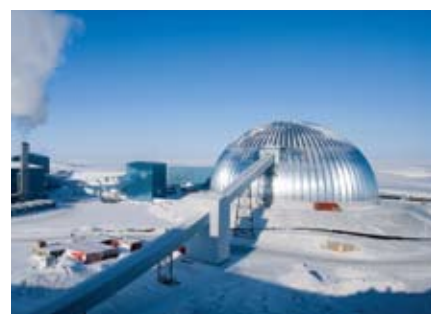


F&F 2012

FACTS & FIGURES

OF THE CANADIAN MINING INDUSTRY



The Mining Association of Canada
ADVOCACY STEWARDSHIP COLLABORATION

THE MINING ASSOCIATION OF CANADA

The Mining Association of Canada (MAC) is the national organization of the Canadian mining industry. We represent companies involved in mineral exploration, mining, smelting, refining and semi-fabrication. Our member companies account for most of Canada's output of metals and minerals.

MAC's functions include advocacy, stewardship and collaboration. Our goals are to promote the industry's interests nationally and internationally, to work with governments on policies affecting minerals, to inform the public and to encourage member firms to cooperate to solve common problems. We work closely with provincial and territorial mining associations, other industries, and environmental and community groups in Canada and around the world.



Paul Stothart
(May 17, 1957–April 17, 2012)

IN DEDICATION

Facts & Figures 2012 is dedicated to the memory of Paul Stothart. Paul was an accomplished professional who was committed to advancing the Canadian mining industry in his role as MAC's Vice-President of Economic Affairs, a position he held from 2006 until his passing in 2012. Although the scope of his work extended well beyond *Facts & Figures*, the development and production of the publication was both a joy and a passion of his.

DATA AND SOURCES

This annual report reflects currently available data, the majority from 2011, though some from prior years and some from 2012. A number of statistical differences occurred in 2002 because of a change from Standard Industrial Classification (SIC) statistics to the North American Industry Classification System (NAICS). Dollar amounts are expressed in Canadian dollars unless noted otherwise.

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Putting our economy on the road to greater growth.

2012
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Canadian mining provides the minerals that help shape fashion trends here and around the world.

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What will we find next?

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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 320,000 workers across the country in mineral extraction, smelting, fabrication and manufacturing. The industry's \$35.6 billion contribution to Canada's gross domestic product in 2011 included \$8.5 billion in mineral extraction, and over \$27 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 22.8% of the value of Canadian goods exports in 2011, 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 \$1.7 billion to \$18.7 billion each.

Canada remained the world's top destination for exploration spending in 2011, hosting 18% of global investment. Australia followed at 13%, the United States at 8% and Mexico at 6%. Canadian exploration spending is focused in many regions, with a strong interest in the North. 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, nearly 3,200 suppliers provide expertise to the industry, including hundreds of engineering, environmental, legal, financial and equipment companies. According to InfoMine, Canada has the world's second-

largest mining supply sector after the United States. Proportionally, mining is also the largest private sector employer of Aboriginal people in Canada and stands to offer more opportunities to this segment of society.

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 90% of the world's mining equity transactions in 2011, making up nearly 40% of the world's mining equity capital. 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 MAC's recent study, the industry paid governments more than \$9 billion in taxes and royalties in 2011 — up significantly (by 21%) from the year before, and edged closer to the peak of 2008. Including the fourth stage of industry activity, fabricated metal product manufacturing, would add another \$2 billion to this total.

The average weekly pay for a mining worker in 2011 was \$1,436, which surpassed the earnings of workers in forestry, manufacturing, finance and construction by 47%, 46%, 35% and 32%, respectively. The wage gap has widened in recent years, reflecting the mining industry's buoyant prices and profitability.

In 2011, Canadian mining and metals companies invested \$590 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. The industry also employs over 6,000 people in R&D. This is more than the aerospace and pharmaceutical 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 \$140 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. No doubt some of these projects may face obstacles and delays, but the figure does suggest the scale of mining-related jobs, supply contracts and tax revenues that lie ahead for Canada. 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 have remained at favourable

levels. However, recent uncertainty over the short-term global economic outlook—such as concerns over Eurozone contagion, the staying power of emerging economies, and uncertainty over the strength of the US economic recovery—has caused the buoyant mineral prices of some mined goods to decline in mid-2012.

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.

Trade and investment protectionism.

Canadian companies operate mines and exploration properties in many high-risk countries. With mineral prices generally up during the past decade, many national governments have tried to gain more mining revenues by reviewing or freezing licences, rewriting contracts or suspending the issuance of permits. So pervasive is the issue that resource nationalism remains the number one risk for mining and metals companies around the world, according to Ernst & Young's annual *Business Risks Facing Mining and Metals 2012–2013* report. The Canadian government can mitigate political risks like these by negotiating bilateral investment and trade agreements. Businesses, for their part, need to invest

in legal and financial protection to manage international operations in turbulent times.

Canadian regulatory burden. Most recently, in its 2012 budget, the federal government brought forward legislation to implement system-wide improvements designed to achieve the goal of “one project, one review” in a clearly defined time period. Uncertainty remains, however, over how some of these changes will be implemented, and how relevant federal, provincial and territorial authorities will work in partnership to enact the new legislation. Although questions concerning implementation of the new regulatory provisions remain, it is widely held that the recent changes have the potential to lead to positive improvements. To ensure these intended outcomes are achieved, officials within relevant federal, provincial and territorial government departments should work closely together, and, where applicable, with industry and stakeholders.

The human resources challenge. According to the Mining Industry Human Resources Council, one out of two current industry workers must be replaced in the next decade. This need affects high-skill areas. For example, 65% of geoscientists will reach retirement age during the next decade. The human resources challenge is greater in mining than in other sectors because the industry typically attracts fewer females, youth and minorities. Proportionally, Canada is the leading private sector employer of Aboriginal people, and therefore, 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 infrastructure investment. The mining industry is the largest customer 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. The federal government’s commitment to enact a rail-freight shipper’s right to a service level agreement (and a commercial dispute resolution mechanism should negotiations break down) is a good example of forward thinking in this regard. 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. Notably, this capital cost of \$400 million will enhance the economics of an estimated \$15 billion in mineral projects. 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



HIGHLIGHTS

Canada's mining and mineral manufacturing sector consists of different segments:

- Exploration
- Mining and quarrying
- Primary metals
- Fabricated metal products
- Non-metallic mineral products

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, consumer electronics and many other items essential to modern life.

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)

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.

THE ECONOMY

THE MINING INDUSTRY'S CONTRIBUTION TO CANADA

HIGHLIGHTS

- The mining industry contributed \$35.6 billion to Canada's GDP in 2011.
- Mineral and metal prices, despite volatility in the second half of 2011, remained at buoyant levels.
- There are mining centres in all regions of Canada, including the north, with related expertise in major cities.
- The mining industry creates jobs and economic growth in more than 115 Canadian communities.
- Canada has the world's second-largest mining supply sector.
- The industry paid \$9 billion in taxes and royalties to Canadian governments in 2011.

THE ECONOMY

THE MINING INDUSTRY'S CONTRIBUTION TO CANADA

Mining is a significant contributor to the Canadian economy. The industry not only adds considerably to the national GDP, it also drives the economic well-being of many regions and communities, including remote and northern communities. Beyond its direct economic impact, the industry 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 2011, the industry's contribution remained within this range, at 2.8%.

2011 Contribution

The extractive industry, which combines mineral extraction with oil and gas extraction, contributed \$49 billion, or almost 3.9%, to Canada's GDP in 2011 (see Figure 1). By this measure, the extractive industry is over twice as large as the agriculture sector and nine times larger than the forestry industry.

The mining industry as a whole goes beyond extraction to include mineral manufacturing. The mining industry's 2011 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): \$8.5 billion.
- **Stage 2**, primary metal manufacturing (smelting, refining, rolling, extruding, alloying and casting of primary metals): \$9.9 billion.
- **Stage 3**, non-metallic mineral product manufacturing (e.g., abrasives, lime, cement, glass, ceramics): \$5 billion.
- **Stage 4**, fabricated metal product manufacturing (e.g., forging, stamping and heat-treating to produce reinforcing

bars, fabricated wire, cutlery, tools, hardware): \$12.1 billion.

The output of these four stages in 2011 totalled \$35.6 billion. In comparison, according to Statistics Canada, the oil and gas extraction sector contributed \$40.5 billion to GDP. About 40% of that sector's total relates to oil sands, some of which could be logically classified under mineral extraction, adding upwards of an additional \$16.2 billion to the above figure.

Economic Trends

Until late 2008, the Canadian economy enjoyed more than a decade of strong growth, low inflation and low interest rates, with GDP increasing about 3% a year. The economy passed the \$1 trillion threshold in 2003 and, according to the World Bank, reached \$1.7 trillion in 2011.

However, economic growth halted from late 2008 to mid-2009 as unstable oil prices, unsound mortgages, high consumer and corporate debt, and ineffective regulation of the US financial sector triggered a global recession. In 2009, Canada's GDP declined by 2.5%. Across the economy, business capacity reached its lowest level in 27 years.

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 have remained at favourable levels. However, recent uncertainty over the short-term global economic outlook—such as concerns over Eurozone contagion, the staying power of emerging economies, and uncertainty over the strength of the US economic recovery—has caused the buoyant mineral prices of some mined goods to decline in mid-2012.

Given the growth projections for China, India and elsewhere, and assuming a positive investment environment, the Canadian mining industry should enjoy strong economic prospects in the coming decades. This optimism contrasts with some economic analysts' concerns over the US deficit and debt situation, the debt loads of certain EU countries and slowing growth in China and other emerging markets.

The possibility of a double-dip recession—a second recession in the wake of the current recovery—should not be dismissed. Another challenge that remains from the economic downturn is the significantly reduced availability of capital. Although the post-recession investment environment has tested some major companies, it has been particularly challenging for junior firms, which are a crucial segment of the Canadian mining industry. (See Section 3 for more information.)

Despite challenges, the prevailing view is that the Canadian mining sector's economic prospects will be strong for the long term. Regardless of recent concerns over the growth rates of the BRIC countries (Brazil, Russia, India, China), which have largely been considered the driving force behind global growth, it is widely held that the longer-term fundamentals are solid. This means that

growth, even if at a moderately reduced pace, is likely to remain strong over the long term.

CONTRIBUTION TO PROVINCES AND TERRITORIES

Canada's provinces and territories benefit significantly from mining operations. The industry has spurred job creation and economic growth in more than 115 rural and northern communities from coast to coast to coast. For example, the 2011 total value of mineral production in Newfoundland and Labrador reached \$5.1 billion—a sixfold increase over the last decade. Similar stories of robust growth are shared by Saskatchewan and British Columbia, whose industries have also grown exponentially over the past decade thanks to mining. Further, some 1,200 Aboriginal communities are located within 200 kilometres of mineral

properties, making mining a significant economic opportunity for this part of the population.

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 and has 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.)

"The Chinese slowdown presently does not appear to be long-term. It is a cyclical slowdown, as it is for India and Indonesia, and does not change the upward secular Asian growth trend."

—Mark Carney, Governor, Bank of Canada

Mining also has significant links 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, Inmet, Vale, Xstrata) and Montreal (ArcelorMittal, Iron Ore Company of Canada, Rio Tinto Alcan).

CANADIAN MINES IN 2011

Total mining establishments: 1,108

Metals: 68

Non-metals: 1,040

PROVINCES WITH THE MOST METAL MINES

Quebec: 21

Ontario: 18

British Columbia: 9

MAIN TYPES OF NON-METAL MINES

Sand and gravel quarries: 639

Stone quarries: 276

Peat mines: 71

Vancouver is the global centre of expertise for mineral exploration. Some 1,200 exploration companies are located in British Columbia, most in the greater Vancouver area.

Toronto is the global centre for mining finance. The Toronto Stock Exchange lists 58% 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.

Elsewhere in Canada, Montreal is home to Rio Tinto Alcan, a world expert in aluminum smelting, and the city hosts significant mining research and education facilities. The global emergence of the oil sands over the past two decades has sparked the growth of

Edmonton and Calgary. Rising uranium and potash prices have brought Saskatoon to the forefront of these industry areas.

Regional Value of Mining

Canadian mineral production increased dramatically in 2011 — by 21% — to a record high as world mineral prices went up.

Over the past decade, Saskatchewan, British Columbia and Newfoundland and Labrador have seen their share of Canada's production value grow most significantly (see Figure 4). This increase is in line with higher uranium, potash and nickel prices and production volumes. The national share of the Northwest Territories, an important diamond producer, has also risen almost threefold, but has now levelled off, reflecting production volumes and diamond prices.

A correlation exists between production values and expenditures on resource development. The top four provinces in terms of production values in 2011 — Ontario, Saskatchewan, British Columbia and Quebec — also led in expenditures on mineral resource development (see Figure 5). Of the \$10.6 billion invested in mine complex development in Canada, spending in each of these provinces neared or exceeded \$2 billion, with Saskatchewan in the lead at \$2.8 billion. This suggests that these four provinces will likely remain vital to Canada's mineral production into future decades.

VALUE OF MINING IN 2011

CANADA-WIDE: \$50.3 BILLION

TOP 4 PROVINCES

1. Ontario: \$10.6 billion

2. Saskatchewan: \$9.2 billion

3. British Columbia: \$8.5 billion

4. Quebec: \$7.7 billion



The three territories together received 22% of total 2011 Canadian spending on exploration and deposit appraisal (the first two columns of Figure 5). This amount, more than three times the territories' share of production value, reflects world interest in Canada's northern mineral potential.

Overall territorial exploration investment increased dramatically in 2011 — by 80% year over year — with Nunavut seeing the biggest share of a 87% increase over 2010 figures.

INDIRECT CONTRIBUTIONS: MINING SUPPLIERS

The mining industry's economic impact goes far beyond its direct contribution to GDP. For instance, mining accounts for more than half of Canada's rail-freight revenues and tonnage. Organizations such as CN Rail, CP Rail, the Port of Montreal and the Port of 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 2012 that 3,170 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.

Nearly 3,200 companies provide the goods and services the mining industry needs to function, thus broadening the industry's economic reach even further.

According to InfoMine, there are 82 mining supply companies in the three territories, of which the EKATI diamond mine is one

example. EKATI has awarded more than \$3.5 billion in contracts to northern and Aboriginal suppliers during its 14 years of operation in the Northwest Territories.

Section 3 of this report looks at the Canadian investment services sector as a mining supplier. During the past five years, 36% of global mining capital and over 80% of all global mining financing transactions were handled through the Toronto Stock Exchange—more than any other stock exchange in the world. Several thousand Canadian brokers, analysts, exchange workers, consultants, trade finance experts and securities lawyers benefit from the mining industry.

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

MAIN SUPPLIERS TO CANADA'S MINING INDUSTRY

- 148 exploration consulting firms and 91 geotechnical consulting firms
- 252 environmental consulting firms
- 159 management and financial firms
- 72 education and training organizations and 34 health and safety consultants
- 34 drilling contractors and 143 drilling/blasting equipment companies
- 35 mineral-processing contractors and 185 mineral-processing equipment companies
- 130 crusher/conveyor equipment companies
- 199 excavation and loading equipment companies
- 98 laboratory and appliance equipment companies

Source: InfoMine.

(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.

2011 Payments

In 2011, the mining industry, including oil sands mining, paid an estimated \$9 billion to federal and provincial/territorial governments (see Figure 6). This total consisted of:

- \$3.9 billion in royalties
- \$3.2 billion in corporate income tax
- \$1.9 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 \$2 billion to the amount industry paid governments in 2011, bringing the total to \$11 billion.

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, the payments outlined here 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.

LEADING MINING SUPPLIERS

NUMBER OF MINING SUPPLIERS IN LEADING COUNTRIES

- United States: 5,436
- Canada: 3,170
- Brazil: 3,131
- Chile: 1,847
- Australia: 1,432
- South Africa: 1,300
- Peru: 1,029
- United Kingdom: 966
- Argentina: 852
- China: 681

Source: InfoMine.

Payment Trends

The total royalties and corporate taxes paid by the industry have increased significantly post-recession. In 2009—the peak of the recession—contributions declined over 50% from an all-time high of \$10.5 billion in 2008 to \$4.9 billion. Over the last two years, however, contributions have shot up 83% from 2009 to reach \$9 billion in 2011, signalling a near

return to pre-recession levels. The movement of these figures during the global recession suggests that Canada's tax and royalty system is working as it should: payments go down during a period of recession and low mineral prices, and go up during buoyant periods.

In another notable trend, the provincial/territorial share of government payments has increased in

recent years as a result of growing royalty payments. In the oil sands, for example, many projects have repaid investors' initial capital and have now entered a higher royalty bracket. According to the ENTRANS study that provided the data in Figure 6, Alberta, Saskatchewan, Newfoundland and Labrador, the Northwest Territories and British Columbia receive particularly large portions of their government revenue from mining.

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 2012 federal budget. Both measures will positively assist financing and exploration efforts—key components for addressing Canada's declining base metal reserves.

One area where industry would like to see improvement relates to exploration and development spending near existing mines.

Expenses for exploration and development at depth (within existing underground workings) are treated less attractively than similar greenfield costs. As a result, there is less incentive for companies to develop

these expensive, yet potentially resource-rich areas.

The industry is in discussion with the federal government on this complex issue. Further, a financial incentive for

producing companies to invest in exploration (as they are not eligible for the flow-through tax credit) is desirable, especially given the increasing proportion of exploration that these companies undertake.

In 2011, the mining industry, including oil sands mining, paid an estimated \$9 billion in taxes and royalties to Canadian governments.

FIGURE 1

CANADA'S REAL GROSS DOMESTIC PRODUCT, BY INDUSTRY¹, 2006–2011

(\$ millions) ²	2006	2007	2008	2009	2010	2011
All industries	1,193,935	1,221,118	1,230,654	1,192,006	1,234,880	1,267,483
Agriculture	20,090	20,373	23,630	22,395	22,122	22,168
Fishing, hunting and trapping	1,108	1,009	1,064	1,063	1,087	1,120
Forestry and logging	5,936	5,383	4,908	4,018	4,781	5,237
Support activities for mining and oil & gas	7,924	7,139	7,597	5,372	7,449	8,564
Mining (including milling) and quarrying, and oil and gas extraction	50,022	51,339	49,365	46,265	47,509	49,088
Manufacturing	68,687	71,539	73,958	67,309	72,576	75,565
Construction	185,353	181,229	169,059	145,553	155,746	160,351
Transportation and warehousing	56,919	57,826	58,062	55,230	57,645	59,855
Information and cultural industries	43,849	44,921	45,270	45,052	45,311	45,847
Electric power, gas and water utilities	30,090	31,453	32,871	31,977	32,412	33,765
Trade, wholesale	67,628	70,981	70,592	66,025	69,911	72,015
Trade, retail	68,957	71,811	73,409	72,937	75,963	77,793
Finance and insurance	75,719	78,784	79,531	80,022	82,216	83,912
Real estate and rental and leasing	148,061	152,872	157,154	160,975	165,364	170,422
Community, business and personal services	285,822	294,604	301,460	302,187	307,296	313,167
Public administration	67,352	69,014	71,330	73,638	75,295	76,272

Source: Statistics Canada, National Economic Accounts, CANSIM Table 379-0027 and Catalogue no. 15-001-X.

¹ At basic prices in 2002 constant dollars.

² In all figures, dollar amounts are expressed in Canadian dollars unless noted otherwise.

FIGURE 2

GROSS DOMESTIC PRODUCT¹ - MINING AND MINERAL MANUFACTURING, 2006–2011

(\$ millions)	2006	2007	2008	2009	2010	2011
Metal mines	3,772	3,625	3,722	3,035	3,226	3,476
Non-metal mines	4,089	4,737	4,498	3,405	4,056	4,147
Coal mines	851	820	865	780	895	888
Total Mining	8,712	9,182	9,085	7,220	8,177	8,511
Primary Metal manufacturing	11,875	11,590	11,487	8,392	9,512	9,911
Fabricated Metal Product Manufacturing	14,055	14,078	12,841	10,653	11,455	12,162
Non-Metallic Mineral Product Manufacturing	5,863	5,937	5,532	4,478	4,956	5,053
Total Mineral Manufacturing	31,793	31,605	29,860	23,523	25,923	27,126
Oil and gas extraction	41,310	42,157	40,280	39,045	39,332	40,577
Petroleum and Coal Products Manufacturing	3,287	3,396	3,312	3,286	3,353	3,217
Support activities for mining and oil & gas	7,924	7,139	7,597	5,372	7,449	8,564
Total	93,026	93,479	90,134	78,446	84,234	87,995

Source: Statistics Canada, National Economic Accounts, CANSIM Table 379-0027 and Catalogue no. 15-001-X.

¹ At basic prices in constant 2002 dollars.

FIGURE 3

CANADIAN MINING INDUSTRY CLUSTERS

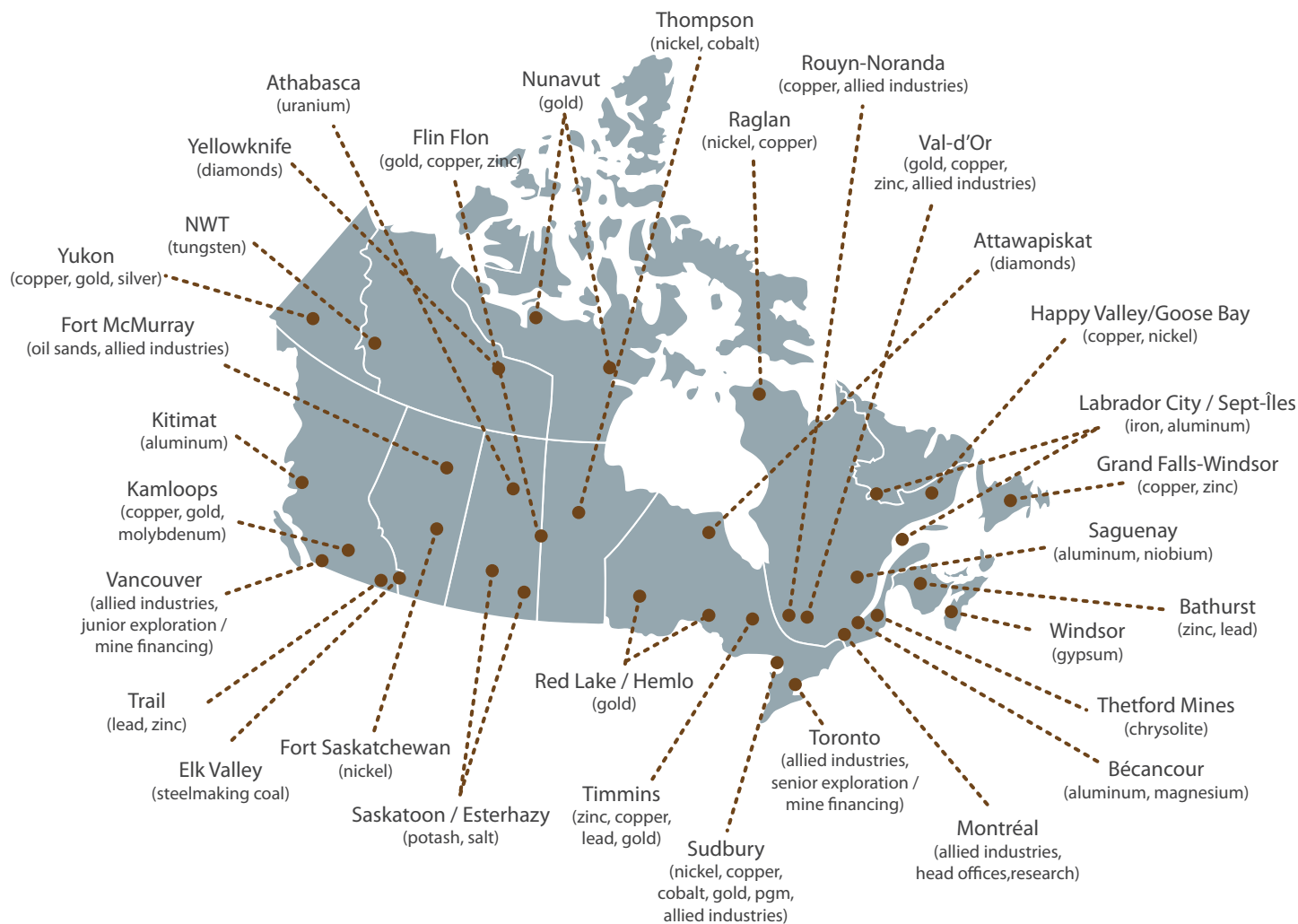


FIGURE 4

VALUE OF CANADIAN MINERAL PRODUCTION BY PROVINCE AND TERRITORY¹, 2001 & 2011

(\$ millions)	2001 (\$ millions)	2001 (%)	2001 RANK	2011 (\$ millions)	2011 (%)	2011 RANK
Ontario	5,635	28.7	1	10,663	21.2	1
Saskatchewan	2,457	12.5	4	9,214	18.3	2
British Columbia	2,867	14.6	3	8,592	17.1	3
Quebec	3,604	18.4	2	7,750	15.4	4
Newfoundland and Labrador	863	4.4	7	5,190	10.3	5
Alberta	1,057	5.4	5	2,587	5.1	6
Northwest Territories	779	4.0	9	2,144	4.3	7
Manitoba	885	4.5	6	1,835	3.6	8
New Brunswick	807	4.1	8	1,308	2.6	9
Nunavut	321	1.6	10	414	0.8	10
Yukon	41	0.2	12	402	0.8	11
Nova Scotia	285	1.5	11	247	0.5	12
Prince Edward Island	4	...	13	3	...	13
Total Canada	19,604	100.0		50,348	100.0	

Sources: Natural Resources Canada; Statistics Canada.

Note: Numbers may not add to totals due to rounding.

¹ This table includes the production of coal but excludes the production of petroleum and natural gas.

^p Preliminary

... Amount is too small to be expressed.

FIGURE 5

TOTAL CAPITAL EXPENDITURES¹ FOR MINERAL RESOURCE DEVELOPMENT, BY PROVINCE AND TERRITORY, 2011^P (CDN \$)

Province/Territory	Exploration	Deposit Appraisal	Mine Complex Development	Total Expenditures
Newfoundland and Labrador	114,839,097	57,851,146	600,376,420	773,066,663
Nova Scotia	7,951,682	4,775,078	13,245,643	25,972,403
New Brunswick	13,253,193	11,983,043	368,144,612	393,380,848
Quebec	384,224,448	384,546,356	1,851,804,711	2,620,575,515
Ontario	593,262,433	485,946,249	2,091,382,061	3,170,590,743
Manitoba	91,265,332	19,397,400	298,909,429	409,572,161
Saskatchewan	224,179,092	382,272,993	2,802,742,746	3,409,194,831
Alberta	19,658,683	45,586,000	144,671,627	209,916,310
British Columbia	338,368,581	230,654,316	1,906,094,119	2,475,117,016
Yukon	233,034,850	79,011,851	80,590,858	392,637,559
Northwest Territories	43,785,596	64,365,143	330,921,167	439,071,906
Nunavut	322,166,620	236,317,280	118,497,065	676,980,965
CANADA	2,385,989,607	2,002,706,855	10,607,380,458	14,996,076,921

Source: Natural Resources Canada, based on the federal-provincial/territorial Survey of Mineral Exploration, Deposit Appraisal and Mine Complex Development Expenditures.

¹ 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. Also includes machinery and equipment and non-residential construction.

^P Preliminary

FIGURE 6

DIRECT REVENUES TO CANADIAN GOVERNMENTS FROM THE MINERAL SECTOR, 2002–2011

Revenues (\$ millions)	2002	2005	2008	2009	2010	2011	Total
Royalties/Mining Taxes	570	1,576	5,279	2,187	3,176	3,889	25,206
Corporate Income Tax	1,380	2,393	3,204	1,083	2,408	3,189	25,591
Personal Income Tax	1,733	1,731	2,047	1,687	1,870	1,966	18,252
TOTAL	3,683	5,700	10,529	4,951	7,454	9,044	69,049
-of which federal	2,244	2,799	3,547	1,905	2,931	3,420	29,927
-of which provincial	1,439	2,901	6,982	3,046	4,523	5,624	39,091
-percent share (%)	39.1	50.9	66.3	61.5	60.6	62.1	56.6

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

HIGHLIGHTS

- Canada ranks among the top five countries in the global production of 11 minerals and metals.
- The value of Canada's mineral production rose sharply in 2011 (by 21%), reaching \$50.3 billion.
- The development of the oil sands continues to be one of the world's biggest economic stories.
- Canada has 30 non-ferrous smelters and refineries operating in six provinces.
- The mining industry and Canada's rail system have an important relationship—the industry provided 54% of rail-freight revenues in 2011.
- The mining industry is a major contributor to the St. Lawrence Seaway and other Canadian ports.

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

Being 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 and cobalt
- Third in aluminum, titanium, platinum, tungsten and sulphur
- Fourth in diamonds and nickel
- Fifth in chrysolite

Canada no longer holds a top five position in the production of gold, silver, zinc, copper, molybdenum or lead, 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

The value of Canadian mineral production rose in 2011, increasing 21% to reach a record \$50.3 billion (see Figure 7). Metal production continued to rise in 2011, increasing by an additional 18% over 2010 levels. This is a notable increase beyond the nearly two-thirds jump in production from the recession-level value of 2009. The increase in the non-metal production value of 22% is comparable. Totalling \$25.3 billion and \$18.0 billion for metal and non-metal respectively,

the 2011 total marks the second highest production value of the decade, second only to pre-recession peaks. The non-metal sector, which grew dramatically in 2008 thanks to buoyant potash markets, remained strong in 2011. The value of coal production has followed suit, spurred by rising energy prices and strong Asian demand, and has stimulated investment in new coal mines in British Columbia and Nova Scotia.

CANADIAN MINERAL PRODUCTION IN 2011

Metals: \$25.3 billion
Non-Metals: \$18.0 billion
Coal: \$7.0 billion

TOTAL: \$50.3 BILLION

Canada's top 10 minerals and metals (see Figure 8) each had production values of more than \$1.5 billion in 2011, with six (potash, coal, iron ore, gold, copper and nickel) over \$4 billion. Nickel and potash showed the greatest value increases in the past year, alongside strong growth in copper, nickel and diamonds (details in Annex 5). Together, the top 10 minerals and metals represented \$42.4 billion in 2011—84% of Canada's total mineral production value.

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

Uranium

The medium and long-term outlooks for uranium and nuclear energy have decreased in Europe and Japan, but remain strong elsewhere in the world.

Japan's tragic tsunami in March 2011, and the resulting damage to nuclear reactors, cast a negative light on nuclear energy in several jurisdictions. Germany has revised its outlook to reflect a phase-out of all nuclear power by 2025, while Japan, Switzerland and Italy reversed course on previously planned expansions. Many countries—particularly in the OECD group—are now under political and environmental pressure to shift away from nuclear power toward wind, solar and other energy forms, to the extent that these can meet capacity needs.

Global demand for uranium, however, has increased in recent years, as countries have embarked on new nuclear energy programs or expanded existing ones. Estimates from the Ux Consulting Company (UxC) suggest that 260 new reactors could be built worldwide by 2030. As a result, UxC predicts that global uranium demand could grow by 80% over the next 20 years. The 2011 World Energy Outlook predicts that nuclear energy will retain its global share of electricity generation until 2035. This outlook is shared by the U.S. Energy Information Administration projecting expansion of nuclear power to continue in the non-OECD region as a whole, with total nuclear capacity more than quadrupling over the same time period.

Nuclear power capacity increases over the medium term are forecast to expand by 109 gigawatts in China, 41 gigawatts in India and 28 gigawatts in Russia. This trend is reinforced by concern over air pollution, greenhouse gas emissions associated with fossil-fuel combustion, and energy security – thus increasing global demand for uranium.

NUCLEAR ENERGY PROJECTIONS

- China foresees a sixfold increase in nuclear energy capacity by 2020.
- Russia expects to add 2–3 gigawatts of nuclear power a year until 2030.
- United States has proposed 20 new reactors, extended licences of about 40 existing ones, and approved 140 “uprates” (power output increases) in recent decades.

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.

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 crude oil prices that rocketed from \$20 a barrel in the 1990s to \$140 in mid-2008 (and \$100 in 2011), made the oil sands economically viable and boosted production to over a million barrels a day. The oil sands have increased wealth and economic activity in western Canada and have created 200,000 jobs, helping to offset jobs lost in manufacturing. The population of Fort McMurray, the hub of oil sands activity, has grown from 6,000 in 1968 to 80,000 today.

Synthetic crude oil accounted for nearly 29% of Canada's crude oil production volume (32% by value) in 2011, up from 15% a decade earlier (see Figure 9). The absolute value of this increase is considerable: from \$5 billion in 2000 to \$30.9 billion in 2011,



up 34% from \$23 billion in 2010. All of this production is from Alberta, though reserves in Saskatchewan are now attracting interest.

Oil sands operating costs run \$40 to \$50 per barrel, so in late 2008, when oil prices plunged from \$140 to about \$40 per barrel, the impacts were severe. Expansion projects were delayed or shelved, jobs were lost, government revenues fell and 1.2 million barrels a day in future projects were deferred. However, growth and investment returned through mid-2009 as oil prices rebounded to \$70 and then to \$100 in mid-2011.

Before the late-2008 downturn, around \$100 billion in oil sands investment was expected over the next 15 years, some 40% of it for mining and 60% for in-situ projects. Recent forecasts project an increase in production of oil sands operations to 5 million barrels a day by 2030—a 210% increase over 2011 production levels. Given the forecast production ramp-up, comparable investments in oil sands development are anticipated, given the appropriate investment and regulatory environments.

Although most of Canada's oil sands output is currently exported to the United States, future customers could include Asian countries. Enbridge has proposed a dual pipeline between Edmonton, Alberta and Kitimat, British Columbia, that could move half a million barrels a day to Asian, especially Chinese, markets.

Chinese entities have recently invested in the oil sands, including a \$5 billion investment in Syncrude and the mid-2011 purchase of Opti Canada for \$2 billion. Most recently, the China National Offshore Oil Corporation (CNOOC) bid \$15 billion to purchase Alberta-based Nexen Inc.—undecided at the time of writing. Recent reports indicate that 84% of the world's remaining oil reserves are either state-owned or controlled. Given that 62% of

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 1.61 million barrels a day at present to 5.02 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.



the freely accessible remaining stock resides in Canada's oil sands, an increase in foreign direct investment in this sector is expected in the coming years—especially from China.

The future of Asian countries as customers assumes that the environmental and related challenges surrounding oil sands development can be overcome. These issues, which are attracting wide public and political attention, are discussed in Section 5 of this report.

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 International Grains Council, available global stocks of wheat and maize are forecast to be below expected volumes into 2013. The lack of available grains comes as a result of drought conditions. This short-term outlook compounds longer-term projections placing global demand for grain up 2% a year—largely to feed animals—while actual acreage under cultivation is going down. These trends, in addition to speculation that global population will reach 8.2 billion by 2030, indicate that fertilizer made from potash will play an even greater role by increasing crop yields.

Potash prices and values have followed a turbulent path in recent years. Although prices will likely increase over the long term, driven

by changing diets and agricultural practices in China and India, these countries will also try to keep prices in check. New supply from BHP Billiton and Vale could also serve to dampen prices.

Saskatchewan remains a world leader in potash. In 2011, it continued to be the world's largest producer and exporter of potash, providing almost 30% of global supply. This position will likely be reinforced by the emergence of BHP Billiton as a major player in the province, with investments in its Jansen Potash Project exceeding \$1 billion in mid-2011. The company is expected to invest significantly in the province's potash industry over the coming years, given the appropriate investment and regulatory environment.

Diamonds

It has been a challenging year in the diamond market, with prices for rough stones dropping about 20%. Some analysts, however, suggest that a turnaround may be in sight.

The investment conditions surrounding the diamond industry, both at home and internationally, are closely linked to the state of the economy. For example, the last recession saw demand for luxury goods contract, triggering a 40–50% drop in rough diamond prices. As a result, temporary mine closures occurred in most major diamond-producing countries in 2009, including Canada (Snap Lake and Diavik).

Global diamond jewellery sales, however, continue to grow, having increased threefold in the past 25 years, and being currently valued in excess of US\$72 billion annually. Given the long-term economic projections for China, India and other emerging markets, with rapidly expanding middle classes, these trends are likely to continue.

Canada has charted a particularly interesting course in diamonds, moving from zero production value to being the world’s third-ranked producer in a span of 13 years. During this period, the Diavik and EKATI diamond mines (NWT) and two new De Beers mines, Snap Lake (NWT) and Victor (Ontario), all entered production.

PROCESSING OF MINERALS

Canada has a large mineral-processing industry, with 30 non-ferrous metal smelters and refineries 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.

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, production volumes of refined lead and aluminum have held steady or increased while those of copper and zinc have decreased (see Figure 11). Refined

nickel production increased between 2006 and 2008 with the opening of the Voisey’s Bay mine, but declined in 2009 as a major strike at Vale took effect. Production of refined nickel augmented in 2011, returning to near pre-recessionary levels.

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 conversion facility, 2 processing plants
- **Manitoba:** 1 smelter/refinery
- **Alberta:** 1 refinery
- **British Columbia:** 2 smelters, 1 smelter/refinery, 2 processing plants

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 therefore 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.

The domestic investment environment for some minerals, however, remains quite strong. For example, Cliffs Natural Resources announced plans to build a \$1.8 billion chromite-processing facility near Capreol, north of Sudbury. The move is expected to employ 450 people during the smelter’s construction, and as many as 450 people when the facility is in operation.

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 processing capacity and competing fiercely for raw materials. Further, the age of some Canadian processing operations, and their ability to meet potential regulatory requirements, also impacts viability. For instance, Hudbay Minerals closed its 80-year-old copper smelter in Manitoba in mid-2010. Canadian industry risks being left behind if strategic actions are not taken to ensure its longevity in the face of these combined factors.

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 customer by industry for Canada's transportation sector, providing it with considerable tonnage, especially in select bulk commodities such as iron ore, coal, potash and sulphur.

On a global level, the price of oil greatly affects the volume of freight carried by the world transportation system. Despite the post-recessionary decrease in shipping rates, if oil prices rise in the coming years, this variable could change investment and global shipping patterns for mining and other industries. As noted by economist Jeff Rubin, the cost of shipping a container from Shanghai quadrupled to \$8,000 over the past eight years, and would reach \$15,000 in a \$200-per-barrel oil scenario, thus diminishing the business case behind investment in China.

It is interesting to note that Vale has contracted for 19 new ships which, when commissioned, will mainly transport Brazilian

iron ore to China. Vale hopes to gain an advantage over competing firms by better controlling future freight costs.

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 2011, shipments of coal and processed minerals represented 54% of total Canadian rail-freight revenue (see Figure 12). In terms of volume, rail remained dependent on mining in 2011, with 48% of its commodity volume coming from mining.

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.

Canada's rail freight system operates primarily as a dual monopoly, shared by Canadian National and Canadian Pacific—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.

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

1. Minerals and metals: 48%
2. Grain: 13%
3. Forest products: 11%
4. Chemicals: 5%

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

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 problems, examine best practices and recommend commercial, regulatory or other remedies to improve service. MAC was pleased with the review panel's recommendations and the federal government's commitment to table legislation to enact a shipper's right to a service level agreement and a commercial dispute resolution mechanism (should negotiations break down). The government concluded its legislative consultations in July 2012, in which MAC participated both as an individual association and as a member of a broader group of shippers. MAC will continue to advocate for these changes throughout the legislative process.

Some mining companies are in periodic dialogue with the government about the legislation and processes concerning transportation of dangerous goods. The companies' intent is to ensure that these products can move safely and efficiently into and out of mining facilities.

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% (\$15 billion) of which was base metals and articles of base metal. Trucks carried \$228 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

The mining industry is a major contributor to Canada's St. Lawrence Seaway. According to the 2011 *Traffic Report*, prepared jointly by the Seaway's management and development corporations, shipments of iron ore, coke and coal represented nearly 40% of total Seaway traffic in 2011. Other mine products (mainly salt) contributed a further 12%.

Mining is also a leading customer of Canadian ports. Mineral products are most important in the St. Lawrence and Great Lakes marine regions and least important in the Atlantic region.

The Port of Montreal handles large volumes of iron ore, copper ore, gypsum and zinc ore. Generally, these arrive by ship as inbound cargo and are then transported by rail or truck to the region's copper and zinc smelting and refining facilities.

Coal accounts for 39% of the total volume handled at the Port of Vancouver, which moves shipments to China, Japan and other Asian markets. Fertilizer/potash represents another 12% of the port's volume, and



minerals and ores 9%. The volumes of coal and potash handled by the port grew by 8% and 15% respectively in 2011.

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 will take effect on January 1, 2013, and have broadened the definition of garbage to include the prohibition of any amount of certain mined products from entering the ocean. Although industry welcomes the environmental improvement, the narrow timeline for implementation raises concern about potential interruption to trade.

Air

Gold and precious metals, because of their high value and low volume, are potentially suitable for transport by air. According to *Transportation in Canada* (2009), Canada exported \$40 billion worth of products by air that year, \$9 billion of which was gold and

precious metals. The same year, Canada imported \$54 billion by air, \$7.5 billion of which was gold and precious metals. Of all traded products, only the machinery sector used air transportation more.

The 2010 and 2011 editions of *Transportation in Canada* do not report any significant precious metal shipments. This suggests either that they were a one-time occurrence or that air cargo reporting practices have changed.

FIGURE 7

VALUE OF CANADIAN MINERAL PRODUCTION, 2006–2011^P

(\$ billions)	2006	2007	2008	2009	2010	2011 ^P
Metals	21.1	26.2	22.6	15.5	21.4	25.3
Non-metals	10.3	11.6	19.4	11.6	14.7	18.0
Coal	2.9	2.7	5.0	4.4	5.5	7.0
Total	34.2	40.6	47.0	31.4	41.6	50.3

Sources: Natural Resources Canada; Statistics Canada, Catalogue no. 26-202 XIB.

Notes: This table excludes petroleum and natural gas. Numbers may not add to totals due to rounding.

^P Preliminary

FIGURE 8

CANADA'S TOP TEN METALLIC AND NON-METALLIC MINERAL PRODUCTS¹ BY VALUE OF PRODUCTION, 2001 AND 2011^P

Unit of Measure		2001		2011	
		Quantity (millions)	\$ Value (millions)	Quantity (millions)	\$ Value (millions)
Potash (K2O) ²	t	8.2	1,617	11.0	7,973
Coal	t	70.4	1,624	66.7	7,050
Iron ore	t	27.1	1,189	33.8	5,329
Nickel	kg	84.3	1,777	212.1	5,087
Copper	kg	614.3	1,535	551.1	5,012
Gold	g	158.9	2,135	98.2	4,741
Diamonds	ct	3.7	718	10.8	2,523
Cement ³	t	13.0	1,348	12.0	1,592
Sand and Gravel	t	236.5	1,062	207.0	1,544
Stone	t	124.8	957	167.7	1,521

Sources: Natural Resources Canada; Statistics Canada, Catalogue no. 26-202-X.

Note: Data include shipments by producers regardless of their industrial classification.

¹ Includes coal, as a mineral fuel.

² Shipments of potash to Canadian potassium sulphate plants are not included in this table.

³ Includes exported clinker minus imported clinker.

^P Preliminary

FIGURE 9

ALBERTA AND CANADA – PRODUCTION OF SYNTHETIC CRUDE OIL BY OIL SANDS MINING PLANTS BY QUANTITY AND VALUE, 1998-2011

	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
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

Source: Statistics Canada.

FIGURE 10

NON-FERROUS SMELTERS AND REFINERIES, 2011¹

Owner	Operation	Type of facility	Location	Outputs
New Brunswick				
Xstrata Zinc Canada (Brunswick)	Brunswick	(Sm.)	Belledune	Pb, Bi, PM
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, PM
Xstrata Zinc Canada	General Smelting Company of Canada	(Sec. Sm.)	Lachine	Recycled Pb
Xstrata Zinc Canada/Noranda	Canadian Electrolytic	(Ref.)	Valleyfield	Zn, Cd, S*
Income Fund (Canadian Electrolytic Zinc Limited - CEZinc)	Zinc Limited (CEZinc)			
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
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

FIGURE 10 (CONTINUED)
NON-FERROUS SMELTERS AND REFINERIES, 2011¹

Owner	Operation	Type of facility	Location	Outputs
Aleris International, Inc.	Mississauga	(Sec. Sm.)	Mississauga	Recycled Zn
Xstrata Nickel Canada	Sudbury	(Sm.), (Pl.)	Sudbury	Ni-Cu, Co, Au, Ag, PGM
Manitoba				
Vale	Manitoba	(Sm.), (Ref.)	Thompson	Ni, Co oxide, PM
Alberta				
Sherritt International Corporation/General Nickel Company S.A.	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, PM, S*

Source: Natural Resources Canada, Map 900A.

¹ In operation as of December 31, 2011.

(Sm.) Smelter

(Ref.) Refinery

(Sec. Sm.) Secondary smelter

(Pl.) Plant

(Con. Fac.) Conversion facility

S* Sulphuric acid

FIGURE 11

CANADIAN PRODUCTION OF SELECTED REFINED METALS, 2005–2011^P

Metals	2005	2006	2007	2008	2009	2010	2011 ^p
Aluminum	2,894,204	3,051,128	3,082,625	3,120,148	3,030,269	2,963,210*	2,987,964
Cadmium	1,727	2,090	1,388	1,409	1,299	1,357*	1,203
Cobalt	4,618	4,555	4,883	4,899	4,358	3,682	5,261
Copper	515,223	500,463	453,453	442,050	335,052	315,636	249,589
Lead	230,237	250,464	236,688	259,094	258,854	273,017	278,973
Nickel	139,683	146,899	153,647	167,732	116,909	98,718	141,727
Zinc	724,035	824,464	802,103	764,310	685,504	693,014	658,518

Sources: Natural Resources Canada; Statistics Canada, Catalogue no. 26-202-X.

^p Preliminary

* Preliminary value

FIGURE 12

CRUDE MINERALS AND PROCESSED MINERAL PRODUCTS TRANSPORTED BY CANADIAN RAILWAYS, 2006–2011

(MILLION TONNES)	2006	2007	2008	2009	2010	2011
Total Revenue Freight ¹	258.7	255.7	244.4	212.9	235.4	250.3
Total Crude Minerals	108.0	112.0	111.9	85.0	79.9	84.5
Total Processed Mineral Products	27.9	27.7	27.6	21.7	52.4	51.4
Total Crude and Processed Minerals	135.9	139.8	139.4	106.7	132.3	135.9
(%)						
Crude Minerals and Processed Mineral Products as a Percentage of Revenue Freight	52.5	54.7	57.1	50.1	56.2	54.3

Source: Statistics Canada, Catalogue no. 52-001-XIE.

Notes: Total crude minerals include coal, but not oil and gas. Numbers may not add due to rounding.

¹ Revenue freight refers to a local or interline shipment from which earnings accrue to a carrier.

THE MONEY

RESERVES, PRICES, FINANCING, EXPLORATION AND INVESTMENT

HIGHLIGHTS

- Canadian mineral reserves are at relatively low levels despite modest reserve increases in a few metals.
- World mineral prices remain buoyant compared to a decade ago, despite volatility for certain minerals and metals.
- The Toronto Stock Exchange (TSX) and the TSX Venture Exchange, the top destinations for mining finance, handled 90% of the world's public mining financings in 2011.
- Spending on mining exploration in Canada increased by 41% in 2011.
- The coming decade could bring an estimated \$140 billion worth of new mining projects in Canada.
- Governments must make lasting investments in geoscience and mapping in Canada.

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. Government investments in geological mapping are closely linked to mineral exploration and, therefore, to reserve levels.

CANADIAN RESERVES

Sustained and effective exploration is needed to prevent Canadian mineral production from outstripping reserve additions. It is necessary to prevent Canada's smelters and refiners from being forced to rely on imported raw materials, which would place the domestic mining industry at risk both competitively and strategically.

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 60% over 2009) to levels not seen since 1995. Copper reserves for the same year, despite significant decline over the long term, were up 21% 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, and the accompanying consequences if not reversed, remains unabated.

Exploration investment, which had reached historically high levels in Canada before the economic downturn, increased significantly in 2011 for the second consecutive year. Canada also remained the world's leading jurisdiction for mineral exploration investment. This trend, based on preliminary indications that exploration investment will surpass the \$4 billion mark in 2012, is hopeful for the future.

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. Essential to these efforts is renewed and reliable funding for geological mapping, particularly in northern Canada, and a long-term commitment to important financial incentives such as the Mineral Exploration Tax Credit. To ensure the Canadian mining industry maintains its competitive advantage in this crucial area, the federal government should continue to strengthen policies that foster exploration

spending and capital investment in new mines, and enhance and develop those that support expansions and modernizations 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 US and Chinese economies. China, in particular, imports more than \$100 billion in metals a year and buys some 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.

Post-recession, global economic demand has largely been driven by China, while recovery in the United States and Europe remains sluggish. As a result, companies in many sectors beyond mining (automobiles, pharmaceuticals, electronics, lumber) are seeing a larger percentage of their profitability come from Chinese sales. The high-profile debt situations facing the United States and the European Union exacerbate growth challenges in those regions, and remain a central challenge to overall global economic recovery.

Figure 14 illustrates the strong growth in mineral prices from 2000 to 2007, the dramatic decline for most metals in late 2008 and the strong rebound of prices through 2011. It also illustrates the slight decline of aluminum, copper, uranium and zinc prices, and the sharp retreat of the price of nickel into September 2012.

The consensus is that mineral prices should stay strong over the medium to long term.

Rising incomes and increased prosperity in developing countries associated with industrialization and urbanization will continue to drive demand for mining products. 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 an extended boom in commodity prices, even if there is volatility along the way.

Another factor influencing these projections is China's per capita consumption of goods relative to developed Asian and Western economies. Recent 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. Similarly, there are 76 personal computers per 100 people in the United States, versus four in China. Though not definitive benchmarks of China's economic

COMMODITY-SPECIFIC PRICE TRENDS

- **Gold.** Although most demand relates to jewellery, gold also serves as a store of wealth. Prices are being driven by geopolitical uncertainties. These include the debt crisis facing the United States, some EU countries and the political situation in the Middle East and North Africa. Gold prices have rallied for 11 consecutive years and continued to rise throughout the 2009 recession and the 2011 debt crises. Prices reached US\$1,923 an ounce in September 2011 and, despite a slight retreat, have remained at historically high levels well into 2012. Recently, a Deutsche Bank report forecast China surpassing India to become the number one global gold consumer in 2012—a trend likely to continue increasing demand for this precious metal.

COMMODITY-SPECIFIC PRICE TRENDS (CONTINUED)

- Copper.** This remains a bellwether commodity, with demand tied to economic growth and consumption of wire, piping, electronics and vehicles. Analysts are closely watching copper, particularly to see whether the near 60% price increase since 2009 is sustainable. Into September 2012, copper remained buoyant despite price fluctuations during the previous 18 months of as much as 11% month over month.
- Uranium.** Spot prices reached US\$136 a pound in 2007 (up from US\$8 in 2000), driven by global demand and production difficulties in Australia. Prices fell during the first half of 2008 but have settled at around US\$50, which is still six times higher than a decade ago. The enduring strength of uranium prices is likely to persist as forecasts indicate significant increases in the number of nuclear power facilities coming online through 2035. As a result, exploration interest in Saskatchewan and other regions, including Argentina and Peru, has ramped up.
- Iron ore.** Prices for this commodity 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 12-fold over the past decade, and, despite volatility and declines from record highs, remain reasonably strong. Prices slumped 42% from a high in April 2012 to a three-year low of \$87 per metric tonne, only to rebound to \$110 per metric tonne in September 2012 as Chinese investors anticipated domestic stimulus measures to increase the demand for steel. 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.
- Metallurgical coal.** Chinese demand for steel has also driven metallurgical coal prices, which have tripled over the past decade. But the linkage to the Chinese steel market has also brought demand-side fluctuations. Despite some bullish forecasts of prices jumping 50% in 2012, by the end of August, prices fell 16% amid slowing steel output in China and the European Union. Recent Chinese stimulus measures, however, have resulted in short-term forecast prices surging to \$220 per metric tonne in 2013.
- Potash.** Index Mundi reported a potash price of \$464 per metric tonne in September 2012, up 37% from the same month in 2010. Canada Potash Corporation—the world's largest supplier of potash—has stated that 2012 should be a record year for global potash fertilizer consumption, driven by growth in Chinese, Brazilian and Southeast Asian markets. However, a delay in new supply deals between Canpotex—the offshore sales arm of PotashCorp—and key export markets in China and India, has caused potash supplies to swell with producer-level inventories, which now stand 39% above the previous five-year average. With new supply contracts not yet in place, analysts will be watching this situation closely.



development, overall Chinese consumption is poised to increase significantly.

Supply-side factors may be poised to affect mineral prices as well. Resource nationalism remained the number one threat to miners in 2012, presenting challenges that may affect market prices as certain governments seek to increase royalty rates. (See Section 6 of this report for more information.)

The challenge of translating new discoveries into commercial production is an additional supply-side variable that may result in demand-driven mineral price increases.

HIGHER PRICES, HIGHER PROFITS?

Other factors beyond supply and demand are playing larger roles for some mined products in certain jurisdictions. The price of nickel, for example, has tripled its value over the past decade, settling at \$17.7 per kilotonne in September 2012, even after a significant price decline over the summer. Despite such volatility, this seems like a good news story. However, when increases in production input costs are factored in—such as oil (up 349%) and coal (up 296%)—the story changes. In Canada, when additional labour costs (up 26%), the consumer price index (up 25%) and dollar value (up 56%) are also factored in, the reality becomes clearer: higher prices do not necessarily equal higher profits.

For example, the consequence of under-investment in new copper mine capacity in the 1990s tests how future global demand will be met. Anglo American's CEO has estimated that 20 new world-scale copper mines are needed to fill projected demand.

The ability to finance exploration projects and mine development also has a direct impact on the industry's ability to meet demand. One of the reasons for Canada's success in the industry globally is the competitive edge that our mineral financing sector offers to both miners and explorers.

FINANCING

Canada is the leading global centre for mining finance. The Toronto Stock Exchange (TSX) is home to 58% of the world's public mining companies and traded more than \$450 billion of mining stock in 2011. TSX mining companies mainly deal in gold, potash, uranium, copper, silver, nickel, iron ore, coal and diamonds.

Of the senior firms listed on the TSX, 371 are mining companies. These firms together, valued at \$398.4 billion, raised \$6.6 billion in 2011. Nine of them—Barrick, PotashCorp, Goldcorp, Teck, Newcrest, Kinross, Agrium, Silver Wheaton and Yamana Gold—are valued at over \$10 billion each.

The TSX is also home to the Venture Exchange, which gives emerging companies efficient access to capital while offering



investors a regulated market for venture investments. The 1,275 mining companies listed on the Venture Exchange in 2011 were valued at \$28 billion, and together they raised \$5.9 billion in equity capital in the same year—just under half of the overall total of equity raised. All told, mining companies listed on both the TSX and Venture Exchanges raised \$12.5 billion in equity capital in 2011.

Companies listing on the TSX must meet National Instrument 43–101, a disclosure standard increasingly seen as the global benchmark for mining disclosure.

Global Financing

The mining industry raised \$31.7 billion in equity worldwide in 2011 (see Figure 15), less than half the amount in 2009. This decline mainly 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 remained.

Despite the global capital crunch, the TSX maintained its leadership as the leading destination for financing international mining projects. Over the past decade, up to and including 2011, the TSX and TSX Venture have transacted over 80% of global mining equity financings, which together account for over one-third of total global equity raised for

the same period—more than \$105 billion. In 2011 alone, 90% of all global mining equity financings were done on the TSX and TSX Venture exchanges, and together these comprised 39% of the equity capital raised globally for the same year (see Figure 16).

London, the second largest mining exchange by equity raised, depends principally on a handful of companies—BHP Billiton, Anglo American, Rio Tinto and, most recently, Glencore—for much of its mining market capitalization. For example, in 2011, of the \$11.9 billion raised on the London Stock Exchange, Glencore's initial public offering alone accounted for approximately \$10 billion of the total sum. Additionally, there have been some large single-equity financings on the Sao Paulo and Shanghai exchanges in recent years, but they are rare and depend on just a few companies' plans.

LISTED MINING COMPANIES (END OF 2011)

- On the TSX—Toronto: 1,646
 - Senior TSX companies: 371
 - Venture Exchange companies: 1,275
- On the ASX—Australia: 700
- On the LSE-AIM—London: 191

Conversely, the large proportion of public financings conducted on the TSX reflects the exchange's appeal to both junior and

senior business players. The TSX Venture Exchange's unique ability to efficiently handle equity financing in the \$1 million to \$5 million range is one reason why Canadian companies lead the exploration business.

This important synergy between exploration and access to capital in Canada cannot, however, be taken for granted. The foreign affiliate dumping measures recently proposed by the federal government will impede the financing and development of exploration projects into operational mines. Taken together, these measures will adversely affect the Canadian mining industry's highly successful junior exploration business model, threatening Canada's (particularly Vancouver's) leadership in this area. Beyond creating a disincentive to exploration investment, these new measures will significantly challenge Canada's reputation and leadership as the mining finance capital of the world.

TSX-listed mining companies have a strong global focus. As of August 2011, TSX companies, including those listed on the Venture Exchange, 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

BREAKDOWN OF TSX AND TSX-V MINING PROJECTS BY LOCATION

- Canada: 53%–5,156 projects
- Mexico and Central/South America: 17%–1,651 projects
- United States: 13%–1,275 projects
- Africa: 7%–684 projects
- China and Asia: 4%–375 projects
- Australia: 3%–280 projects
- UK and Europe: 3%–315 projects

Source: InfoMine.

BREAKDOWN OF TSX AND TSX-V MINING ISSUERS BY PRIMARY METALS

Gold: 41%
 Potash: 13%
 Uranium: 10%
 Copper: 8%
 Diversified: 6%
 Silver: 6%
 Nickel: 4%
 Iron ore: 2%
 Coal: 2%
 Diamonds: 2%
 Zinc: 1%
 Platinum group metals: 1%
 Molybdenum: 1%
 Other: 3%

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 & Deposit Appraisal in Canada

The financial health of the mineral exploration sector can be measured by spending on

exploration and deposit appraisal. Gauging levels of spending 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."

The most recent estimates (see Figure 18) indicate continued and robust growth in Canadian exploration investment. In 2011, investment reached record levels, totalling \$3.9 billion—a 41% increase over 2010 and a doubling over 2009 levels. Exploration expenditures accounted for 52% of the 2010 total, deposit appraisal expenditures for 48%. Exploration spending intentions for 2012 estimate a further increase to \$4.2 billion.

Precious metals attracted the lion's share of Canadian exploration spending in 2011, accounting for 52% overall (see Figure 19). Given the strong price of gold during and since the recession, spending directed to precious metals is likely to increase in the future.

Between 2002 and 2011, exploration spending grew by 585%, increasing in every area except diamonds. Iron ore saw the most dramatic jump, rising 20,000% over the decade, with many projects located in Newfoundland and Labrador and northern Canada.

In the "non-metals" category, potash exploration investment rose steadily due to buoyant prices—a fourfold price increase over the last decade—and indicative of the world-class quality of Saskatchewan's resource. Additionally, coal exploration has also seen dramatic increases over the last decade, a large percentage of which has been invested in British Columbia, also reflective of the quality of its 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, Plan Nord—the centrepiece of the outgoing provincial government—aims to attract over \$80 billion of new mineral development investment in the northern regions of the province. The new minority government stated that it would revisit the plan. Such development, if it goes forward, would enhance the economic viability of significant nickel, cobalt, platinum group metals, zinc and iron ore developments.

The share of exploration and deposit appraisal spending invested in Canada's three territories is three times larger than their share of mineral production value. This reflects world interest in Canada's northern mineral potential, especially in gold, base metals, iron ore and diamonds.

As for the companies that undertake exploration, junior firms have historically accounted for 50% to 65% 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 the incentives. Recent data, however, show this trend is fluctuating downward as junior firm spending decreased over the past three years. In 2011, juniors sunk below their historic threshold to \$1.9



billion, or 49% of exploration dollars (see Figure 20).

This post-recession trend, although projected to reflect a modest recovery in 2012 to 52% of overall spending, is likely related to issues in raising capital to finance operations. Linked to uncertainty in global economic strength, the current risk-averse sentiment among investors is likely to endure until the global economy stabilizes. Ambiguity over the length of global economic uncertainty, the adverse impact this uncertainty has on the ability of junior firms to raise funds, and the crucial exploration role that juniors play present significant challenges to the industry. The passage of the above-mentioned foreign affiliate dumping measures would only serve to exacerbate an already critical situation.

International Exploration

Globally, Canada has been the top destination for investment in mineral exploration for 19 of the past 33 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 Metals Economic Group (MEG), a mining information company, has tracked world mineral exploration since 1989. Based on data from 3,200 companies, MEG determined that worldwide exploration investment in 2011 reached a record US\$18.2 billion—a 62% increase from 2010—and more than doubled the 2009 low of US\$8.4 billion. This

new all-time high exceeds pre-recessionary peaks by more than \$3 billion, and represents a near sevenfold dollar increase over the decade. Exploration figures for iron ore are excluded from the above figures, and would have increased the 2011 total by an estimated US\$1.84 billion.

Historically, Canada and Australia have attracted the largest exploration budgets, and this trend continued in 2011 with 18% of global exploration dollars being spent in Canada and 13% in Australia (see Figure 21). More recent trends indicate there has been a general increase in the number of companies willing to explore in higher-risk countries because of the possibility of finding large deposits. (International investment and risk are discussed in Section 6 of this report).

In spite of high global exploration spending, it is concerning that 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 low exploration spending of the 1990s and early 2000s. The dramatic rise in this spending through the 2000s was offset to some extent by the rising cost 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.



Recent years have made it clear that the world's easiest mineral reserves have been found and that future reserves will be increasingly difficult to locate and develop.

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 like these:

- 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, copper and uranium projects in the surrounding region.

In 2011, capital spending in the Canadian mining industry totalled \$17.3 billion, up 27% from the previous year (see Figure 22). An increase to \$21.5 billion for 2012 is projected.

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

CANADA'S ROLE IN GLOBAL EXPLORATION IN 2012

- Canadian companies account for approximately 37% 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: Metals Economic Group, Natural Resources Canada.

two-thirds of capital spending goes toward construction and one-third to 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. Adding repair costs (which in 2010 were about \$2.6 billion for Stage 1 and \$2.4 billion for the other three stages) to the above capital (\$17.3 billion) and exploration (\$3.9 billion) spending produces roughly \$26.2 billion in Canadian mineral development investment in 2011.

Figure 22 also shows capital investment in the oil sands, where spending was \$21.6 billion in 2011. Oil sands investment is projected to reach \$27 billion in 2012. These levels of investment surpass the pre-recession

LARGEST CAPITAL INVESTMENTS IN 2011

METALS SECTOR

- Gold/silver mines: \$3.6 billion
- Nickel/copper mines: \$1.2 billion
- Copper/zinc mines: \$1 billion
- Iron ore mines: \$697 million

NON-METALS SECTOR

- Potash industry: \$2.5 billion
- Diamond industry: \$394 million

COAL SECTOR

- Capital spending: \$1 billion

peaks. One interpretation is that some of the announced oil sands projects and expansions that were affected by the recession have come back online in the post-recession era.

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. Recent market fluctuations have resulted in several projects being reconsidered. Vale postponed a \$3 billion potash project east of Regina, and BHP Billiton announced it would not be making a final approval on its Jansen Lake mine until the end of fiscal year 2013 at the earliest. Despite market challenges, other potash projects are moving forward. Potash One's new Legacy mine is now in construction and expected to be producing by 2015.

In New Brunswick, Atlantic Potash Corp. signed a two-year agreement at the end of 2011 to explore the Millstream potash deposit and explore development opportunities in the province. Meanwhile, exploration for the valuable mineral continues province-wide.

In northern Saskatchewan, the Cigar Lake project is the world's largest undeveloped high-grade uranium deposit, with proven and probable reserves of more than 216.7 million pounds of U_3O_8 at an average grade of 18.3%. Having been previously delayed by flooding problems, first commissioning in ore is expected in mid-2013 and the first packaged pounds in the fourth quarter of 2013.

There is still potential in the Canadian diamonds sector, despite the decline in exploration spending in recent years. The Chidliak project on Baffin Island, the Gahcho Kue project in the Northwest Territories and the Aviat diamond field in Nunavut all offer promise. Shore Gold Inc. is currently advancing the FALC-JV and Star Diamond Project in the Fort à la Corne Forest in central Saskatchewan.

On June 28, 2012, in British Columbia, New Gold's New Afton gold and copper mine



started production, bringing significant benefits to the surrounding communities. Notably, 75% of the 400 people employed at the mine were hired locally.

All together, \$140 billion worth of mining-related projects have been proposed for Canada in the coming years (see Annex 7). That includes billions of dollars in proposed projects for each of 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. Also notable is that BHP Billiton relocated its Vancouver diamonds and speciality products office to Saskatoon in 2011 as part of its commitment to develop major potash projects.

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 are 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.

Funding for basic geological science in Canada has run a varied course over the last decades. Nominal spending by government has not kept pace with real value adjustments since the early 1980s. In fact, the purchasing power of dollars invested has declined markedly at all levels of government (see Figure 23). Between 1988 and 2011, total real value spending on all forms of geological surveying fell by nearly 37%, or \$44 million. Figure 24 demonstrates the variation over time of total expenditures and expenditures as percentage of mineral production. Both illustrate that survey spending has not kept pace with either inflation or mineral production.

This drop in geoscience spending is a troubling trend for the mining industry. Nearly three-quarters of Nunavut—73%—is either unmapped or has inadequate geological maps, and until recent budget increases would not have been fully mapped for another 80 years. The challenges are similar in other Canadian regions, but particularly so in the north. Given the high interest in diamonds, uranium, base metals and other northern resources, it is unclear how the public good is served by such under-investment, which

only weakens Canada's readiness for northern development and sovereignty.

In recent years, MAC has worked with federal, provincial and territorial governments to support federal reinvestment in geoscience that would be matched at the provincial level. In its 2008 budget, the federal government announced the Geo-mapping for Energy and Minerals (GEM) program, a \$100 million investment over five years. The funding is supplemented by some provincial increases, and the program is guided by the National Geological Surveys Committee (which represents the federal, provincial and territorial governments).

Roughly three-quarters of the GEM spending is directed toward investment in the three territories and one-quarter toward the provinces. The investment, classed as a "temporary" allocation of funds, is a positive development for the industry in the medium term. However, a more sustained approach would be to increase the permanent appropriation for GEM.

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.

Given that the federal government's 2008 GEM program is set to expire on March 31, 2013, there is uncertainty as to which direction geoscience funding in Canada is going to take. Given Canada's declining base metal reserves, the importance of adequate geoscience funding for Canadian mineral exploration cannot be understated.

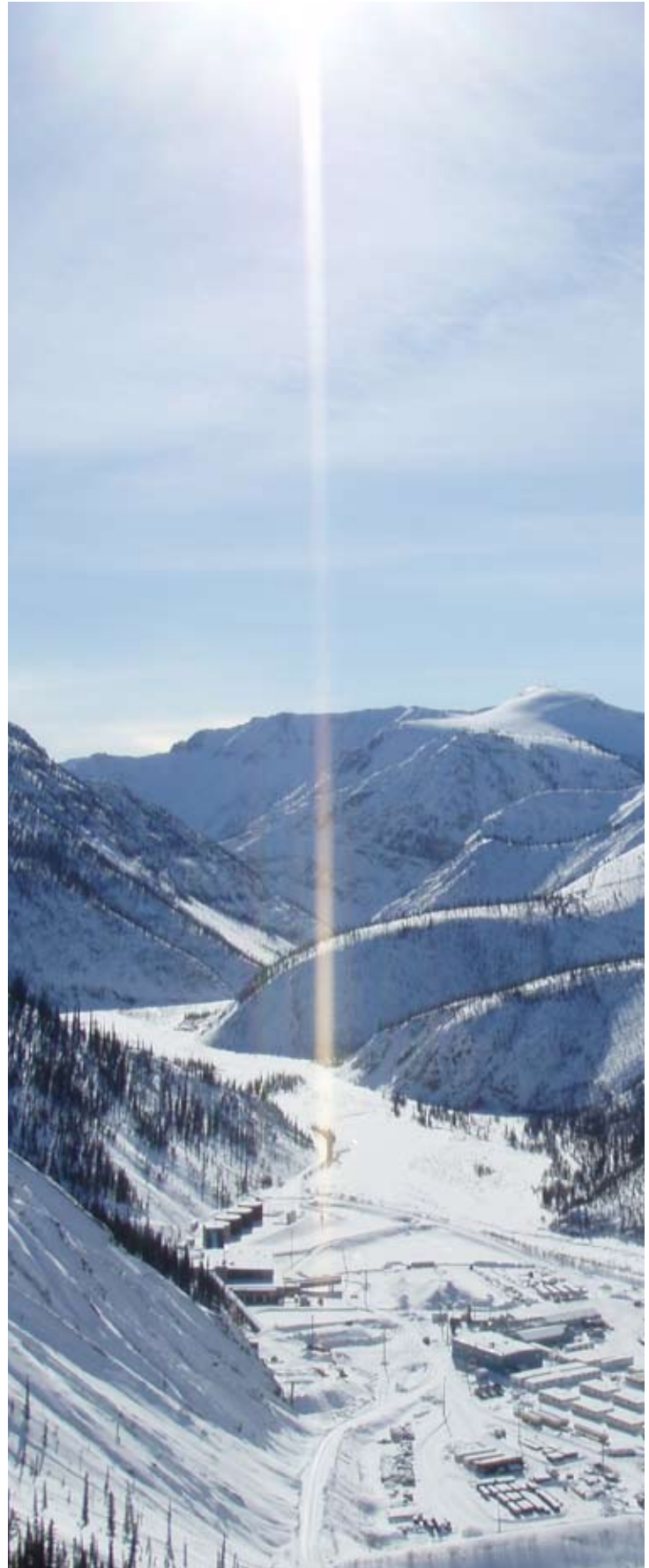


FIGURE 13

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 (3) (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 2012

Mineral Prices (%)	2000	2007	2008	2009	2010	2011	Sep/'12	'00-'12 (%)
Aluminium (\$/lb)	0.70	1.20	1.17	0.76	0.98	1.09	0.93	32
Copper (\$/lb)	0.82	3.23	3.15	2.34	3.40	4.00	3.66	346
Gold (\$/oz)	279.00	697.00	872.00	973.00	1225.00	1,568.31	1,744.81	525
Uranium (\$/lb)	8.29	98.81	63.17	47.00	48.00	56.26	47.73	475
Nickel (\$/lb)	3.92	16.88	9.57	6.50	9.85	10.39	7.84	100
Zinc (\$/lb)	0.51	1.47	0.85	0.75	0.98	1.00	0.91	78

Source: Index Mundi.

Notes: Table denotes yearly prices as well as actual price as of September 2012. The final column indicates percent growth in prices between 2000–2012.

FIGURE 15

MINING EQUITY RAISED—ROLE OF TORONTO STOCK EXCHANGE, 2000–2011

(value in US\$ billion)

Mineral Prices	2000	2006	2007	2008	2009	2010	2011
Worldwide	3.1	26.5	50.3	46.6	65.9	29.6	31.7
TSX exchanges	1.1	10.1	17.6	8.3	22.2	17.8	12.5
Percent of worldwide total on TSX	36.0	17.6	35.0	18.0	34.0	60.0	39.4

Source: Gamah International, compiled by Toronto Stock Exchange.

FIGURE 16

GLOBAL MINING FINANCING, 2011

Exchange	TSX Venture Toronto	LSE–AIM London	ASX Australia	HKEx Hong Kong	NYSE New York
Global mining equity financings	2,021.0	142.0	63.0	7.0	3.0
Capital raised (C\$ billions)	12.5	11.9	3.4	1.8	1.4
Market value (C\$ billions)	426.8	439.0	464.4	247.6	1,137.1
New listings	201.0	20.0	79.0	12.0	8.0
Number of issuers listed	1,646.0	191.0	700.0	69.0	141.0

Source: Gamah International, compiled by the Toronto Stock Exchange.
Note: All values as at December 31, 2011.

FIGURE 17

GEOGRAPHIC REACH OF TSX-LISTED COMPANIES, DECEMBER 2011

Location of Mineral Projects	Number	Percent
Canada	5,156	53
Mexico and Central/South America	1,651	17
United States	1,275	13
Africa	684	7
China and Asia	375	4
Australia	280	3
United Kingdom and Europe	315	3
Total	9,736	100

Source: Infomine, compiled by the Toronto Stock Exchange.

FIGURE 18

MINERAL EXPLORATION AND DEPOSIT APPRAISAL EXPENDITURES¹ BY PROVINCE AND TERRITORY, 2006–2012

Province	2006 (\$ millions)	2007 (\$ millions)	2008 (\$ millions)	2009 (\$ millions)	2010 (\$ millions)	2011 ^P (\$ millions)	2012 ⁱ (\$ millions)	% Change From 2011 to 2012
Newfoundland and Labrador	100.8	148.0	146.7	54.9	105.2	172.1	233.8	35.8
Nova Scotia	11.0	23.5	21.4	9.0	16.7	12.7	21.0	65.1
New Brunswick	13.4	35.8	32.7	8.1	17.1	25.2	20.6	- 18.3
Quebec	295.1	476.4	526.1	379.3	511.6	709.5	763.5	7.6
Ontario	346.5	571.7	799.3	536.2	853.4	1,021.9	916.2	- 10.3
Manitoba	52.9	102.6	152.1	97.8	83.5	110.5	125.6	13.6
Saskatchewan	235.6	314.0	430.7	311.0	299.4	349.7	299.4	- 14.4
Alberta	18.7	11.8	20.8	8.3	15.2	44.1	38.6	- 12.6
British Columbia	344.2	470.6	435.4	217.1	374.4	567.7	812.3	43.1
Yukon	106.4	144.7	134.0	90.9	156.9	306.6	285.0	- 7.0
Northwest Territories	176.2	193.7	147.7	44.1	81.7	105.4	124.0	17.7
Nunavut	210.6	338.0	432.6	187.6	256.7	502.3	568.6	13.2
Total	1,911.5	2,830.8	3,279.5	1,944.4	2,771.9	3,927.8	4,208.5	7.1

Source: Natural Resources Canada, based on the federal-provincial/territorial Surveys of Mineral Exploration, Deposit Appraisal and Mine Complex Development Expenditures (current dollars).

Note: Numbers may not add due to rounding.

¹ 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.

^P Preliminary

ⁱ Intentions

FIGURE 19

CANADIAN EXPLORATION AND DEPOSIT APPRAISAL SPENDING¹ BY TARGET, 2002 AND 2011^p

	2002		2011	
	millions \$	% of Total	millions \$	% of Total
Precious metals	212.8	37.1	2,043.5	52.0
Base metals	138.8	24.2	681.8	17.4
Iron ore	1.6	0.3	325.2	8.3
Non-metals (excluding diamonds)	10.1	1.8	244.7	6.2
Other metals	14.0	2.4	237.9	6.1
Uranium	30.1	5.2	197.3	5.0
Coal	4.3	0.8	101.6	2.6
Diamonds	161.6	28.2	95.7	2.4
Total	573.4	100.0	3,927.8	100.0

Source: Natural Resources Canada, based on the federal-provincial/territorial Surveys of Mineral Exploration, Deposit Appraisal and Mine Complex Development Expenditures (current dollars).

¹ 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.

^p Preliminary

FIGURE 20

MINERAL EXPLORATION AND DEPOSIT APPRAISAL EXPENDITURES¹ BY TYPE OF COMPANY, 2005–2012ⁱ

Type of Co.	2005	%	2006	%	2007	%	2008	%	2009	%	2010p	%	2011i	%	2012	%
Junior	801	61	1,238	65	1,904	67	2,118	65	1,111	57	1,547	56	1,942	49	2,190	52
Senior	504	39	674	35	927	33	1,161	35	834	43	1,225	44	1,986	51	2,019	48
Total	1,305	100	1,912	100	2,831	100	3,279	100	1,944	100	2,772	100	3,928	100	4,209	100

Source: Natural Resources Canada, based on the federal-provincial/territorial Surveys of Mineral Exploration, Deposit Appraisal and Mine Complex Development Expenditures (current dollars).

Note: Numbers may not add due to rounding.

¹ 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.

^p Preliminary

ⁱ Intentions

FIGURE 21

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

Country/Region	% of Worldwide Exploration
Canada	18
Australia	13
United States	8
Sub-Saharan Africa	8
Mexico	6
West Africa	6
Chile	5
Pacific Islands	5
China	4
Peru	4
Europe	4
Russia	3
Brazil	3
Former Soviet Union/Mongolia	3
Colombia	2
Argentina	2
Rest of the world	6
Total	100

Source: Metals Economic Group.

FIGURE 22

CAPITAL EXPENDITURES IN THE CANADIAN MINING INDUSTRY, 2008–2012ⁱ

(\$ Millions)	2008	2009	2010	2011 ^P	2012 ⁱ
Stage 1 - Total mineral extraction	8,587	7,078	10,015	12,469	15,670
- Metal ore mineral extraction	5,244	4,204	6,260	8,172	10,480
- Non-metallic mineral extraction	2,533	2,453	2,985	3,274	3,871
- Coal mining	810	422	770	1,023	1,319
Stage 2 - Primary metal manufacturing	1,918	1,176	2,087	3,009	4,061
Stage 3 - Non-metallic mineral product manufacturing	787	671	868	865	716
Stage 4 - Fabricated metal product manufacturing	846	896	720	989	1,064
Total	12,138	9,821	13,690	17,332	21,511
Non-conventional oil extraction (oil sands)	20,663	10,551	17,155	21,612	26,927

Source: Statistics Canada, Catalogue no. 61-205.

Note: Totals may not add due to rounding.

^P Preliminary

ⁱ Intentions

FIGURE 23

GEOSCIENCE SPENDING IN CANADA, 1982–2011

YEAR (\$ Millions)	NL	NB	NS	QC	ON	MB	SK	AB	BC	YT	NT	NU	P+T ¹	GoC ²	Nominal Sum ³	CPI 1982	Sum 1982\$
1982	3.00	1.50	5.40	13.00	17.60	2.00	2.10	9.00	3.10	0.67	1.10	0.00	58.5	59.1	117.6	1.00	117.6
1988	4.70	2.80	5.80	20.70	21.30	3.30	3.70	9.60	8.80	1.51	2.63	0.00	84.8	98.8	183.7	1.29	142.4
1989	5.10	2.00	4.20	20.90	19.90	3.50	3.80	8.40	7.30	1.54	2.46	0.00	79.1	98.3	177.4	1.36	130.4
1990	4.80	2.30	3.80	17.30	19.90	3.60	4.40	8.60	7.80	1.77	1.93	0.00	76.2	101.2	177.4	1.42	124.9
1995	3.91	3.17	2.48	17.85	13.46	3.78	2.44	3.21	6.94	3.23	2.53	0.00	63.0	82.1	145.1	1.59	91.3
2000	3.50	2.23	1.96	16.20	20.11	4.32	2.87	5.15	4.00	3.06	2.68	3.39	69.5	71.7	141.2	1.73	81.6
2005	3.62	2.34	2.14	11.33	18.90	5.06	3.42	6.52	3.95	5.37	5.54	2.55	70.7	70.9	141.6	1.93	73.4
2006	3.96	2.31	2.08	10.08	19.00	5.08	3.49	8.27	3.88	4.51	3.63	2.96	69.2	77.8	147.0	1.98	74.3
2007	5.06	2.37	2.24	16.28	18.50	5.31	4.20	11.69	3.15	5.71	3.47	3.79	81.8	84.0	165.8	2.02	82.1
2008	5.09	2.39	2.39	16.78	18.70	5.69	4.83	11.69	4.04	6.00	3.64	2.51	83.7	88.3	172.0	2.09	82.3
2009	5.73	2.40	2.39	14.40	18.90	6.07	4.48	11.33	4.31	6.93	2.34	2.69	82.0	92.3	174.2	2.07	84.2
2010	5.72	2.21	2.50	18.82	19.30	5.91	4.03	7.26	2.96	6.41	2.64	2.84	80.6	86.0	166.6	2.11	79.0
2011	6.13	2.20	2.50	18.70	19.30	5.64	4.41	7.12	2.75	5.19	2.28	2.62	78.8	80.3	159.1	2.17	73.5

Source: Compiled by Murray Duke from data published by Natural Resources Canada and the Committee of Provincial and Territorial Geologists.

Note: Spending from Geoscience British Columbia is not included in these totals.

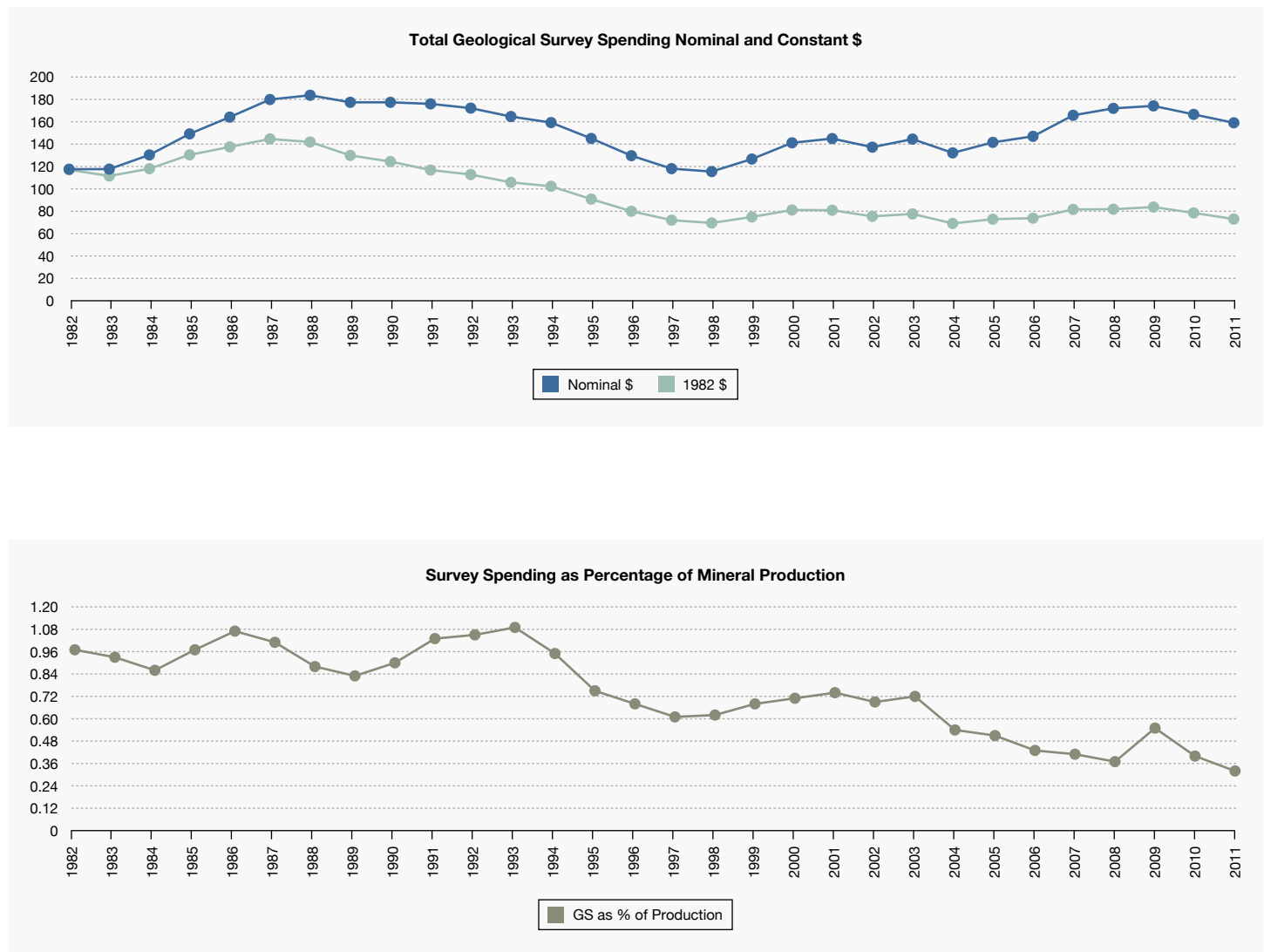
¹ P+T = Total Provincial and Territorial Sum.

² GoC = Government of Canada.

³ Sum 1982\$ = Total Annual Sum Adjusted to 1982 dollars.

FIGURE 24

GEOLOGICAL SURVEY EXPENDITURES OVER TIME AND EXPENDITURES AS A PERCENTAGE OF MINERAL PRODUCTION, 1982–2011



Source: Compiled by Murray Duke.

A photograph of two mining workers in a dark tunnel. They are wearing blue hard hats with headlamps and high-visibility safety vests. The worker on the right is pointing at a green and white surveying instrument mounted on a tripod. A plumb line hangs from the ceiling in the background.

THE PEOPLE

EMPLOYMENT, COSTS AND INNOVATION

HIGHLIGHTS

- The mining industry employed 320,000 people in 2011, representing one in every 54 Canadian jobs.
- Oil sands companies awarded \$3.7 billion in contracts to local Aboriginal businesses from 1998 to 2010, including \$1.3 billion in 2010 alone.
- The industry needs 11,000 new workers each year over the next decade to replace current positions and fill new ones.
- Mining continues to offer the highest wages of all industrial sectors in Canada.
- Canadian mining and metals companies invested \$590 million in research and development in 2011, more than the motor vehicles and parts sector, the pulp and paper sector and the machinery sector.
- Six mining and oil sands firms rank among Canada's top 100 investors in research and development.

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 commit 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

Total employment across the Canadian economy in 2011 averaged 17.3 million workers. According to Natural Resources Canada definitions, the mining industry employed 320,000 people, accounting for one in every 54 Canadian jobs (see Figure 25).

Overall Employment Numbers

Nearly 57,000 of the 320,000 people directly employed by mining in 2011 worked in Stage 1, mineral extraction (see Figure 25). This group included nearly 27,000 in metal mining, 23,000 in non-metal mining and just under 7,000 in coal mining (see Figure 26).

The past decade has seen a steep decline in smelting and refining jobs (39%) of Stage 2, primary metal manufacturing (see Figure 25). 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 25 or 26), data for 2011 show that Suncor and Syncrude directly employ over 13,500 and 5,000 people, respectively, in mining and oil and gas activities. These figures do not include indirect employees.

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, nearly 3,200 companies supply goods and services to the mining industry, adding many indirect jobs to the picture. Recent estimates suggest that a multiplier of 2.5 might show the industry's complete economic impact (though more research is needed).

Gender-specific statistics are outdated and difficult to obtain, but even so, it is clear that women are still under-represented in the industry. A 2010 collaborative report by Women in Mining Canada and the Mining Industry Human Resources Council (MiHR) found that women represent 14.4% of the mining and exploration workforce—the lowest among primary industry categories in Canada.

The low number of female engineers is one reason why this number is small. According to Engineers Canada, female enrolment in Canadian engineering programs was 17.7% in 2010—down nearly 3% from the 2001 peak of 20.6%. Beyond enrolment, women represent an even smaller percentage of the country's total population of professional engineers, accounting for 10.5%, or just under 17,000 of Canada's 160,000 plus engineers. These numbers are especially low given that women made up 56% of the total student body in

Canadian universities in 2010, and nearly half of the Canadian workforce.

Employment of Aboriginal People

Proportionally, the mining industry is the largest private sector employer of Aboriginal Canadians. According to the most recent census data, 4,515 Aboriginal people worked in the mining extraction sector in 2006, up 43% since 1996. Aboriginal workers made up an estimated 7.5% of the mining workforce in 2006, versus 3.6% in 1996. Those numbers were roughly double the proportion of Aboriginal people in the overall Canadian workforce in those years. New data from the 2011 census are forthcoming and will provide a clearer picture of Aboriginal employment in the mining industry.

There are also many Aboriginal workers in the oil sands. 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. Between 1998 and 2010, Aboriginal-owned companies secured more than \$5 billion worth of contracts, including \$1.3 billion in 2010 alone. 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.

Aboriginal employment in the extractive sectors is poised to increase. Approximately

MINING COMPANIES THAT EMPLOY MORE THAN 1,000 PEOPLE

Barrick: 18,400	First Majestic: 2,300
Teck: 13,500	Jaguar Mining: 2,194
Kinross: 8,203	Gran Colombia Gold: 2,084
Sherritt: 7,957	SEMAFO: 2,000
Goldcorp: 7,413	New Dawn Mining: 1,779
First Quantum: 6,904	Fortuna Silver: 1,537
Potash Corp of Saskatchewan: 5,703	Golden Star Resources: 1,500
Pan American Silver: 5,400	Alacer Gold: 1,500
Eldorado Gold: 5,348	Great Basin Gold: 1,406
High River Gold: 5,191	Lundin Mining: 1,400
IAMGOLD: 5,100	Hudbay Minerals: 1,315
Yamana Gold: 5,085	Aura Metals: 1,307
Inmet: 4,270	Avion Gold: 1,300
Aurico Gold: 4,251	La Mancha: 1,250
Atlatsa Resources: 3,515	TVI Pacific: 1,223
Cameco: 3,470	Olympus Pacific Minerals: 1,200
Ivanhoe Mines: 3,358	New Gold: 1,146
Agnico-Eagle: 5,106	Primer Mining: 1,212
First Uranium 3,197	Thompson Creek: 1,056
Centerra Gold: 3,125	China Gold Int'l Resources: 1,018
Iberian Minerals: 2,500	Great Panther Silver: 1,000
Dundee Precious Metals: 2,400	

Note: Includes employees at international operations.

Source: Globe and Mail, Report on Business Magazine, July/August 2012.

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. As well, 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 ideally situated to access emerging employment opportunities in the mining industry.

Some of the worker shortages discussed in the next section could be filled if there were more Aboriginal training and skills development, but dedicated government support for such initiatives is crucial. The recent discontinuation of the Aboriginal Skills and Employment Partnership (ASEP) program has created a gap that needs to be filled. The federal government's decision to extend funding to the British Columbia Aboriginal Mine Training Association is an important step; however, more needs to be done. (This issue, along with the related topic of impact benefit agreements, is discussed in Section 5 of this report).

Need for Workers and Skills

The mining industry, both in Canada and abroad, faces a serious human resources challenge in the next decade. The MiHR's 2011 report *Canadian Mining Industry Employment and Hiring Forecasts* estimates that the Canadian mining industry must hire approximately 11,000 new workers each year for the next decade. These hiring requirements stem from the need to replace

existing workers and fill new positions—in other words, to meet baseline production targets (see Figure 27). According to MiHR's definitions, this means replacing one out of every two current employees over the next decade.

This need comes at a time when the skilled core of the industry, including some 65% of geoscientists, is reaching retirement age. MiHR's 2010 National Employer Survey reported that 40% of the Canadian mining workforce will be eligible for retirement by 2014, taking with them an average of 21 years of mining sector experience each.

Teck Resources, as one example, estimates that up to half of its workers in British Columbia will retire over the next five years.

In 2012 alone, Teck is looking to hire an additional 1,500 people in that province.

The industry needs 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 workers.

Additional hurdles on the supply side need to be overcome as mining has historically had difficulty recruiting women, visible minorities and immigrants. Further, companies in other countries are actively recruiting Canadian graduates and workers. This situation is compounded by estimates that Canadian universities in 2011 are graduating one-third

"[T]he energy and mining industries may provide a critical path to prosperity for an impoverished but rapidly growing segment of the Canadian population, so long as all parties work together."

—Shawn Atleo, National Chief, Assembly of First Nations, in a June 2011 speech.



fewer mining engineers than the industry requires.

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.

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 and Strikes

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 2011 was \$1,436, which surpassed the earnings of workers in forestry,

manufacturing, finance and construction by 47%, 46%, 35% and 32% 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.

A total of 11 strikes and lockouts affected the mining industry in 2011 (see Annex 10A and 10B). This was down by three over 2010, and marks a significant reduction in lost person days over both 2009 and 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.

Canadian firms also deal with labour relations issues internationally and can face pressures common to other mining companies in the region where they operate. For example, in 2012, widespread strikes in South Africa have resulted in several interruptions to Lonmin's operations in that country. As of November, several strikes affected the mining operations at the Marikana platinum mine, and at Lonmin's Magdalena and Aviemore underground coal mines. So far, as a result of the wildcat strikes, over 30,000 miners have been fired in different South African operations, causing serious damage to the country's economy.

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 2010, the most recent year for which data are available (see Figure 28). Wages equalled 9% of the industry's total production value, energy 6%, and materials and supplies 17%.

Internationally, project costs sometimes rise because of delays. In mid-2011, for example, Sherritt announced a nine-month delay in developing its nickel-cobalt project in Madagascar, with costs expected to rise by 16%. (The theme of international risks is discussed in Section 6 of this report.)

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 29). In Stage 2, primary metal manufacturing, productivity grew at more

than twice the rate of Canadian manufacturing as a whole.

Productivity comparisons with other countries should be drawn carefully. US data

for the same decade suggest that Canada's productivity growth in the first three stages of mining outstripped that of the United States.

Productivity can be affected by mineral prices. According to a 2009 study by the Centre for the Study of Living Standards, when prices are high, companies will go further to extract resources, and mine deeper and into more marginal rock areas. This willingness can boost profits but lower productivity in terms of output per hour.

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 disturbing the ground and the environment as little as possible. 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,

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.

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 further 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 least 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 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 possible introduction of new greenhouse gas regulations, taxes and

WHO IS INVESTING IN R&D?

RESEARCH 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 2010:

- No. 32: Suncor—\$72 million
- No. 33: Vale Canada—\$67 million
- No. 42: Novelis—\$39 million
- No. 71: Teck—\$21 million
- No. 81: ArcelorMittal Dofasco—\$17 million

trading systems. New regulations could affect the viability of some older processing facilities in Canada.

Research and Development

In 2011, Canadian mining and metals companies invested \$590 million in R&D (see Figure 30). Mining's investment surpassed that of the motor vehicles and parts sector, the machinery sector, and the wood products and paper sector. The industry also employs 6,064 people in R&D (see Figure 31). This is more than the aerospace and pharmaceutical 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.

The recent Review of Federal Support to Research and Development proposed changes to the popular SR&ED tax incentive that will reduce the tax credit rate from 20% to 15% and eliminate the eligibility for capital expenditures. This will significantly increase the taxes paid by Canada's top R&D performers.

In response to these challenges, and to better achieve the calibre of research and development required to meet industry needs, the mining industry came together to form the Canadian Mining Innovation Council (CMIC) a few years ago. As of November 2012, CMIC has grown significantly to 85 members, including Natural Resources Canada and eight provincial/territorial governments. This growth showcases significant industry-wide support for the CMIC and the desire to galvanize collective research on key industry priorities. CMIC's main objectives are to increase mining research, innovation and commercialization, and to boost the supply of qualified graduates from mining and earth sciences faculties.

The 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. The organization has also applied for funding from the federal government to support these important initiatives.



FIGURE 25

EMPLOYMENT IN THE CANADIAN MINING AND MINERAL MANUFACTURING INDUSTRIES¹, 1998-2011

(Number of Employees)

Year	Mining and Quarrying NAICS 212	Non-Metallic Mineral Product Manufacturing NAICS 327	Primary Metal Manufacturing NAICS 331	Fabricated Metal Product Manufacturing NAICS 332	Total Mining and Mineral Processing
1998	60,090	52,166	100,957	165,626	378,839
1999	57,353	53,286	100,529	173,072	384,240
2000	56,698	56,440	104,253	183,246	400,637
2001	51,231	53,719	91,185	184,269	380,404
2002	47,893	51,423	90,322	181,096	370,734
2003	47,391	51,329	85,402	180,561	364,683
2004	45,986	51,403	79,703	176,439	353,531
2005	46,689	51,304	78,731	176,068	352,792
2006	48,830	53,701	80,681	179,728	362,940
2007	52,877	52,807	78,802	175,091	359,577
2008	58,506	52,707	69,107	171,126	351,446
2009	52,429	48,711	59,413	147,808	308,361
2010	52,532	49,687	61,098	144,485	307,802
2011	56,669	49,405	61,845	152,378	320,297

Source: Statistics Canada.

Note: NAICS refers to the North American Industry Classification System.

¹ Excludes oil and gas, and services incidental to mining.

FIGURE 26

EMPLOYMENT IN THE MINERAL EXTRACTION STAGE, 1998-2011

Year	Metal Mines	Non-metal Mines	Coal	Total 2011
1998	32,354	19,431	8,304	60,089
1999	29,555	19,987	7,812	57,354
2000	29,468	20,031	7,199	56,698
2001	25,564	19,524	6,143	51,231
2002	22,585	19,497	5,811	47,893
2003	21,810	20,224	5,357	47,391
2004	21,374	19,907	4,705	45,986
2005	21,196	20,456	5,037	46,689
2006	22,007	21,487	5,336	48,830
2007	23,850	23,183	5,844	52,877
2008	28,074	23,988	6,443	58,505
2009	24,286	21,775	6,369	52,430
2010	23,311	22,051	7,170	52,532
2011	26,917	22,870	6,881	56,668

Source: Statistics Canada, Survey of Employment, Payroll and Hours (SEPH).

FIGURE 27

CANADIAN MINING INDUSTRY EMPLOYMENT AND HIRING FORECAST SCENARIOS, 2011-2021

	Change in Employment	Retirement	Non-Retirement Separation	Cumulative Hiring Requirements
Contractionary	-28,200	61,550	41,930	75,280
Baseline	-1,000	67,080	45,940	112,020
Expansionary	20,500	71,740	49,300	141,540

Sources: Mining Industry Human Resources Council; Canadian Mining Industry Employment and Hiring Forecasts, 2011.

FIGURE 28

SELECTED COSTS OF PRODUCTION IN THE MINERAL INDUSTRY¹, 2010

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	68	1,782,723	1,135,866	3,904,188	20,573,614
Non-metallic mining and quarrying	1,040	1,068,554	726,562	1,578,564	11,200,758
Coal	22	440,460	347,103	694,965	5,217,551
Total mineral industry	1,130	3,291,738	2,209,531	6,177,717	36,991,923

Sources: Natural Resources Canada; Statistics Canada, Catalogue no. 26-201-X.

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.

¹ Excludes the oil and gas extraction industry.

FIGURE 29

ANNUAL PRODUCTIVITY GROWTH, 1997–2006

	Canada %	United States %
All industries	1.50	
Manufacturing sector	2.10	
Stage 1—Mineral extraction	1.80	1.10
Stage 2—Primary metal manufacturing	4.80	3.40
Stage 3—Non-metallic mineral product manufacturing	1.60	1.50
Stage 4—Fabricated metal product manufacturing	1.20	2.00

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

FIGURE 30

R&D EXPENDITURES BY MINING AND SELECTED INDUSTRIES, 2007–2011

(\$ million)	2007	2008	2009	2010 ^p	2011 ^p
Mining–extraction	59	46	110	F	99
Primary metals–ferrous	U	81	63	F	44
Primary metals–non-ferrous	299	257	209	142	165
Fabricated metal products	250	260	250	211	217
Non-metallic mineral products	77	66	74	75	65
Total	685	710	706	428	590
Other sectors:					
Oil and gas extraction	663	934	815	831	725
Motor vehicles and parts	608	425	309	305	287
Wood products and paper	691	370	174	226	153
Machinery	576	565	618	566	566
Aerospace products and parts	972	1,000	1,107	1,223	1,276
Pharmaceutical and medicine	1,085	675	649	669	635
Total manufacturing	8,850	7,724	7,562	7,084	7,337
Total all industries	16,474	16,644	15,569	15,116	15,358

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."

U denotes "unavailable."

p Preliminary

FIGURE 31

NUMBER OF PERSONS ENGAGED IN R&D, 2010^p

	Professionals	Technicians	Other	Total
Mining–extraction	229	211	29	469
Primary metals–ferrous	424	279	95	798
Primary metals–non-ferrous	166	137	36	339
Fabricated metal products	372	263	116	751
Non-metallic mineral products	1,796	1,568	343	3,707
Total	2,987	2,458	619	6,064
Other sectors:				
Oil and gas extraction	1,082	694	90	1,821
Motor vehicles and parts	1,514	932	325	2,771
Wood products and paper	708	701	155	1,565
Machinery	4,646	2,203	497	7,346
Aerospace products and parts	3,199	1,322	1,510	6,031
Pharmaceutical and medicine	2,069	866	915	3,850
Total manufacturing	38,082	16,554	6,154	60,791
Total all industries	89,271	36,171	10,761	136,203

Source: Statistics Canada, Catalogue no. 88-202-X.
p Preliminary

THE ENVIRONMENT

SUSTAINABLE DEVELOPMENT AND SOCIAL RESPONSIBILITY



HIGHLIGHTS

- MAC members have significantly reduced their releases of major substances—anywhere from 64% to 97% over the past 15 to 20 years.
- The mining industry is building a strong relationship with the Aboriginal community, with progressive agreements at the company and industry levels.
- Energy access and efficiency is a challenge for existing older, deeper mines, as well as northern operations.
- The metal smelting and refining sector has greatly reduced its greenhouse gas emissions intensity since the 1990s.
- Progress towards cleaner energy in the next decade will depend on the availability of metals and minerals, which are essential building blocks for many clean technologies.
- Canada's regulatory environment must be streamlined to remove overlaps and unnecessary obstacles to sustainable development.

THE ENVIRONMENT

SUSTAINABLE DEVELOPMENT AND SOCIAL RESPONSIBILITY

Mining has never been environmentally benign. The process of extracting ore from rock poses many technical challenges. Similarly, the process of turning raw concentrate into a pure metal also has environmental considerations.

Finding ways to limit mining's environmental impacts is a top priority for the Canadian industry. It is a key component of corporate social responsibility, which is a growing area of focus for mining companies. The industry has made great strides in recent decades, driven by the actions of individual companies, government regulations and industry standards like MAC's Towards Sustainable Mining initiative. Together, corporate responsibility and progressive regulations and standards have earned Canadian mining a global reputation for leading-edge social and environmental practices.

Removing ore from rock, however, when the ore may make up less than 1% of the volume, poses significant technical and environmental challenges. So does turning raw concentrate into the 99.99% pure metal needed to produce the host of products that businesses and people rely on, such as cell phones, aircraft, solar energy equipment and medical technologies, to name a few.

In Canada, mineral development can mean accessing lands situated within the boreal forest. It also means effective tailings management where, in some instances, the responsible use of a body of water for storage is the safest option. Accessing land, bodies of water and resources require careful consideration of Aboriginal rights, regulatory frameworks and environmental stewardship—all elements embodied in a company's social licence to operate.

PROGRESS THROUGH TSM AND OTHER INITIATIVES

The Canadian mining industry has made great progress in its environmental performance through participation 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 32). Releases of major substances have dropped between 64% and 97%, a result of companies investing in cleaner processes in response to voluntary initiatives and regulations.

As Figure 32 shows, however, results in the past few years have been mixed, with decreases in some areas and increases in others where industry may have reached the limits of current technology. Natural variations in the metal content of feedstock can also affect results from one year to the next.

Towards Sustainable Mining

Towards Sustainable Mining (TSM) is an industry-wide, performance-based program that was developed to help mining companies evaluate and manage their environmental and social responsibilities. The program'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. 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.

Participation in TSM is a condition of membership for MAC. Members commit to a set of guiding principles and annually report their performance against a set of performance indicators. TSM assessments take place at the facility level to ensure that management systems are in place, with results externally verified every three years.

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

TSM includes ongoing consultation with a Community of Interest (COI) Advisory Panel. This multi-stakeholder group helps mining companies and their communities of interest to foster dialogue, improve the industry's performance and shape the program for continual advancement. The program continually evolves to meet emerging priorities. For instance, the energy use and greenhouse gas emissions management protocol was amended in June 2012. Currently, a seventh protocol on mine closure is being developed.

Launched in 2004, TSM has since been recognized for performance excellence. It received the Globe Foundation's 2005 Industry Association Award for Environmental Performance and the 2011 Prospectors and Developers Association of Canada's

Environmental and Social Responsibility Award. For details of companies' performance under the TSM, and more information about the program, see MAC's annual *Towards Sustainable Mining Progress Report* (available at www.mining.ca).

MINE CLOSURE PROTOCOL

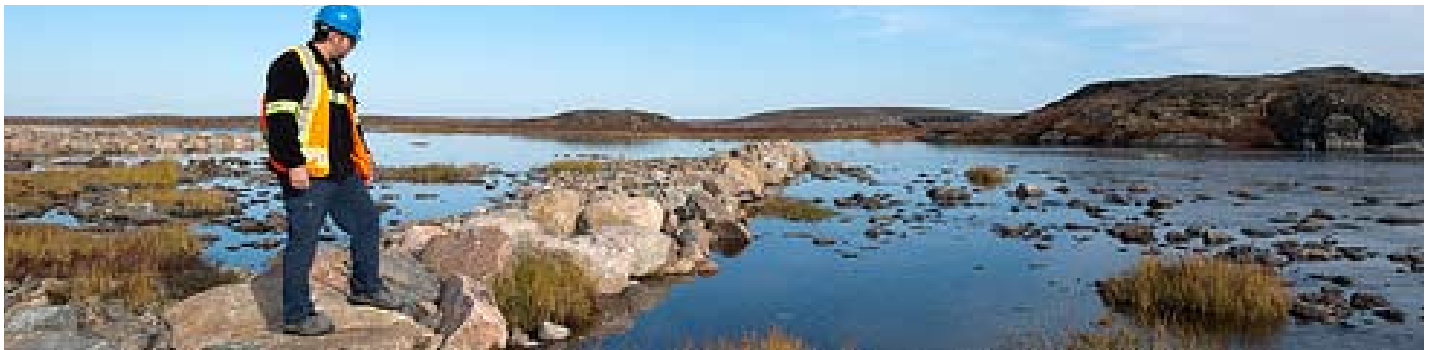
A goal of TSM is to minimize mining's impact on the environment and biodiversity, through all stages of development, from exploration to mine closure. To this end, the TSM team has been working with technical experts from operations across the country to develop criteria to measure performance in mine closure.

Through consultation with the Community of Interest Advisory Panel, the membership is drafting a protocol to address this important issue. Once complete, MAC members will report their progress in mine closure planning and implementation against a series of indicators that currently include planning for closure, progressive reclamation, closure and post-closure, and financial assurance. Implementing a mine closure protocol is another example of how the mining industry is being proactive in its commitment to social and environmental stewardship.

Other Initiatives

Beyond TSM, Canadian mining firms are involved in additional environmental initiatives. Two examples are the Mine Environment Neutral Drainage Program and the National Orphaned/Abandoned Mines Initiative.

Internationally, an array of sustainability and social licence initiatives affect the Canadian mining industry. Companies seeking project financing are guided by the rules of 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 Devonshire 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 33.

Recycling and E-Waste

E-waste is a critical societal issue. As a point of reference, in 2005, there were 156,000 tonnes of electronic waste generated in Canada. As consumers and businesses favour disposable technology and a short life cycle for electronics, the amount of e-waste is increasing. Besides the volumes disposed of, e-waste is a concern because of the metals and other potential pollutants released once protective casings are broken.

E-waste includes items such as cell phones, computer towers, monitors, television sets and video cassette players. A large portion of e-waste, however, can be recycled and 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

E-WASTE RECYCLING IN CANADA

RECYCLABLES:

- **Electronic waste**—TVs, desktop and portable computers, certain medical and monitoring devices, stereos, all-in-one display products, printers, VCRs, cameras, telephones and audio and video game consoles.

URBAN ORE:

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

COMPANIES IN THE FOREFRONT:

- Xstrata, at its Horne smelter in Rouyn-Noranda, Quebec, uses precious metal-bearing recyclables as feedstock to make 99% anode copper. The Horne smelter recently doubled its e-waste recycling capacity.
- Teck Resources developed its e-waste process in conjunction with the BC Ministry of Environment. The company's Trail operations have the capacity to recycle up to 30,000 tonnes of e-waste annually. The electronics recycling process operates based on a recycling fee, making it sustainable and independent of the metal market.

in landfills. By recycling these items, materials such as steel, glass, copper, aluminum, plastic and precious metals are kept out of



landfills and can produce new products using resources that don't need to be mined.

Internationally, e-waste recycling tends to get greater attention. The Basel Convention, for instance, controls the export of hazardous waste and requires e-waste to be treated as close to its origins as possible. The convention now has about 179 signatories, including Canada and the European Union.

The European Union has dealt with the e-waste issue for many years and has passed directives requiring all e-scrap to be recycled. In August 2012, for example, a new EU directive was introduced to improve collection schemes in member states. It aims at increasing the recycling and re-use of products and materials by allowing consumers to return used electronic and electrical items free of charge. The directive introduces a collection target of 45% of electronic equipment sold starting in 2016 and, in 2019, a target of 65% of equipment sold, or 85% of e-waste generated.

Countries like China, where scrap metal is a major input in manufacturing, tend to have an ingrained culture of recycling and reuse. China's enormous demand for scrap metal is illustrated in its trading relationship with Canada. In 2009, Canada exported 391,000 tonnes of scrap metal to China.

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 produce and consume.

ABORIGINAL RELATIONS AND IMPACT BENEFIT AGREEMENTS

The mining industry needs to continue fostering a strong, progressive relationship with Aboriginal communities. Proportionally, mining is the largest private sector employer of Aboriginal people in Canada, and the numbers have only been growing. Given the nearness of many Aboriginal communities to mining operations, and the large number of Aboriginal youth, there is significant potential to create a stronger and mutually beneficial partnership between Aboriginal Canadians and the mining industry.

A strong relationship with Aboriginal people is important at government, industry and company levels. Beyond following laws and regulations, and going through environmental review processes, companies generally reach formal bilateral agreements with affected Aboriginal groups to help mining projects move forward. These impact benefit agreements (IBAs), as they are often known, are usually signed by mining firms and Aboriginal communities. They may contain commitments in such areas as education, training, jobs, business contracts and financial payments. IBAs have also been developed for pipeline, hydroelectric and oil sands projects.

Since the groundbreaking 1974 Strathcona Agreement, 318 agreements of all types have been negotiated across the country, covering 185 different projects. According to a recent report on this subject by the Mining Industry Human Resources Council, a breakdown of the agreements shows that 98 are IBAs or IBA-like agreements associated with 61 projects. The remaining 220 are less formal agreements, such as exploration agreements and memoranda of understanding, which are negotiated earlier in the mining cycle than IBAs. Among these agreements is the 2009 industry-level MAC Memorandum of Understanding with the Assembly of First Nations.

ABORIGINAL INVOLVEMENT IN BUSINESS

Aboriginal communities are becoming more involved in Canada's business activities. According to a 2011 TD Bank study, income earned by Aboriginal households and businesses doubled over the past decade. The increase, from \$12 billion in 2001 to an estimated \$24 billion in 2011, and projected to reach \$32 billion in 2016, largely reflects the recent global commodities boom. The portion of this income that came from businesses rose from 35% to 37% over the decade, while the portion from government transfers fell from 38% to 31%.

Progressive agreements, such as the EKATI mine project agreement in the Northwest Territories and the Raglan agreement in Quebec, can provide Aboriginal groups 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. More recently, 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 breaks new ground in Aboriginal and natural resources public policy. These commitments provide the confidence and mutual benefit needed for mining projects to move forward.

According to Natural Resources Canada, a total of 182 projects, mostly in mineral exploration and development, involve agreements between businesses and affected Aboriginal groups. Of these, 27 agreements concern producing mine sites with IBAs. Large companies are generally involved, such as Barrick Gold, Vale, Syncrude, Diavik, BHP Billiton, De Beers, Cameco and Xstrata.

ENERGY EFFICIENCY AND GHG EMISSIONS

Energy and greenhouse gas (GHG) policy issues have become visible and more important to Canadians in recent years. Media coverage of dramatic climate events, strong growth in the oil sands and frequent global summits have lent momentum to these front-page issues.

Mineral Extraction

Direct emissions from Canada's 227 operating mines (metal and non-metal) account for just 0.72% of the country's total GHG emissions. The federal government has, therefore, decided to focus clean air and GHG targets on the relatively few smelters, refineries and pelletizing facilities whose emissions are higher.

Despite having no regulated targets, many extraction operations are improving their capabilities in compressed air, ventilation, metering and energy management. Investment in these areas is a priority for MAC and the industry when dealing with

Natural Resources Canada (NRCan) on energy efficiency. In recent years, MAC and NRCan funded a detailed guidance document for energy and GHG management, as well as related workshops, to help companies in their efforts to improve. Additionally, through the TSM's energy use and GHG emissions management protocol, members evaluate their performance against indicators. The resulting assessments help member companies develop capacity to monitor and improve performance, as well as provide a basis for company assurance.

The energy required per unit of extracted metal ore has remained fairly stable since the 1990s, while efficiency improvement has nearly doubled over the same period for non-metal mining—the more energy intensive of the two (see Figure 34). Among the difficulties facing mine sites now is the fact that today's 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, requiring a reliance on more expensive fossil fuel inputs. The Diavik and EKATI diamond operations in the Northwest Territories, for example, both depend on fuel oil being brought in over a winter ice road and are therefore less able to lower their carbon emissions. The same applies to Agnico-Eagle's Meadowbank gold mine in Nunavut where storage of the annual re-supply of diesel fuel required the construction of a tank farm. Although these mines have been designed with energy efficiency in mind, the infrastructure challenges create a reliance on carbon-heavy fuels for 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. (Oil sands operations fall under the oil and gas sector in the government's framework.)

The most energy-intensive players in the mining sector, smelting and refining, have greatly improved their energy use and GHG intensity over the past two decades. The primary metal smelting and refining sector brought down the energy required per unit from 50 terajoules per kilotonne of output in 1990 to 37 in 2010—a 26% improvement (see Figure 34). The sector cut its GHG emissions from 1.9 kilotonnes of CO₂e per kilotonne unit produced in 1990 to 1.1 in 2010—an intensity improvement of 41%.

Oil Sands

About 20% of the oil sands reserves is close enough to the surface to be mined, while around 80% is 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.

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 soar from 1.6 million barrels a day to 4.2 million in 2025, and by as much as 5 million by 2030. Assuming current technology, this could increase GHG emissions fourfold.

The GHG situation facing Alberta and Canada at large, while serious, is placed in perspective by emissions from the US coal industry (see Figure 35). In fact, 15 states—Texas, Missouri, Illinois, Indiana, Ohio,



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}), which involves adding a polymer flocculent to fine tailings, 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.

Kentucky, Tennessee, Alabama, Georgia, Florida, Ohio, Michigan, West Virginia, Pennsylvania and North Carolina—face

larger energy-related GHG challenges than Canada's oil sands. This puts the debate about trade barriers against "GHG-intensive oil," advanced by some NGOs in the United States and Canada, in a more realistic context.

One option for improving the oil sands' GHG intensity is to develop nuclear power plants in Alberta to supply electricity and steam. Although some industry players have discussed this possibility, there are major obstacles. For one, Alberta has no history with nuclear energy and no infrastructure. For another, the oil sands projects are located far away from each other, making it difficult to transport steam.

A second option, one that could mean major improvements in GHG intensity, is to introduce large-scale carbon capture and sequestration (CCS) systems. However, 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.

Another environmental area where oil sands operators are making progress is in tailings management. The Oil Sands Tailings Consortium is an alliance of seven mineable

oil sands companies that are collaborating to share research and knowledge on tailings management technologies. Some examples of these include Suncor's TRO_{TM} reduction initiative mentioned above, Syncrude's centrifuge tailings technology and Shell's thin lift tailings management.

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 14 of the largest companies involved in Canada's oil sands, 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.

GHG Emissions Policies

With the failure of the Copenhagen Summit and other setbacks, it has become unclear whether the world will see any real progress in climate change policy. Geopolitics, significant concerns over the health of national and global economies, and the cost associated with addressing climate change have proven obstacles to an effective policy framework.

In December 2011, Canada withdrew from the Kyoto Accord. The Kyoto Protocol committed major industrial economies to reducing their annual CO₂ emissions to below 1990 levels, while providing financial supports to developing nations to encourage them to follow suit eventually.

Despite noble aspirations, the Kyoto Accord presented significant geopolitical challenges as an international framework for emissions reductions. By excluding China, India and Brazil—three of the world's largest emitters who collectively account for over a third of global population—from needing to limit emissions under the agreement, a large fraction of global emissions were left unaddressed. This exemption enables global emissions levels to continue rising.

Canada, having ratified the accord in 1997, was not on track to meet its targets because climate policy has remained inconsistent in this country since its inception. The climate change plans of 1990, 1995, 2000, 2002, 2005 and 2006 have come and gone. Most recently, in 2010, as signatory to the Copenhagen Accord, the government downscaled its 2007 Turning the Corner target. Canada is now committed to a 17% reduction from 2005 levels by 2020, thus aligning with the target set by the United States.

Given Canada's turbulent history with climate change policy, it is uncertain what changes lay ahead. With such policy inertia, 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 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.

In May 2012, at the Bonn Climate Change Conference in Germany, Guy Saint-Jacques, Canada's former chief negotiator and climate change ambassador, stated that the Canadian government was working towards draft regulations for 2013 in the oil and gas sector. Reports indicate that the federal regulations are likely to place emissions limits on a per barrel of oil production basis, while giving the provinces flexibility to set their own rules to achieve the federal targets.

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 processes. 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.

In 2011, a 6.1% increase in CO₂ emissions in countries outside the OECD was only partly offset by a 0.6% reduction in emissions inside the OECD. China made the largest contribution to the global increase, with its emissions rising by 720 million tonnes, or 9.3%, primarily due to higher coal consumption.

— International Energy Agency

THE CLEAN ENERGY ECONOMY

Around the world, demand for environmental goods and services is on the rise. The most promising technology areas, according to a survey by the *Climate Change Business Journal*, are low-carbon energy, energy storage, carbon capture and storage, green buildings and materials, clean vehicles and renewable energy.

GHG EMISSIONS: A GLOBAL PERSPECTIVE

According to British Petroleum's 2011 Statistical Review of World Energy, China surpassed the United States as the top consumer of energy in 2010, with demand increasing 11.2% over the previous year. Chinese demand for coal in the same year resulted in a traffic jam 120 kilometres long caused by more than 10,000 trucks carrying coal supplies from Inner Mongolia. In 2011, China was by far the largest consumer of coal, providing 70% of the country's total energy and accounting for 49% of global demand. Recent reporting indicates that in the next four years, the mega-consumer will add another 160 coal plants to the 620 coal-fired power stations already operating in China. This represents a new coal plant every 10 days on average. Although coal plant efficiency in China has improved, increased soot, ash and GHG emissions will inevitably result. Recent reporting indicates that China's growth in GHG emissions each year is more than Canada's total annual emissions from all sectors. In MAC's view, development in China and other competing countries needs to take place within a balanced global GHG framework, using the cleanest possible technologies.

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 70% in 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 some 600 known deposits in 30 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.

In the interim, for Canadian mining, the availability of reliable, well-priced energy is a key driver of investment. As a case in point, a concentrator/furnace investment near a proposed chromite mine in Ontario's Ring of Fire region could reportedly be viable with power prices at \$0.04 per kilowatt hour, but not at a higher figure. If regions want these types of economic development, political leaders and policy makers must ensure that the industrial energy supply is stable, long term and competitively priced.

REGULATORY ENVIRONMENT

The Canadian mining industry is governed by dozens of federal, provincial and territorial acts and regulations. 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.

In recent years, the industry's experience with the regulatory environment has been mixed. Environmental legislation, such as the *Canadian Environmental Assessment Act*, serves as a good example. The federal environmental commissioner has commented on the many overlaps between government review agencies, and has noted that there is no evidence of this duplicative approach leading to better environmental outcomes. Overlaps and inefficiencies can weaken Canada's status as a destination for capital investment.

Steps have been taken to address industry concerns over the effectiveness, predictability and efficiency of Canada's regulatory environment.

Canada's Major Projects Management Office (MPMO) is set up to coordinate the many agencies and departments that review projects proposed by industry. The work it undertakes has been a positive step towards achieving clarity. Funding for the office was announced in the 2007 federal budget, which allocated \$150 million over five years to improve the regulatory regime. 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.

Additionally, positive changes were announced in the 2010 budget that enabled the Canadian Environmental Assessment Agency to initiate and manage comprehensive studies. These changes should speed up processes by enabling quicker ministerial decisions about project scale and by reducing the number of agencies involved in certain project assessments.

Most recently, the 2012 budget introduced legislation to implement system-wide improvements for achieving the goal of "one project, one review" in a clearly defined time period. The government initiated these measures with the understanding that a modern regulatory system is critical to attracting investment and jobs in Canada. The regulatory reform package focuses on four major areas:

- Making the review process for major projects more predictable and timely
- Reducing duplication and regulatory burden
- Enhancing environmental protection
- Enhancing Aboriginal consultation

Uncertainty remains, however, over how some of these changes will be implemented, and how relevant federal, provincial and territorial authorities will work in partnership to enact the new legislation. For example, industry would like clarity on how the fisheries and pollution prevention provisions of the *Fisheries Act* will work together in practice, and whether the Act will be predictable and proportionate to risk. Given the extent of change to the *Canadian Environmental Assessment Act*, industry is seeking clarity on how the Act will function in the longer term. Of particular interest is how substitution and equivalency will work with respect to Aboriginal consultation and federal permitting.

Although questions concerning implementation of the new regulatory provisions remain, it is widely held that the recent changes have the potential to lead to positive improvements. To ensure these intended outcomes are achieved, officials within relevant federal, provincial and territorial government departments should 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.

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. In 2010, for example, the British Columbia government placed a moratorium on exploration, mining and oil and gas activity in the province's Flathead Valley—a decision made with little consultation that sets a large area aside from resource development.

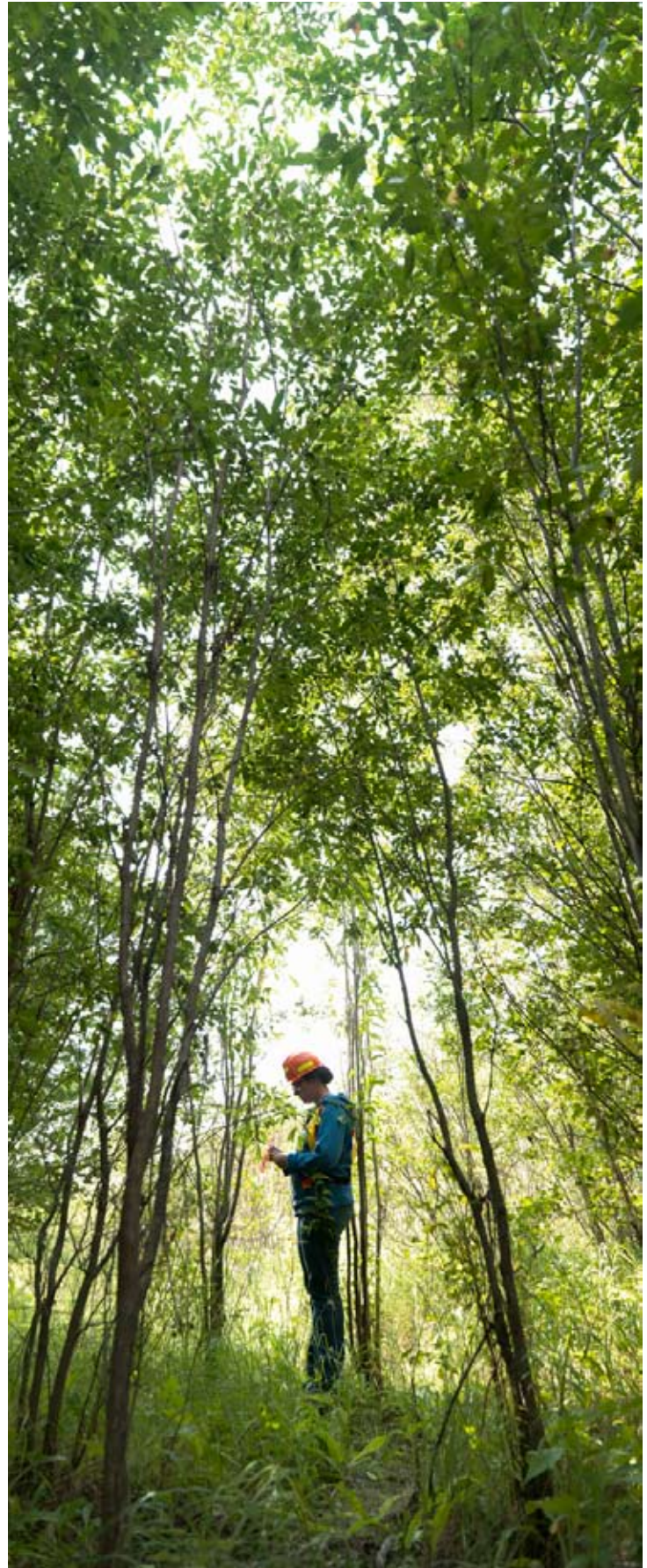


FIGURE 32

MINING INDUSTRY RELEASE OF SUBSTANCES TO THE ENVIRONMENT, BASE YEAR TO 2010

	Base-Year	2007	2008	2009	2010	% Change (Base-10)
Cadmium	130.1	26.6	19.9	23.4	13.8	89
Arsenic	319.5	85.4	110.0	66.4	48.7	85
Copper	976.0	384.1	313.9	270.3	347.2	64
Lead	1,843.9	230.7	214.5	194.1	158.5	91
Mercury	28.2	1.5	2.5	1.1	0.8	97
Nickel	1,372.0	246.7	212.9	119.8	114.0	92
Zinc	3,014.6	444.1	403.9	554.1	355.8	88

Source: MAC Member Companies, TSM Progress Report, 2012.

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 33

INTERNATIONAL STANDARDS AND PROGRAMS

MAC MEMBER COMPANY APPLICATION OF INTERNATIONAL STANDARDS AND PROGRAMS

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 Environmental 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	NA																			
	IAMGOLD Corporation	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																			
	INMET Mining Corporation	X	X	X	X	X	X	X	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																				
Xstrata Canada		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																					
COMPANIES HEADQUARTERED OUTSIDE OF CANADA WITH CANADIAN OPERATIONS																																								
ArcelorMittal Mines Canada				X	X																																			
De Beers			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	X	NA	X	NA																					
BHP Billiton - Ekati		X				X	X	X		X	X	X						NA	X																					

Source: MAC Member Companies, TSM Progress Report, 2012.

* Applied at international operating facilities.

FIGURE 34

MINING INDUSTRY ENERGY AND GHG EMISSIONS DATA, 1990–2010

	1990	1995	2000	2005	2008	2010
Canadian Economy						
Canadian energy use (PJ)	9,608	10,155	11,362	11,738	11,575	11,069
Energy used by broader industry (PJ)	2,400	2,533	2,724	2,759	2,543	2,344
Canadian GHG emissions (mt)	592	642	718	731	732	694
GHG emissions by industry (mt)	135.8	138.6	156.4	158.7	151.8	151
Metal ore mining						
Energy use—from electricity (PJ)	47	42	36	37	39	37
Total energy use (PJ)	102	91	81	83	92	86
Share of Canadian energy use (%)	1.06	0.9	0.7	0.7	0.79	0.78
Energy per unit (TJ/kt)	0.36	0.34	0.33	0.33	0.37	0.34
Direct GHG emissions (mt CO ₂ e)	3.92	3.55	3.25	3.3	3.85	3.5
Direct share of Canadian GHG emissions (%)	0.66	0.55	0.45	0.45	0.53	0.5
Direct GHG emissions per unit (kt CO ₂ e/kt)	14	15	13	13	15	16
Non-metal mining						
Energy use—from electricity (PJ)	10	-	10	11	11	9
Total energy use (PJ)	40	44	42	42	48	36
Share of Canadian energy use (%)	0.42	0.43	0.37	0.36	0.42	0.32
Energy per unit (TJ/kt)	1.8	-	1.7	1.4	1.5	1.0
Direct GHG emissions (mt CO ₂ e)	2	2	2	2	2	2
Direct share of Canadian GHG emissions (%)	0.3	0.3	0.2	0.2	0.3	0.2
Direct GHG emissions per unit (kt CO ₂ e/kt)	0.076	-	0.076	0.064	0.067	0.046

Source: Canadian Industrial Energy End-Use Data Analysis Centre (CIEEDAC) Report, March 2012.

Notes: Smelting and refining data are for non-ferrous metals. Also does not include aluminum.

TJ=trillion; PJ=1000 TJ

- Nil

FIGURE 34 (CONTINUED)
MINING INDUSTRY ENERGY AND GHG EMISSIONS DATA, 1990–2010

	1990	1995	2000	2005	2008	2010
Metal and non-metal mining						
Energy Use—from electricity (PJ)	57	-	49	48	50	46
Total energy use (PJ)	142	135	125	125	140	122
Share of Canadian energy use (%)	1.48	1.33	1.05	1.06	1.2	1.1
Energy per unit (TJ/kt)	0.49	-	0.49	0.49	0.53	0.44
Direct GHG emissions (mt CO ₂ e)	5.63	5.4	5.04	5.12	5.96	5
Direct share of Canadian GHG emissions (%)	0.95	0.84	0.7	0.7	0.81	0.72
Direct GHG emissions per unit (kt CO ₂ e/kt)	0.019	-	0.021	0.02	0.023	0.018
Primary metal smelting and refining						
Energy Use—from electricity (PJ)	31	41	42	36	28	23
Total energy use (PJ)	77	84	86	75	57	55
Share of Canadian energy use (%)	0.8	0.83	0.75	0.66	0.52	0.49
Energy per unit (TJ/kt)	50	46	46	42	39	37
Direct GHG emissions (%)	2.89	2.72	2.58	2.34	2.49	1.69
Direct share of Canadian GHG emissions (%)	0.49	0.42	0.36	0.32	0.34	0.24
Direct GHG emissions per unit (kt CO ₂ e/kt)	1.9	-	1.4	1.4	1.4	1.13

Source: Canadian Industrial Energy End-Use Data Analysis Centre (CIEEDAC) Report, March 2012.

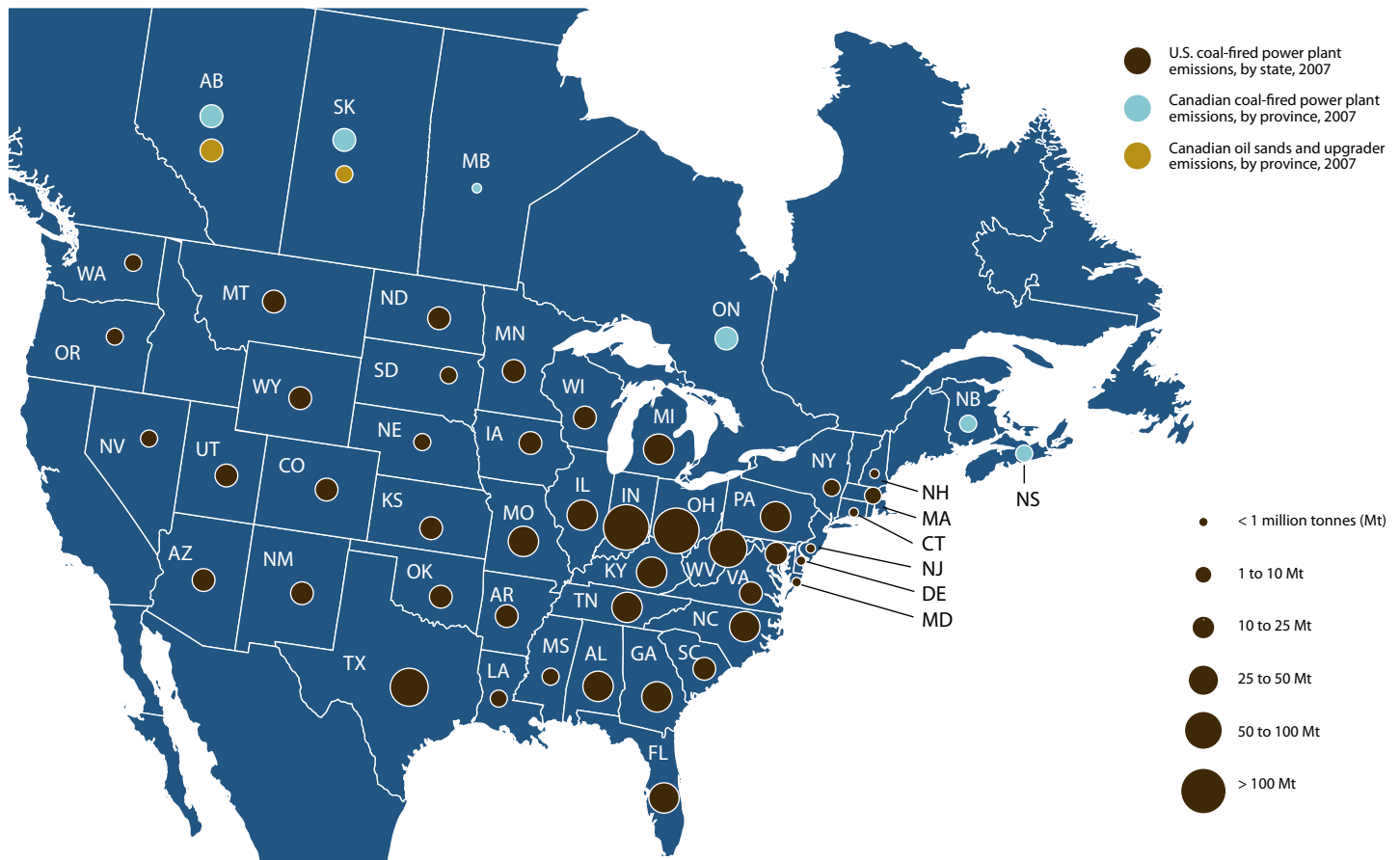
Notes: Smelting and refining data are for non-ferrous metals. Also does not include aluminum.

TJ=trillion; PJ=1000 TJ

- Nil

FIGURE 35

CANADA AND THE UNITED STATES—THE GHG CHALLENGE



THE WORLD

INTERNATIONAL MARKET ACTIVITIES AND DEVELOPMENTS

HIGHLIGHTS

- The industry exported \$101.9 billion worth of metals, non-metals and coal in 2011—22.8% of Canada's total goods exports.
- The availability of energy, water and transportation, and the prospect of governments undoing existing agreements, are risks many companies face in international mining projects.
- Sovereign wealth funds are increasingly important sources of investment funding and now have a larger combined value than Germany's economy.
- Canadian trade policy initiatives with Europe, India, China, the Americas and Africa could improve the mining industry's trade and investment environment over time.
- Policy measures by China, still the main driver of mineral prices and trends, are shaping the Canadian and global mining industry.

Mining companies are global traders, with multi-billion dollar exports in many areas. Approximately 800 Canadian exploration companies operate in over 100 countries, and the industry receives new capital, ideas and opportunities through high flows of inward and outward investment. World market conditions, including imports, exports and investment, shape the industry, as do global trade and investment policies.

INTERNATIONAL TRADE STATISTICS

Despite showing a trade deficit in the third stage of mining in 2011, the sector's overall surplus rose to \$24.7 billion, approaching pre-recession highs (see Figures 36, 37 and 38). This can largely be attributed to the surge in metal exports.

Exports

Exports continued to rise in 2011, reaching a record \$89 billion for the first three stages, up 23% over the previous year, and surpassing a pre-recession high of \$80 billion. Stage 4 exports came in at \$12.6 billion, breaking the \$11 billion plateau maintained since the economic downturn.

Some 53% of Canada's metal exports go to the United States, mainly iron and steel, aluminum, gold, silver and copper (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 nickel, copper, iron ore and potash.

Imports

Imports surged in 2011 to a record \$77.2 billion for all four stages of mining—a 16% increase from 2010 levels and a 40% increase from 2009 recessionary levels. Stages 1 to 3 rose 56% from 2009 recessionary levels to \$47 billion. Stage 4 imports surpassed pre-recession highs reaching a total of \$30.5 billion. Of Canada's total metal imports in

2011, around 48% came from the United States and 32% from other regions, including South America, Russia and Africa (see Annex 12). An indicator of the importance that the Trans-Pacific Partnership (TPP) will have for industry is the total sum of metals imported from TPP countries. When the US portion is removed from the total, TPP countries accounted for 5% more of total metal exports to Canada than the European Union—

CANADIAN MINING INDUSTRY—2011 EXPORTS AT A GLANCE

Total industry exports: \$101.9 billion

- Metals: \$76.5 billion
- Non-metals: \$17 billion
- Coal: \$8.4 billion

Percentage of total Canadian goods exported: 22.8%

Commodity	2010 (\$000)	2011 (\$000)
Gold	15,131,649	18,363,792
Iron and steel	12,706,182	13,453,823
Aluminum	9,260,431	9,916,697
Coal, thermal and metallurgical	6,232,490	8,272,866
Nickel	5,085,451	6,771,998
Potash and potassium compounds	5,197,393	6,724,335
Copper	5,270,158	6,536,805
Iron ore	3,190,593	4,177,526
Silver	1,862,408	3,663,244
Diamonds	2,681,647	2,737,193
Uranium and thorium	2,186,617	2,736,503
Zinc	1,734,624	1,695,477
All other minerals	9,020,966	10,724,401
Total	84,531,390	101,902,095

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

currently the second largest source for metals imported to Canada.

INTERNATIONAL MARKET 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.

CANADIAN MINING INDUSTRY—2011 IMPORTS AT A GLANCE		
Total industry imports: \$77.2 billion		
<ul style="list-style-type: none"> • Metals: \$65.7 billion • Non-metals: \$10.3 billion • Coal: \$1.2 billion 		
Percentage of total Canadian goods imported: 17.3%		
Commodity	2010 (\$000)	2011 (\$000)
Aluminum	5,002,699	5,426,494
Copper	3,037,093	3,069,736
Gold	9,512,031	12,312,023
Iron and steel	20,263,540	22,616,039
Silver	2,003,440	4,130,614
<i>Source: Natural Resources Canada. More information in Annex 12.</i>		

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.

Following the recession, and driven by growth in China, demand and prices increased through mid-2011. At that point, market uncertainty returned, as concerns about US and EU debt and inflation in China dampened demand and prices yet again. Despite a

modest return, uncertainty resurfaced as China reduced its growth forecast in March 2012. These 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, India and Brazil are the first, second and fifth most populous nations in the world and rank among the 20 largest economies. These countries' economies grew on average by 9%, 6% and 3% a year, respectively, over the past decade. They 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.

Automobile consumption serves as a good indicator of metal intensity. For example, in 2010, the BRIC countries (Brazil, Russia, India and China) accounted for 16 million new passenger car sales—a figure six times larger than average annual sales in those countries in the 1990s. Despite this increase, passenger car density among China and India remains significantly below developed countries. For example, according to the World Bank, India and China had approximately only 15 and 30 passenger cars, respectively, for every thousand people in 2009. Such consumption trends and indicators lead many analysts to conclude that demand for metals and minerals will remain strong into the future. According to a recent OECD report, for example, both China and India's economic growth is projected to average approximately 7% a year through 2020.



Governments Seeking More Revenues

With mineral prices generally up during the past decade, many national governments have tried to gain more mining revenues by reviewing or freezing licences, rewriting contracts or suspending the issuance of permits. So pervasive is the issue, resource nationalism remains the number one risk for mining and metals companies around the world, according to Ernst & Young's annual *Business Risks Facing Mining and Metals 2012–2013* report.

The Oyu Tolgoi mine in Mongolia is an interesting case study of the complexities of major projects in developing countries. Proposed by Ivanhoe Mines—now known as Turquoise Hill Resources and 51% owned by Rio Tinto—the original investment agreement signed in 2009 gave the miner a 66% stake in the project. One of the world's largest copper-gold projects, the mine could put Mongolia among the economic growth leaders in Asia. Mongolia recently elected a pro-development president. However, by mid-2011 there were signs that the government wanted to renegotiate the development agreement yet again, with the aim of securing a greater share of revenues. The latest developments include a group of 24 members of parliament calling for the enforcement of a parliamentary resolution stating that the Mongolian government should own 51% of the project once foreign partners recoup their start-up investments.

The desire to capture more revenues from mining is not limited to the governments of developing nations. In May 2010, the Australian government proposed a 40% super-profits tax that would also apply to existing operations. Industry sources protested that the sector already contributed over twice its GDP share of the country's corporate income tax, and several firms stalled their investment decisions. The issue contributed to the resignation of Australia's prime minister in June 2010 and to the later agreement to reduce the super-profit tax rate, narrow its scope and increase the profitability threshold. Australia's Senate approved a 30% Minerals Resource Rent Tax (MRRT) on iron ore and coal mining profits on July 1, 2012.

South Africa's ruling African National Congress (ANC) party is considering Australia's MRRT as a potential template for its own resource tax. The ANC released a draft report on February 6, 2012, dealing with state intervention in the minerals sector. The report proposes an alternative "tax" in the form of a resource rent tax. If implemented, a mining company would be accountable for tax at a rate of 50% of a currently unspecified amount exceeding what is perceived to be a "normal return" on investments.

While Canada is hailed as one of the most consistent and reliable mining taxation regimes in the world, it has demonstrated resource nationalism in a different form. A recent mining related example of this includes



the federal government's blocking of the 2010 proposed acquisition of Saskatchewan's Potash Corporation by Australia's BHP Billiton (see below for more discussion on foreign direct investment).

On the provincial level, Quebec has raised mineral royalty rates in recent years, reaching 16% of profits in 2012 and moving its position as the lowest burden province to third-highest. The Ontario government recently commissioned a report that proposed a re-thinking of the province's mineral tax regime. The report states that the province needs to maintain support for industry, while ensuring that tax payers receive fair return on the region's resources. At this point, it is uncertain what tax changes may result.

Some governments, on the other hand, are actively working to attract investment. Jamaica unveiled its first national minerals policy in 2009. Tanzania, Zambia and Colombia, despite being difficult investment regimes, are looking to make exploration and development more attractive. The importance of government action was underscored in South America in 2009, when a tax agreement struck between Chile and Argentina led Barrick Gold to approve the \$3 billion Pascua-Lama project, one of the world's prime undeveloped gold projects.

International Competitiveness: Canada and Global Jurisdictions

Energy, water and transportation are key variables that affect the mining industry's competitiveness, and conditions can vary widely from one country to the next. Chile, for example, has water scarcity and closely monitors water use at mine sites. Energy availability is also an issue in northern Chile, and uncertain power supply interferes with mining production in South Africa. Many large investments are needed in transportation infrastructure, such as rail links in Tanzania and highways in northern Quebec. Often the share to be paid by companies versus governments is unclear and requires negotiation.

In Canada, some analysts are concerned that the mining industry's competitiveness could suffer because of the lack of clarity and commitment on land access issues at the provincial and territorial level. Government proposals to protect northern lands and amendments to provincial mining laws require the right balance. Imbalance can drive mineral investment to other countries and can stifle development opportunities for Aboriginal and other communities. (These issues are also discussed in Section 5 of this report.)

Another competitiveness issue is the value of the Canadian dollar, which now hovers around parity with the US dollar. For Canadian industry, minerals are generally priced in US dollars, labour and other costs in

POLICY ENVIRONMENTS FOR MINING INVESTMENT

An annual Fraser Institute survey, released in March 2011, asked 802 mineral exploration and development companies which regions (of 93 listed) have the best policy environments for mining investment. Here are some of the results:

- Canadian jurisdictions placed among the world leaders (New Brunswick captured first place overall), with political stability and security being important variables.
- The top 10 jurisdictions were New Brunswick, Finland, Alberta, Wyoming, Quebec, Saskatchewan, Sweden, Nevada, Ireland and Yukon.
- Manitoba's ranking (20) fell while Ontario (13) and British Columbia (31) showed gains.
- The bottom 10 scorers were Honduras, Guatemala, Bolivia, Venezuela, India, Philippines, Kyrgyzstan, Ecuador, Indonesia and Vietnam.

Canadian currency, so a rising dollar reduces profitability. However, according to Natural Resources Canada, the benefits to the industry of stronger mineral prices have more than offset the drawbacks of a higher dollar.

GLOBAL TRADE AND INVESTMENT POLICY

The global trade policy front has been quiet for several years. Discussions with the World Trade Organization (WTO) continue, and while there has been some progress on export subsidies and market access tariffs, the conclusion of the WTO Doha Round seems distant. Since 2008, talks have stalled due to division on major issues, including industrial tariffs, non-tariff barriers, services and trade

remedies. In a May 2012 report to the WTO, General Council Director-General, Pascal Lamy, advocated “small steps, gradually moving forward the parts of the Doha Round which were mature, and re-thinking those where greater differences remained.”¹ Given the status of negotiations, the timeframe for overcoming these more significant differences remains unclear.

Protectionism Trends

There are signs of some key countries growing more protective of their raw material supply. Twice in recent years, Russia has halted energy exports to Belarus and Ukraine. Overall investment interest in Russia has cooled, and the number of exploration projects there is limited, as is the number of successes. Russia falls in the bottom 20% of the Fraser Institute rankings of investment policy regimes. To counter this situation, the Russian government will likely have to play a greater role in financing or bearing the risks of mineral exploration.

India, concerned that its iron ore reserves might not meet domestic demand, imposed a tax in 2007 aimed at cutting exports of the commodity in half. In April 2011, India increased its export duty on iron ore fines from 5% to 20%. Some Indian states have also imposed iron ore export bans. Recent developments on these issues, however, indicate some signs of easing. In September 2012, the Indian High Court ruled that 18 iron ore mines in Karnataka could resume activities. Despite hundreds of other mines in the region banned from operating, this is a step in the right direction. Following the court ruling, the Indian government is considering reducing its export taxes on iron ore shipments—another positive step. These measures are likely related to the fact that

¹ Director General Pascal Lamy, *Report by the Chairman of the Trade Negotiations Committee*, World Trade Organization, May 1, 2012, http://www.wto.org/english/news_e/news12_e/gc_rpt_01may12_e.htm.

India's iron ore exports had fallen by more than a third by March 31, 2012.

Despite these positive signs, the world's third-largest iron ore exporter still hangs on to protectionist measures. Immediately following Karnataka's reduction of restrictions, the government of Goa imposed a complete ban on mining. (Goa accounts for about half of India's iron ore shipments.) Such inconsistencies in the investment environment, among other challenges, have contributed to India ranking in the bottom 10 of the Fraser Institute survey three out of the past four years.

Closer to home, recent reports indicate a possible shift in Chinese investment away from the West. Lou Jiwei, China Investment Corporation Chairman, recently stated that the rise in protectionism in both trade and investment in some Western countries is leading China to shift investment towards Asia. Wan Jifei, President of the China Council for the Promotion of International Trade, also expressed a similar sentiment. How and whether these views will shape policy under Xi Jinping's new leadership is uncertain at this time.

China itself, however, is facing several protectionism cases at the WTO, including one brought jointly by the United States, the European Union and Japan over the country's restrictions on rare earth exports (discussed below).

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. In February 2012, the vote by government representatives from the 27 nations of the European Union (EU-27) resulted in a temporary stalemate over the controversial Fuel Quality Directive. The motion, having been passed from the bureaucratic to the ministerial levels of governments, has been delayed until early 2013, while the European Commission conducts an impact assessment.

One of the complicated issues surrounding the Fuel Quality Directive and carbon tariffs is the geopolitical dynamic of oil production. Out of the top 10 countries ranked by oil reserves, Canada, which ranks third, is the only Western liberal democracy.

While carbon tariffs could gain attention in the coming years, any action would likely lead to retaliatory trade measures, since most forms of energy generation affect the environment, albeit to different extents. In the United States, for example, 30 states have a coal emissions carbon footprint as large as, or larger than, that of Alberta's oil sands (see Section 5 of this report).

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 October 2012, those assets were valued at \$5.2 trillion. Some SWFs such as the Alberta Heritage Savings Trust Fund,



currently valued at \$15.9 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.

FOREIGN INVESTMENT STATISTICS

Canada's direct investment abroad (CDIA) totalled \$684 billion in 2011, a 7% increase over 2010 (see Figure 39). Of that, the metallic minerals and metal products sector

accounted for \$58.6 billion, or 8.6%. The sector's share has held steady at about 10% over the past decade, down from 15% in the 1990s. In the last two 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 due to large CDIA increases by other sectors.

As for foreign direct investment in Canada (FDIC), the amount invested in the metallic minerals and metals products sector jumped in 2007 from \$38 billion to \$60.6 billion and has stayed in that range ever since (see Figure 39). In 2011, the sector's share of FDIC edged upward to \$60.9 billion comprising 10% of the Canadian total, up from the 5–7% seen in previous decades. This increase reflects foreign acquisitions in the sector in recent years. Other leading Canadian industries in terms of FDIC stocks include finance/insurance and energy.

CANADA'S TRADE AND INVESTMENT POLICY

Canada remains among the world's most open countries in terms of trade and investment in mining. Canada has no notable barriers except for some foreign ownership restrictions in uranium, which have been and will be waived in cases where reciprocal openness is seen. The country's openness to investment was underscored in 2006–07

SOVEREIGN WEALTH FUNDS

- The Sovereign Wealth Fund Institute put the combined value of global SWFs at \$5.1 trillion as of October 2012, larger than several of the G7 economies.
- The Sovereign Wealth Fund Institute ranks SWFs in its regular analysis. The largest in terms of assets:
 - Norway Pension Fund: \$656.2 billion
 - Abu Dhabi Investment Authority: \$627 billion
 - China's SAFE: \$597.9 billion
 - Saudi Arabia's SAMA: \$532.8 billion
 - China Investment Corporation: \$482 billion



when Inco, Falconbridge and Alcan were acquired by foreign companies.

Foreign investment, whether it flows in or out, gives Canadian businesses easier access to new technologies and ideas, and to larger markets and production chains. Government's main roles, in the industry's view, are to ensure that two-way flows are fair and open, to negotiate investment protection agreements and to keep Canada an attractive place for investment.

Trade Openness Challenged

Canada's traditional openness has been called into question in recent years. BHP Billiton's \$40 billion takeover bid for PotashCorp in mid-2010 became a major political issue. The premier of Saskatchewan (and several other premiers) opposed the takeover, essentially forcing the hand of Conservative parliamentarians in that province and the Conservative government in Ottawa. The takeover was ultimately rejected as not being in Canada's best interests. This decision has contributed to a growing view that Canada's tool for considering foreign direct investment (FDI) — the *Investment Canada Act* — is overly subject to political considerations.

One example of this view is a Conference Board of Canada study, *Fear the Dragon? Chinese Foreign Direct Investment in Canada*, published in June 2012. The study bluntly states that Canada's current FDI review

process dissuades Chinese investments in Canadian resource industries. The report explores changes that can be made to clarify the *Investment Canada Act* to set clearly stated conditions for Chinese investment.

Under the Act, the Minister of Industry can block any transaction valued at \$299 million and above if the deal does not provide a "net benefit" to the country, based on factors such as output and employment levels. Since 1985, when the Act came into force, Industry Canada has reviewed more than 1,600 foreign acquisitions worth almost \$600 billion, and has approved all but a few. But those blockages occurred under the current government.

A key link between FDI in Canada and the federal government's aggressive trade expansion (discussed further below) 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, keeping this reputation is a high priority of the federal government. Inconsistencies between the government's stated goals and actions, such as rejecting the BHP bid, could lead investors to question whether Canada walks the talk when it comes to investment.

Positive Developments

Despite certain challenges, the Canadian trade and investment 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:

- **Possible economic agreement with the European Union.** A background study suggests that trade liberalization between Canada and the European Union could increase Canada's GDP by \$12 billion and bilateral trade by 20%. Negotiations towards a comprehensive agreement were announced in May 2009. Both Canada and the European Union are committed to maintaining the momentum of the negotiations, with the aim of concluding the agreement by the end of 2012.
- **Freer trade with Central and South America.** Canadian mining presence in this region is one reason why Canada is moving towards more liberal trade relations. In 2009 and 2010, legislation was passed to set up free trade agreements (FTA) with Peru and Colombia, respectively. In August 2011, Canada concluded FTA negotiations with Honduras and suggested that it was open to resuming talks with Guatemala, El Salvador and Nicaragua at a future date. In November 2012, a Canada-Panama FTA passed in the House of Commons.
- **Negotiation of FIPAs.** Canada is negotiating new or stronger foreign investment protection agreements (FIPAs) with, among others, Mongolia, Indonesia, Vietnam, Kazakhstan and Tunisia. FIPAs are bilateral agreements that give foreign investors access to independent rules and arbitrators should disputes arise between them and the host government. While the enforcement components

are rarely used, the mere existence of a FIPA gives foreign governments a set of rules and expectations for fairness and transparency. Most recently, the following FIPA negotiations, with significant relevance to mining, have concluded in Tanzania, China and Senegal.

- **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 benefit 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.

CORPORATE SOCIAL RESPONSIBILITY

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.

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.

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 Government of Canada 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 Canadian borders.

DEVELOPMENTS IN AFRICA

The number of FIPAs in progress between Canada and African countries reflects Africa's growing importance as an investment destination for Canadian mining. Canada's recent conclusion of the FIPA with Tanzania is a positive step forward for mining companies with projects in that country. The potential for increased Canadian investment in Tanzania is important, especially in the mining, oil and gas, power infrastructure, mining equipment and services, and transport sectors. Total cumulative mining assets in Tanzania were valued at \$2.3 billion in 2011 – a value that is likely to grow once the FIPA comes into force.

Since 2006, Canada has concluded or brought into force FIPAs with 13 countries, and is in active negotiations with 13 others, many of which are African countries. Negotiations are currently underway in Zambia, Tunisia, Benin, Burkina Faso, Ghana, Côte d'Ivoire and Cameroon. Other recently concluded FIPA agreements with African countries include Madagascar, Mali and Senegal.

Instead, the Canadian government should continue to work with other governments to promote stronger social responsibility in mining developments. Initiatives like the Intergovernmental Forum on Mining, Minerals, Metals and Sustainable Development, Canada's Corporate Social Responsibility (CSR) Strategy for the Canadian International Extractive Sector, and the Canadian International Institute for Extractive Industries and Development 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 aspirations for MAC's Towards Sustainable Mining (TSM) program (see Section 5 of this report). Beyond being a condition of MAC membership and mandatory for domestic mining sites, several MAC members have decided to proactively adopt the program for their international operations. Specifically, Hudbay Minerals Inc., IAMGOLD Corporation, Inmet Mining Corporation, Agnico-Eagle Mines and Teck Resources Limited are using TSM to drive performance improvement in areas such as environmental stewardship and community engagement on the international stage.

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.



Each of these standards requires public reporting and third-party validation. These include the United Nations Global Compact, Voluntary Principles on Security and Human Rights, 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 the last year, MAC's International Social Responsibility Committee undertook four groundbreaking 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 holding 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.

- A study on the international application of Free, Prior and Informed Consent is currently being completed.

This year, the industry proactively partnered with two prominent NGOs, Publish What You Pay and the Revenue Watch Institute to jointly develop a framework for the disclosure of payments to governments for Canadian mining companies operating domestically and internationally. Transparency around the payments made to foreign governments (taxes and royalties, for example) is essential to addressing corruption and for citizens to hold their own governments to account for the spending of revenues they gain from mining.

The Canadian government unveiled its CSR policy in 2009. The *Building the Canadian Advantage Strategy* includes four main pillars: 1) support for host country resource governance capacity-building initiatives; 2) endorsement and promotion of widely recognized international CSR performance guidelines; 3) support for the development of a CSR Centre of Excellence; and 4) the creation of the Office of the Extractive Sector CSR Counsellor. The policy complements the dozens of CSR initiatives, programs and guidelines around the world. It also adds to Canadian mining companies' investments in dozens of countries, funding that helps pay for schools, roads, electricity, hospitals, clinics, school breakfast programs,

community halls, and child health and nutrition programs.

CANADIAN MINERS ON THE WORLD STAGE

Increasingly, leading mining companies are partnering with non-governmental development and environmental organizations at the site level to more effectively deliver social and economic benefits. Examples include:

- A partnership between IAMGOLD and Plan Canada in Burkina Faso to implement a job skills training project in 13 communities to meet labour market demands in a variety of sectors, including the mining sector and its sub-sectors.
- In Ghana, Rio Tinto is working with World University Service of Canada (WUSC), to provide direct skills training to 400 young people to help diversify the local economy within mining communities. This investment will also strengthen the local government's ability to provide quality education and access to clean, safe, water for 134,000 residents.
- In July 2011, Barrick contributed to a World Vision project in the district of Quiruvilca, Peru. Supported by the Canadian International Development Agency, the project aims to improve economic and social development for local households, especially women, youth and disadvantaged groups where there is an accelerated increase in mining revenue.

CHINA'S TRADE AND INVESTMENT POLICY

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

Trade Measures

China has a copper permitting and export duty system to protect the country's raw materials for domestic use and keep them out of global trading. The United States, the European Union and Mexico have challenged China's export restrictions in nine mineral categories, alleging that by keeping the materials in China, the country is making them available to its steel manufacturers at subsidized rates. In July 2011, the WTO found China's restrictions inconsistent with its commitments. China appealed, however, on January 30, 2012, but the recommendation that China bring its export duty and export quota measures into conformity with its WTO obligations was upheld. China has until the end of 2012 to implement the recommendations.

In recent years, China has periodically stockpiled iron ore, aluminum, copper, nickel, tin, zinc and crude oil. Those purchases helped to raise global metal prices following the 2008 recession.

Foreign Investment

Investment abroad was once discouraged by Chinese authorities, but this is no longer the case. According to Bloomberg, China held US\$3.3 trillion in foreign exchange reserves as of September 2012.

Besides investing in Africa and seeking opportunities in western countries (discussed below), China is building closer oil supply relationships with Iraq, Iran and Venezuela. More recently, attempts have been made to do the same with Canada. The China National Offshore Oil Company's \$15 billion bid for Nexen Inc., for example, signals China's largest interest in a Canadian oil company to-date.

China is also interested in former CIS countries, especially Uzbekistan, where an agreement to increase cooperation between

the two countries in the area of energy was signed in 2010. This partnership led to the Uzbek-Chinese joint venture, the Uz-China Uran uranium project in the Navoi region. The project is in the development phase. Chinese investors are also involved in a gold-silver mine development in Uzbekistan.

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. In July 2012, the WTO agreed to investigate claims by the United States, European Union and Japan that China is unfairly strangling rare earth exports in order to favour its domestic manufacturing industry.

In recent years, China has turned to Africa as a business partner and supplier of raw materials. Africa is now China's leading source of imported oil, with Angola, Sudan, Nigeria and Gabon as major partners. One deal in Angola featured a \$2 billion package of loans and aid, including funds for Chinese companies to build railroads, schools, roads, bridges, hospitals and fibre optic networks.

In electricity, China has linkages with South Africa's nuclear power program and has built power stations in Angola, Zambia and Zimbabwe. In minerals, Chinese firms have invested in Zambia and DR Congo, have acquired rights to mine gold and uranium in Zimbabwe, are developing uranium assets in Niger and are building a \$2.5 billion iron ore project in Sierra Leone.

According to the African Development Bank, Chinese companies dominate deal making in

EMERGENCE OF RARE EARTH ELEMENTS

Global demand for rare earth elements is estimated at 136,000 tons per year. As of 2010, global production accounted for only 133,600 tons of total demand, the gap being made up by previously mined stockpiles. As of 2012, global annual demand for the elements is projected to rise to at least 185,000 tons by 2015.

In anticipation of increased demand, Lynas Corporation's rare earth mine in Mount Weld, Australia, began producing in August 2011. Molycorp restarted its rare earth mine in California in early 2011. In August 2012, the company also announced that it is increasing its global market share of rare earths from 4% to 30%. The Colorado-based company plans to spend US\$895 million on doubling production capacity from 20,000 tons to 40,000 tons annually.

The European Commission has recommended more support for the exploration of strategic metals, including rare earths, and has proposed incentives for more recycling. In Canada, several companies are looking to develop rare earth finds in Quebec, the Northwest Territories, Yukon, Ontario, New Brunswick, Manitoba and Saskatchewan.

Despite the above-mentioned new supply, some analysts predict that new mining projects for the elements could take 10 or more years to reach production. Given the short-term projected demand spike, it is uncertain whether supply will be able to catch up. In the long run, however, global reserves and undiscovered resources are anticipated to be large enough to meet demand.



Africa, accounting for 40% of the corporate contracts signed in 2010 compared with 2% for US companies. South Africa's Standard Bank, the largest bank in Africa, predicts Chinese investment in Africa will reach \$50 billion by 2015, up 70% from 2009.

Relations between China and Australia have been tested recently by increased acquisitions and the sentencing of four Rio Tinto employees for bribery and theft of state secrets. Recent Chinese acquisitions and investments in Australia include Minmetals' purchase of OZ Minerals and Wuhan Iron and Steel's takeover of Centrex Metals. Hunan Valin's investment in Fortescue, a large Australian iron ore supplier, is part of China's strategy to rely less on Vale, Rio Tinto and BHP Billiton. China has reportedly invested \$56 billion in global iron ore assets to reduce this reliance.

Chinese investment in Canada's mining industry is expected to grow in the coming years. To date, Chinese interests have invested modestly in oil sands assets and have bought minority equity stakes in Kinross and PotashCorp. In July 2009, China Investment Corporation, the country's sovereign wealth fund, spent \$1.7 billion to acquire 17% of Teck Resources. China Investment Corporation opened an office in Toronto in January 2011 to be closer to new opportunities.

Economic Issues

Debate has arisen within the US Congress and the Obama administration about whether China is manipulating its currency. Some research suggests that the yuan is undervalued by 40% relative to the US dollar and that increasing it would create 1.2 million jobs in the United States. This prompted many Congress members to write to the US treasury secretary in 2010 urging punitive duties. In June 2010, and perhaps in light of the protest, the Chinese government sent positive signals about a currency appreciation, and the United States held off on pronouncing China a currency manipulator. More recently, the US treasury reported to Congress on the subject in May 2012, concluding that China is no longer considered a currency manipulator, even though its currency may be seriously undervalued.

According to the United States-China Business Council, the US treasury made the right call in its assessment. John Frisbie, president of the Council, explained that "branding China a currency manipulator triggers nothing to help reach the goal of a fully convertible currency and market-driven exchange rate for China. In addition, the 'manipulator' label would likely lead China to react negatively and slow down progress on this issue."² Segments of China's low-cost workforce may soon see better working conditions and wages. Through strike action, workers in companies such as Honda are receiving increases in the 25% range, which

are becoming more common for workers in the export economy. According to Credit Suisse, in 2011 all Chinese provinces and regions boosted their minimum wage for the second year in a row, with several regions seeing further increases in 2012.

Demand for workers in China is expected to outstrip supply by 2013, an economic issue that will evolve over the coming decade. The Chinese middle class will likely gain purchasing power, while companies may see their low-cost competitive advantage erode or shift to neighbouring countries.



² Kenneth Rapoza, "China: Currency Manipulator No More," *Forbes*, May 25, 2012, <http://www.forbes.com/sites/kenrapoza/2012/05/25/china-currency-manipulator-no-more/>.

FIGURE 36

MINERAL AND METAL PRODUCT IMPORTS AND EXPORTS¹, 2007-2011²

(\$ Millions)	2007	2008	2009	2010	2011	2011 Percentage of Canada's Total Economy
Total Imports						
Stage I	7,778	9,147	6,984	7,713	8,964	2.0
Stage II	7,674	9,362	7,742	12,378	15,714	3.5
Stage III	19,555	22,002	15,276	18,746	21,997	4.9
Stage IV	27,598	28,784	25,020	27,733	30,559	6.9
Stage I-IV	62,605	69,295	55,022	66,570	77,234	17.3
Metals	52,509	57,379	45,412	55,971	65,696	-
Non-metals	8,763	9,993	8,397	9,237	10,337	-
Coal and coke	1,332	1,924	1,212	1,361	1,198	-
Total economy imports	407,301	433,999	365,359	403,750	445,961	-
Total Exports ¹						
Stage I	18,171	28,799	19,911	24,626	32,532	7.3
Stage II	32,570	31,128	22,052	32,445	38,301	8.6
Stage III	19,746	20,419	13,157	15,609	18,413	4.1
Stage IV	14,616	14,799	11,302	11,852	12,653	2.8
Stage I-IV	85,103	95,146	66,422	84,531	101,899	22.8
Metals	69,407	69,395	49,123	63,984	76,507	-
Non-metals	12,521	19,290	12,095	14,298	16,993	-
Coal and coke	3,174	6,461	5,205	6,250	8,398	-
Total economy exports	450,321	483,488	359,754	399,300	447,802	-

Source: Natural Resources Canada, TRAGS; Statistics Canada.

Note: For trade purposes, Natural Resources Canada divides the mining and mineral processing industry into stages according to the degree of processing or manufacturing corresponding to the product Harmonized System Classification Code. These four stages include Stage I-Mineral Extraction and Concentrating, Stage II-Smelting and Refining, Stage III-Non-metals and Metals-Based Semi-Fabricated Industries, and Stage IV-Metals Fabricating Industries.

Note: Numbers may not add due to rounding.

¹ Total exports is the sum of domestic exports and re-exports.

FIGURE 37

BALANCE OF CANADA'S MINERAL TRADE, 2011

Stage	Domestic Exports (\$)	Total Exports (\$)	Total Imports (\$)	Balance of Trade (\$)
Stage I	32,439,079.00	32,535,837.00	8,962,769.00	23,573,068.00
Stage II	36,675,107.00	38,301,660.00	15,714,753.00	22,586,907.00
Stage III	17,307,098.00	18,411,813.00	21,997,438.00	(3,585,625.00)
Stage IV	11,167,382.00	12,652,785.00	30,528,101.00	(17,875,317.00)
Total	97,588,666.00	101,902,095.00	77,203,061.00	24,699,034.00

Sources: Natural Resources Canada; Statistics Canada.

Notes: Mineral trade includes coal. Numbers may not add to totals due to rounding.

FIGURE 38

VALUE OF CANADA'S MINING AND MINERAL PROCESSING INDUSTRY TRADE, 2002–2011

Year	Imports (\$ billions)	Exports (\$ billions)	Balance of Trade (\$ billions)
2002	48.2	50.5	2.4
2003	45.2	48	2.8
2004	52.1	56.7	4.6
2005	56.6	64.6	8
2006	61.8	75.5	13.7
2007	62.6	85.1	22.5
2008	69.3	95.1	25.9
2009	55	66.4	11.4
2010	66.6	84.5	18
2011	77.2	101.9	24.7

Sources: Natural Resources Canada; Statistics Canada.

Notes: Mineral trade includes coal. Numbers may not add to totals due to rounding.

FIGURE 39

METALLIC MINERALS AND METAL PRODUCTS—DIRECT INVESTMENT STOCKS, 1990–2011

Direct Investment (\$ billions)	1990	1995	2000	2005	2006	2007	2008	2009	2010	2011
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
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
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
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
Percentage of total										
Canadian direct investment abroad	13.74%	15.17%	11.90%	12.47%	11.35%	11.81%	10.39%	11.74%	9.44%	8.56%
Foreign direct investment in Canada	7.51%	5.68%	5.46%	5.32%	8.76%	11.84%	11.83%	10.37%	9.86%	10.03%

Source: Statistics Canada, CANSIM Table 376-0038; 2011 figures are preliminary.

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.

ANNEX 1

PRODUCING MINES IN CANADA, 2011¹

COMPANY	MINE SITE	ACTIVITY TYPE	LOCATION	COMMODITY
Newfoundland and 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	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
Hurley Slateworks Company Inc.	Burgoyne's Cove	(P.)	Burgoyne's Cove	Slate
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
CGC Inc.	Little Narrows	(P.)	Little Narrows	Gypsum
Georgia-Pacific Canada, Inc.	Melford	(P.)	Melford	Gypsum
Georgia-Pacific Canada, Inc.	Sugar Camp	(P.)	Port Hawkesbury	Gypsum
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
Shaw Resources Ltd.	Nova Scotia Sand and Gravel	(P.)	Nine Mile River	Silica
The Canadian Salt Company Limited	Pugwash	(U.)	Pugwash	Salt
Fundy Gypsum Company (USG Canadian Mining Ltd.)	Miller Creek	(P.)	Miller Creek	Gypsum
Fundy Gypsum Company (USG Canadian Mining Ltd.)	Wentworth Creek	(P.)	Wentworth	Gypsum
Sifto Canada Inc.	Nappan	(Solution mining)	Nappan	Salt
Black Bull Resources Inc.	White Rock	(P.)	White Rock	Quartz
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
Graymont Inc.	Havelock	(P., Plant)	Havelock	Lime, limestone
Potash Corporation of Saskatchewan Inc.	New Brunswick	(U., Plant)	Sussex	Potash, salt
Atlantic Silica Inc.	Poodiac	(P.)	Poodiac	Silica
Brookville Manufacturing Company	Brookville	(P., Plant)	Saint John	Dolomitic lime
Elmtree Resources Ltd.	Sormany	(P., Plant)	Sormany	Limestone

ANNEX 1 (CONTINUED)

PRODUCING MINES IN CANADA, 2011¹

COMPANY	MINE SITE	ACTIVITY TYPE	LOCATION	COMMODITY
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	(C.)	Desmaraisville	Au, Ag
Richmont Mines Inc.	Beaufor	(U.)	Val-d'Or	Au, Ag
Alexis Minerals 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
Agnico-Eagle Mines Limited	Goldex	(U., C.)	Val-d'Or	Au, Ag
Wesdome Gold Mines Ltd.	Kiena	(U., C.)	Val-d'Or	Au, Ag
North American Palladium Ltd.	Sleeping Giant	(U., 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
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
La Compagnie Bon Sable Ltée	Saint-Joseph-du-Lac	(P.)	Saint-Joseph-du-Lac	Silica
La Compagnie Bon Sable Ltée	Ormstown	(P.)	Ormstown	Silica
Unimin Canada Ltd.	Saint-Canut	(P., Plant)	Saint-Canut	Silica
Unimin Canada Ltd.	Saint-Donat-de-Montcalm	(P., Plant)	Saint-Donat-de-Montcalm	Silica
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
Temisca inc.	Saint-Bruno-de-Guigues	(P.)	Saint-Bruno-de-Guigues	Silica

ANNEX 1 (CONTINUED)

PRODUCING MINES IN CANADA, 2011¹

COMPANY	MINE SITE	ACTIVITY TYPE	LOCATION	COMMODITY
Ontario				
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
Xstrata Nickel Canada	Nickel Rim South	(U.)	Sudbury	Ni, Cu, Co, PGM, Au
Vale	Garson	(U.)	Sudbury	Ni, Cu, Co, PGM, Au, Ag, Se, Te
Quadra FNX Mining Company Inc.	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
Liberty Mines Inc.	Redstone	(U., C.)	southeast of Timmins	Ni
Lake Shore Gold Corp.	Bell Creek	(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	Fraser	(U.)	Sudbury	Ni, Cu, Co, PGM
Xstrata Nickel	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
Quadra FNX Mining Company Inc.	Levack/Morrison	(U.)	Sudbury	Cu, Ni, PM
Quadra FNX Mining Company Inc.	McCreedy West	(U.)	Sudbury	Cu, PGM, Au, Ag
Lake Shore Gold Corp.	Timmins	(U.)	Timmins	Au
URSA Major Minerals Inc.	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

ANNEX 1 (CONTINUED)

PRODUCING MINES IN CANADA, 2011¹

COMPANY	MINE SITE	ACTIVITY TYPE	LOCATION	COMMODITY
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
St. Marys CBM (Canada) Inc.	Bowmanville	(P.)	Bowmanville	Limestone
Hutcheson Sand & Gravel Ltd.	Huntsville	(P.)	Huntsville	Silica
Unimin Canada Ltd.	Midland	(P.)	Midland	Silica
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. Mary's	(P.)	St. Mary's	Limestone (cement)
Unimin Canada Ltd.	Badgeley Island	(P.)	Blue Mountain	Silica
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
HudBay Minerals Inc.	Chisel North	(U., C.)	Snow Lake	Cu, Zn
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

ANNEX 1 (CONTINUED)

PRODUCING MINES IN CANADA, 2011¹

COMPANY	MINE SITE	ACTIVITY TYPE	LOCATION	COMMODITY
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.	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
Preferred Sands LLC	Hanson Lake	(P., Plant)	Hanson Lake	Silica
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
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

ANNEX 1 (CONTINUED)

PRODUCING MINES IN CANADA, 2011¹

COMPANY	MINE SITE	ACTIVITY TYPE	LOCATION	COMMODITY
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.)	Cordell	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
Transalta Corporation	Whitewood	(P.)	Warburg	Coal
Sherritt International Corporation	Coal Valley	(P.)	Edson	Coal
Teck Coal 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				
FortyTwo Metals Inc. (Roca Mines Inc.)	MAX	(U., C.)	Trout Lake	Mo
Copper Mountain Mining Corporation	Copper Mountain	(P., C.)	Princeton	Cu, Au, Ag
Craigmont Mines Ltd.	Craigmont	(C.)	Merritt	Fe
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
Barkerville Gold Mines Ltd.	QR	(P., U., C.)	southeast of Quesnel	Au
Taseko Mines Limited	Gibraltar	(P., C.)	north of Williams Lake	Cu, Mo
Thompson Creek Mining Limited	Endako	(P., C.)	Fraser Lake	Mo
Breakwater Resources Ltd.	Myra Falls	(U., C.)	Buttle Lake	Zn, Cu, Au, Ag
Aurico Gold Inc.	Kemess South	(P., C.)	Smithers	Au, Cu
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
Heemskirk Canada Limited	Moberly	(P.)	Golden	Silica
Imasco Minerals Inc.	Lost Creek	(U.)	Lost Creek	Limestone

ANNEX 1 (CONTINUED)

PRODUCING MINES IN CANADA, 2011¹

COMPANY	MINE SITE	ACTIVITY TYPE	LOCATION	COMMODITY
Mighty White Dolomite Ltd.	Rock Creek	(P., Plant)	Rock Creek	Dolomite
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
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.	Imperial Limestone	(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	(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
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Sources: Data compiled by the Minerals and Metals Sector, Natural Resources Canada and the National Energy Board.

Notes: Excluded operations are clay products, peat and most construction materials (stone, sand and gravel).

¹ Included are operations that produced during 2011.

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

ANNEX 2

MINING ESTABLISHMENTS IN CANADA BY MINERAL, PROVINCE OR TERRITORY, 2011¹

	NL	PE	NS	NB	QC	ON	MB	SK	AB	BC	YT	NT	NV	TOTAL
Iron ore	2	-	-	-	3	-	-	-	-	1	-	-	-	6
Gold and silver ore	1	-	-	-	14	10	1	1	-	1	-	-	1	29
Lead-zinc ore	-	-	-	1	-	-	-	-	-	-	-	-	-	1
Nickel-copper ore	1	-	-	-	1	6	2	-	-	-	-	-	-	10
Copper, copper-zinc ore	1	-	-	-	1	1	1	-	-	5	1	-	-	10
Molybdenum	-	-	-	-	-	-	-	-	-	2	-	-	-	2
Uranium	-	-	-	-	-	-	-	4	-	-	-	-	-	4
Other metals	1	-	-	-	2	1	1	-	-	-	-	1	-	6
Total metals	6	0	0	1	21	18	5	5	0	9	1	1	1	68
Chrysotile	-	-	-	-	2	-	-	-	-	-	-	-	-	2
Diamonds	-	-	-	-	-	1	-	-	-	-	-	3	-	4
Gypsum	1	-	4	1	-	-	1	-	-	1	-	-	-	8
Peat	1	1	1	22	32	1	5	1	6	1	-	-	-	71
Potash	-	-	-	1	-	-	-	9	-	-	-	-	-	10
Salt	-	-	2	-	1	4	-	3	1	-	-	-	-	11
Sand and gravel	2	-	13	9	58	288	17	42	144	65	1	-	-	639
Stone	5	-	14	7	81	114	7	-	22	26	-	-	-	276
Shale, clay and other refractory minerals	-	-	1	-	3	2	-	1	1	-	-	-	-	8
Other Non-metals	-	-	-	-	3	3	-	2	-	3	-	-	-	11
Total non-metals	9	1	35	40	180	413	30	58	174	96	1	3	0	1,040

Sources: Natural Resources Canada; Statistics Canada.

¹ As of June 21, 2012.

- Nil

ANNEX 3

CANADIAN PRODUCTION OF LEADING MINERALS BY PROVINCE AND TERRITORY, 2011^p

	COAL		POTASH (K ₂ O) ¹		GOLD		IRON ORE		COPPER	
	KILOTONNES	\$000	KILOTONNES	\$000	TONNES	\$000	KILOTONNES	\$000	KILOTONNES	\$000
Newfoundland and Labrador	-	-	-	-	300	14,483	16,523	2,651,514	67,074	609,967
Prince Edward Island	-	-	-	-	-	-	-	-	-	-
Nova Scotia	-	-	-	-	-	-	-	-	-	-
New Brunswick	-	-	x	x	225	10,843	-	-	9,211	83,768
Quebec	-	-	-	-	26,966	1,302,460	16,995	x	20,273	184,361
Ontario	-	-	-	-	50,642	2,446,031	-	-	207,445	1,886,501
Manitoba	-	-	-	-	5,311	256,517	-	-	55,960	508,899
Saskatchewan	x	x	x	x	1,410	68,113	-	-	-	-
Alberta	x	x	-	-	28	1,120	-	-	-	-
British Columbia	26,661	5,691,021	-	-	2,651	128,026	55	x	169,608	1,542,414
Yukon	-	-	-	-	2,105	101,653	-	-	21,336	194,033
Northwest Territories	-	-	-	-	-	-	-	-	222	2,018
Nunavut	-	-	-	-	8,529	411,937	-	-	-	-
Canada	66,736	7,049,888	11,005	7,972,604	98,166	4,741,183	33,573	5,329,081	551,128	5,011,961

	NICKEL		DIAMONDS		SAND AND GRAVEL ²		CEMENT ³		URANIUM	
	KILOTONNES	\$000	000'S OF CARATS	\$000	KILOTONNES	\$000	KILOTONNES	\$000	KILOTONNES	\$000
Newfoundland and Labrador	69,448	1,666,120	-	-	4,482	16,453	-	-	-	-
Prince Edward Island	-	-	-	-	85	779	-	-	-	-
Nova Scotia	-	-	-	-	5,169	39,953	x	x	-	-
New Brunswick	-	-	-	-	2,164	10,917	-	-	-	-
Quebec	26,791	642,733	-	-	16,763	92,922	2,648	353,534	-	-
Ontario	90,552	2,172,443	797	453,362	80,148	482,810	4,934	562,291	-	-
Manitoba	25,265	606,142	-	-	13,108	72,073	-	-	-	-
Saskatchewan	-	-	-	-	12,419	90,043	-	-	8,690	1,089,205
Alberta	-	-	-	-	46,276	471,258	x	x	-	-
British Columbia	-	-	-	-	24,979	258,438	x	x	-	-
Yukon	-	-	-	-	1,073	6,588	-	-	-	-
Northwest Territories	-	-	9,998	2,069,630	307	2,174	-	-	-	-
Nunavut	-	-	-	-	-	-	-	-	-	-
Canada	212,056	5,087,439	10,795	2,522,992	206,974	1,544,407	11,972	1,591,975	8,690	1,089,205

Sources: Natural Resources Canada; Statistics Canada, Catalogue no. 26-202-X.

Notes: Totals may not add due to rounding.

¹ Excludes shipments to Canadian potassium sulphate plants.

² Mineral production of sand and gravel for Nunavut is included in totals for the Northwest Territories.

³ Includes exported clinker minus imported clinker.

p Preliminary

- Nil; x Confidential

ANNEX 4

CANADA'S WORLD ROLE AS A PRODUCER OF CERTAIN IMPORTANT MINERALS, 2011^P

			Rank of Five Leading Countries				
		World	1	2	3	4	5
			Canada	Russia	Belarus	Germany	China
Potash (K ₂ O equivalent)	000 t	37,000	11,200	7,400	5,500	3,300	3,200
(mine production)	% of world total		30.3	20.0	14.9	8.9	8.6
			Kazakhstan	Canada	Australia	Namibia	Russia
Uranium (metal content)	t	53,663	17,803	9,783	5,900	4,496	3,562
(mine production) (for 2010)	% of world total		33.2	18.2	11.0	8.4	6.6
			Congo	Canada	China	Russia	Zambia
Cobalt (mine production)	t	98,000	52,000	7,200	6,500	6,300	5,700
	% of world total		53.1	7.3	6.6	6.4	5.8
			China	Russia	Canada	United States	Australia
Aluminum (primary metal)	000 t	44,100	18,000	4,000	2,970	1,990	1,930
	% of world total		40.8	9.1	6.7	4.5	4.4
			South Africa	Australia	Canada	India	Mozambique
Titanium concentrate	000 t	6,000	1,030	900	700	550	510
(Ilmenite)	% of world total		17.2	15.0	11.7	9.2	8.5
			South Africa	Russia	Canada	Zimbabwe	United States
Platinum group metals	kg	399,000	217,000	111,000	28,000	16,800	16,200
(metal content)	% of world total		54.4	27.8	7.0	4.2	4.1
			China	Russia	Canada	Portugal	Bolivia
Tungsten (mine production)	t	72,000	60,000	3,100	2,000	1,300	1,200
	% of world total		83.3	4.3	2.8	1.8	1.7
			China	United States	Canada	Russia	Germany
Sulphur, elemental	000 t	69,000	9,600	8,800	7,100	7,100	3,700
(mine production)	% of world total		13.9	12.8	10.3	10.3	5.4

ANNEX 4 (CONTINUED)
CANADA'S WORLD ROLE AS A PRODUCER OF CERTAIN IMPORTANT MINERALS, 2011^P

			Rank of Five Leading Countries				
		World	1	2	3	4	5
Diamonds (precious) (2010)			Russia	Botswana	D.R.C.	Canada	Australia
	000 carats	126,317	34,857	22,018	20,166	11,804	9,976
	% of world total		27.6	17.4	16.0	9.3	7.9
Nickel (mine production)			Russia	Indonesia	Philippines	Canada	Australia
	000 t	1,800	280	230	230	200	180
	% of world total		15.6	12.8	12.8	11.1	10.0
Chrysotile (asbestos) (mine production)			Russia	China	Brazil	Kazakhstan	Canada
	000 t	2,000	1,000	400	270	210	100
	% of world total		50.0	20.0	13.5	10.5	5.0
Molybdenum (Mo content) ¹ (mine production)			China	United States	Chile	Peru	Mexico
	t	250,000	94,000	64,000	38,000	18,000	12,000
	% of world total		37.6	25.6	15.2	7.2	4.8
Salt (mine production) ¹			China	United States	Germany	India	Australia
	000 t	290,000	65,000	44,000	20,000	18,000	13,000
	% of world total		22.4	15.2	6.9	6.2	4.5
Cadmium (metal) ¹			China	Korea	Japan	Kazakhstan	Mexico
	t	21,500	7,500	2,500	2,000	1,800	1,500
	% of world total		34.9	11.6	9.3	8.4	7.0
Zinc (mine production) ¹			China	Peru	Australia	India	United States
	000 t	12,400	3,900	1,400	1,400	790	760
	% of world total		31.5	11.3	11.3	6.4	6.1
Gold (mine production) ²			China	Australia	United States	Russia	South Africa
	t	2,700	355	270	237	200	190
	% of world total		13.1	10.0	8.8	7.4	7.0

ANNEX 4 (CONTINUED)

CANADA'S WORLD ROLE AS A PRODUCER OF CERTAIN IMPORTANT MINERALS, 2011^p

			Rank of Five Leading Countries				
		World	1	2	3	4	5
			China	Australia	Brazil	India	Russia
Iron ore (mine production) ³	000 t	2,800	1,200	480	390	240	100
	% of world total		42.9	17.1	13.9	8.6	3.6
			China	Australia	United States	Peru	Mexico
Lead (mine production) ³	000 t	4,500	2,200	560	345	240	225
	% of world total		48.9	12.4	7.7	5.3	5.0
			Chile	Peru	China	United States	Australia
Copper (mine production) ³	000 t	16,100	5,420	1,220	1,190	1,120	940
	% of world total		33.7	7.6	7.4	7.0	5.8
			Mexico	Peru	China	Australia	Chile
Silver ⁴	t	23,800	4,500	4,000	4,000	1,900	1,400
	% of world total		18.9	16.8	16.8	8.0	5.9
			China	Iran	Spain	United States	Thailand
Gypsum (mine production)	000 t	148,000	47,000	13,000	11,500	9,400	8,500
	% of world total		31.8	8.8	7.8	6.4	5.7

Sources: U.S. Geological Survey (USGS); World Nuclear Association; Kimberley Process.

1 Canada ranked 6th.

2 Canada ranked 7th.

3 Canada ranked 9th.

4 Canada ranked 10th.

p Preliminary

ANNEX 5

MINERAL PRODUCTION OF CANADA, 2008–2011^P

	Unit	2008		2009		2010		2011 ^P	
		(quantity)	(\$000)	(quantity)	(\$000)	(quantity)	(\$000)	(quantity)	(\$000)
Metallic Minerals									
Antimony	t	111	731	54	318	x	x	x	x
Bismuth	t	71	1,918	87	1,615	91	1,759	92	2,189
Cadmium	t	313	1,976	322	1,055	2,403	9,644	1,767	4,898
Calcium	t	-	-	-	-	-	-	-	-
Cesium	t	x	x	x	x	x	x	x	x
Cobalt	t	4,809	440,913	2,275	102,241	2,644	125,144	2,966	121,567
Copper	t	584,003	4,329,801	470,347	2,766,112	507,883	3,941,677	551,128	5,011,961
Gold	kg	94,909	2,835,318	96,573	3,448,639	102,147	4,143,067	98,166	4,741,183
Ilmenite	000 t	x	x	x	x	x	x	x	x
Indium	kg	x	x	x	x	x	x	x	x
Iron ore	000 t	32,102	4,063,452	31,728	2,673,757	36,178	5,314,154	33,573	5,329,081
Iron, remelt	000 t	x	x	x	x	x	x	x	x
Lead	t	87,127	236,115	71,377	140,041	62,397	138,022	60,003	149,707
Lithium	t	x	x	x	x	x	x	x	x
Magnesium	t	-	-	-	-	-	-	-	-
Molybdenum	t	8,229	x	9,116	x	8,524	x	8,404	x
Nickel	t	246,197	5,713,003	132,471	2,213,597	156,270	3,509,833	212,056	5,087,439
Niobium (Columbium)	t	4,400	x	4,169	x	4,298	x	4,532	x
Platinum group	kg	22,764	618,547	10,925	258,242	9,864	260,304	21,567	741,107
Selenium	t	191	13,933	131	7,633	97	8,001	35	4,708
Silver	t	709	364,295	609	328,201	570	381,086	533	612,199
Tantalum	t	53	x	29	x	-	-	-	-
Tellurium	t	20	4,526	16	2,817	8	1,913	6	2,271
Tungsten	t	2,795	61,862	2,506	48,378	364	7,370	2,368	62,478
Uranium	t	8,703	953,858	10,133	1,358,144	9,927	1,230,182	8,690	1,089,205
Zinc	t	704,780	1,408,149	669,879	1,265,402	609,567	1,356,287	575,761	1,296,039
Total metallic minerals		..	22,594,378	..	15,474,941	..	21,358,783	..	25,260,044
Non-metallic minerals									
Barite	000 t	9	3,344	16	4,443	21	6,500	24	7,800
Carbonatite	000 t	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	11,972	1,591,975
Chrysotile	000 t	x	x	x	x	x	x	x	x
Clay products ²	000 t	..	187,774	..	132,902	..	148,907	..	139,595
Diamonds	000 ct	14,523	2,369,266	10,946	1,684,304	11,804	2,377,147	10,795	2,522,992
Gemstones	t	51	5,851	22	2,759	35	4,966	42	2,943

ANNEX 5 (CONTINUED)

MINERAL PRODUCTION OF CANADA, 2008-2011^p

	Unit	2008		2009		2010		2011 ^p	
		(quantity)	(\$000)	(quantity)	(\$000)	(quantity)	(\$000)	(quantity)	(\$000)
Graphite	000 t	x	x	x	x	x	x	x	x
Gypsum ³	000 t	5,819	83,023	3,568	55,749	3,046	47,771	2,555	40,128
Lime	000 t	2,046	273,316	1,613	238,508	1,863	288,787	1,959	296,279
Magnesite	000 t	x	x	x	x	x	x	x	x
Marl	000 t	x	x	x	x	x	x	x	x
Mica	000 t	x	x	x	x	x	x	x	x
Nepheline syenite	000 t	646	54,864	527	53,354	603	57,304	610	59,098
Peat	000 t	1,231	238,510	1,214	266,634	1,286	260,664	1,122	228,260
Phosphate	000 t	x	x	x	x	x	x	x	x
Potash (K ₂ O) ⁴	000 t	10,379	7,662,373	4,297	3,431,147	9,700	5,061,927	11,005	7,972,604
Potassium sulphate	000 t	x	x	x	x	x	x	x	x
Pumice	000 t	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	1,431	73,311
Salt	000 t	14,224	537,273	14,676	578,618	10,278	602,607	12,315	700,005
Sand and gravel	000 t	241,591	1,690,944	201,678	1,361,664	211,342	1,573,968	206,974	1,544,407
Serpentine	000 t	-	-	-	-	-	-	-	-
Soapstone, talc, pyrophyllite	000 t	64	22,314	56	19 701	100	26,125	147	26,741
Sodium sulphate	000 t	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	167,716	1,521,369
Sulphur, elemental	000 t	6,880	2,116,017	6,435	16,499	6,247	298,990	5,914	566,468
Sulphur, in smelter gas	000 t	746	148,456	543	77,817	610	70,903	609	110,424
Titanium dioxide	000 t	x	x	x	x	x	x	x	x
Tremolite	000 t	-	-	-	-	-	-	-	-
Zeolite	000 t	x	x	x	x	x	x	x	x
Total non-metallic minerals		..	19,372,019	..	11,552,034	..	14,699,276	..	18,037,847
Mineral fuels									
Coal	000 t	67,750	4,985,956	62,935	4,406,365	68,152	5,540,967	66,736	7,049,888
Total mineral fuels		67,750	4,985,956	62,935	4,406,365	68,152	5,540,967	66,736	7,049,888
Total mineral production		..	46,952,353	..	31,433,340	..	41,599,026	..	50,347,779

Sources: Natural Resources Canada; Statistics Canada, Catalogue no. 26-202 XIB.

Notes: Numbers may not add to totals due to rounding. Confidential values are included in totals.

Data include shipments by producers regardless of industrial classification.

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.

^p Preliminary

- Nil

.. Not available

x Confidential

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) = 1,102,311.3 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	Capital Investment (\$ million)
Coal Valley Resources Inc.	Robb Trend Coal Mine Expansion	AB	10.00
MAXIM Power Corp.	Development of #14 Coal Mine	AB	50.00
Canadian Natural Resources Ltd. (CNRL)	Project Horizon	AB	5,080.00
Fort Hills Energy Corp. (Suncor Energy Inc./Total SA/Teck)	"Fort Hills" Oil Sands Mine	AB	9,600.00
Imperial Oil Resources / ExxonMobil Canada	"Kearl Lake" Oil Sands Mine Phase 1	AB	10,900.00
Shell Canada	Athabasca Oil Sands Project Debottleneck Phase 1	AB	2,000.00
SilverBirch Energy/Teck Resources	"Equinox" Oil Sands Mine (Lease 14)	AB	2,500.00
SilverBirch Energy/Teck Resources	"Frontier" Oil Sands Mine Phase 1	AB	6,000.00
Suncor Energy Inc./Total SA	Voyageur	AB	19,000.00
Syncrude Canada	Mildred Lake	AB	4,300.00
Syncrude Canada Ltd.	Aurora	AB	2,335.00
Total E&P Canada Ltd./Suncor Energy Inc.	Joslyn North Mine	AB	6,000.00
KGHM Ajax Mining Inc.	Ajax Copper-Gold Mine	BC	535.00
Skyline Gold Corporation	Bronson Slope Metal Mine	BC	258.00
First Coal Corp.	Central South Coal Mine	BC	225.00
TTM Resources Inc.	Chu Molybdenum Mine	BC	1,180.00
Nova Gold/Teck	Galore Creek	BC	5,155.20
Canadian Dehua	Gething Coal	BC	1,000.00
Yellowhead Mining Inc.	Harper Creek Copper-Gold-Silver Mine	BC	759.00
Northgate Minerals Corporation	Kemess Underground Project	BC	437.00
Avanti Mining Inc.	Kitsault Molybdenum Mine	BC	837.00
Seabridge Gold Inc.	KSM (Kerr-Sulphurets-Mitchell) Copper-Gold Mine	BC	4,700.00
Capstone Mining Corp.	Kutcho Copper-Zinc-Silver-Gold	BC	185.00
Teck Coal Ltd.	Line Creek Coal Mine Expansion	BC	140.00
Pacific Booker Minerals Inc.	Morrison Copper-Gold Mine	BC	516.68
Fortune Minerals	Mount Klappan Coal	BC	768.00
Thompson Creek Metals	Mt Milligan Copper-Gold Mine	BC	915.00
Canadian Dehua International Mines Group Inc.	Murray River Underground Coal Mine	BC	
New Gold Inc.	New Afton mine	BC	630.00
Taseko Mines Ltd.	New Prosperity Gold-Copper Mine	BC	1,100.00
Teck Coal Ltd.	Quintette Coal Mine	BC	500.00
Compliance Coal Corp.	Raven Underground Coal Mine	BC	241.00
Imperial Metals Corp.	Red Chris	BC	443.00
Peace River Coal Inc.	Roman Coal	BC	320.00
Imperial Metals Corp.	Ruddock Creek Zinc Lead Mine	BC	100.00
Copper Fox Metals	Schaft Creek	BC	3,000.00
Pan Pacific Aggregates Ltd.	Sechelt Carbonate Mine	BC	100.00
Spanish Mountain Gold Ltd.	Spanish Mountain	BC	496.00
Columbia Yukon Explorations	Storie molybdenum Mine	BC	390.00

ANNEX 7 (CONTINUED)

PROPOSED CAPITAL INVESTMENTS BY THE CANADIAN MINING INDUSTRY

Company	Project	Province	Capital Investment (\$ million)
Hard Creek Nickel	Turnagain Nickel Project	BC	2,920.00
Western Coal Corp.	Willow Creek Expansion	BC	270.00
Teck Resources	Trail Operations	BC	210.00
Teck Resources	Highland Valley Copper	BC	475.00
Mustang Minerals Corp	Makwa Project	MB	
Victory Nickel	Minago Nickel Mine	MB	596.00
HudBay Minerals	Lalor	MB	704.00
Castle Resources Inc.	Elmtree Property Gold Mine	NB	2.50
Northcliff Resources Ltd.	Sisson Tungsten-Molybdenum Mine	NB	500.00
Vale	Long Harbour Hydromet Plant	NL	2,800.00
IOC (Rio Tinto operator)	Carol Expansion, phase 1 and 2 only	NL	677.00
Labrador Iron Mines Holdings	Schefferville area DSO project	NL	105.00
Rambler Metals and Mining	Ming mine/Nugget Pond mill reactivation	NL	25.00
New Millennium/Tata Steel	Schefferville area DSO project	NL	300.00
Canada Fluorspar	St. Lawrence fluorspar mine reactivation	NL	160.00
Alderon Resources Corp.	Kami Iron Ore Project	NL	
Xstrata Coal	Donkin Coal Project	NS	550.00
Newmont	Hope Bay	NU	2,000.00
Baffinland Iron Mines	Mary River	NU	4,000.00
Mountain Province Diamonds Inc. and De Beers	Gahcho Kue	NT	650.00
Canadian Zinc Corporation	Prairie Creek	NT	100.00
Avalon Rare Metals	Nechalacho	NT	729.00
Fortune Minerals	Nico	NT	350.00
Tyhee Resources	Yellowknife Gold	NT	350.00
DetourGold Corp.	Detour Lake	ON	992.00
Osisko	Hammond Reef Gold Mine	ON	881.00
Noront Resources Inc.	Eagle's Nest Multi-metals Mine	ON	600.00
Vale	Sudbury	ON	3,400.00
Vale	Clarabelle Mill	ON	200.00
Vale	Totten Mine	ON	360.00
Northgate Minerals	Young-Davidson	ON	339.00
Kirkland Lake Gold	Expansion	ON	56.00
Goldcorp	Red Lake	ON	350.00
Goldcorp	Porcupine	ON	335.00
Goldcorp	Musselwhite	ON	390.00
Lake Shore	Timmins West gold mine	ON	186.00
Xstrata Nickel	Fraser Morgan Project	ON	119.00
Xstrata Nickel	Nickel Rim South	ON	920.00
Quadra FNX	Sudbury area expansion	ON	200.00

ANNEX 7 (CONTINUED)

PROPOSED CAPITAL INVESTMENTS BY THE CANADIAN MINING INDUSTRY

Company	Project	Province	Capital Investment (\$ million)
North American Palladium	Lac des Iles Mine expansion	ON	270.00
Stillwater Mining Company	Marathon PGM-Cu Project	ON	351.00
Adriana Resources Inc.	Lac Otehluk Iron Mine	QC	8,500.00
Canada Phosphate	Lac à Paul Apatite and Ilmenite Mine	QC	325.00
Canada Lithium Corp	Quebec Lithium Mine	QC	202.00
Mines Aurizon Ltée	Joanna Gold Mine	QC	187.00
Royal Nickel Corp.	Dumont Nickel Project	QC	2,300.00
Agnico-Eagle	Lapa expansion	QC	5.70
Xstrata Zinc	Bracemac-McLeod	QC	158.00
Stornoway Diamonds Corporation	Renard Diamond Mine	QC	511.00
Mine Arnaud Inc.	Arnaud Apatite Mine	QC	800.00
Xstrata Nickel	Raglan Extension	QC	530.00
Western Troy Capital Resources Inc.	MacLeod Lake Molybdenum-Copper	QC	210.00
Strateco Resources Inc.	Matoush Project	QC	342.00
Métaux BlackRock Inc.	BlackRock Vanadium Iron Titanium Mine	QC	
Cameco	Cigar Lake	SK	1,000.00
Cameco	Millenium Uranium Mine	SK	
AREVA Resources Canada Inc.	Midwest Uranium Mining and Milling	SK	435.00
Shore Gold Inc.	Star-Orion South Diamond Mine	SK	2,500.00
Total			139,134.08

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 accurate as of January 2012. 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.

ANNEX 8

AVERAGE WEEKLY WAGES & SALARIES IN THE CANADIAN MINING, SMELTING & REFINING INDUSTRIES ¹, 1999-2011

	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
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
Coal mines			
1999	7.81	1,126.95	8,803,733
2000	7.20	1,204.74	8,672,923
2001	6.03	1,159.56	6,992,147
2002	5.70	1,104.33	6,294,681
2003	4.84	1,193.05	5,775,555
2004	4.54	1,294.43	5,880,595
2005	5.04	1,291.55	6,505,537
2006	5.34	1,269.39	6,773,465

ANNEX 8 (CONTINUED)

AVERAGE WEEKLY WAGES AND SALARIES IN THE CANADIAN MINING, SMELTING AND REFINING INDUSTRIES ¹, 1999–2011

	Number of Employees (000)	Average Weekly Earnings (\$)	Total Weekly Wages for Group (\$)
2007	5.84	1,427.52	8,342,427
2008	6.44	-	-
2009	6.37	-	-
2010	7.12	-	-
2011	6.88	-	-
Smelting and refining			
1999	21.42	1,033.71	22,136,900
2000	23.09	1,035.31	23,902,202
2001	19.60	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	16,675,202
2010	13.74	1,349.43	18,541,170
2011	15.26	1,315.75	20,073,082
Total mining, smelting and refining			
1999	78.78	1,038.22	81,779,612
2000	79.79	1,077.09	85,935,898
2001	70.71	1,087.82	76,109,656
2002	64.49	1,055.28	68,046,447
2003	61.59	1,114.78	68,667,387
2004	60.12	1,170.50	70,372,751
2005	61.13	1,178.35	72,017,159
2006	65.06	1,158.01	75,328,817
2007	69.72	1,293.97	90,224,587
2008	71.67	-	-
2009	65.59	-	-
2010	66.22	-	-
2011	71.92	-	-

Source: Statistics Canada.

Note: Numbers may not add due to rounding.

¹ Number of employees is based on the North American Industry Classification System (NAICS): 2122–Metal ore mining; 2123–Non-metallic mineral mining and quarrying; 2121–Coal mining; 3314–Non-ferrous metal (except aluminum) production and processing.

- Unavailable

ANNEX 9

AVERAGE WEEKLY EARNINGS, BY CANADIAN INDUSTRIAL SECTOR, 1995–2011

(\$)	Forestry	Mining, Smelting & 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	790.11	x
2002	809.81	1,055.35	818.51	819.64	851.57
2003	847.06	1,115.81	838.15	847.87	877.10
2004	894.01	1,170.94	862.53	846.38	886.93
2005	883.89	1,178.35	896.28	877.34	920.68
2006	902.28	1,157.99	904.63	900.32	950.90
2007	907.41	1,293.98	940.61	961.15	998.52
2008	935.84	1,347.90	949.57	1,014.50	1,001.39
2009	853.28	1,353.08	917.07	1,048.51	1,035.97
2010	948.38	1,425.06	960.43	1,066.08	1,049.45
2011	974.12	1,436.44	981.45	1,091.42	1,064.35

Source: Statistics Canada, Survey of Employment, Payroll and Hours (SEPH).

¹ Based on a weighted average of North American Industry Classification System NAICS: 212–Mining and quarrying (except oil and gas) and 3314–Non-ferrous metal (except aluminum) production and processing.

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ANNEX 10A

STRIKES AND LOCKOUTS IN CANADIAN MINING AND MINERAL MANUFACTURING INDUSTRIES, 2008–2011

	Work Stoppages	Workers	Person Days Not Worked	Average Duration
2008	15	2,142	65,200	58
Mineral manufacturing	14	1,507	47,960	60
Non-metallic mineral products	6	548	26,810	54
Primary metals	8	959	21,150	64
Mining	1	635	17,240	28
Metals	1	635	17,240	28
Mineral fuels	–	–	–	–
Non-metals	–	–	–	–
Support activities	–	–	–	–
2009	11	4,874	568,580	120
Mineral manufacturing	10	4,749	559,890	121
Non-metallic mineral products	3	163	23,080	109
Primary metals	7	4,586	536,810	126
Mining	1	125	8,690	108
Metals	1	125	8,690	108
Mineral fuels	–	–	–	–
Non-metals	–	–	–	–
Support activities	–	–	–	–
2010	17	6,022	567,390	97
Mineral manufacturing	14	5,649	540,500	96
Non-metallic mineral products	7	344	27,020	65
Primary metals	7	5,305	513,480	127
Mining	3	373	26,890	101
Metals	1	125	19,530	255
Mineral fuels	1	168	6,720	40
Non-metals	1	80	640	8
Support activities	–	–	–	–
2011	11	2,167	210,735	79
Mineral manufacturing	9	1,342	173,540	89
Non-metallic mineral products	3	137	8,380	61
Primary metals	6	1,205	165,160	102
Mining	2	825	37,195	36
Metals	1	125	2,895	23
Mineral fuels	1	700	34,300	49
Non-metals	–	–	–	–
Support activities	–	–	–	–

Source: Human Resources and Social Development Canada, Workplace Information Directorate.

– Nil

ANNEX 10B

CANADIAN STRIKES AND LOCKOUTS BY INDUSTRY, 2008–2011^P

	2008			2009		
	Strikes and Lockouts	Workers Involved	Duration in Person-Days	Strikes and Lockouts	Workers Involved	Duration in Person-Days
Agriculture	–	–	–	–	–	–
Logging and forestry	–	–	–	–	–	–
Fishing and trapping	–	–	–	–	–	–
Mining	2	662	17,880	1	205	22,400
Utilities	3	347	5,070	2	2,842	14,210
Oil and gas extraction	–	–	–	–	–	–
Construction	4	60	1,930	–	–	–
Manufacturing	55	6,368	315,620	42	9,120	853,720
Wholesale and retail trade	35	1,818	77,280	30	1,859	80,770
Transportation and warehousing	11	14,287	114,820	12	5,574	112,440
Information and culture	5	1,039	56,870	3	314	7,360
Finance, insurance and real estate	6	187	13,950	10	821	23,420
Education, health and social sciences	27	12,264	118,560	19	8,495	95,060
Entertainment and hospitality	30	3,211	133,350	19	2,084	130,460
Public administration	9	1,048	20,310	16	35,741	763,530
Total for all industries	187	41,291	875,640	154	67,055	2,103,370

	2010			2011		
	Strikes and Lockouts	Workers Involved	Duration in Person-Days	Strikes and Lockouts	Workers Involved	Duration in Person-Days
Agriculture	–	–	–	–	–	–
Logging and forestry	–	–	–	–	–	–
Fishing and trapping	–	–	–	–	–	–
Mining	17	6,022	567,390	11	2,167	210,753
Utilities	2	200	300	1	32	2,010
Oil and gas extraction	–	–	–	–	–	–
Construction	4	1,469	9,790–	1	19	360
Manufacturing	50	9,365	865,430	38	4,786	283,855
Wholesale and retail trade	20	1,293	58,177	16	931	33,310
Transportation and warehousing	7	1,575	69,500	22	53,975	498,740
Information and culture	3	294	66,700	6	532	25,070
Finance, insurance and real estate	11	744	18,650	13	1,246	13,590
Education, health and social sciences	28	31,305	127,209	20	24,674	382,977
Entertainment and hospitality	34	3,860	79,070	15	795	47,319
Public administration	11	7,240	7,427	10	3,128	20,480
Total for all industries	187	63,367	1,859,853	153	92,285	1,518,464

Source: Human Resources and Social Development Canada, Workplace Information Directorate.

^P Preliminary

– Nil

ANNEX 11

TOTAL EXPORTS OF MINERALS AND MINERAL PRODUCTS BY COMMODITY AND COUNTRY OF DESTINATION, 2011

	United States	European Union (EU-27)	China	Japan	Other Countries	Total	TPP ¹ Member Countries
METALS							
Aluminum	7,795,616,267	772,194,317	234,929,443	175,445,721	937,450,764	9,915,636,512	8,100,751,322
Antimony	1,080,240	201,764	14,278,478	36,496	71,116	15,668,094	1,081,305
Barium	100,521	9,818	481	—	—	110,820	100,521
Beryllium	39,408	15,975	—	—	905	56,288	39,408
Bismuth	785,247	11,741	—	—	49,544	846,532	785,247
Cadmium	844,690	4,817,360	775,265	—	2,665,413	9,102,728	3,445,540
Calcium metals	224,636	57,384	—	5,242	241,019	528,281	244,936
Chromium	10,341,870	37,609	—	4,490	252,677	10,636,646	10,394,086
Cobalt	55,341,491	84,607,249	11,024,896	70,992,785	129,201,692	351,168,113	73,641,112
Copper	3,055,684,132	631,667,617	1,149,694,008	950,182,851	749,576,442	6,536,805,050	3,094,877,787
Gold	5,013,202,514	11,328,190,892	210,014,413	62,624,605	1,749,759,639	18,363,792,063	5,070,212,982
Iron and steel	11,181,523,868	343,824,455	153,321,081	26,858,178	1,749,980,234	13,455,507,816	11,734,718,116
Iron ore	620,748,009	1,140,903,390	1,633,042,112	141,822,639	641,009,963	4,177,526,113	635,921,573
Lead	660,193,117	17,086,363	27,157,383	23,126,859	33,409,891	760,973,613	661,545,372
Lithium	674,621	819,184	—	—	3,042	1,496,847	674,621
Magnesium and magnesium compounds	52,645,485	1,721,702	2,300,447	45,075	121,056	56,833,765	52,663,484
Manganese	13,922,083	11,124	151,919	3,794	981,013	15,069,933	13,963,660
Mercury	329,371	—	—	—	1,438,888	1,768,259	339,003
Molybdenum	69,073,011	94,702,604	3,824,802	60,879,323	80,671,928	309,151,668	141,477,529
Nickel	1,307,817,246	1,762,664,738	742,862,901	183,400,847	2,775,252,302	6,771,998,034	1,368,991,816
Niobium	37,996,460	86,780,831	25,064,360	9,128,177	7,461,197	166,431,025	37,996,460
Platinum group metals	212,255,803	73,419,292	866,382	4,726	3,052,632	289,598,835	213,908,431
Rare earth metals	97,053,435	6,337,140	—	4,868,891	773,531	109,032,997	97,053,435
Selenium	16,338,249	20,811,270	28,767,333	24,047	1,332,798	67,273,697	16,338,249
Silicon	136,005,156	52,436,757	13,973,550	1,014,346	16,846,155	220,275,964	148,615,270
Silver	3,415,005,395	124,875,866	37,751,512	33,443,842	52,167,701	3,663,244,316	3,420,961,084
Strontium	117,750	—	—	—	—	117,750	117,750
Tantalum	305,097	22,925	17,433	—	159,594	505,049	390,218
Tellurium	4,769,852	22,975,199	951,214	215,012	606,412	29,517,689	4,787,251
Tin	65,637,933	3,394,443	256,592	6,696	507,528	69,803,192	65,672,553
Titanium metal	21,567,459	5,462,832	710,757	149,089	8,025,472	35,915,609	23,513,448
Tungsten	13,647,658	51,859,442	41,361,651	5,013,238	1,433,268	113,315,257	14,954,874
Uranium and thorium	1,038,380,941	1,492,215,446	107,192,828	20,872,745	77,840,673	2,736,502,633	1,050,142,251
Vanadium	121,399,817	183,963,306	4,155,321	26,487,506	81,594,764	417,600,714	126,800,454
Zinc	1,267,504,852	218,055,672	34,391,786	9,656,718	161,806,025	1,691,415,053	1,284,209,905
Zirconium	3,419,927	8,761,503	1,543,333	610,939	126,011	14,461,713	3,453,086
Other metals	4,112,693,274	1,056,174,276	84,464,022	70,713,451	803,578,462	6,127,623,485	4,357,789,526
Total Metals	40,404,286,885	19,591,091,486	4,564,845,703	1,877,638,328	10,069,449,751	76,507,312,153	41,832,573,665

ANNEX 11 (CONTINUED)
TOTAL EXPORTS OF MINERALS AND MINERAL PRODUCTS, BY COMMODITY AND COUNTRY OF DESTINATION, 2011

	United States	European Union (EU-27)	China	Japan	Other Countries	Total	TPP ¹ Member Countries
Non-metals							
Abrasives	240,341,858	27,117,600	12,401,464	11,880,848	30,137,955	321,879,725	247,328,254
Barite and witherite	95,809	—	—	—	—	95,809	95,809
Boron	1,860,427	247,539	52,699	—	1,614,418	3,775,083	1,898,074
Bromine	319,883	14	—	—	6,627	326,524	322,079
Cement	476,621,692	3,813,722	609,104	372,968	8,098,499	489,515,985	478,648,987
Chlorine and chlorine compounds	166,872,705	921,548	12,166	—	21,403,161	189,209,580	182,577,237
Chrysotile (Asbestos)	3,123,256	4,033,785	108,325	86,916	41,965,332	49,317,614	5,974,892
Clay and clay products	52,703,722	8,538,905	1,080,890	160,732	6,967,719	69,451,968	54,233,851
Diamonds	155,537,057	2,245,997,430	6,200,247	52,396	329,409,575	2,737,196,705	187,948,830
Dolomite	22,325,057	682,491	—	—	8,277,035	31,284,583	22,325,057
Feldspar	—	81,305	—	—	59,838	141,143	—
Fluorspar	61,728,725	492,951	752,861	—	5,864,201	68,838,738	61,762,129
Glass and glassware products	476,766,639	31,787,289	3,618,290	1,629,845	26,422,187	540,224,250	481,798,570
Granite	34,042,110	466,394	3,038,971	104,227	4,554,210	42,205,912	34,446,883
Graphite	130,477,296	11,125,281	2,519,915	766,663	16,822,885	161,712,040	132,046,497
Gypsum	62,085,968	786,807	5,442	12,233	5,166,612	68,057,062	63,296,536
Iodine	4,032,430	568,224	—	—	1,717,119	6,317,773	4,305,065
Lime	52,717,120	—	25,240	—	—	52,742,360	52,717,120
Limestone flux and other limestone	15,994,628	593,245	111,443	12,109	4,110,438	20,821,863	15,994,633
Marble, travertine and other calcareous stones	44,362,923	333,844	236,921	269	268,492	45,202,449	44,362,923
Mica	6,241,982	768,609	971,889	2,277,403	841,494	11,101,377	6,524,999
Mineral pigments	136,471,416	4,773,467	2,128,817	3,258,835	10,891,575	157,524,110	139,396,428
Nepheline syenite	53,771,288	14,294,080	1,176,422	1,291,734	3,835,085	74,368,609	54,820,508
Nitrogen	1,769,968,897	890,944	271,138	79,970	16,469,216	1,787,680,165	1,785,972,958
Pearls	1,872,817	9,527	42,265	11,368	333,348	2,269,325	1,874,806
Peat	246,349,889	1,762,490	530,548	14,774,427	20,716,227	284,133,581	251,654,139
Phosphate and phosphate compounds	113,919,777	449,716	461,090	927,473	3,235,892	118,993,948	115,693,318
Potash and potassium compounds	3,606,316,921	10,290,956	503,112,002	73,973	2,604,529,138	6,724,322,990	4,100,540,186
Salt and sodium compounds	572,583,234	6,927,444	5,631,780	31,005,185	57,125,135	673,272,778	595,436,290
Sand and gravel	42,259,139	24,119	510	—	2,178,114	44,461,882	42,261,353
Sandstone	175,909	—	9,224	—	250	185,383	175,909
Silica and silica compounds	52,559,873	1,370,442	525,624	327,143	4,948,307	59,731,389	53,237,251
Slate	6,900,659	9,644,580	—	18,650	304,522	16,868,411	7,200,903
Sulphur and sulphur compounds	360,080,567	168,447	234,214,468	3,579	441,871,082	1,036,338,143	562,880,449
Talc, soapstone and pyrophyllite	21,370,545	24,726	51,496	154,355	29,660	21,630,782	21,371,679

ANNEX 11 (CONTINUED)

TOTAL EXPORTS OF MINERALS AND MINERAL PRODUCTS, BY COMMODITY AND COUNTRY OF DESTINATION, 2011

	United States	European Union (EU-27)	China	Japan	Other Countries	Total	TPP ¹ Member Countries
Titanium oxides	255,680,360	6,799,036	1,107,840	83,602	8,712,627	272,383,465	255,778,262
Other Non-metals	530,876,810	37,096,944	6,506,650	3,153,744	46,989,133	624,623,281	539,695,007
Other structurals	148,719,741	21,828,468	769,614	136,611	13,378,156	184,832,590	154,377,226
Total non-metals	9,928,129,129	2,454,712,369	788,285,355	72,657,258	3,749,255,264	16,993,039,375	10,760,975,097
Mineral fuels							
Coal	623,613,853	1,249,808,927	827,113,361	2,188,722,747	3,383,606,899	8,272,865,787	754,757,096
Coke	121,092,417	3,723,568	—	—	735,272	125,551,257	121,092,417
Total mineral fuels	744,706,270	1,253,532,495	827,113,361	2,188,722,747	3,384,342,171	8,398,417,044	875,849,513
Total mining exports	51,077,122,284	23,299,336,350	6,180,244,419	4,139,018,333	17,203,047,186	101,898,768,572	53,469,398,275

Source: Natural Resources Canada, TRAGS; Statistics Canada; data as of July 30, 2012.

Note: Total exports are the sum of domestic exports and re-exports.

¹ Trans-Pacific Partnership.

— Nil

ANNEX 12

TOTAL IMPORTS OF MINERALS AND MINERAL PRODUCTS BY COMMODITY AND COUNTRY OF DESTINATION, 2011

	United States	European Union (EU-27)	China	Japan	Other Countries	Total	TPP ¹ Member Countries
Metals							
Aluminum	3,279,131,334	249,342,589	358,617,221	6,747,780	1,532,655,869	5,426,494,793	3,443,374,909
Antimony	2,476,808	317,166	19,483,110	47,478	684,457	23,009,019	2,635,377
Barium	1,603,571	2,935,384	2,214,501	14,241	16,400	6,784,097	1,603,571
Beryllium	440,507	773	—	—	668	441,948	440,507
Bismuth	532,439	685,522	684,271	—	182,727	2,084,959	532,439
Cadmium	473,538	65,713	392,359	207	23,641	955,458	488,295
Calcium metals	57,984,461	4,882,152	777,011	66,787	2,779,205	66,489,616	58,581,130
Chromium	7,737,072	14,080,104	1,703,688	25,753	42,111,488	65,658,105	8,067,261
Cobalt	20,425,729	9,975,560	1,261,130	54,606	22,959,014	54,676,039	33,796,211
Copper	2,309,378,603	158,196,021	145,618,359	16,664,475	439,879,125	3,069,736,583	2,543,728,715
Gallium	336,482	59,042	—	11,433	66,647	473,604	336,482
Germanium	5,225,692	1,489,979	1,030,561	—	230,746	7,976,978	5,225,692
Gold	2,308,852,893	743,095,346	530,424	18,374	9,259,526,423	12,312,023,460	6,727,818,058
Hafnium	136,129	70,869	—	—	—	206,998	136,129
Indium	1,081,032	276,855	646,696	6,644	58,240	2,069,467	1,081,032
Iron and steel	13,891,163,779	2,309,984,525	2,396,486,393	609,404,283	3,409,000,987	22,616,039,967	15,016,145,815
Iron ore	886,385,650	187,091	1,547	586	18,281,493	904,856,367	904,424,653
Lead	419,953,433	59,518,316	39,789,270	3,360,040	89,452,028	612,073,087	482,590,735
Lithium	28,798,637	6,893,358	8,183,705	3,466,129	20,300,494	67,642,323	34,793,663
Magnesium and magnesium compounds	33,879,343	9,356,649	155,604,654	3,173,939	8,350,211	210,364,796	35,142,029
Manganese	145,997,329	11,104,359	26,341,503	198,695	159,117,517	342,759,403	156,254,181
Mercury	1,236,252	36,355	874,409	139	67,627	2,214,782	1,236,887
Molybdenum	117,839,276	1,481,264	386,198	2,505	19,392,232	139,101,475	135,340,865
Nickel	244,270,511	141,708,060	11,345,105	36,728,500	432,534,764	866,586,940	641,986,588
Niobium	5,259,808	2,809,161	407,020	—	42,195,525	50,671,514	5,259,808
Platinum group metals	135,691,523	62,611,090	15,670	5,998,906	178,469,017	382,786,206	135,951,893
Rare earth metals	662,197	429,636	10,355,344	384	2,712,505	14,160,066	2,310,927
Rhenium	13,666	232,130	1,969	—	16,062	263,827	13,666
Selenium	3,272,201	8,241,109	107,222	5,245,096	1,158,064	18,023,692	3,636,207
Silicon	25,854,883	781,734	71,910,448	23,584	17,482,467	116,053,116	25,933,656
Silver	1,233,401,863	1,094,332,794	70,336,511	22,182,796	1,710,360,548	4,130,614,512	2,288,188,738
Strontium	50,717	397,129	5,222	—	278,780	731,848	314,307
Tantalum	879,669	95,982	437,463	10	14,591	1,427,715	879,669
Tellurium	1,277,967	3,330,333	9,861,183	3,917,522	12,740,546	31,127,551	1,277,967
Thallium	4,433	—	—	—	—	4,433	4,433
Tin	25,651,175	1,330,064	21,247,508	1,773,652	64,123,986	114,126,385	77,710,511
Titanium metal	73,745,219	11,805,634	5,769,488	1,583,362	59,838,525	152,742,228	73,792,110
Tungsten	17,781,616	7,025,210	6,711,807	26,813	909,072	32,454,518	17,806,103
Uranium and thorium	120,901,186	9,302,985	2,838,252	—	908,436,168	1,041,478,591	248,839,590

ANNEX 12 (CONTINUED)

TOTAL IMPORTS OF MINERALS AND MINERAL PRODUCTS BY COMMODITY AND COUNTRY OF DESTINATION, 2011

	United States	European Union (EU-27)	China	Japan	Other Countries	Total	TPP ¹ Member Countries
Vanadium	6,456,303	3,968,597	8,044,100	—	9,568,967	28,037,967	6,456,422
Zinc	293,487,512	17,733,594	9,544,336	23,732	112,197,826	432,987,000	357,702,647
Zirconium	34,834,730	2,315,340	5,591,592	1,140,510	4,297,533	48,179,705	35,075,733
Other metals	6,267,076,220	1,273,817,692	1,967,019,331	239,964,527	2,537,447,599	12,285,325,369	7,561,921,690
Total metals	32,011,643,388	6,226,303,266	5,362,176,581	961,873,488	21,119,919,784	65,681,916,507	41,078,837,301

Non-metals

Abrasives	185,573,961	128,312,679	46,216,451	13,724,384	82,261,885	456,089,360	193,481,995
Arsenic	49,944	6,961	123,733	36,403	129	217,170	49,944
Barite and witherite	9,429,220	373,957	11,887,060	—	2,135,529	23,825,766	9,429,220
Boron	20,688,006	443,885	864,927	103,668	10,292,217	32,392,703	21,618,951
Bromine	5,532,746	496	263,354	258	3,698	5,800,552	5,532,746
Calcium (Industrial minerals)	717,634	7,789	—	11,586	502,740	1,239,749	1,220,374
Cement	360,367,362	36,032,760	41,176,464	1,843,552	50,002,439	489,422,577	367,161,763
Chlorine and chlorine compounds	74,441,164	4,728,863	5,099,175	136,596	2,236,301	86,642,099	75,934,254
Chrysotile (Asbestos)	86,067,859	4,292,957	7,245,788	4,819,413	20,443,058	122,869,075	94,306,477
Clay and clay products	294,314,491	202,383,150	337,466,043	16,464,973	183,909,450	1,034,538,107	358,016,155
Diamonds	98,796,579	83,267,231	2,316,201	122,804	585,156,324	769,659,139	123,856,259
Dolomite	12,826,211	24,969	1,470	—	43,299	12,895,949	12,829,074
Feldspar	581,131	2,346	—	—	—	583,477	581,131
Fluorspar	11,427,942	7,993,714	24,772,438	427,698	39,428,586	84,050,378	41,805,933
Glass and glassware products	1,683,154,520	193,715,968	401,173,262	18,366,261	251,233,670	2,547,643,681	1,855,756,771
Granite	18,002,222	28,192,605	36,715,463	10,123	76,312,334	159,232,747	18,123,456
Graphite	284,235,144	61,110,712	75,662,788	50,771,019	35,677,059	507,456,722	287,544,416
Gypsum	174,697,195	1,165,497	504,396	10,705	3,712,339	180,090,132	178,047,488
Iodine	4,666,919	537,684	34,785	2,880,530	9,639,986	17,759,904	13,651,633
Lime	20,053,840	109,395	21	1,359	42,030	20,206,645	20,053,840
Limestone flux and other limestone	19,018,401	25,215	318,608	—	467,070	19,829,294	19,039,618
Marble, travertine and other calcareous stones	10,972,612	38,862,043	24,515,016	727	52,319,229	126,669,627	13,608,478
Mica	5,797,767	2,603,198	234,770	427,400	989,170	10,052,305	5,835,141
Mineral pigments	116,500,885	23,486,995	4,372,408	2,296,721	10,058,548	156,715,557	120,734,774
Nepheline syenite	92,493	—	—	—	4,217	96,710	92,493
Nitrogen	175,967,218	107,340,181	6,717,723	108,232	307,599,908	597,733,262	182,110,072
Olivine	906,176	—	62	—	84,178	990,416	906,176
Pearls	6,307,697	1,209,851	11,646,390	1,911,999	5,618,130	26,694,067	6,779,783
Peat	3,633,108	578,591	144,070	53	3,967,836	8,323,658	3,637,170
Perlite	13,730,856	2,746,504	5	169	21,267	16,498,801	13,730,903
Phosphate and phosphate compounds	734,867,956	15,411,690	6,263,075	90,727	28,488,878	785,122,326	738,764,985
Potash and potassium compounds	56,898,718	3,645,126	3,398,076	476,882	8,434,673	72,853,475	57,850,851

ANNEX 12 (CONTINUED)

TOTAL IMPORTS OF MINERALS AND MINERAL PRODUCTS BY COMMODITY AND COUNTRY OF DESTINATION, 2011

	United States	European Union (EU-27)	China	Japan	Other Countries	Total	TPP ¹ Member Countries
Salt and sodium compounds	347,166,136	28,143,065	45,811,792	10,100,657	64,908,948	496,130,598	369,949,905
Sand and gravel	14,212,786	48,552	416,670	1,226	416,266	15,095,500	14,409,538
Sandstone	2,418,333	117,906	136,087	—	3,018,567	5,690,893	2,418,352
Silica and silica compounds	141,054,356	15,419,735	13,177,009	1,755,232	6,300,379	177,706,711	142,165,466
Slate	3,015,584	333,978	6,696,725	—	3,569,086	13,615,373	3,049,771
Sulphur and sulphur compounds	38,521,517	2,135,122	769,097	47,856	171,674	41,645,266	38,521,535
Talc, soapstone and pyrophyllite	12,183,998	924,317	78,938	94,230	304,408	13,585,891	12,184,013
Titanium oxides	167,827,110	13,601,313	9,711,124	1,756,907	30,676,885	223,573,339	183,963,328
Vermiculite	4,394,263	123,301	523,546	—	5,113,797	10,154,907	4,394,264
Other Non-metals	675,289,935	70,159,913	22,043,966	10,668,975	49,707,777	827,870,566	689,856,803
Other structurals	74,903,343	17,067,936	26,996,914	1,507,883	17,305,356	137,781,432	78,419,217
Total non-metals	5,971,305,338	1,096,688,150	1,175,495,890	140,977,208	1,952,579,320	10,337,045,906	6,381,424,516
Mineral fuels							
Coal	810,282,475	32,638,314	2,746,854	208,851	230,456,699	1,076,333,193	811,538,674
Coke	100,786,930	11,965,728	822	—	9,014,835	121,768,315	100,786,965
Total mineral fuels	911,069,405	44,604,042	2,747,676	208,851	239,471,534	1,198,101,508	912,325,639
Total mining imports	38,894,018,131	7,367,595,458	6,540,420,147	1,103,059,547	23,311,970,638	77,217,063,921	48,372,587,456

Source: Natural Resources Canada, TRAGS; Statistics Canada; data as of July 30, 2012.

¹ Trans-Pacific Partnership.

— Nil

THE CANADIAN MINING INDUSTRY AT A GLANCE

	2005	2007	2009	2011
Mining industry GDP (\$ billion)	40.0	41.9	32.0	35.6
Percentage of total Canadian GDP (%)	3.8	3.4	2.7	2.8
Value of mineral production (\$ billion)	27.4	40.6	32.2	50.3
Synthetic crude production value (\$ billion)	9.2	18.0	n/a	30.9
Synthetic crude production (million cubic metres)	21.9	39.9	n/a	50.0
Number of mining establishments	859	766	961	1,068
Mineral extraction employment (thousand)	47	53	52	57
Total mining/mineral industry employment (thousand)	353	360	308	320
Metal prices—copper (cents per pound)	168	322	234	400
Metal prices—gold (\$ per ounce)	445	697	973	1,568
Mineral exploration/appraisal spending (\$ billion)	1.3	2.8	1.9	3.9
Mining industry capital expenditures (\$ billion)	7.4	10.1	9.8	17.3
Oil sands capital expenditures (\$ billion)	9.8	16.8	10.6	21.6
Industry payments to Canadian governments (\$ billion)	5.7	10.2	5.1	9.0
Stock of foreign direct investment (\$ billion)	21.2	61.6	59.8	60.9
Stock of Canadian direct investment abroad (\$ billion)	56.4	57.3	64.5	58.6

n/a—not available





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