)	1.3	2.8	1.9	3.9
Mining industry capital expenditures ($ billion)	7.4	10.1	9.8	22.4
Oil sands capital expenditures ($ billion)	9.8	16.8	10.6	25.2
Industry payments to Canadian governments ($ billion)	5.7	10.2	5.1	6.6
Stock of foreign direct investment ($ billion)	21.2	61.6	59.8	58.5
Stock of Canadian direct investment abroad ($ billion)	56.4	57.3	64.5	62.7



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