Natural Resources Canada | Ressources naturelles Canada

Minerals and Metals Fact Book – 2016

Canada

Natural Resources Canada
Ressources naturelles Canada

Minerals and Metals Fact Book

2016

Canada

Aussi disponible en français sous le titre : Cahier d'information sur les minéraux et les métaux – 2016

Cat. No. M31-16E-PDF
ISSN 2371-3704

Recycled paper

Preface

The purpose of the *Minerals and Metals Fact Book – 2016* is to provide key information related to Canada's exploration, mining, and mineral manufacturing industries in a format that is easy to consult.

The data and information in this edition cover the 2015 calendar year except where noted otherwise. Some historical information for the period 2006-15 is also included. All data are subject to revision by statistical sources. In some instances, more than one source may be available and discrepancies in values may arise because of conceptual or methodological differences. In addition, some values may not add to totals because of rounding.

This fact book was prepared by the Minerals and Metals Sector (MMS) of Natural Resources Canada.

You are invited to subscribe to the MMS web site at www.nrcan.gc.ca/mms-smm/subscribe to receive e-mail notification of publication releases or to contact us by e-mail at NRCan.info-mms-info-smm.RNCan@canada.ca for additional information or to provide feedback.

For the purposes of this publication, the following terms are defined as:

- **Exploration:** The search for, discovery, and first delimitation of a previously unknown mineral deposit, or the re-evaluation of a sub-marginal or neglected mineral deposit in order to enhance its potential economic interest based on delimited tonnage, grade, and other characteristics.
- **Deposit appraisal:** The steps undertaken to bring a delimited deposit (by definition drilling, comprehensive tests, and planning) to the stage of detailed knowledge required for an exhaustive and complete feasibility study that will fully justify and support a production decision and the investment required.
- **Senior company:** A senior company normally derives its operating income from mining or other business segments (it need not be a mining company) rather than from the issuance of shares.

- **Junior company:** A junior company is neither a producing company (a senior company) nor the recipient of operating income from production or from some other business segments. Its principal business is exploration, for which it is raising funds through the issuance of treasury shares.
- **Mine production:** The value of the material extracted from the mine.
- **Production:** The value of the material or recoverable metal shipped from the mine.
- **Exports:** Are merchandise exports and do not include services.

In addition, the **mining and mineral processing industry** comprises the following North American Industry Classification System (NAICS) categories:

- **Mining:**
  - NAICS 212 – mining and quarrying (except oil and gas)
- **Mineral processing:**
  - NAICS 327 – nonmetallic mineral product manufacturing
  - NAICS 331 – primary metal manufacturing
  - NAICS 332 – fabricated metal product manufacturing

For some indicators (i.e., nominal gross domestic product, employment, and investment), additional industry data are included for **mining-related support activities**, which comprise:

- **Mining-related support activities:**
  - NAICS 213117 – contract drilling (except oil and gas)
  - NAICS 213119 – other support activities for mining

The mining support activity subsector includes exploration and drilling companies, and service companies operating on a fee or contract basis. It does not include all mining industry suppliers as some entities service multiple sectors (e.g., transportation, construction, finance, legal).

Table of Contents

Statistical Annex

Introduction

Canada's minerals sector, which comprises mining, mining-related support activities, and mineral processing, is a mainstay of the national economy that supports jobs and economic activity in every region. In 2015, it directly employed nearly 373,000 Canadians and accounted for 19.1% of exports and 3.3% of the country's gross domestic product (GDP).

Canada produced some 60 minerals and metals at 200 active mines and 7,000 sand and gravel and stone quarries, worth nearly $43 billion, in 2015. It is the world's leader in the production of potash and a major global producer of key commodities such as primary aluminum,[1] cobalt, diamonds, gold, nickel, platinum group metals, salt, tungsten, and uranium.

Canada is globally recognized as an important mining nation. The Toronto Stock Exchange (TSX) and TSX Venture Exchange (TSX-V) represent the world's number one listing venue, accounting for 52% of global mining and exploration companies. In 2015, the 1,300 issuers listed on these exchanges raised almost $7 billion through 1,123 financings, which represents 53% of public company financings completed globally for these types of companies. Canada remained the world's top destination for nonferrous mineral exploration investment in 2015, attracting 13.5% of global exploration budgets, while Canadian-based companies accounted for 31.8% of global exploration budgets. In 2014, Canadian-based companies had total mining and exploration assets of $256 billion, of which $170 billion was located in more than 100 foreign countries.

[1] Canada accounts for a significant amount of the global production of primary aluminum, but does not host a domestic source of bauxite, an ore that is first processed into alumina and then into aluminum. Thus, Canadian-based operators must import 100% of this commodity to supply their smelters.

Key Facts and Figures

- **GDP (in current prices):**[2] In 2015, the direct GDP of mining, mining-related support activities, and mineral processing was **$60.3 billion**, which represented **3.3%** of Canada's total GDP. Indirect GDP added a further **$18.9 billion**, for a total of **$79.2 billion**:
  - mining and quarrying (except oil and gas) – $25.4 billion;
  - mining-related support activities – $2.6 billion;
  - primary metal manufacturing – $10.9 billion;
  - nonmetallic mineral product manufacturing – $6.5 billion;
  - fabricated metal product manufacturing – $14.9 billion; and
  - indirect mining, mining-related support activities, and mineral processing – $18.9 billion.

- **Employment:**[3] In 2015, the mining, mining-related support activities, and mineral processing industries directly employed nearly **373,000** individuals and indirectly employed an additional **190,000**, for a total of **563,000**:
  - mining and quarrying (except oil and gas) – 60,565;
  - mining-related support activities – 26,265;
  - primary metal manufacturing – 71,460;
  - nonmetallic mineral product manufacturing – 56,335;
  - fabricated metal product manufacturing – 158,810; and
  - indirect mining, mining-related support activities, and mineral processing – 189,657.

- **Capital expenditures:**[4] In 2015, the mining, mining-related support activities, and mineral processing industries invested **$14.9 billion** in new capital construction and in machinery and equipment, accounting for **5.9%** of the Canadian total.
- **Exports**:[5] Valued at **$92.0 billion** in 2015, Canada's domestic mineral exports, which include ores, concentrates, and semi- and final-fabricated metal products, accounted for **19.1%** of Canada's total domestic exports.

---

[2] Natural Resources Canada, based on Statistics Canada data.
[3] Ibid.
[4] Ibid.
[5] Ibid.

- **Balance of trade:**[6] In 2015, Canada's mineral exports, which include ores, concentrates, and semi- and final-fabricated mineral products, had a balance of trade of **+$16.2 billion**.
- **Shipping:**[7] Mining and mineral processing products traditionally account for **over half** of railway shipping and for **around half** of marine shipping.
- **Stock exchanges:**[8] The Toronto Stock Exchange (TSX) and TSX Venture Exchange (TSX-V) are the world's number one listing venue for mining and mineral exploration companies, with approximately 1,300 issuers, accounting for **52%** of global listings in 2015.
- **Financing:**[9] Canada is number one in equity financing raised for mining and mineral exploration. In 2015, over **34%** ($6.8 billion) of the world's equity capital was raised by companies listed on the TSX or TSX-V stock exchanges, which also accounted for **53%** of the number of mining equity financings for mineral exploration and mining globally.
- **Taxes and royalties:**[10] From 2010 to 2014, the mining and select manufacturing sectors (mining and quarrying, primary metal manufacturing, and nonmetallic mineral product manufacturing) paid annually, on average, **$2.9 billion** in corporate income taxes and royalties.
- **Mining assets abroad:**[11] Canadian exploration and mining companies have mining assets abroad worth over **$170 billion** invested in **over 100 countries** (2014).

---

[6] Natural Resources Canada, based on Statistics Canada data.

[7] Statistics Canada.

[8] TMX Group.

[9] Ibid.

[10] Statistics Canada; Natural Resources Canada, based on provincial/territorial public accounts.

[11] Natural Resources Canada. Canadian mining asset values are those reported in company financial reports, nearest to December 31, 2014, for public companies headquartered in Canada that are not under foreign control. Mining assets, in this context, reflect non-current assets, including mineral properties, deferred mineral exploration expenses, royalties, investments in non-Canadian mining companies, and other non-current assets related to mining that can be reconciled to a specific geographic location. Canadian mining assets include values for all countries while Canadian mining assets abroad include values for all countries but Canada.

- **Indigenous employment:**[12] The mining and mineral processing industry is an important employer of Indigenous Peoples, providing jobs to over 10,000 individuals in 2015, mostly in upstream activities such as mining and quarrying.
- **Indigenous representation:**[13] Indigenous Peoples accounted for approximately 8% of the mining and quarrying industry's labour force (2011 National Household Survey), more than double the all-industry average representation of 3.4%.
- **Indigenous communities:**[14] Within the last decade (2006-15), an estimated 374 separate agreements (e.g., Impact and Benefit Agreements, Memoranda of Understanding, Exploration Agreements) were signed between mining and exploration companies and Indigenous communities or governments, accounting for three-quarters of all agreements (an estimated 480) signed since 1974.
- **Service suppliers:**[15] **Over 3,000 firms in Canada** were available to provide technical, legal, financial, accounting, environmental, and other expertise to the mining and exploration industry.

[12] Statistics Canada.
[13] Ibid.
[14] Natural Resources Canada.
[15] Infomine Inc.

Mineral Production

- Canada is one of the world's largest producers of minerals and metals with over **60 commodities** produced at **200 principal producing mines** and more than 7,000 stone quarries and gravel pits.
- The total value of Canada's mineral production was **$42.8 billion** in 2015.
- **Gold was the top-ranked commodity** (by value) produced in Canada in 2015 at $7.3 billion. Potash ($6.7 billion) and copper ($4.5 billion) were the next most valuable commodities.
- Canada continues to be the **global leader in the production (by volume) of potash** and ranks among the **top five** global producers for primary aluminum,[16] cobalt, diamonds, gold, nickel, platinum group metals, salt, tungsten, and uranium.

Table 1. Canada's Mineral Production, by Commodity Group, 2014 and 2015 (p)

Commodity Group	2014	2015 (p)	Change
	($ billions)		(%)
Metals	24.2	22.5	-7.1
Nonmetals	15.8	17.2	8.7
Total non-fuels	40.0	39.7	-0.7
Coal	3.9	3.1	-20.2
Total production	**43.9**	**42.8**	**-2.6**

Sources: Natural Resources Canada; Statistics Canada.
(p) Preliminary.

[16] Canada accounts for a significant amount of the global production of primary aluminum, but does not host a domestic source of bauxite, an ore that is first processed into alumina and then into aluminum. Thus, Canadian-based operators must import 100% of this commodity to supply their smelters.

Table 2. Canada's Leading Minerals, by Value of Production, 2015 (p)

Mineral	Production Value ($ billions)
Gold	7.29
Potash (1)	6.66
Copper	4.49
Nickel	3.59
Coal	3.11
Iron ore	2.80
Diamonds	2.13
Sand and gravel (2)	2.06
Cement (3)	1.77
Stone (2)	1.69
Uranium (4)	1.51
Platinum group metals	1.15

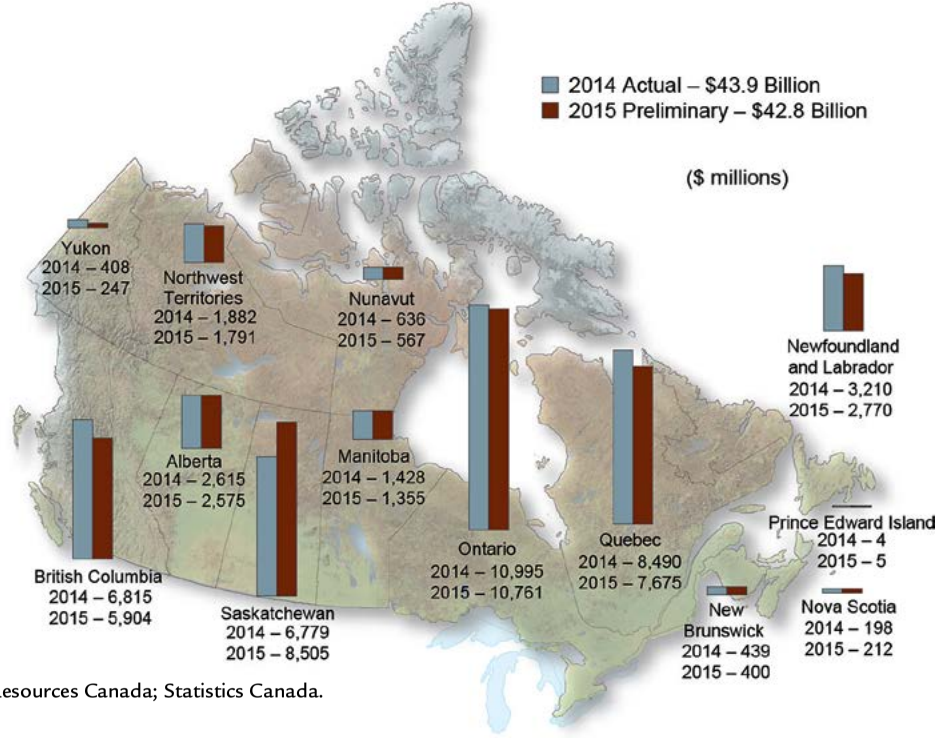
Sources: Natural Resources Canada; Statistics Canada.
(p) Preliminary.
(1) Excludes shipments to potassium sulphate plants. (2) Excludes shipments of sand, gravel, and stone to Canadian cement, lime, and clay plants. (3) Includes exported clinker. (4) The uranium value was calculated using spot market prices.

MAP 900A – PRINCIPAL MINERAL AREAS, PRODUCING MINES, AND OIL AND GAS FIELDS IN CANADA

This map is produced and published annually by Natural Resources Canada. It contains a variety of statistics on Canada's mineral production and provides the geographic locations of significant metallic, nonmetallic, and industrial mineral mines; oil sands mines; and gas fields for the provinces and territories of Canada.

An interactive version of Map 900A and an electronic version are available for viewing or downloading on Natural Resources Canada's web site at www.nrcan.gc.ca/mining-materials/publications/8790. If you wish to request a printed copy, please contact us by e-mail at NRCan.info-mms-info-smm.RNCan@canada.ca.

Figure 1. Canadian Mineral Production, 2014 and 2015 (p)



Sources: Natural Resources Canada; Statistics Canada.
(p) Preliminary.

Mineral Exploration and Deposit Appraisal

- Preliminary figures for 2015 indicate that mining and mineral exploration companies spent **$1.7 billion** on exploration and deposit appraisal projects in Canada, compared to **$2.0 billion** in 2014. Spending intentions for 2016 indicate a further decline to **$1.4 billion**.
- Canada is known for its large contingent of junior mining companies that have no internally generated revenue (i.e., do not have an operating mine) and mostly rely on stock markets to raise the capital necessary to conduct their exploration programs.
- In 2015, junior mining companies spent $0.6 billion on exploration and deposit appraisal activities, a 29.6% decline from 2014 because of a continued challenging market outlook that affected access to capital.
- Precious metals, particularly gold, remained the leading target for exploration spending (**$0.8 billion**), accounting for **45.4%** of total spending.
- According to SNL Metals & Mining (S&P Global Market Intelligence):
  - Canadian-headquartered mining and exploration companies accounted for the largest portion of worldwide nonferrous exploration budgets, reaching **31.8%** in 2015.
  - Canada remained the world's top destination for nonferrous mineral exploration in 2015, attracting **13.5%** of budgeted exploration expenditures.

Table 3. Exploration and Deposit Appraisal Expenditures, by Junior and Senior Companies, 2006-16 (si)

Year	Senior Companies	Junior Companies
	($ millions)	
2006	673.5	1,238.0
2007	926.5	1,904.4
2008	1,161.7	2,117.8
2009	833.7	1,110.7
2010	1,224.9	1,546.7
2011	2,179.7	2,047.7
2012	2,028.1	1,847.0
2013	1,390.1	965.1
2014	1,203.2	814.3
2015 (p)	1,136.2	572.9
2016 (si)	904.3	496.5

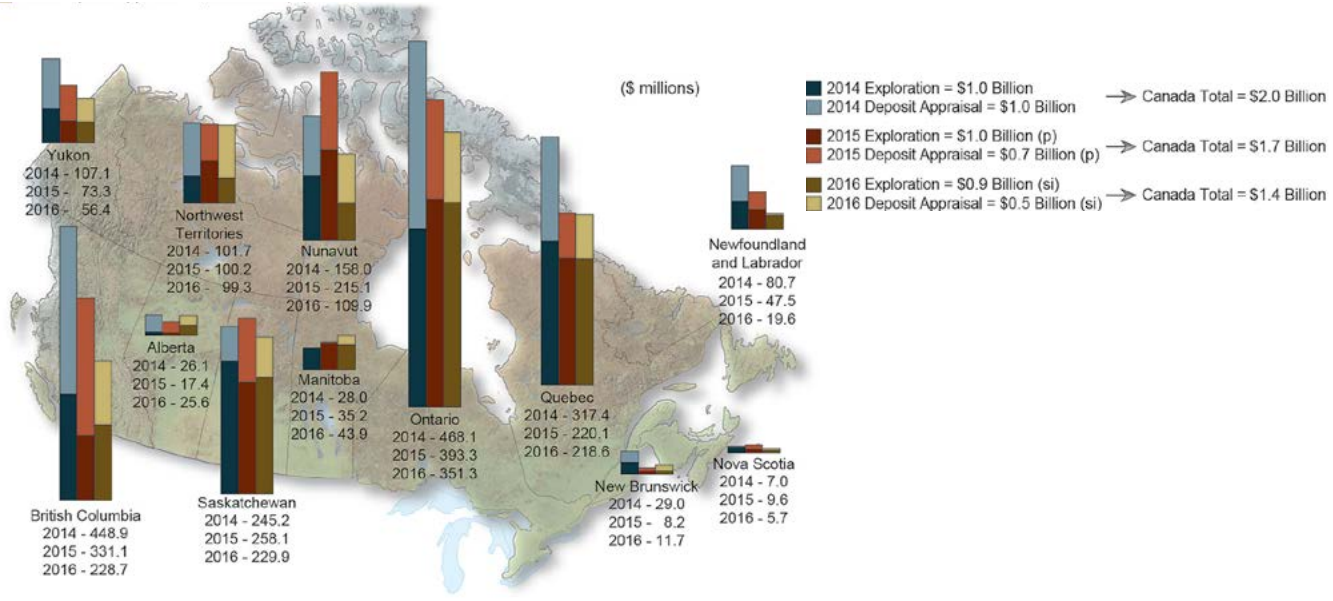
Source: Natural Resources Canada, based on the annual Survey of Exploration, Deposit Appraisal and Mine Complex Development Expenditures.
(p) Preliminary; (si) Spending intentions.

Table 4. Exploration and Deposit Appraisal Expenditures, by Mineral Commodity Group, 2006-16 (si)

Year	Precious Metals	Base Metals	Iron Ore	Uranium	Diamonds	Other Metals	Nonmetals	Coal
	($ millions)							
2006	724.6	411.9	65.1	213.6	342.0	85.6	17.3	51.3
2007	1,025.2	711.5	118.6	413.3	321.6	175.3	31.1	34.2
2008	1,161.4	842.1	224.4	409.0	221.6	189.6	179.4	51.9
2009	989.3	296.6	61.4	205.1	70.0	99.1	165.9	57.1
2010	1,443.9	551.9	110.1	190.4	106.8	141.8	168.8	58.1
2011	2,277.3	734.1	307.0	197.6	91.9	260.8	214.2	144.5
2012	1,842.7	633.0	358.6	205.1	74.6	230.9	313.6	216.6
2013	1,103.6	419.3	130.7	167.4	72.9	191.9	116.5	149.8
2014	849.4	420.0	69.1	184.4	109.9	125.3	136.0	123.4
2015 (p)	776.2	330.5	28.8	168.9	118.2	69.2	127.1	90.3
2016 (si)	642.6	206.0	32.5	161.5	112.4	58.3	90.8	96.6

Source: Natural Resources Canada, based on the annual Survey of Exploration, Deposit Appraisal and Mine Complex Development Expenditures.
(p) Preliminary; **(si)** Spending intentions.
Notes: "Precious metals" include gold, silver, and platinum group metals (iridium, osmium, palladium, platinum, rhodium, and ruthenium). "Base metals" refer to nonferrous metals such as copper, lead, nickel, and zinc. "Other metals" refers to all other metals not captured under the precious metals, base metals, uranium, and iron ore categories.

Figure 2. Exploration and Deposit Appraisal Expenditures in Canada, 2014-16 (si)



Source: Natural Resources Canada, based on the annual Survey of Exploration, Deposit Appraisal and Mine Complex Development Expenditures.
(p) Preliminary; **(si)** Spending intentions.
Notes: Exploration and deposit appraisal activities include all activities carried out to search for, discover, characterize, and define in detail a mineral deposit for the pre-feasibility and final feasibility studies that will support a production decision and the investment required. Expenditures include on-mine-site and off-mine-site activities, field work, overhead costs, engineering, economic and pre-production or production feasibility studies, environment, and land access costs.

Canadian Mining Assets

- Canadian mining assets (CMA)[17] totaled **$256.9 billion** in 2014, a 7.7% increase from the 2013 value of $238.5 billion.
- Canadian mining assets abroad (CMAA) totaled **$169.7 billion**, up 7.5% from the 2013 value of $157.9 billion.
- CMAA as a percentage of CMA remained stable at **66%** for both years.
- Almost every region experienced growth in 2014 except for Asia. Africa experienced the greatest growth in percentage terms while Latin America was first in dollar terms.
- Canadian mining and exploration companies were present in **105 foreign countries** in 2014. The top five destinations by CMAA value were all in the Americas: the United States ($25.6 billion), Chile ($21.8 billion), Mexico ($20.6 billion), Argentina ($13.2 billion), and Peru ($8.7 billion).
- The top 10 companies by value for 2014 accounted for nearly two-thirds of total CMA and for over **80%** of the net year-over-year increase with a cumulative value of **$166.0 billion**.

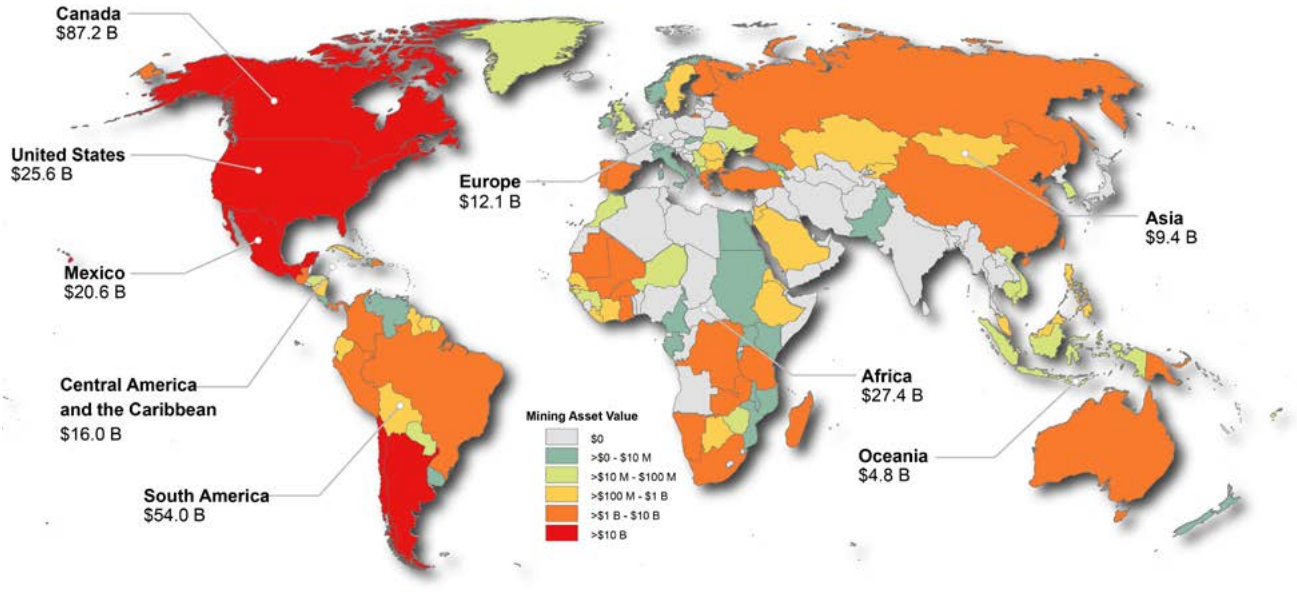
[17] Natural Resources Canada. Canadian mining asset values are those reported in company financial reports, nearest to December 31, 2014, for public companies headquartered in Canada that are not under foreign control. Mining assets, in this context, reflect non-current assets, including mineral properties, deferred mineral exploration expenses, royalties, investments in non-Canadian mining companies, and other non-current assets related to mining that can be reconciled to a specific geographic location. CMA includes values for all countries including Canada while CMAA include values for all countries except Canada.

Table 5. Canadian Mining Assets by Region, 2013 (r) and 2014

	2013 (r)	2014	Variation ($ billions)	Variation (%)
	($ billions)			
Africa	24.2	27.4	3.2	13.3
Americas (excluding Canada)	108.3	116.1	7.8	7.2
Asia	9.5	9.4	-0.1	-1.8
Europe	11.3	12.1	0.8	6.6
Oceania	4.6	4.8	0.2	3.4
Canadian mining assets abroad	**157.9**	**169.7**	**11.8**	**7.5**
Canada	80.6	87.2	6.6	8.2
Total Canadian mining assets	**238.5**	**256.9**	**18.4**	**7.7**

Source: Natural Resources Canada.
(r) Revised.

Figure 3. Canadian Mining Assets, by Region, 2014



Source: Natural Resources Canada.
B Billion; M Million.

Indigenous Peoples' Participation in the Minerals and Metals Sector

EMPLOYMENT

- Approximately 30,000 Indigenous Peoples[18] living off reserves are directly employed in Canada's natural resources sector. Of this total, about 10,000 are employed in the mining and mineral processing industries.
- In 2015, nearly half of Indigenous employment was concentrated in the mining and quarrying subsector.

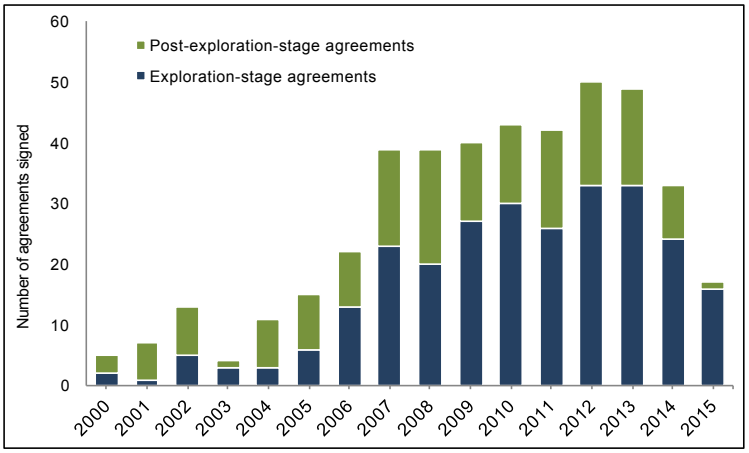
AGREEMENTS BETWEEN MINING AND EXPLORATION COMPANIES AND INDIGENOUS COMMUNITIES OR GOVERNMENTS

- An estimated 480 agreements (active and expired agreements at the exploration, development, and post-development stages) have been signed since 1974 for 301 mining and exploration projects.
- Agreements have helped secure benefits for local Indigenous communities and businesses and improve certainty for exploration and mining companies. A total of 428 agreements were signed between 2000 and 2015, compared to 53 prior to 2000. The increase can be attributed to a higher level of mining and exploration activity and a growing focus on building a mutual understanding between a community and a company.
- Of these agreements, 384 were still active across Canada at the end of 2015.

[18] The Indigenous employment numbers presented in this section are from Statistics Canada's 2015 Labour Force Survey (LFS). The LFS excludes persons living on reserves and settlements. Although the LFS produces employment estimates for the territories, it uses a different methodology than the one used for the provinces and does not provide estimates at the industry level required for this report. Consequently, the data included in this section are incomplete and may underestimate the number of Indigenous Peoples employed in the mining sector.

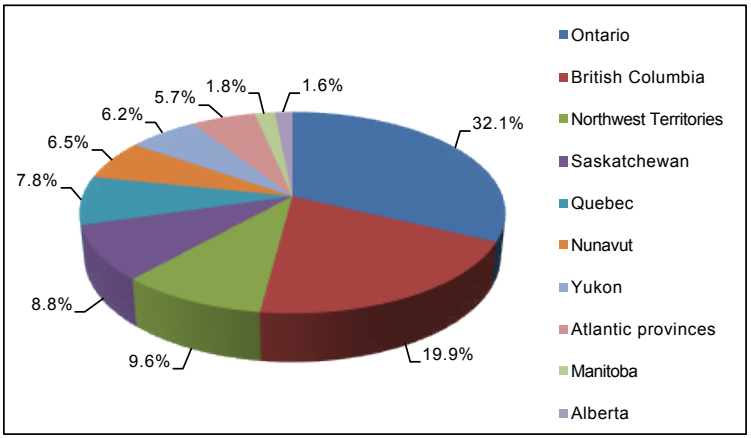
- Exploration-stage agreements, as a share of all agreements, increased from 20.2% signed prior to 2005 to 64.5% signed between 2005 and 2015.
- More than half of all active agreements in 2015 were located in Ontario (32.1%) and British Columbia (19.9%).

Figure 4. Number of Agreements Signed Between Mining and Exploration Companies and Indigenous Communities or Governments, 2000-2015



Source: Natural Resources Canada.

Figure 5. Distribution of Active Agreements Signed Between Mining and Exploration Companies and Indigenous Communities or Governments by Province and Territory, 2015



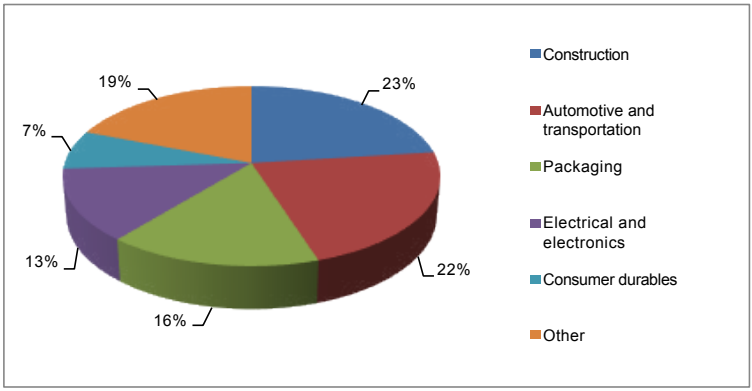
Source: Natural Resources Canada.

Aluminum

USES

- Light, strong, flexible, non-corrosive, and infinitely recyclable, aluminum is one of the most widely used metals in the world.
- Because of its lightness and durability, aluminum is widely used in the transportation industry. The use of aluminum in vehicle production reduces a vehicle's weight, fuel consumption, and greenhouse gas emissions.
- Aluminum is also commonly used in packaging (e.g., beverage cans, foils).
- The construction industry relies on a variety of aluminum alloys in the manufacture of products ranging from exterior siding to structural components.
- Its ability to conduct heat and electricity also make aluminum a popular choice in the electrical and electronics industries.

Figure 1. Aluminum, Global Uses, 2015



Source: Future Market Insights Report, 2015.

CANADIAN PRODUCTION

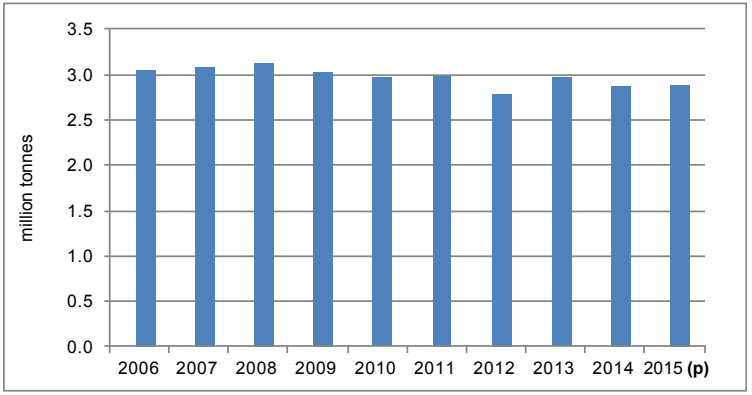
- In nature, aluminum does not naturally exist in a pure state. The production of primary aluminum metal commences with bauxite ore, which is composed of hydrated aluminum oxide (40-60%) mixed with silica and iron oxide. Roughly 4-5 tonnes (t) of bauxite ore are refined to produce approximately 2 t of alumina. This 2 t of alumina is smelted to produce approximately 1 t of aluminum.
- No bauxite is mined in Canada.
- Canada imported roughly 3.7 million tonnes (Mt) of bauxite ore in 2015, mostly from Brazil and Guinea, that was refined into alumina at Rio Tinto Aluminium's Quebec-based refinery. This alumina was then further smelted into aluminum.
- Canada also directly imported approximately 4.2 Mt of alumina in 2015, mainly from Brazil, the United States, Jamaica and Suriname, that was also smelted into aluminum.
- There are ten primary aluminum smelters in Canada: one is located at Kitimat, British Columbia, and the other nine are in Quebec. There is also one alumina refinery located in Saguenay (Quebec).
- Canada is the world's third largest primary aluminum producer after China and Russia.
- Canada's primary aluminum production in 2015 remained about the same as in 2014 at an estimated 2.9 Mt.
- Canadian aluminum is produced mostly with hydro-electricity using the latest generation of technologies.

Table 1. Canadian Refinery and Smelters, Estimated Capacity, 2015

Location	Company	Capacity (tonnes/year)
ALUMINA REFINERY		
Jonquière, Quebec (Vaudreuil Works)	Rio Tinto Aluminium	1,500,000
ALUMINUM SMELTERS		
Sept-Îles, Quebec (Aluminerie Alouette)	Rio Tinto Aluminium, 40%; AMAG, 20%; Hydro Aluminium, 20%; Investissement Québec, 6.7%; Marubeni, 13.3%	590,000
Baie-Comeau, Quebec	Alcoa Inc.	295,000
Saguenay-Lac-Saint-Jean, Quebec (Grande-Baie)	Rio Tinto Aluminium	224,000
Saguenay-Lac-Saint-Jean, Quebec (Laterrière)	Rio Tinto Aluminium	238,000
Saguenay-Lac-Saint-Jean, Quebec (Arvida)	Rio Tinto Aluminium	176,000
Saguenay-Lac-Saint-Jean, Quebec (Arvida), AP-60 Technology Centre	Rio Tinto Aluminium	60,000
Saguenay-Lac-Saint-Jean, Quebec (Alma)	Rio Tinto Aluminium	438,000
Deschambault, Quebec	Alcoa Inc.	260,000
Bécancour, Quebec	Alcoa, 75%; Rio Tinto Aluminium, 25%	413,000
Kitimat, British Columbia	Rio Tinto Aluminium	**420,000

Sources: Natural Resources Canada; company web sites.
**Expected to be achieved in 2016.

Figure 2. Canadian Production of Primary Aluminum, 2006-15

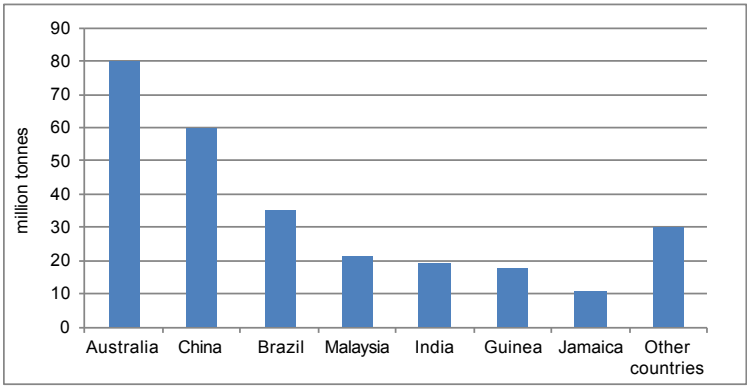


Sources: Natural Resources Canada; Aluminium Association of Canada.
(p) Preliminary.

WORLD PRODUCTION

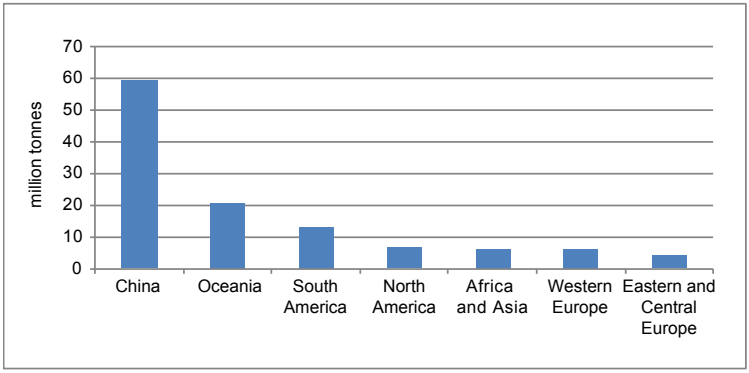
- World primary aluminum production totaled 56.0 Mt in 2015.
- China was the world's largest producer with 30.5 Mt.

Figure 3. World Production of Bauxite Ore, by Country, 2015



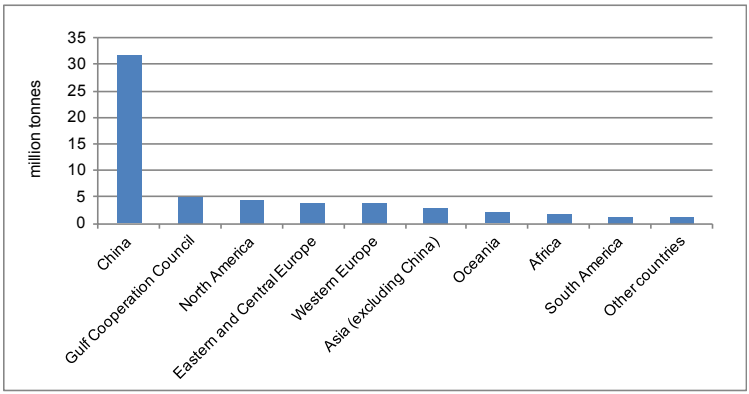
Source: U.S. Geological Survey.

Figure 4. World Production of Alumina, by Region, 2015



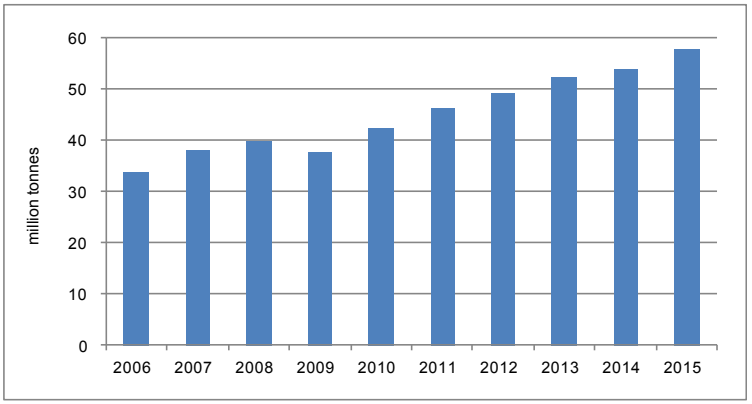
Source: International Aluminium Institute.

Figure 5. World Production of Primary Aluminum, by Region, 2015



Source: International Aluminium Institute.

Figure 6. World Production of Primary Aluminum, 2006-15

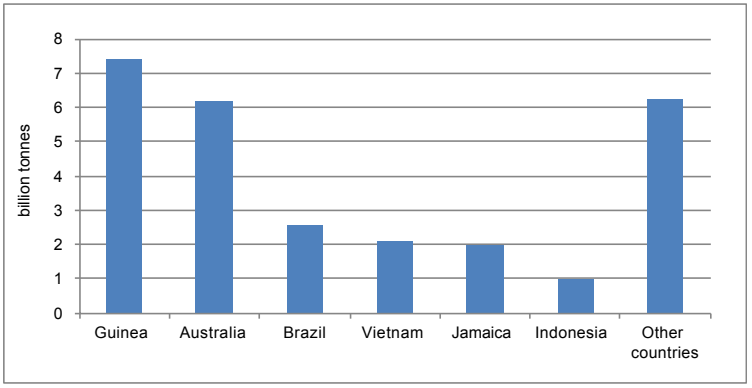


Source: International Aluminium Institute.

WORLD RESERVES

- In 2015, global reserves of bauxite ore were assessed at 27.5 billion t.
- Guinea ranked first with 7.4 billion t, or 26%.
- Australia was second with 6.2 billion t, or 23%.

Figure 7. World Reserves of Bauxite Ore, by Country, 2015



Source: U.S. Geological Survey.

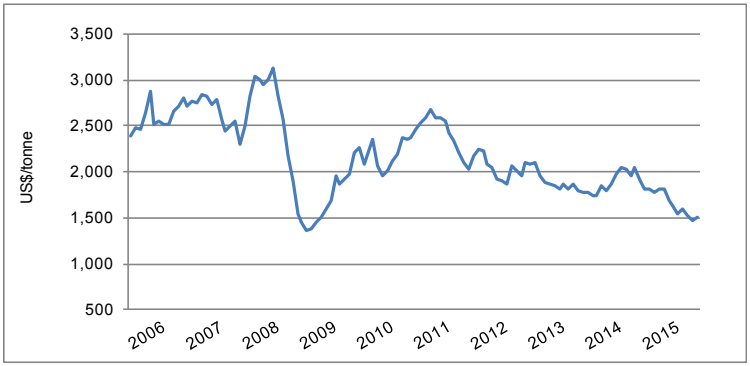
TRADE

- Canadian exports of aluminum products were valued at $10.6 billion in 2015, an increase of $700 million over 2014. Of this amount, $6.6 billion comprised unwrought alloyed and non-alloyed aluminum, $944 million comprised aluminum waste and scrap, and $680 million comprised aluminum plates, sheets, and strip.
- The United States was Canada's largest export destination for aluminum products at all production stages, accounting for 88% of total aluminum export trade, followed by China (2.4%), Mexico (2.3%), and the Netherlands (2.0%).
- Canada's total imports of aluminum products, principally from the United States, China, and Germany, were valued at $6.6 billion in 2015, of which approximately 60% comprised semi-fabricated and fabricated aluminum products.

PRICES

- The expansion of domestic smelting capacity and slowing primary aluminum consumption growth in China continued to put downward pressure on aluminum prices in 2015.

Figure 8. Aluminum Prices, Three-Month Official Average, 2006-15

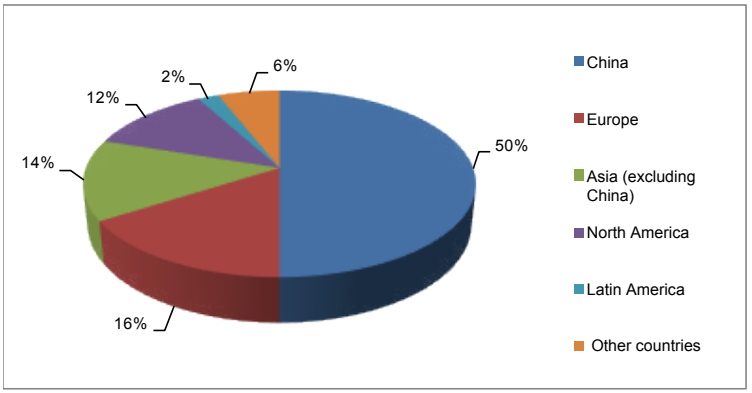


Source: London Metal Exchange.

DEMAND

- Global demand for primary aluminum reached an estimated 58 Mt in 2015. On average, world aluminum demand grows at an annual rate of 5-7%, supported by increased intensity in key applications, notably transportation. Asia accounted for the largest portion of global demand with China representing 50% of global demand.

Figure 9. Primary Aluminum Demand, by Region, 2015



Source: Wood Mackenzie.

RECYCLING

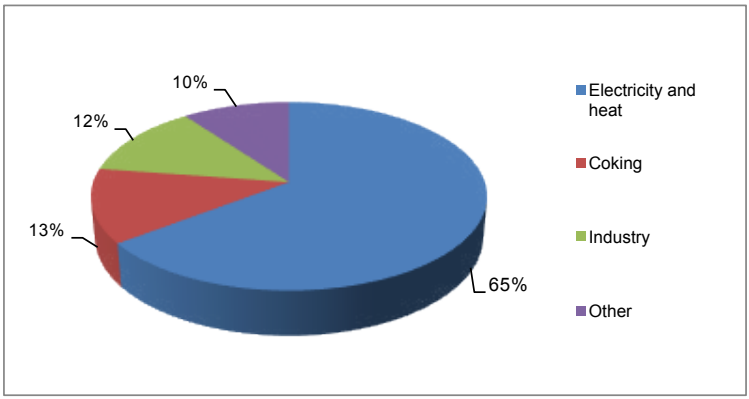
- The intensity of aluminum use in transportation is rising as its unique properties and recyclability fit the world's needs to reduce greenhouse gas emissions.
- Aluminum is infinitely recyclable, making it one of the most recycled metals in the world. More than 90% of the aluminum used in automotive and construction applications is recycled, driving a closed-loop circular economy.
- Secondary aluminum production requires 95% less energy than primary aluminum production.

Coal

USES

- Coal is used for electricity generation, steelmaking, and various industrial and residential applications.
- The main use of coal is electricity generation (coal-fired generation). The coal used for this purpose is referred to as thermal coal. In 2013, electricity generation accounted for 65% of total global coal usage.
- Coal is a key ingredient in the manufacturing of steel. The coal used for this purpose is referred to as metallurgical coal (coking coal or steelmaking coal). In 2013, steel manufacturing accounted for 13% of total global coal usage.
- Coal is also used in a number of other industrial applications, including cement production. In 2013, these other industrial uses accounted for 12% of total global coal usage.
- Other uses, including residential and non-energy uses, accounted for 10% of total global coal usage.

Figure 1. Coal, Global Uses, 2013

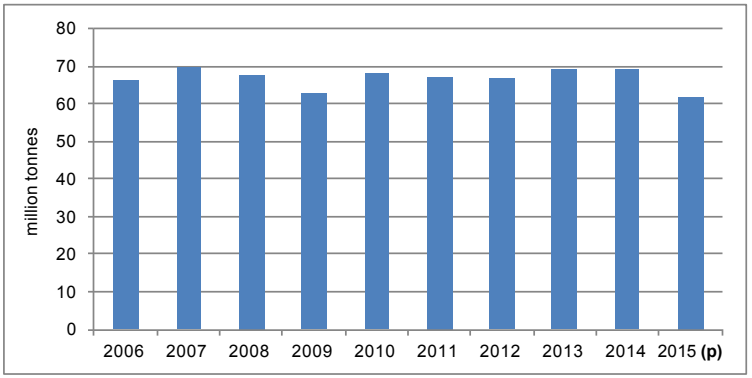


Source: International Energy Agency, *Coal Information 2015*.

CANADIAN PRODUCTION

- In 2015, Canadian mines produced 62 million tonnes (Mt) of coal, a decline from 69 Mt in 2014.
- The decline was due to weak global demand for metallurgical coal, which resulted in the suspension of production at several coal mines in Canada.

Figure 2. Canadian Coal Production, 2006-15



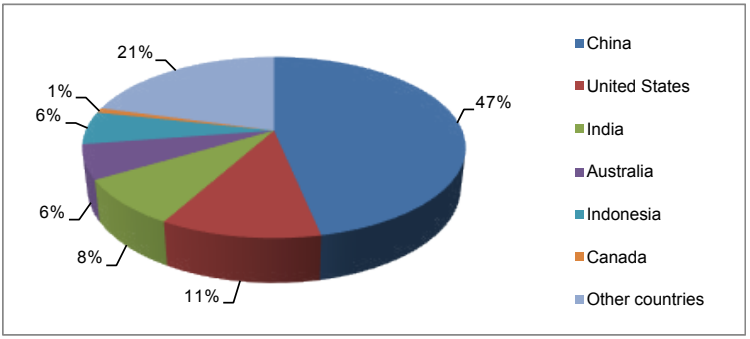
Sources: Natural Resources Canada; Statistics Canada.

(p) Preliminary.

WORLD PRODUCTION

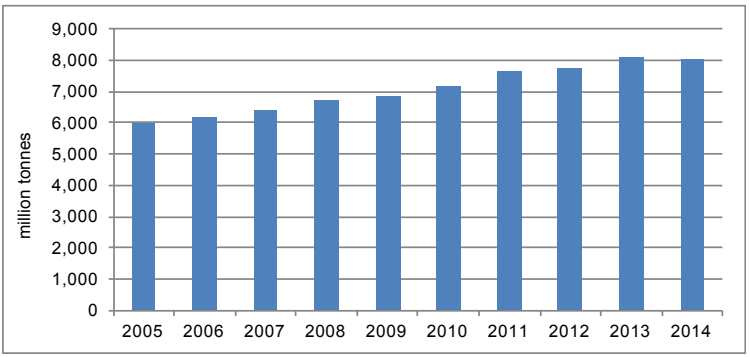
- China was the world's largest producer of coal in 2014, accounting for 3.7 billion tonnes (t), or 47% of total world production.
- The top 10 producing countries accounted for 91% of world coal production.
- Canada ranked twelfth among global coal-producing countries.

Figure 3. World Coal Production, by Country, 2014



Source: International Energy Agency, *Coal Information 2015*.

Figure 4. World Coal Production, 2005-14

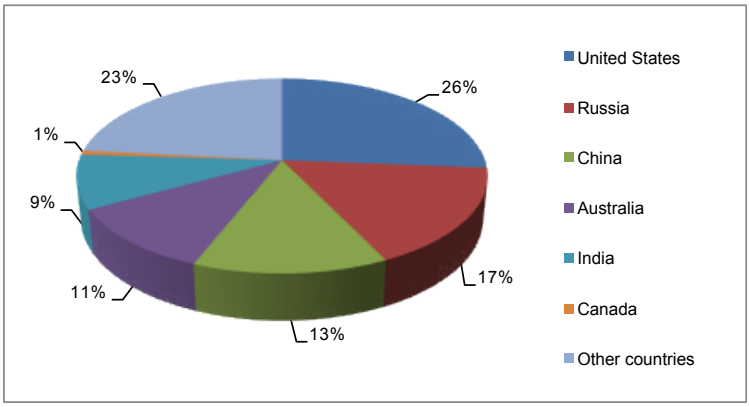


Source: International Energy Agency, *Coal Information 2015*.

WORLD RESERVES

- According to the German Federal Institute for Geosciences and Natural Resources' 2014 Energy Study, world coal reserves were 968 billion t at the end of 2013.
- The United States ranked first with 253 billion t, or 26%.
- Russia was second with 160 billion t, or 17%.
- China was third with 128 billion t, or 13%.
- Australia was fourth with 106 billion t, or 11%.
- Canada ranked fifteenth with 6.6 billion t, or 0.7%.

Figure 5. World Coal Reserves, by Country, 2013

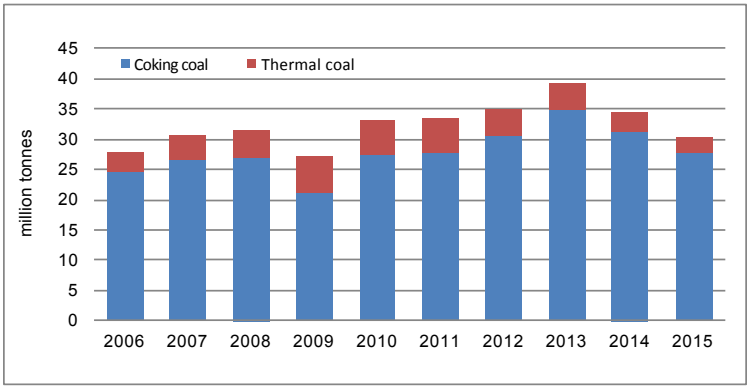


Source: Federal Institute for Geosciences and Natural Resources, Germany, 2014 Energy Study.

TRADE

- Canada is the world's third largest exporter of metallurgical coal after Australia and the United States.
- In 2015, Canada exported 28 Mt of metallurgical coal, down 3 Mt from 2014. The value of metallurgical coal exports also declined to $3.3 billion from $3.9 billion in 2014 because of weaker demand and a lower coal price.
- Canada's total coal exports were 30.5 Mt in 2015, a decrease of 4 Mt from 2014.

Figure 6. Canadian Coal Exports, 2006-15

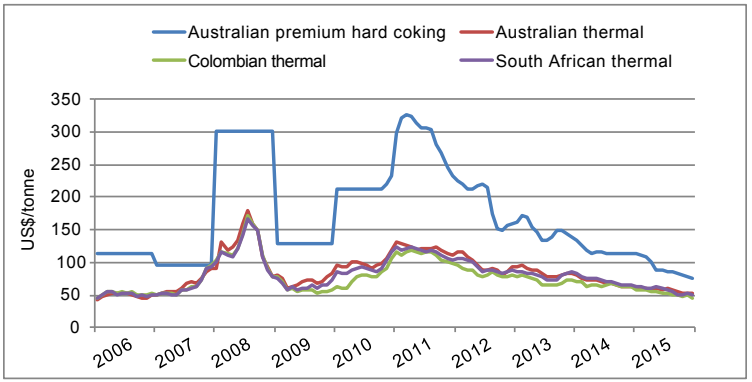


Sources: Natural Resources Canada; Statistics Canada.

PRICES

- The global metallurgical coal price peaked twice over the last 10-year period. The first peak occurred in 2008 when the price jumped to US$300/t and the second peak was in 2011 when it hit US$330/t. The price has since trended downward to reach US$77/t in December 2015.
- Globally, thermal coal prices experienced a similar trend. The three indicating thermal coal prices (Australian, Colombian, and South African) peaked in the summer of 2008 at US$170-$180/t, but began declining in 2011 to reach US$45-$52/t by December 2015.
- Fluctuating and declining prices were directly tied to global economic ups and downs.

Figure 7. Coal Prices, 2006-15



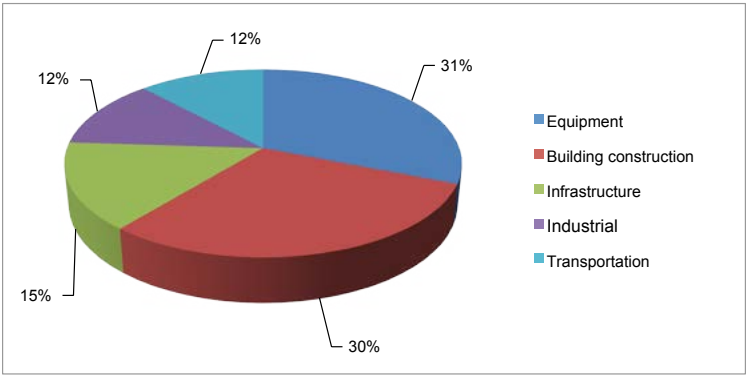
Notes: All prices are in nominal U.S. dollars, free on board (f.o.b.) port terms. Between 2005 and 2010, Australian premium hard metallurgical or coking coal prices were the annual contract prices. From 2011 to 2015, they were monthly prices. Australian thermal was f.o.b. Newcastle 6,300 kilocalories per kilogram (kcal/kg), Colombian thermal was f.o.b. Bolivar 6,450 kcal/kg, and South African thermal was f.o.b. Richard Bay 6,000 kcal/kg.
Sources: Natural Resources Canada; World Bank; AME; McCloskey.

Copper

USES

- Copper is used in electrical wires and cables for its electrical conductivity.
- It is also used in plumbing, industrial machinery, and construction materials because of its durability, machinability, corrosion resistance, and ability to be cast with high precision and tolerances.

Figure 1. Copper, Global Uses, 2014

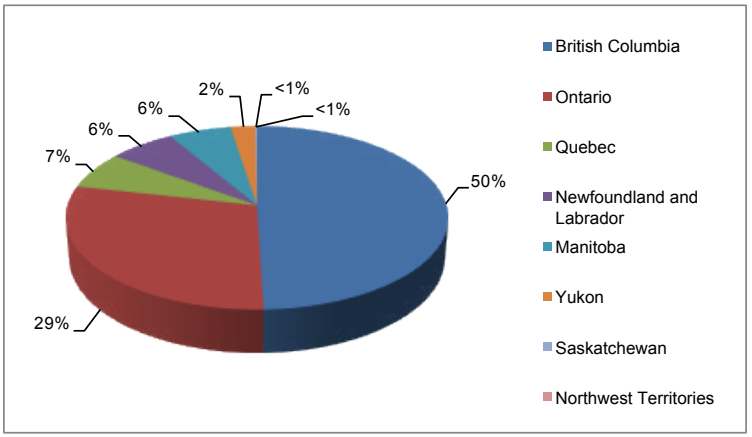


Source: International Copper Study Group.

CANADIAN PRODUCTION

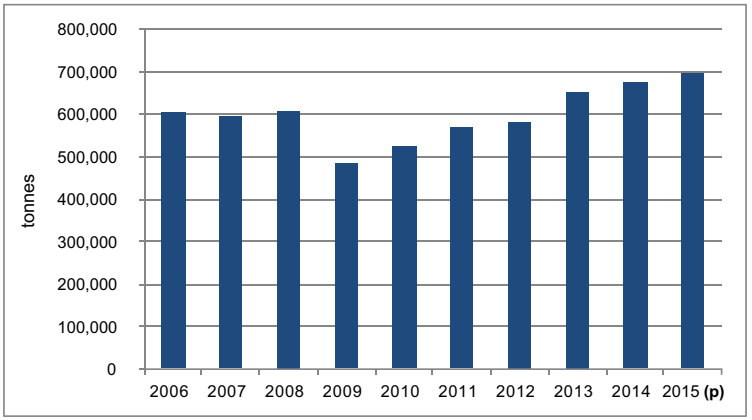
- In 2015, Canadian mines produced 695,637 tonnes (t) of copper in concentrate, a 3.4% increase compared to 672,729 t in 2014.
- The increase was mostly attributed to higher production in British Columbia.
- Canadian refineries produced 331,000 t of refined copper in 2015, a 1.4% increase compared to 326,300 t in 2014.

Figure 2. Canadian Mine Production of Copper, by Province and Territory, 2015 (p)



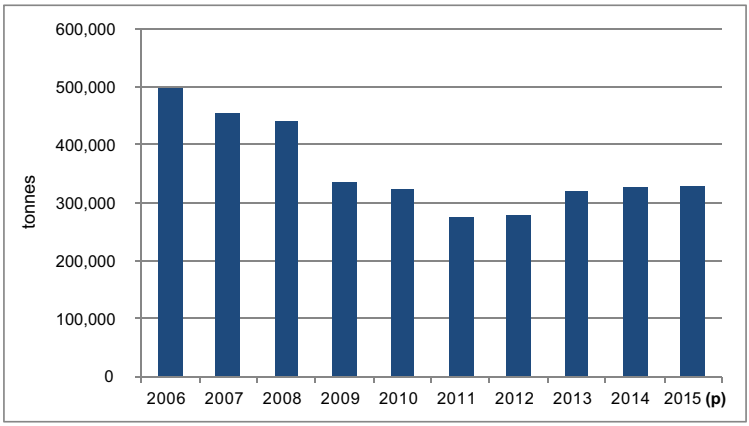
Source: Natural Resources Canada.
(p) Preliminary.

Figure 3. Canadian Mine Production of Copper, 2006-15



Source: Natural Resources Canada.
(p) Preliminary.

Figure 4. Canadian Refined Production of Copper, 2006-15

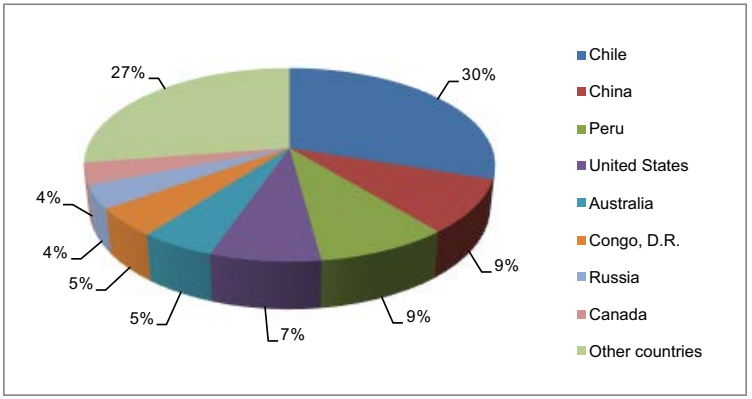


Source: Natural Resources Canada.
(p) Preliminary.

WORLD PRODUCTION

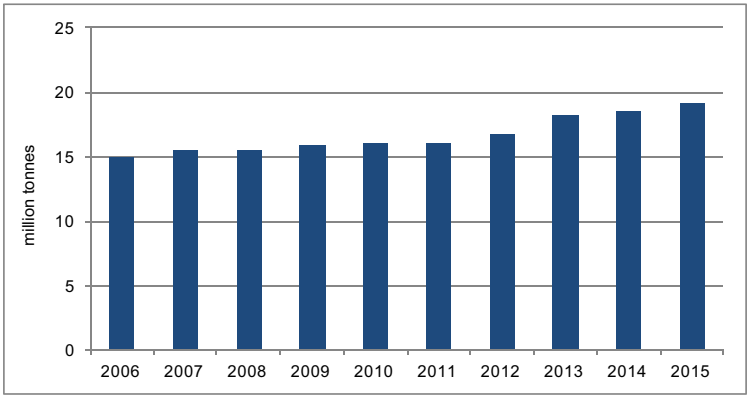
- With 30% of world mine production, Chile was the world's largest copper producer in 2015.
- The top 15 producing countries accounted for 90% of the world's mine production of copper in 2015; Canada ranked ninth.
- China was the largest producer of refined copper, accounting for 35% of the global total.
- The top 21 countries accounted for 90% of global refined copper output; Canada ranked seventeenth.

Figure 5. World Mine Production of Copper, by Country, 2015



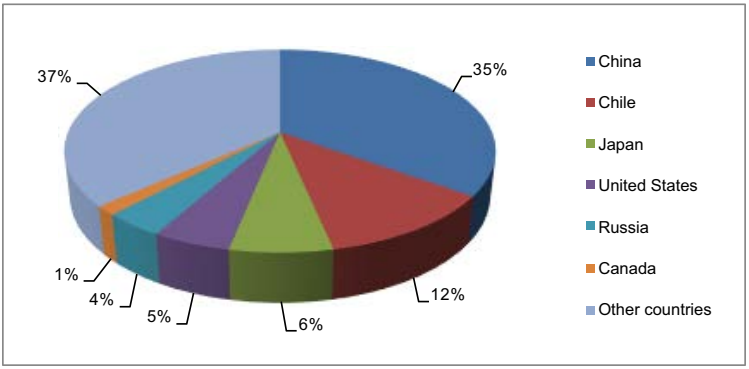
Source: International Copper Study Group.

Figure 6. World Mine Production of Copper, 2006-15



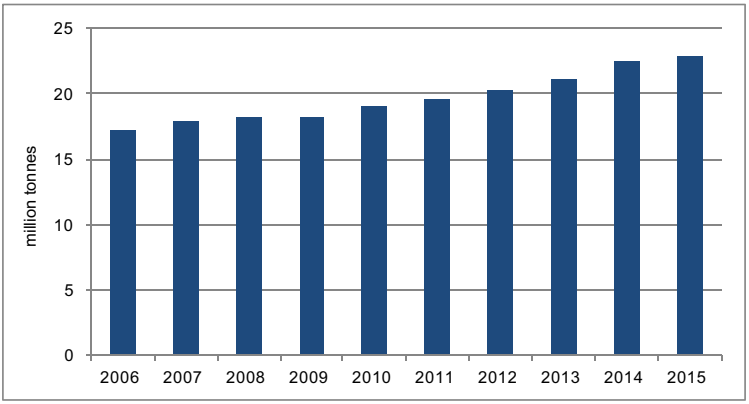
Source: International Copper Study Group.

Figure 7. World Refined Production of Copper, by Country, 2015



Source: International Copper Study Group.

Figure 8. World Refined Production of Copper, 2006-15

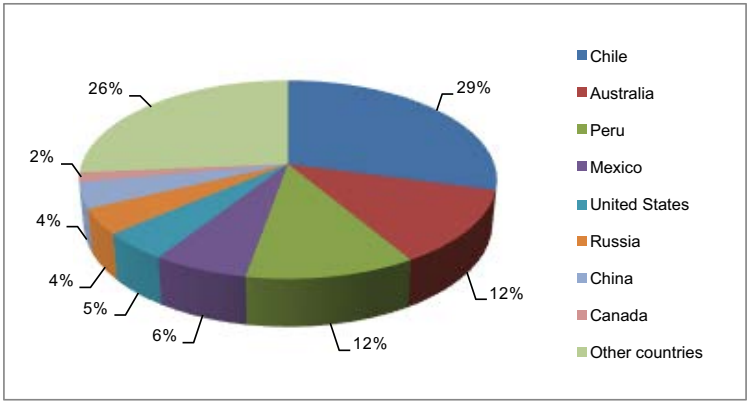


Source: International Copper Study Group.

WORLD RESERVES

- In 2015, Chile ranked first with 210 million tonnes (Mt), or 29% of the world total.
- Australia was second with 88 Mt, or 12%.
- Peru was third with 82 Mt, or 11%.
- Canada was estimated to have 11 Mt of copper reserves, or roughly 1.5% of the world total.

Figure 9. World Reserves of Copper, by Country, 2015



Source: U.S. Geological Survey.

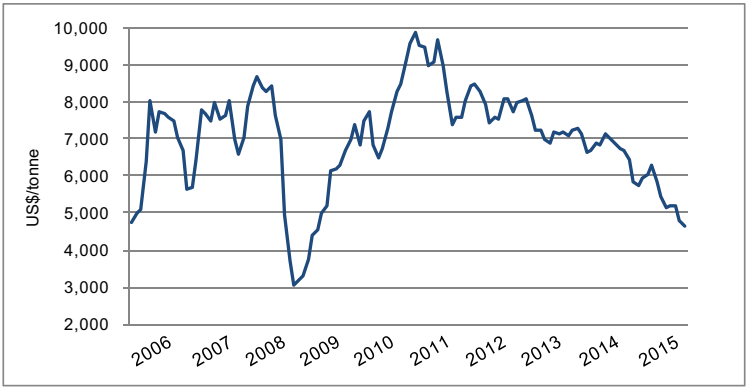
TRADE

- Canada's total trade (exports and imports) in copper and copper-based products in 2015 was valued at $10.2 billion.
- Canada's total copper exports were $6.98 billion in 2015, a 1.7% decrease compared to $7.1 billion in 2014. Total copper imports were valued at $3.2 billion in 2015, down from $3.3 billion in 2014.
- Copper concentrate exports were $3.1 billion, up marginally from $3.0 billion in 2014. The volume of concentrate exports increased to 480,655 t in 2015 from 439,140 t in 2014.

- Exports of refined copper were $1.65 billion in 2015, up marginally from $1.6 billion in 2014. More than 85% of Canada's refined copper exports were destined for the United States with the balance exported to six other countries.
- Canada sourced 56% of its copper imports from the United States, 15% from Chile, and smaller percentages from more than 100 other countries.

PRICES

Figure 10. Copper Price, Monthly Average, 2006-15



Source: World Bank Commodity Price Data.

RECYCLING

- Copper is among the few materials that do not degrade or lose their chemical or physical properties in the recycling process. Recycling has the potential to extend the use of resources and minimize waste.
- In 2013, the International Copper Study Group estimated that more than 30% of the world's copper consumption came from recycled copper.
- Canada maintains a vibrant copper recycling industry, much of which is recovered in its Quebec-based smelter and refinery located in Rouyn-Noranda and Montréal, respectively.

Diamonds

USES

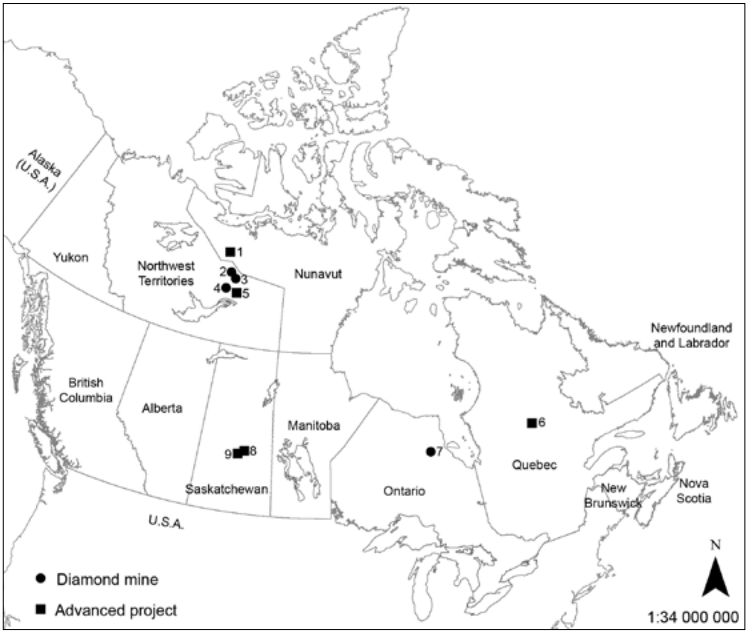
- Diamonds are best known as gemstones, even though only 20% of the world's production by weight is used for jewellery. The other 80%, known as bort, is used in industrial and research applications where diamond's unique properties are required.
- Because it is the hardest known material, diamonds have been used for centuries as an abrasive in cutting, drilling, grinding, and polishing. This is the dominant industrial use for diamonds.
- Diamonds also have the highest thermal conductivity of any material at room temperature and are used as a heat sink to dissipate heat in electronic devices such as computers and diode lamps.

CANADIAN PRODUCTION

- In 2015, Canadian mines produced 11.7 million carats (Mct) of diamonds valued at $2.1 billion, representing a 2.8% decrease in volume and a 4.2% decrease in value compared to 2014.
- The decrease in volume was mostly attributed to a drop in production at the Diavik mine because of lower grades from the A-418 kimberlite pipe, lower mining rates from the A-154N pipe, and decreased availability of the processing plant during part of the year. However, this drop was minimized by an increase in production at the Ekati mine, which sourced more of its ore from the high-grade, but lower per-carat value, Misery pit.
- The drop in value was mostly due to the lower mine output from Diavik mentioned above, the lower-value diamonds mined at Ekati, and the reported 15% drop in world market prices for rough diamonds. Another significant factor influencing the 2015 value was the 17% depreciation of the Canadian dollar versus the U.S. dollar. As sales are made in U.S. dollars, this depreciation translated into a higher exchange return in Canadian dollar terms, which helped buffer the price drop.

- Looking ahead, Canada's rough diamond production is forecast to remain close to 2015 levels. While the Snap Lake mine shut down in December 2015, the Gahcho Kué mine in the Northwest Territories and the Renard mine in Quebec are expected to open in 2016.

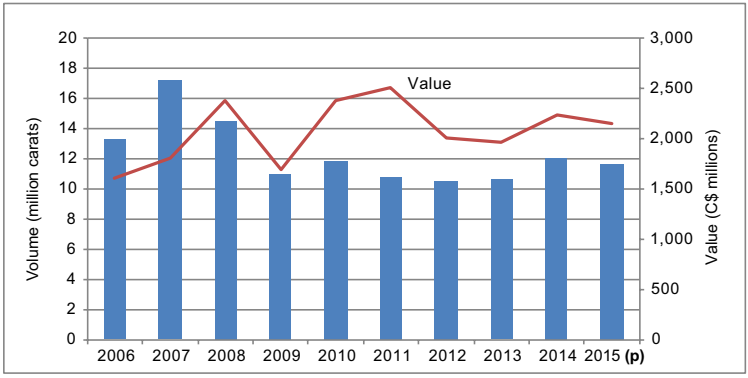
Figure 1. Diamond Mines and Advanced Projects in Canada, 2015



1. Jericho
2. Ekati
3. Diavik
4. Snap Lake
5. Gahcho Kué
6. Renard
7. Victor
8. Star
9. Fort-à-la-Corne

Source: Natural Resources Canada.

Figure 2. Canadian Production of Rough Diamonds, 2006-15

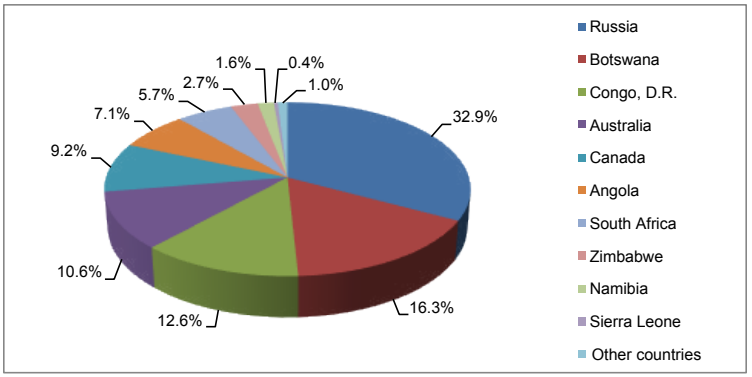


Source: Natural Resources Canada.
(p) Preliminary.

WORLD PRODUCTION

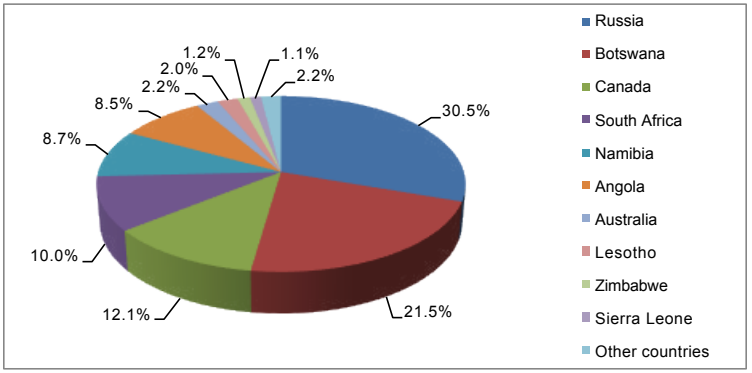
- World rough diamond production in 2015 was estimated (preliminary) at 127.4 Mct and valued at US$13.9 billion for an average per-carat price of US$108.96/ct. This represented a 2.1% increase in production on a carat basis and a 4.2% decrease on a value basis over 2014.
- Russia remained the largest producer by value, accounting for 30.5% of world production, while Botswana, in second place, accounted for 21.5%.
- Canada was the third largest producer by value and the fifth largest producer by volume.
- Six countries accounted for 91% of world production by value.

Figure 3. World Production of Rough Diamonds, by Country, Carat Basis, 2015 (p)



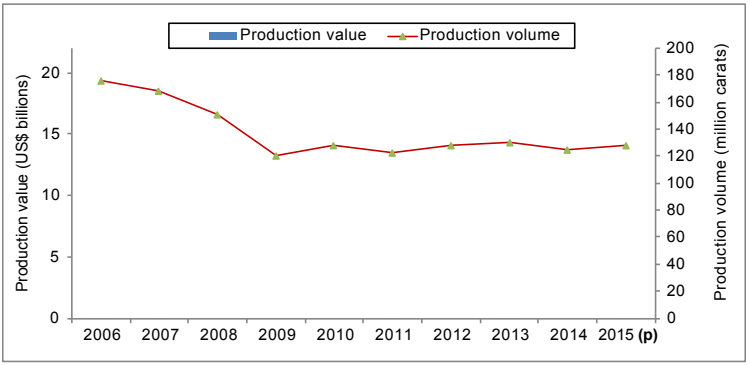
Source: Kimberley Process Certification Scheme.
(p) Preliminary.

Figure 4. World Production of Rough Diamonds, by Country, Value Basis, 2015 (p)



Source: Kimberley Process Certification Scheme.
(p) Preliminary.

Figure 5. World Production of Rough Diamonds, 2006-15



Source: Kimberley Process Certification Scheme.
(p) Preliminary.

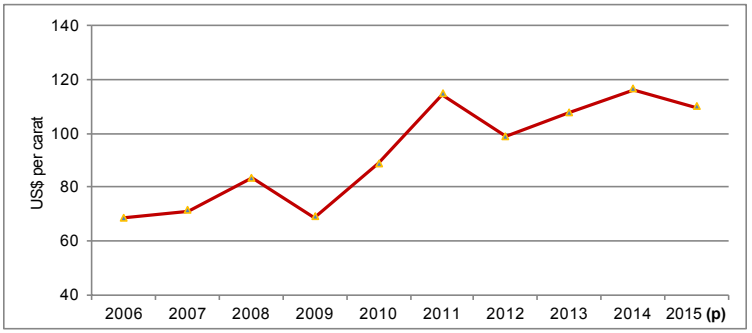
TRADE

- The estimated value of Canada's total primary exports of diamonds in 2015 was $2.37 billion, a 6.3% decrease compared to 2014 because of a decrease in both volume and value.
- Canada's most important diamond export items by value were unsorted rough diamonds, sorted gem-quality rough diamonds, and cut gem-quality diamonds.
- These exports were shipped mostly to Belgium, Botswana, India, the United States, Hong Kong, and Vietnam.
- The estimated value of Canada's total primary imports of diamonds in 2015 was $534 million, a 17% decrease relative to 2014 because of a drop in the import of uncut gem diamonds.
- The top import item by value was cut gem diamonds, most exceeding 0.5 ct in weight, which were destined for jewellery manufacturing, followed by uncut gem diamonds.

PRICES

- There are no internationally set prices for rough gem-quality diamonds as there are for many metals and other commodities.
- Mining companies hold "sights" at regular intervals to market their production. The prices reached at these sights are dictated by supply and demand for each of the many categories of diamonds.
- In 2015, world market prices for rough diamonds were reported to have decreased by about 15%.
- However, in comparison, Kimberley Process statistics indicated that the average per-carat value of production (all categories aggregated) decreased by 6.2% to US$108.96/ct in 2015 relative to 2014.

Figure 6. Rough Diamonds, Average Value Per Carat, 2006-15



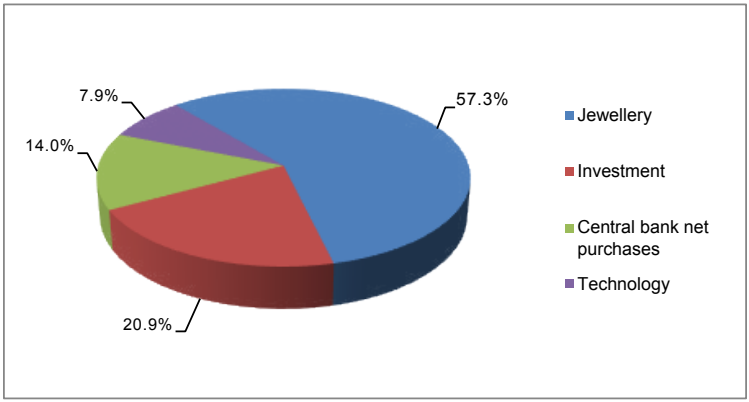
Source: Kimberley Process Certification Scheme.
(p) Preliminary.

Gold

USES

- The predominant use (57%) for gold is in jewellery (rings, necklaces, watches, etc.).
- Approximately 8% of gold demand is in technology applications, mostly as a component of micro-circuitry in a range of electronic products.
- Investment demand for gold takes the form of wafers, bars, and coins, primarily as a hedge against inflation and market volatility. Gold-bearing exchange-traded funds are another source of investment demand for gold.
- Central bank net purchases comprised about 14% of gold demand in 2015.
- The Bank of Canada no longer holds gold as part of its international reserves. This is the result of a Government of Canada decision to diversify its portfolio by selling physical commodities and investing in financial assets that are easily tradable.

Figure 1. Gold, Global Demand, 2015

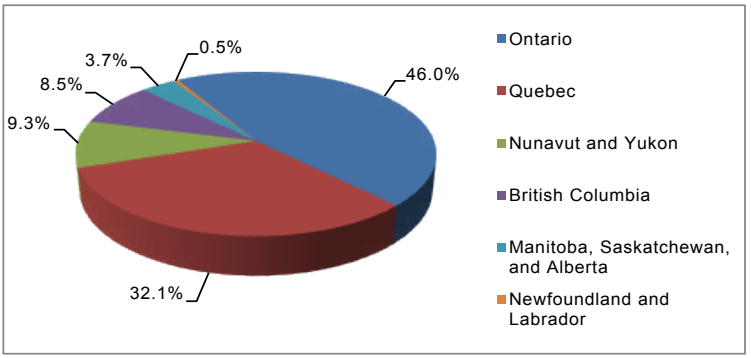


Source: World Gold Council.

CANADIAN PRODUCTION

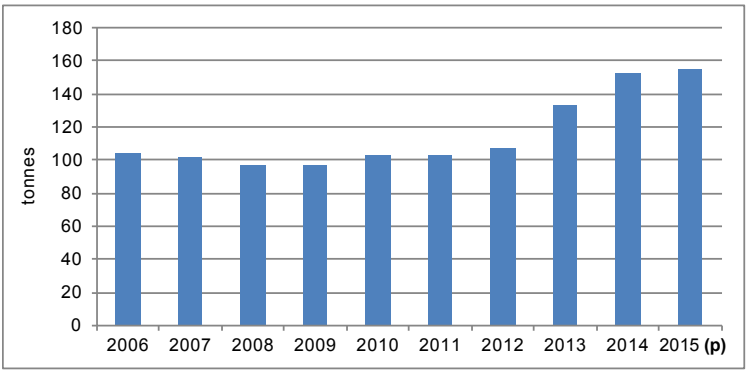
- Canadian mines produced an estimated 154.9 tonnes (t) of gold in 2015, a 1.6% increase compared to 152.5 t in 2014.
- Production increases in Quebec, British Columbia, and Saskatchewan more than offset production decreases in Ontario, Nunavut, Yukon, Manitoba, and Alberta.
- The most significant increase came from Goldcorp Inc.'s Éléonore mine in Quebec, which commenced full commercial production in 2015.

Figure 2. Canadian Mine Production of Gold, by Region, 2015 (p)



Source: Natural Resources Canada.
(p) Preliminary.

Figure 3. Canadian Mine Production of Gold, 2006-15

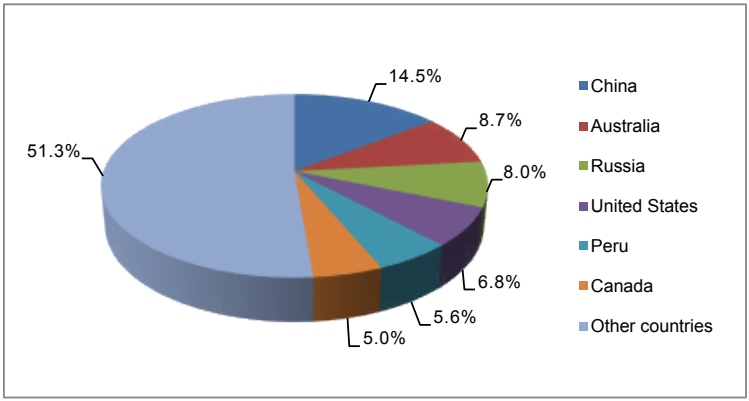


Source: Natural Resources Canada.
(p) Preliminary.

WORLD PRODUCTION

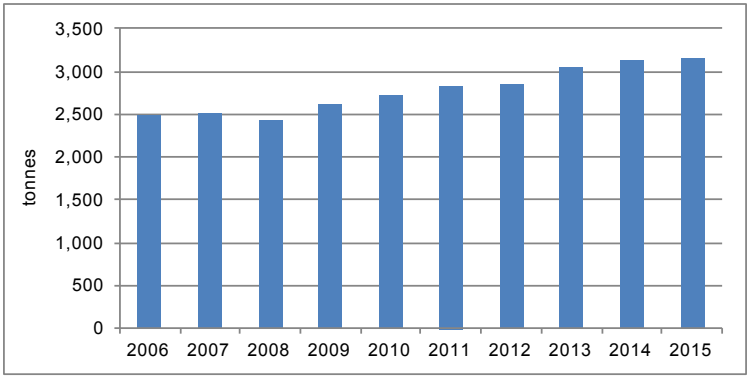
- World mine production of gold reached an estimated 3,158 t in 2015, up 1% from 3,132 t in 2014.
- The top five gold-producing countries were China, Australia, Russia, the United States, and Peru. Together they accounted for 44% of total production. Globally, the top 20 gold-producing countries accounted for over 83% of the world's annual gold output.
- Canada ranked sixth in terms of gold production in 2015, up one position from 2014.

Figure 4. World Mine Production of Gold, by Country, 2015



Sources: GFMS; Thomson Reuters.

Figure 5. World Mine Production of Gold, 2006-15

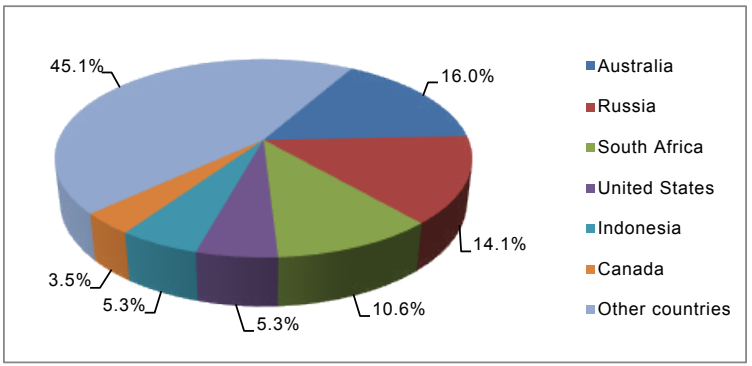


Sources: GFMS; Thomson Reuters.

WORLD RESERVES

- Mineral ore reserves of gold are generally calculated based on economically and technically feasible extraction.
- The U.S. Geological Survey estimated world reserves of gold ore at around 56,000 t in 2015.
- Australia ranked first with 9,100 t, or 16%.
- Russia was second with 8,000 t, or 14%.
- South Africa was third with 6,000 t, or 11%.
- Canada ranked eighth with 2,400 t, or 4.3%.

Figure 6. World Gold Reserves, by Country, 2015



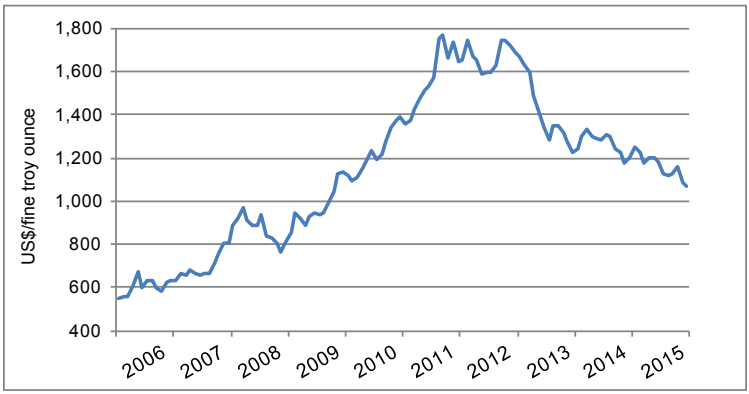
Source: U.S. Geological Survey.

TRADE

- In 2015, the value of Canadian gold exports was $18 billion while the value of gold imports was $9.7 billion.
- Canada's exports of gold in unwrought form declined 8.9% to 337 t in 2015 from 370 t in 2014, while the value declined 4.3% to $15.8 billion from $16.5 billion.
- Canada's exports of gold content in metal ores and concentrates increased to $624 million in 2015 from $552 million in 2014.
- Canada imported 366 t of gold in unwrought form in 2015, up slightly from 363 t in 2014, while the value decreased to $8.3 billion in 2015 from $8.8 billion in 2014.

PRICES

Figure 7. Gold Prices, Monthly Average (PM Fix), 2006-15



Source: The London Bullion Market Association.

RECYCLING

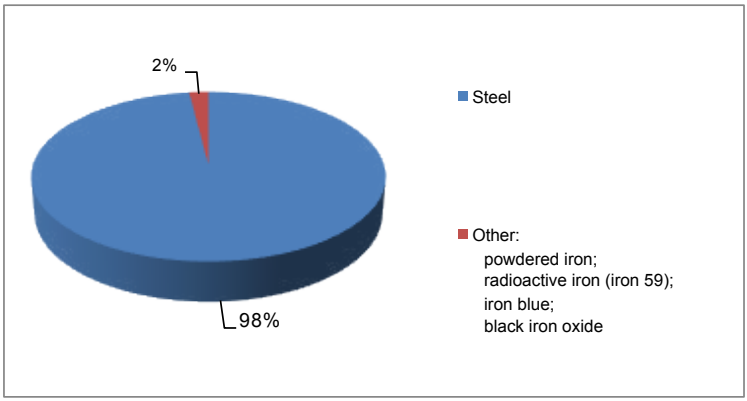
- Gold is a metal that is continuously being recycled. Most gold recycling takes the form of old jewellery that is melted down for its gold content.
- The scrap supply of gold (recycled gold) increased by 1% to 1,173 t in 2015 from 1,158 t in 2014. The main motivation for consumers to sell or hold onto their gold jewellery is the price of gold in their respective currencies. A higher local currency value for gold usually increases the scrap supply available in that country.
- In recent years, the amount of gold recovered from end-of-life electronic products has increased steadily.

Iron Ore

USES

- The primary use of iron ore (98%) is to make steel.
- The remaining 2% is used in other forms in various applications such as:
  - powdered iron, for metallurgy products, magnets, high-frequency cores, auto parts, and catalysts;
  - radioactive iron (iron 59), for medicine and as a tracer element in biochemical and metallurgical research;
  - iron blue, in paints, printing ink, plastics, cosmetics (e.g., eye shadow), artist colours, laundry blue, paper dyeing, fertilizer, baked enamel finishes on vehicles and appliances, and industrial finishes; and
  - black iron oxide, as a pigment in polishing compounds, metallurgy, medicine, magnetic inks, and ferrites for the electronics industry.

Figure 1. Iron Ore, Global Uses, 2015



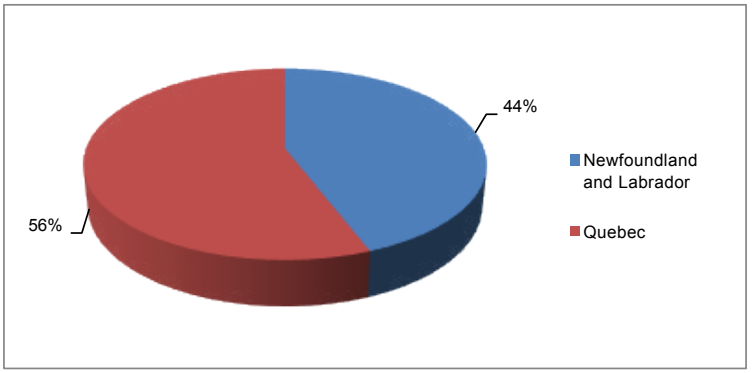
Source: Iron – Minerals Education Coalition.

CANADIAN PRODUCTION

- Canadian mines increased their production by 6.4% to 46.0 million tonnes (Mt) of iron ore in concentrate and pellets in 2015, compared to 43.2 Mt in 2014.

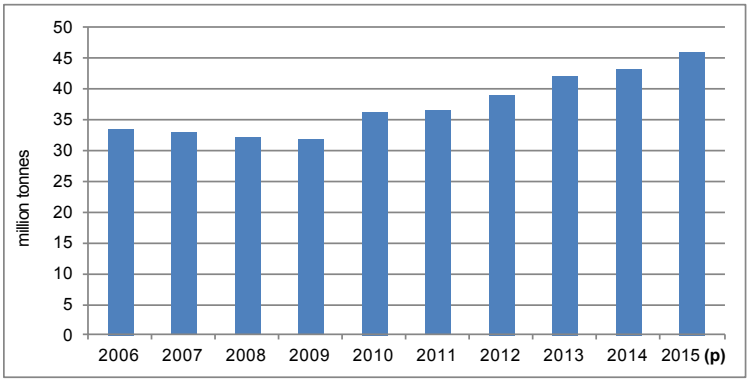
- This increase stems from new output from the expansion projects of established producers.
- Most of Canada's iron ore production comes from the Labrador Trough region of Quebec, Newfoundland and Labrador, and more recently (August 2015) Nunavut.
- In August 2015, Baffinland Iron Mines Corporation loaded its first bulk ship carrying 53,624 tonnes (t) of iron ore from its Mary River project in Nunavut. The company expects to produce 3.5 Mt of treated iron ore annually beginning in 2016.
- Cliffs Natural Resources Inc. suspended production at Bloom Lake in January 2015.
- Canada's estimated crude steel production for 2015 was 12.5 Mt, a small 2.2% decrease from 12.7 Mt in 2014.

Figure 2. Canadian Mine Production of Iron Ore, by Province, 2015 (p)



Source: Natural Resources Canada.
(p) Preliminary.
Note: Production from Nunavut was not included for 2015.

Figure 3. Canadian Mine Production of Iron Ore, 2006-15

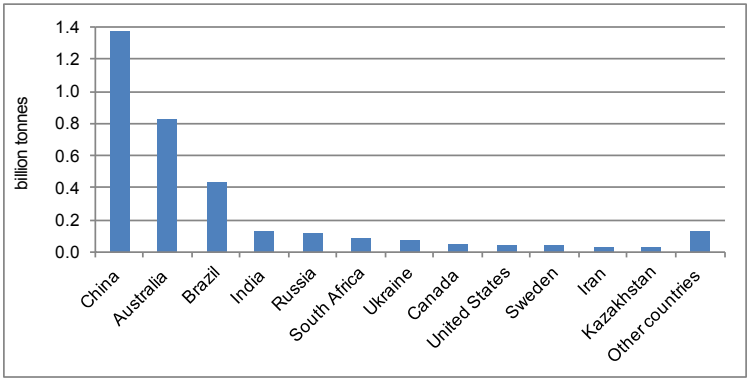


Source: Natural Resources Canada.
(p) Preliminary.

WORLD PRODUCTION

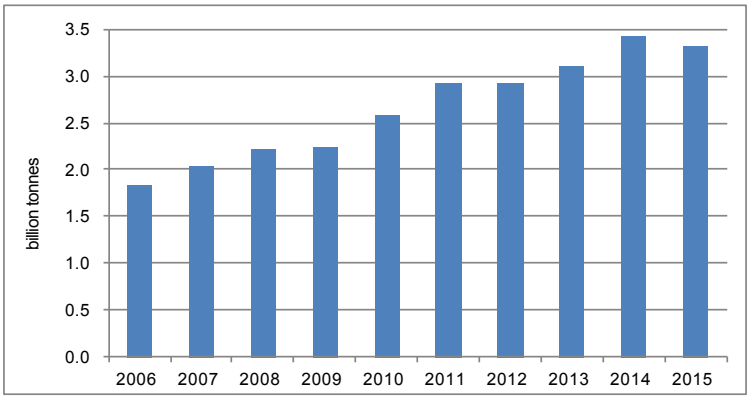
- In 2015, China accounted for 41% of global production and was the world's largest producer of iron ore.
- The top five producing countries accounted for 86% of global production.
- Canada was the eighth largest producer.

Figure 4. World Mine Production of Iron Ore, by Country, 2015



Sources: Natural Resources Canada; U.S. Geological Survey.

Figure 5. World Mine Production of Iron Ore, 2006-15

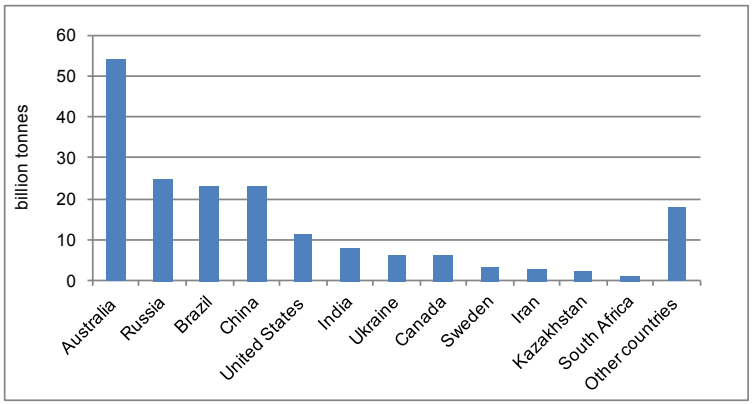


Source: U.S. Geological Survey.

WORLD RESERVES

- In 2015, Australia ranked first with 54 billion t, or 29%.
- Russia was second with 25 billion t, or 14%.
- China and Brazil were both in third position with 23 billion t each, or 12%.
- Canada was eighth with 6 billion t, or 3%.

Figure 6. World Reserves of Crude Iron Ore, by Country, 2015



Source: U.S. Geological Survey.

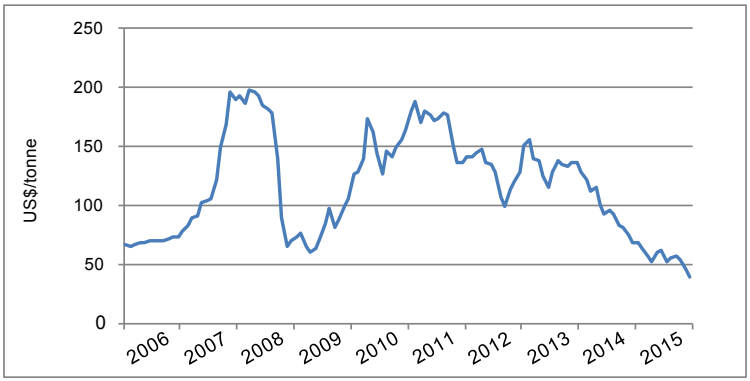
TRADE

- Canada exported 37 Mt of iron ore (valued at $3.6 billion) in 2015, down 8.2% from 40 Mt in 2014. Pellets accounted for 39% ($1.7 billion) and concentrates accounted for 61% ($1.9 billion).
- Canada imported 6.6 Mt of iron ore (valued at $0.7 billion) in 2015, down 26.7% from 9.0 Mt in 2014. Most of the imported pellets (95%) came from the United States. Concentrate imports came mainly from Argentina (41%), the United States (30%), and Sweden (27%).
- In 2014, Canada was a net importer of semi-finished and finished steel products, with the Canadian steel industry exporting 6.2 Mt and importing 10.3 Mt.

PRICES

- Falling prices in 2015 reflected a raw material oversupply due to declining demand from China.

Figure 7. Iron Ore Prices, (1) Monthly Average, 2006-15



Source: World Bank Commodity Price Data.
(1) Iron ore, CFR spot ($/dmtu).
CFR = cost and freight; dmtu = dry metric ton unit (a unit is 10 kilograms or 1 t divided into 100 units, e.g., $8/dmtu = $800/t).

RECYCLING

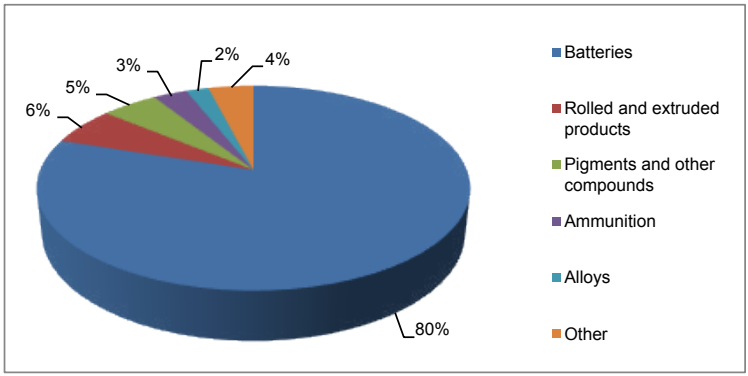
- Steel is 100% recyclable, which means it can be reprocessed into the same material of the same quality again and again. Recycling accounts for significant energy and raw materials savings (i.e., more than 1,400 kilograms [kg] of iron ore, 740 kg of coking coal, and 120 kg of limestone are saved for every tonne of steel scrap made into new steel).
- The global market for steel scrap is projected to reach 793 Mt by 2020, driven by the growing demand for steel and the increasing shift toward the use of electric arc furnaces in the manufacture of steel.

Lead

USES

- The primary use of lead is in lead-acid batteries for automobiles and other vehicles (80% of total use).
- Other battery applications include stationary batteries used for back-up power and for a range of other vehicles (e.g., motorcycles, forklift trucks).
- Lead is also used as rolled sheet for roofing, mostly in Europe; in chemical compounds and alloys; and for ammunition.

Figure 1. Lead, Global Uses, 2015



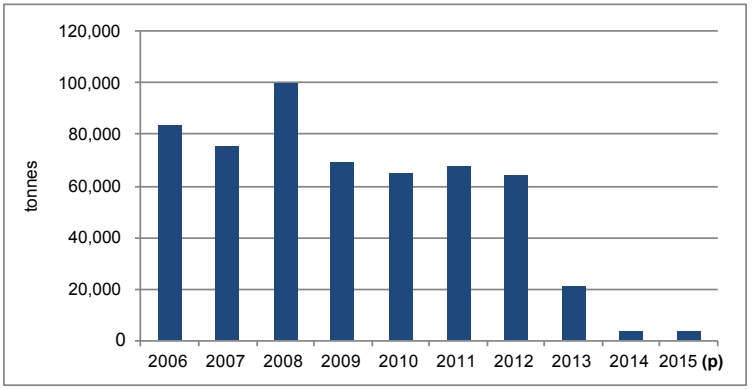
Source: International Lead and Zinc Study Group.

CANADIAN PRODUCTION

- In 2015, Canadian mines produced an estimated 4,031 tonnes (t) of lead in concentrate, compared to 3,500 t in 2014.
- Three mines produced lead in concentrate form in Canada in 2015: Nyrstar NV's Myra Falls mine in British Columbia, Trevali Mining Corporation's Caribou mine in New Brunswick, and Yukon Zinc's Wolverine mine in Yukon, which was placed on care and maintenance in January 2015.
- Refined lead metal production in Canada (from both primary and recycled sources) was 268,864 t in 2015, compared to 281,456 t in 2014.

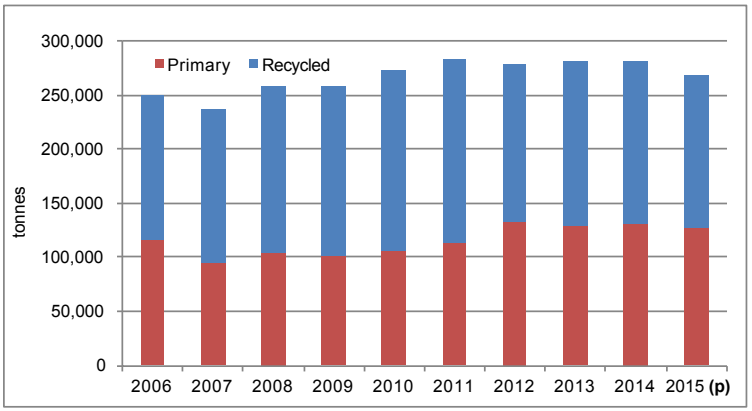
- Canada operates two primary lead and four recycled lead smelters. Because of its significant recycling of used lead-acid batteries, recycled lead production comprised 53% of Canada's total refined lead metal production in 2015.

Figure 2. Canadian Mine Production of Lead, 2006-15



Source: Natural Resources Canada.
(p) Preliminary.

Figure 3. Canadian Refined Production of Lead, Primary and Recycled, 2006-15

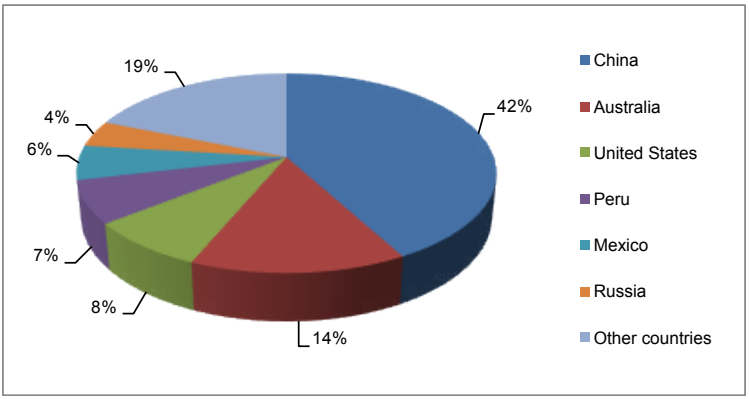


Source: Natural Resources Canada.
(p) Preliminary.

WORLD PRODUCTION

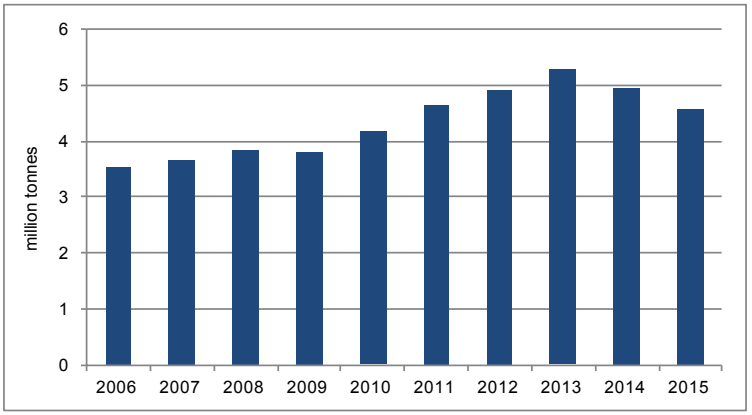
- Global production of mined lead was estimated at 4.6 million tonnes (Mt) in 2015 of which China accounted for 42%. China, Australia, the United States, Peru, and Mexico together accounted for more than 75% of the world's mine production of lead in 2015.
- For refined lead production, which includes metal refined from both primary and recycled sources, the top three producing countries in 2015 were China, the United States, and South Korea. Together these countries accounted for more than 50% of the 10.7 Mt of lead metal produced in some 64 countries in 2015.
- Canada ranked eighth in terms of world refined lead production.

Figure 4. World Mine Production of Lead, by Country, 2015



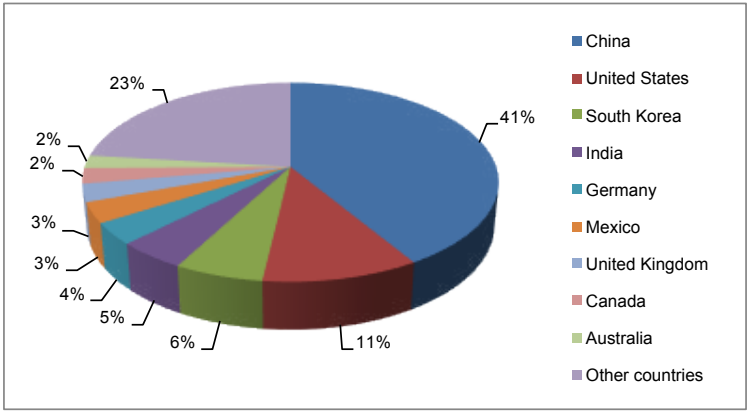
Source: International Lead and Zinc Study Group.

Figure 5. World Mine Production of Lead, 2006-15



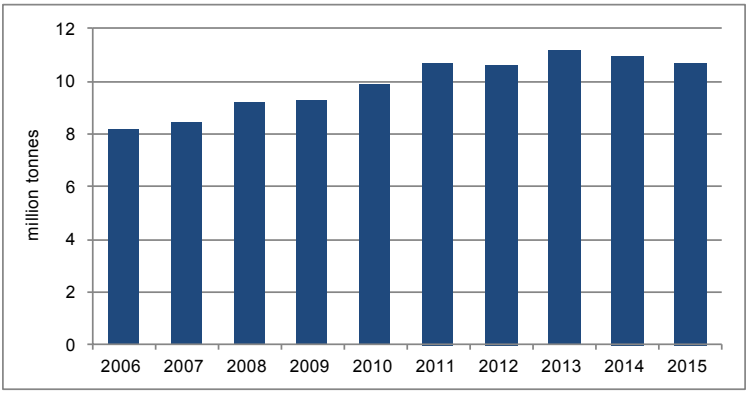
Source: International Lead and Zinc Study Group.

Figure 6. World Refined Production of Lead, by Country, 2015



Source: International Lead and Zinc Study Group.

Figure 7. World Refined Production of Lead, 2006-15

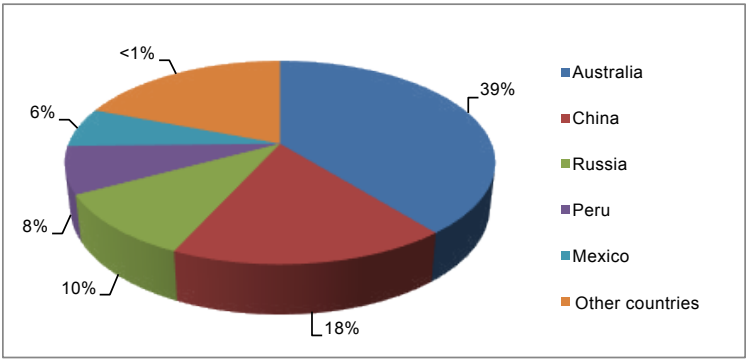


Source: International Lead and Zinc Study Group.

WORLD RESERVES

- In 2015, total world lead reserves, as calculated by the U.S. Geological Survey, were an estimated 89 Mt.
- Australia ranked first with 35 Mt of contained lead, or 39%.
- China was second with 15.8 Mt, or 18%.
- Russia was third with 9.2 Mt, or 10%.

Figure 8. World Reserves of Lead, by Country, 2015



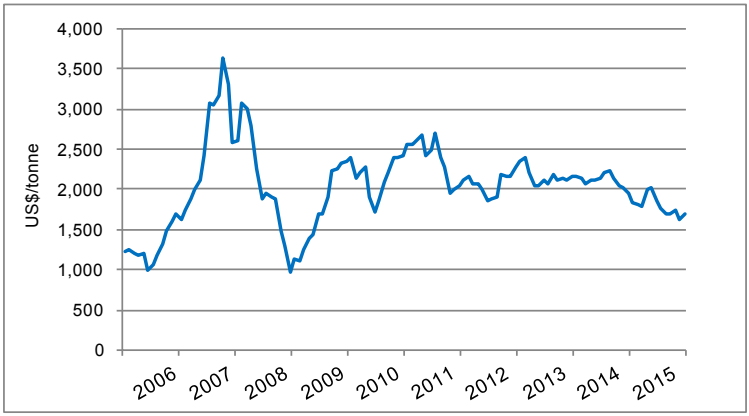
Source: U.S. Geological Survey.

TRADE

- Total exports of lead and lead products from Canada were valued at $756.2 billion in 2015; imports were valued at $380.6 billion.
- In 2015, Canadian lead smelters imported 113,386 t of lead in concentrates, compared to 111,000 t in 2014. Concentrates were imported mainly from the United States, Peru, Mexico, and Australia.
- Canada exported 259,000 t of unwrought lead metal in 2015, compared to 271,000 t in 2014. The majority of these exports went to the United States with minor amounts shipped to China and Japan.

PRICES

Figure 9. Lead, Monthly Average Three-Month Prices, 2006-15



Source: London Metal Exchange.

RECYCLING

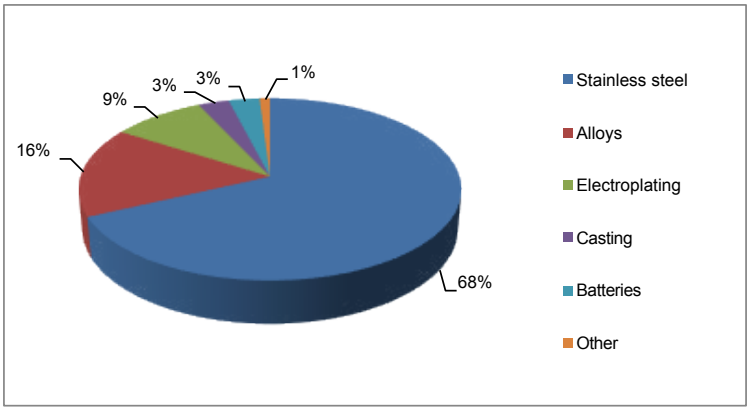
- Recycled lead from lead-acid batteries is one of the most recycled metals. Over 95% of the lead contained in batteries is recovered and recycled for use in new batteries.
- Canada has four secondary lead processing plants located in British Columbia (1), Ontario (1), and Quebec (2). In addition, secondary lead is processed at Canada's two primary smelters located in British Columbia and New Brunswick. In 2015, 142,000 t of secondary lead metal were produced in Canada, down slightly from 150,629 t in 2014.

Nickel

USES

- Stainless steel is the largest end use for nickel, accounting for two thirds of total consumption.
- Nickel is also used as an alloying agent in the manufacture of both nonferrous and ferrous metal products.
- Another important use is nickel electroplating, in which a thin layer of nickel is coated onto a metal object as a decorative feature or to provide resistance to both corrosion and wear.

Figure 1. Nickel, Global Uses, 2015

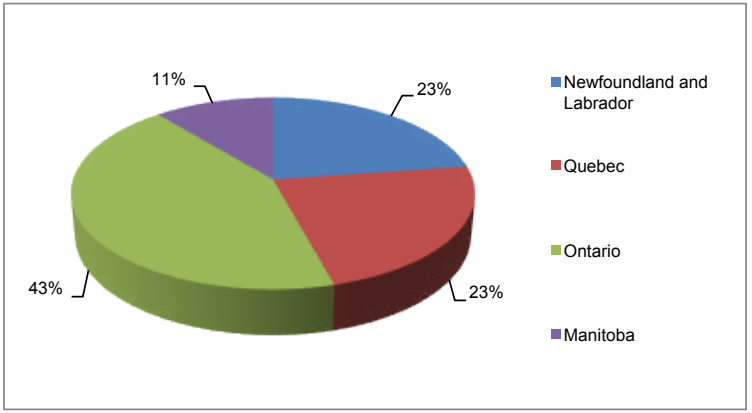


Source: International Nickel Study Group, 2015.

CANADIAN PRODUCTION

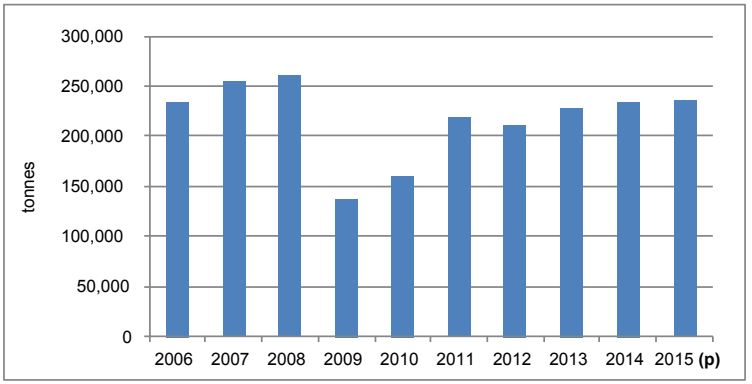
- In 2015, Canadian mines produced an estimated 232,595 tonnes (t) of nickel in concentrate from mines located in Newfoundland and Labrador, Quebec, Ontario, and Manitoba.
- Canada also produced 159,705 t of refined nickel at four refineries located in Fort Saskatchewan, Alberta; Thompson, Manitoba; Sudbury, Ontario; and Long Harbour, Newfoundland and Labrador.

Figure 2. Canadian Mine Production of Nickel, by Province, 2015 (p)



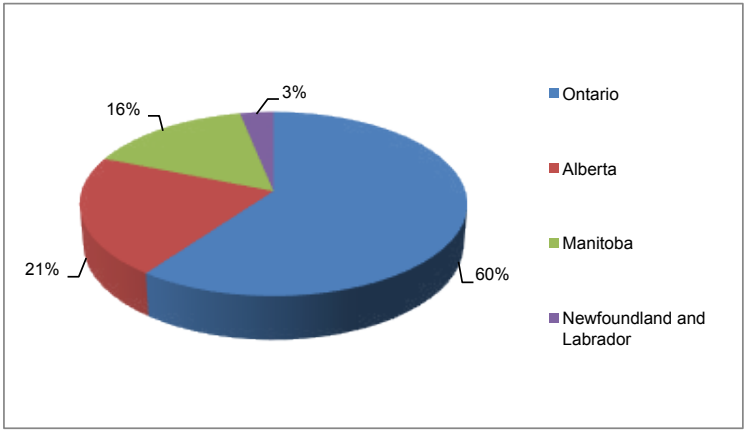
Source: Natural Resources Canada.
(p) Preliminary.

Figure 3. Canadian Mine Production of Nickel, 2006-15



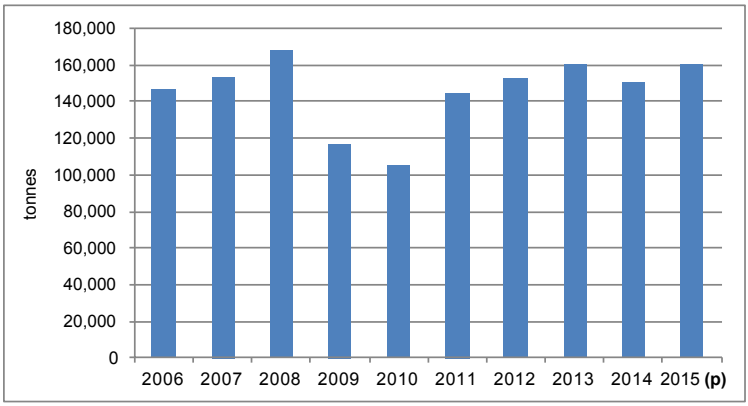
Source: Natural Resources Canada.
(p) Preliminary.

Figure 4. Canadian Refined Production of Nickel, by Province, 2015 (p)



Source: Natural Resources Canada.
(p) Preliminary.

Figure 5. Canadian Refined Production of Nickel, 2006-15

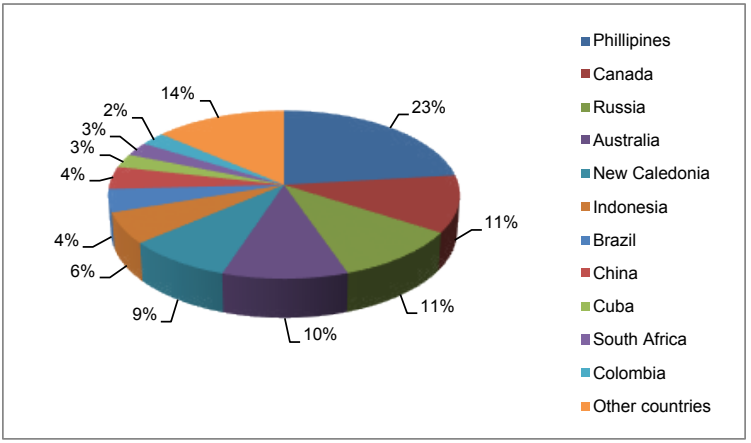


Source: Natural Resources Canada.
(p) Preliminary.

WORLD PRODUCTION

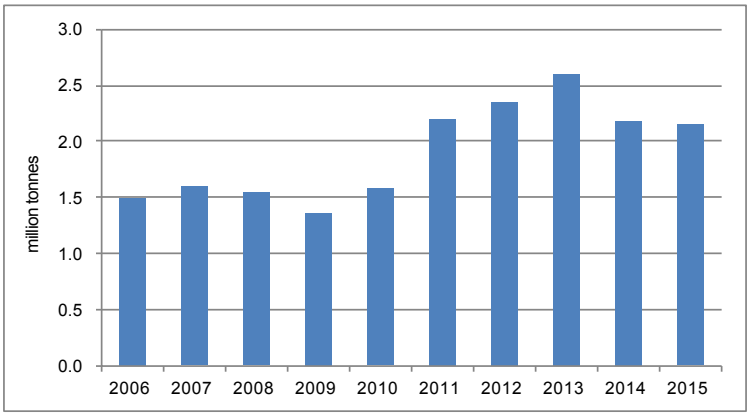
- Global mine production of nickel in 2015 was estimated at 2,146,100 t. The Philippines was the world's largest producer of mined nickel, accounting for 23% of global mined production.
- Global refined production of nickel in 2015 was estimated at 1,981,500 t. China was the world's largest producer of refined nickel, accounting for 30% of world production.
- Overall, Canada ranked fourth among world refined nickel producers after China (600,000 t), Russia (231,900 t), and Japan (193,800 t).
- Seven countries accounted for more than 75% of world refined nickel production.

Figure 6. World Mine Production of Nickel, by Country, 2015



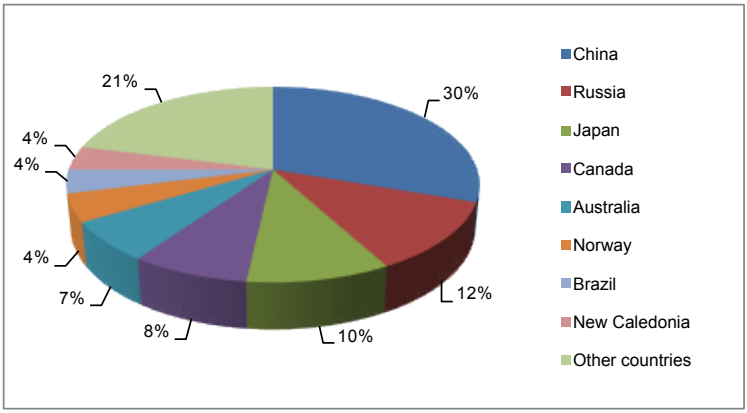
Source: International Nickel Study Group.

Figure 7. World Mine Production of Nickel, 2006-15



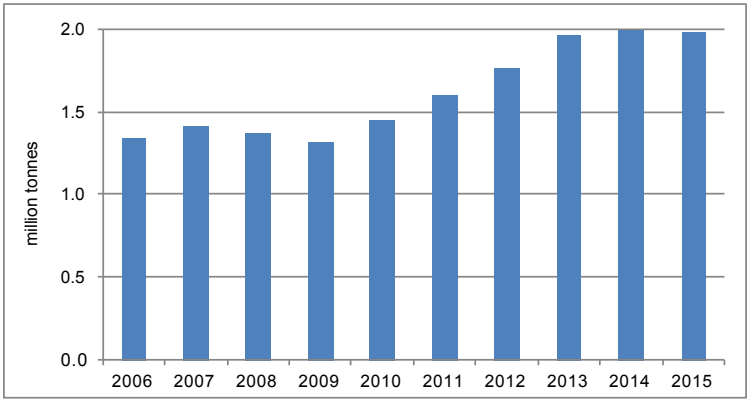
Source: International Nickel Study Group.

Figure 8. World Refined Production of Nickel, by Country, 2015



Source: International Nickel Study Group.

Figure 9. World Refined Production of Nickel, 2006-15

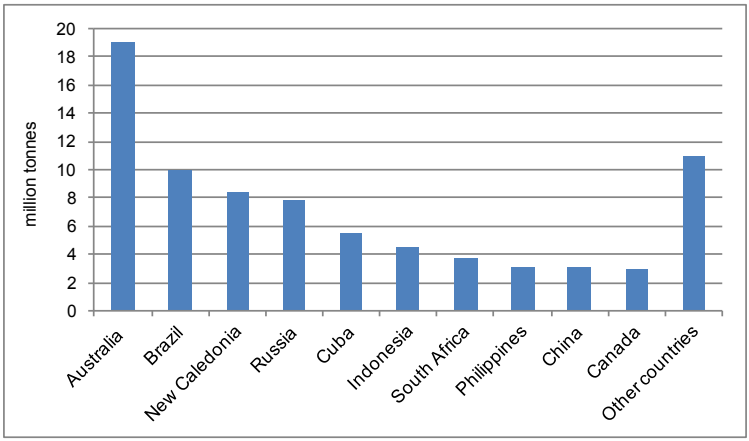


Source: International Nickel Study Group.

WORLD RESERVES

- In 2015, Australia ranked first with 19 million tonnes (Mt) of contained nickel, or 24%.
- Brazil was second with 10 Mt, or 13%.
- New Caledonia was third with 8.4 Mt, or 11%.
- Russia was fourth with 7.9 Mt, or 10%.
- Canada was tenth with 2.9 Mt, or 3.7%.

Figure 10. World Reserves of Nickel, by Country, 2015



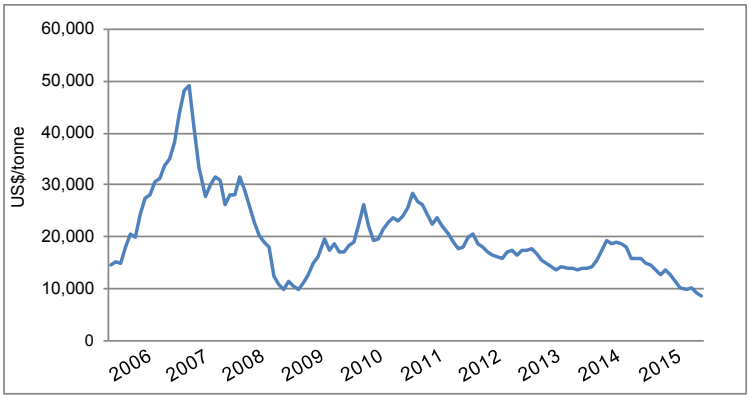
Source: U.S. Geological Survey.

TRADE

- Canada's total trade in nickel and nickel-based products in 2015 was valued at $6.3 billion.
- Exports of nickel and nickel-based products were valued at $5.5 billion; imports were valued at $792 million.
- Canada exported 128,678 t of unwrought nickel valued at $2.1 billion in 2015. The United States imported 38% of this export trade with 24% destined for China/Hong Kong; 16% destined for the Netherlands, and the remainder shipped to some 22 countries.
- Nickel and nickel compounds are essential for the manufacture of countless products that we rely on daily. Reflecting this vast use, Canada's nickel and nickel-related products are exported to more than 100 countries.

PRICES

Figure 11. Nickel, Monthly Average Three-Month Prices, 2006-15



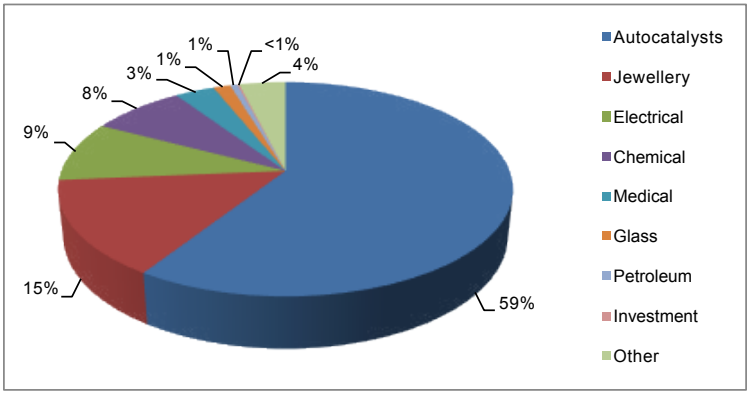
Source: London Metal Exchange.

Platinum Group Metals

USES

- The manufacture of catalytic converters represents the largest use of platinum group metals (PGM),[1] accounting for more than half of total consumption.
- PGM are important components in a variety of downstream manufacturing sectors, including jewellery, chemicals, glass, medical equipment, and dental applications.
- PGM are also used as a financial investment vehicle for investors interested in acquiring precious metals in their portfolios.

Figure 1. Platinum Group Metals, Global Uses, 2015



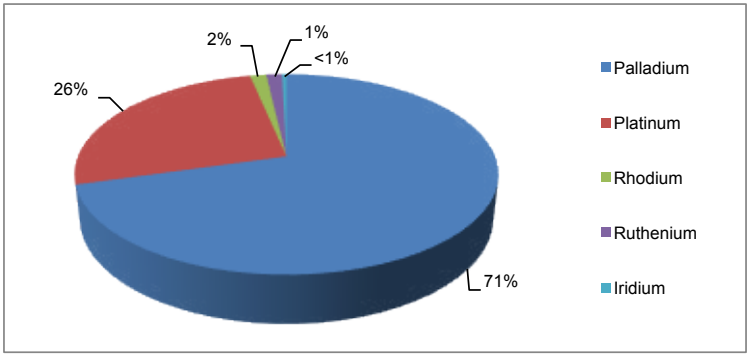
Source: Johnson Matthey.

[1] The platinum group metals are six metallic elements (platinum, palladium, rhodium, ruthenium, osmium, and iridium) in the periodic table that have similar physical and chemical properties and that tend to occur together in the same mineral deposits. Global statistics on PGM production typically report for platinum, palladium, and rhodium. Canada's mine statistics include ruthenium and iridium, but not osmium.

CANADIAN PRODUCTION

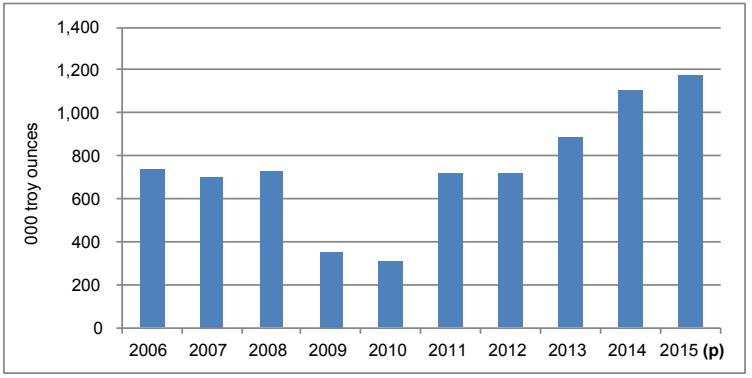
- In 2015, Canada mined an estimated 1.8 million troy ounces (oz) of PGM[2] in concentrate form.
- While Canada does not refine PGM domestically, they are recovered from eight operating mines located in four Canadian provinces.

Figure 2. Canadian Mine Production of Platinum Group Metals, 2015 (p)



Source: Natural Resources Canada.
(p) Preliminary.

Figure 3. Canadian Mine Production of Platinum Group Metals, 2006-15



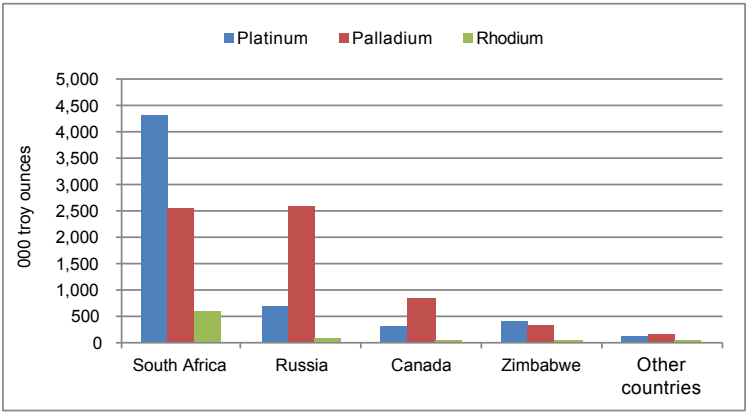
Source: Natural Resources Canada.
(p) Preliminary.

[2] Canadian companies provide no production estimates for osmium.

WORLD PRODUCTION[3]

- South Africa was the world's largest mine producer of PGM (7.4 million troy oz), accounting for an estimated 57% of global mine production in 2015. Russia, the second largest mine producer (3.4 million troy oz), accounted for an estimated 26% of global mined production. Overall, Canada produced an estimated 8% of globally mined PGM, ranking third among world mine producers.
- An estimated 17.6 million troy oz of PGM were supplied from mined and recycled sources in 2015. Mining accounts for close to 75% of the global PGM supply while recycling accounts for slightly more than 25%.

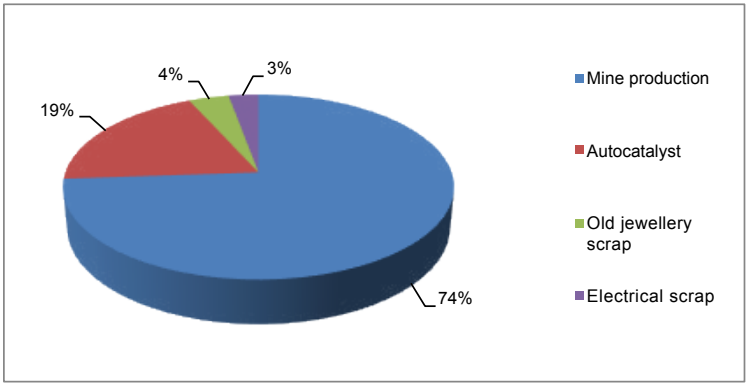
Figure 4. World Mine Production of Platinum Group Metals, by Country, 2015 (p)



Sources: Johnson Matthey; Natural Resources Canada.
(p) Preliminary.

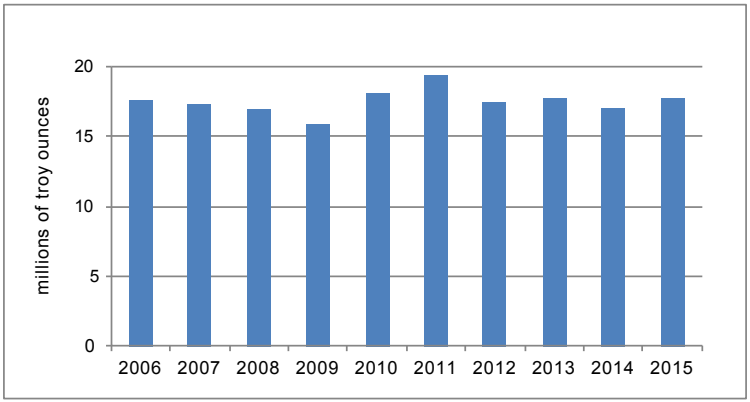
[3] Preliminary.

Figure 5. World Supply of Platinum Group Metals, by Source, 2015 (p)



Source: Johnson Matthey.
(p) Preliminary.

Figure 6. World Production of Platinum Group Metals, 2006-15 (p)

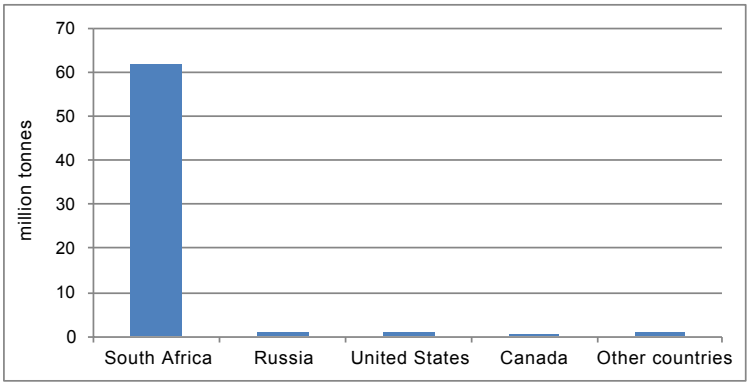


Source: Johnson Matthey.
(p) Preliminary.

WORLD RESERVES

- In 2015, South Africa ranked first with 63,000 tonnes (t) of PGM reserves, or 95%.
- Russia was second with 1,100 t, or 1.7%.
- The United States was third with 900 t, or 1.4%.
- Canada was estimated to have 310 t of PGM reserves, or roughly 0.5% of the world total.

Figure 7. World Reserves of Platinum Group Metals, by Country, 2015



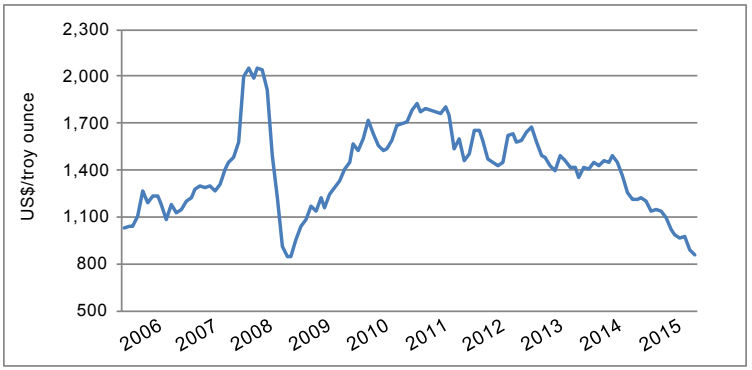
Source: U.S. Geological Survey.

TRADE

- Total exports of PGM and PGM products from Canada were valued at $1.3 billion in 2015 with the United States accounting for more than 90% of this export trade value.
- Imports were valued at $346 million with more than 85% of the value arising from the United States (32%), Switzerland (21%), South Africa (18%), and Russia (14%).
- Overall, Canada traded in PGM and PGM-related products with more than 50 countries.

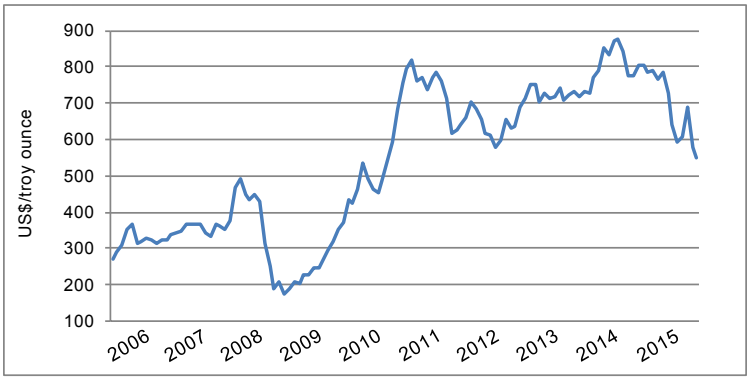
PRICES

Figure 8. Platinum, AM Prices, Monthly Average, 2006-15



Source: London Metal Exchange.

Figure 9. Palladium, AM Prices, Monthly Average, 2006-15



Source: London Metal Exchange.

Potash

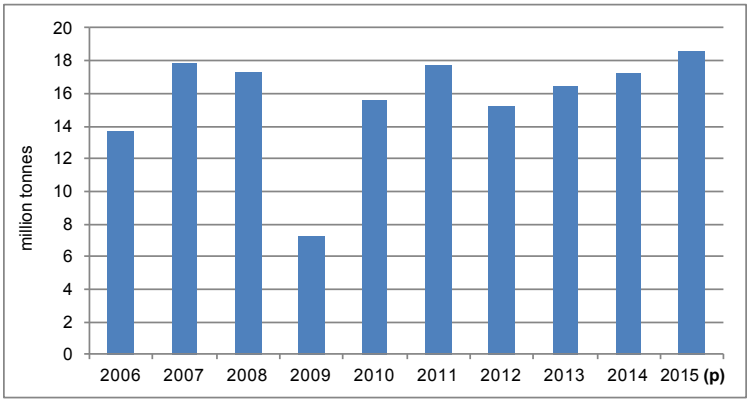
USES

- Potash is primarily used as a fertilizer (approximately 95%) to support plant growth, increase crop yield and disease resistance, and intensify water preservation.
- Small quantities are used in the manufacture of potassium-bearing chemicals such as detergents, ceramics, pharmaceuticals, and water conditioners, and as an alternative to de-icing salt.
- Potassium is an important element of the human diet that is essential for growth and the maintenance of tissues, muscles, and organs, as well as the electrical activity of the heart. Good sources of potassium include citrus fruits and juices, milk, chicken, red meat, fish, soy products, root vegetables, bananas, nuts, and yogurt.
- There are no substitutes for potash.

CANADIAN PRODUCTION

- Canada produced 18.6 million tonnes (Mt) of potassium chloride (KCl) in 2015, an increase of 8% compared to 17.2 Mt in 2014.

Figure 1. Canadian Mine Production of Potash, 2006-15

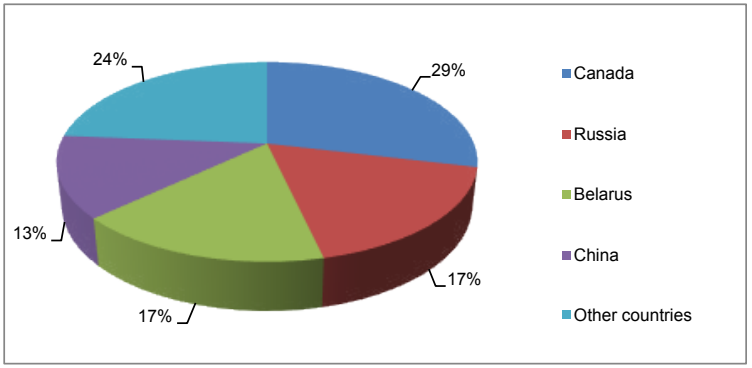


Source: Natural Resources Canada.
(p) Preliminary.

WORLD PRODUCTION

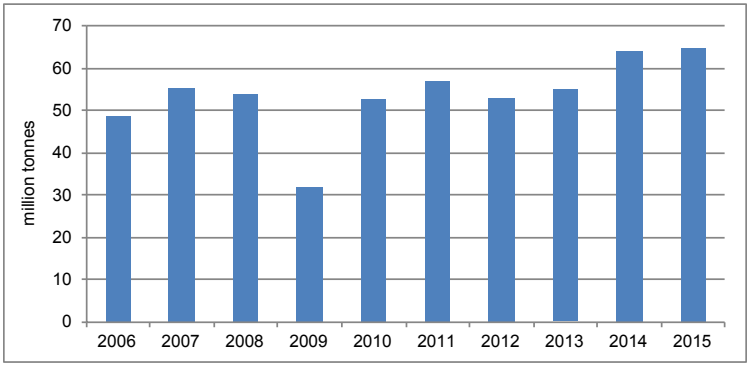
- Canada is the world's largest potash producer.
- Canada accounted for 29% of the world's total potash production in 2015.
- Three countries (Canada, Russia, and Belarus) accounted for 63% of the world's total potash production in 2015.

Figure 2. World Mine Production of Potash, 2015



Sources: Natural Resources Canada; International Fertilizer Industry Association; producers' statistics and annual reports.

Figure 3. World Mine Production of Potash, 2006-15

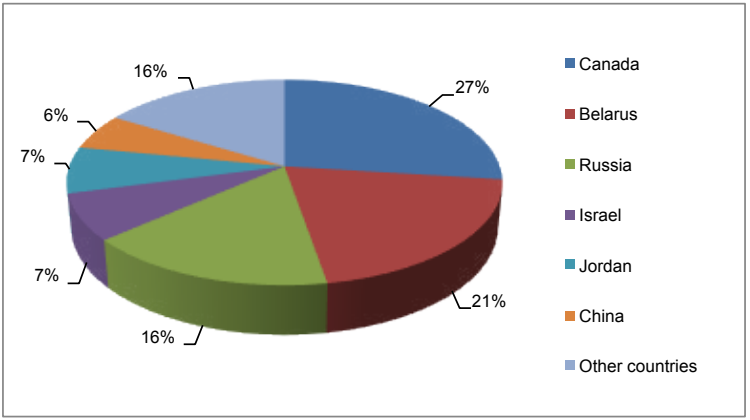


Sources: Natural Resources Canada; International Fertilizer Industry Association.

WORLD RESERVES

- Canada had the world's largest potash reserves with 1 billion tonnes (t) of potassium oxide (K_2O) equivalent, or 27%.
- Belarus was second with 750 Mt, or 20%.
- Russia was third with 600 Mt, or 16%.

Figure 4. World Potash Reserves, 2015

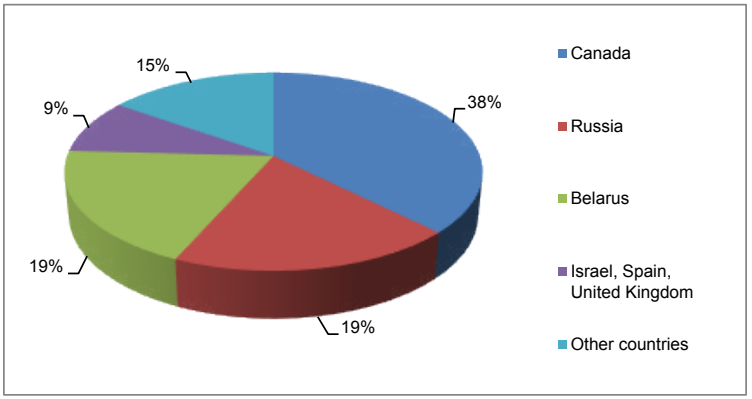


Source: U.S. Geological Survey.

TRADE

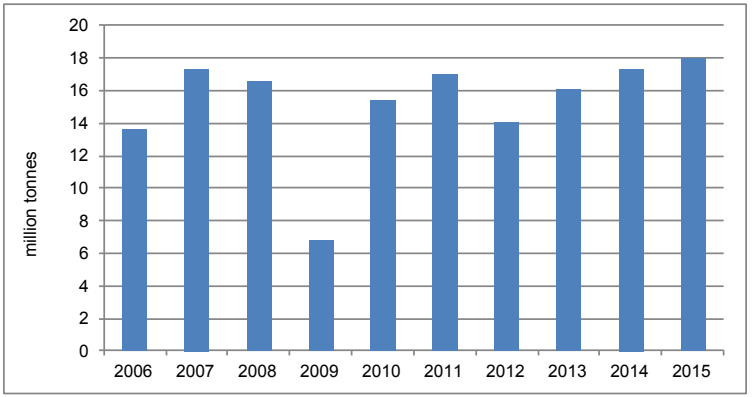
- Canada is the world's largest exporter of potash. In 2015, Canadian potash exports accounted for 38% of the world's total exports.
- About 75% of global potash production in 2015 was traded internationally.

Figure 5. World Potash Exports, by Country, 2015



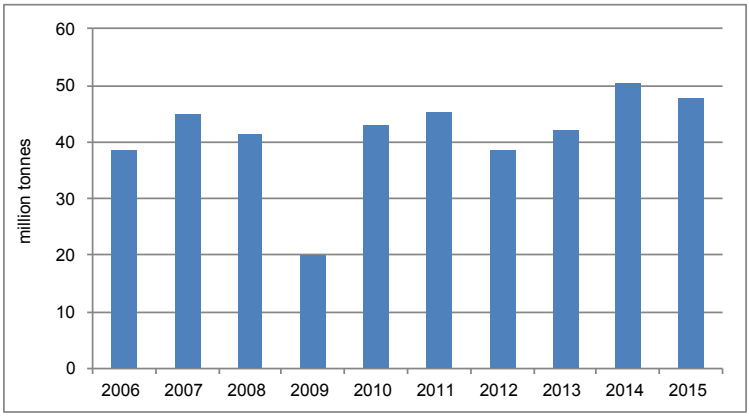
Sources: Natural Resources Canada; International Fertilizer Industry Association; producers' statistics and annual reports.

Figure 6. Canadian Potash Exports, 2006-15



Source: Natural Resources Canada.

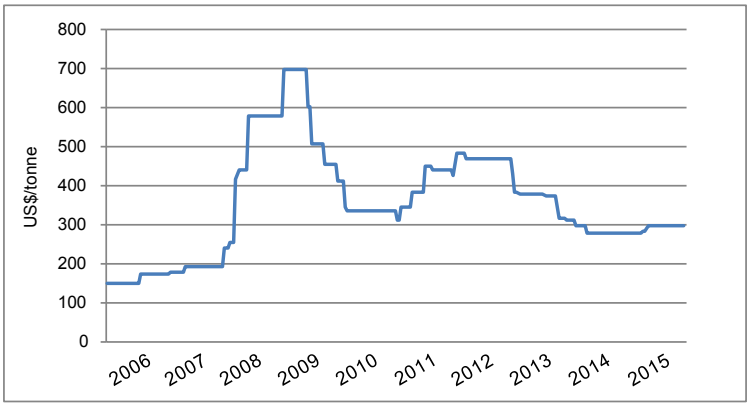
Figure 7. World Potash Exports, 2006-15



Sources: Natural Resources Canada; International Fertilizer Industry Association.

PRICES

Figure 8. Potassium Chloride Prices, Standard, Contract, f.o.b. Vancouver, Bi-Weekly, 2006-15



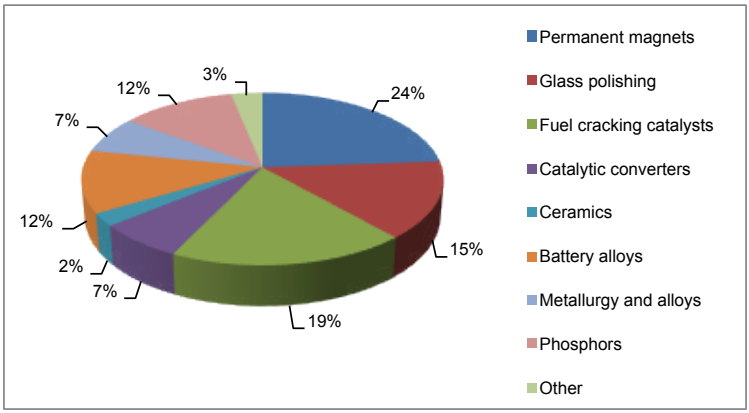
Source: FERTECON.
f.o.b. Free on board.

Rare Earth Elements

USES

- Rare earth elements (REE) are essential, basic materials for national defence cutting-edge technology applications such as electric interference and confrontation, precision guidance and positioning, aviation, and aerospace.
- Global demand for REE was estimated at roughly 120,000 tonnes (t) in 2015. The manufacture of permanent magnets represents the largest and most important end use for REE, accounting for close to 25% of total consumption.
- REE are also widely used in high-technology and "green" products because of their luminescent and catalytic properties.

Figure 1. REE Uses, 2015



Sources: Adamas Intelligence; Roskill.

Table 1. Canada-Based Advanced REE Exploration Projects, 2015

(containing a minimum of 10% "heavy" REE)

Project/Company	Location	Tonnes Per Year	Target Year	Total Million Tonnes	Total REE %	Heavy REE %
Buckton, DNI Metals	Alberta	Unspecified	>2020	3,161,550	0.025	24
Clay Howells, Canada Rare Earth	Ontario	5,000	2020	9	0.730	10
Eco-Ridge, Pele Mountain	Ontario	4,000	2019	47	0.160	11
Foxtrot, Search Minerals	Newfoundland and Labrador	10,000	2020	10	1.100	20
Nechalacho, Avalon	Northwest Territories	10,000	2019	320	1.550	28
Kipawa, Matamec	Quebec	6,000	2019	16	0.510	36
Strange Lake, Quest	Quebec	12,500	2019	300	0.930	46
Grand-Vallée, Orbite Aluminae	Quebec	1,000	2019	1,209,000	0.051	20

Sources: Natural Resources Canada; Technology Metals Research.

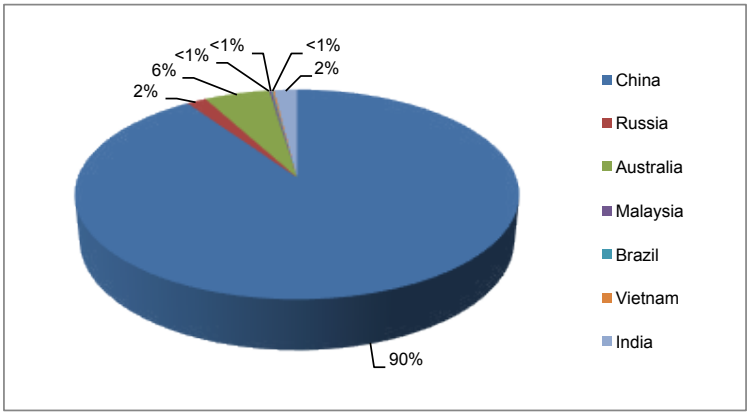
CANADIAN PRODUCTION

- While not a current producer of REE, Canada does host some of the most advanced exploration projects in the world. Canada hosts 20 of the 63 advanced REE projects tracked by Technology Metals Research, and Canadian exploration companies are developing an additional 6 advanced REE projects located outside of Canada.
- The REE are categorized as either "light" or "heavy" based on their electron configuration. "Light" REE, produced in global abundance, are in surplus supply. "Heavy" REE, produced only in China, are in limited supply and global efforts to bring new resources to the marketplace continue.
- Many of Canada's most advanced exploration projects contain high concentrations of the globally valued "heavy" REE used in high-technology and clean-energy applications.

WORLD PRODUCTION

- China is the world's largest producer of REE, accounting for 90% of global annual production, estimated at 144,000 t.
- The remaining 10% is shared among six other countries.
- Molycorp, the world's largest producer of REE outside of China, declared bankruptcy in 2015 and is not expected to resume its California-based mine or refinery production.
- China remains virtually the only producer of the valued "heavy" REE.

Figure 2. Global Production of REE, by Country, 2015

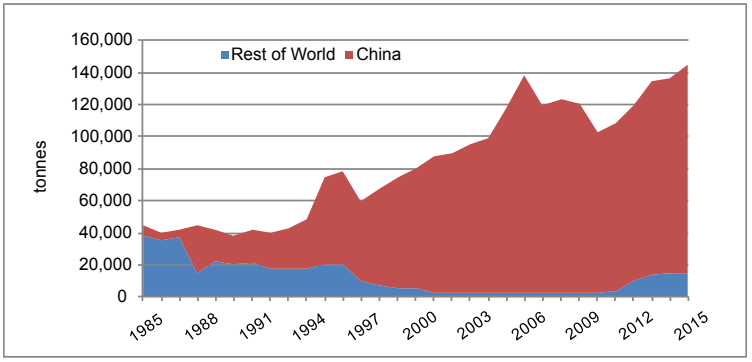


Sources: Adamas Intelligence; Roskill.

GLOBAL REE SUPPLY CHAIN, 1985-2013

- The United States was the world's largest supplier of REE until the emergence of China in the mid-1990s.
- China was virtually the world's sole REE supplier until 2012 when the now-bankrupt U.S. producer, Molycorp Inc., and the Australian company, Lynas Corporation Ltd., commenced commercial production.

Figure 3. Global REE Supply, 1985-2015



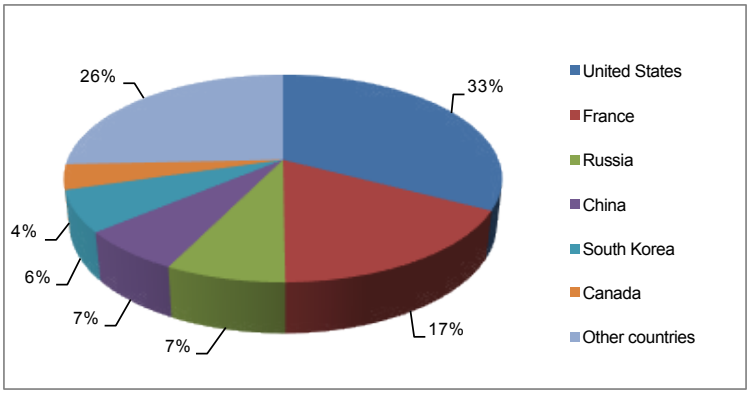
Sources: Curtin University; Adamas Intelligence.

Uranium

USES

- The primary use of uranium (more than 99% of total use) is to produce fuel for nuclear power plants. Nuclear power generated 11.5% of the world's electricity in 2015.
- Other uses of uranium (less than 1%) include the production of medical isotopes and producing fuel for research reactors.
- Under Canada's Nuclear Non-Proliferation Policy, Canadian uranium can only be used for peaceful purposes.

Figure 1. Share of World Nuclear Power Production, by Country, 2015



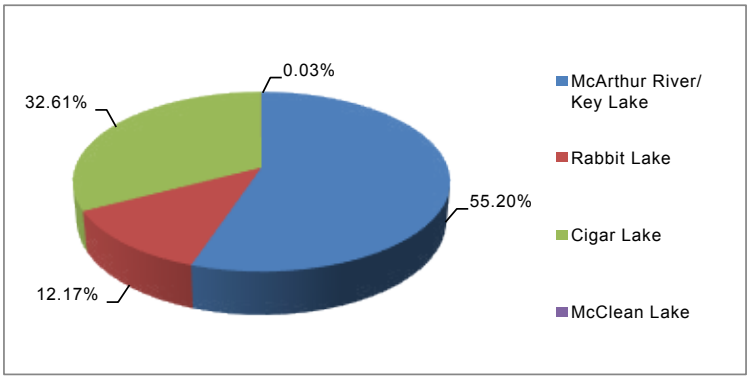
Source: World Nuclear Association.

CANADIAN PRODUCTION

- Since 1996, all Canadian uranium production has been from northern Saskatchewan.
- In 2015, Canadian mines and mills produced 13,325 tonnes of uranium metal (tU), or 22% of world production.
- The high-grade McArthur River mine and the Key Lake mill, which are the world's largest uranium production facilities in terms of annual production, produced 7,355 tU in 2015.

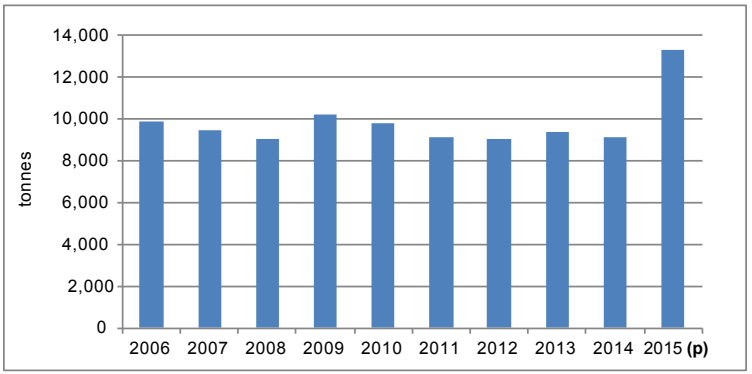
- In 2015, output at the high-grade Cigar Lake mine and the McClean Lake mill increased substantially, to 4,349 tU, making them the world's second largest uranium production facilities in terms of annual production.
- The Cigar Lake mine is expected to be in full production by 2017 with an annual output of 6,900 tU.

Figure 2. Canadian Production of Uranium, by Mine/Mill, 2015 (p)



Source: Natural Resources Canada.
(p) Preliminary.

Figure 3. Canadian Production of Uranium, 2006-15

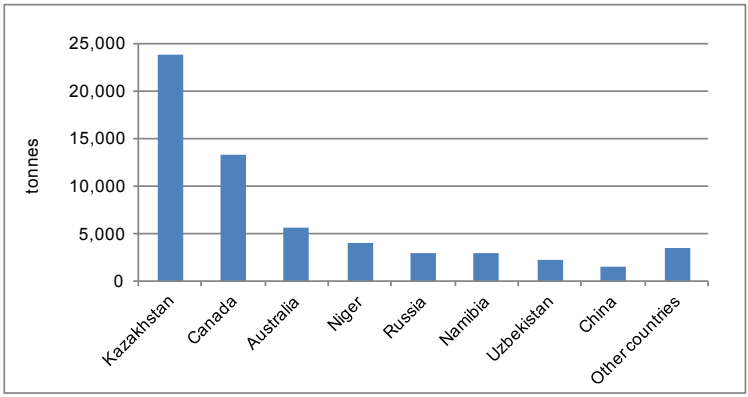


Source: Natural Resources Canada.
(p) Preliminary.

WORLD PRODUCTION

- In 2015, Kazakhstan was the world's largest uranium producer, accounting for 39% of world production.
- Canada was second with 22%.
- Australia was third with 9%.
- Six countries accounted for 88% of world production in 2015.

Figure 4. World Production of Uranium, by Country, 2015

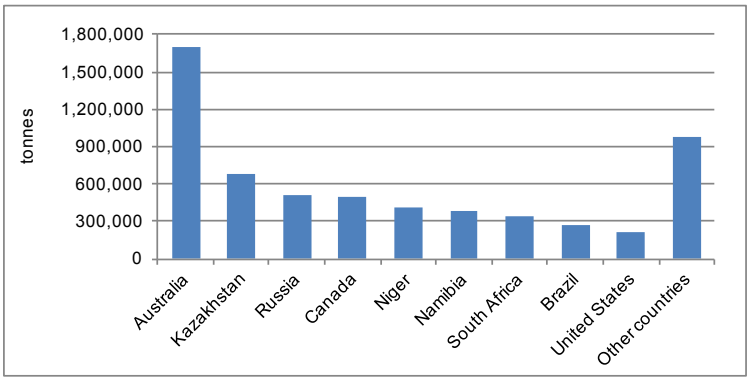


Source: World Nuclear Association.

WORLD RESOURCES

- In 2013, Australia ranked first with 1,706,000 tU, or 29% of the world's identified uranium resources that are mineable at a cost of less than US$130 per kilogram (kg) of uranium (US$50 per pound of U_3O_8 [yellowcake]).
- Kazakhstan was second with 679,300 tU, or 12%.
- Russia was third with 505,900 tU, or 8.6%.
- Canada was fourth with 493,900 tU, or 8.4%.

Figure 5. Identified Uranium Resources, at a Cost of Less Than US$130/kg, by Country, 2013



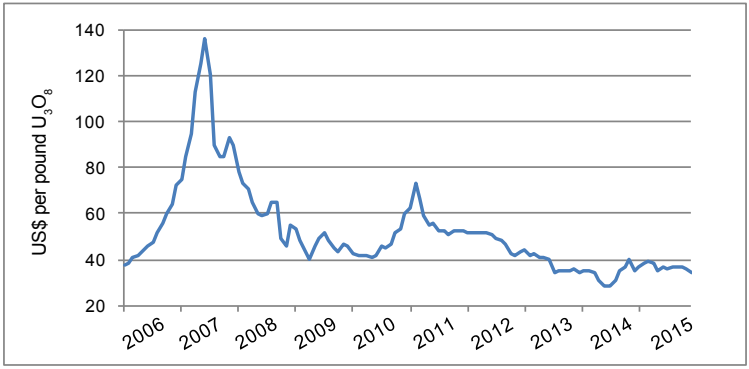
Source: OECD-NEA/IAEA.

TRADE

- Approximately 85% of Canada's uranium production is exported. In 2015, these exports had a total value of over $1.8 billion.
- A uranium refinery in Blind River, Ontario, processes Canadian and imported uranium concentrates to produce uranium trioxide, which is sent to a uranium conversion facility in Port Hope, Ontario.
- The Port Hope facility produces uranium dioxide, which is used to make fuel for CANDU pressurized heavy-water power reactors in Canada; it also produces uranium hexafluoride, which is exported to be enriched to make fuel for light-water reactors that are used throughout the world.

PRICES

Figure 6. Uranium Prices, Spot Market, 2006-15



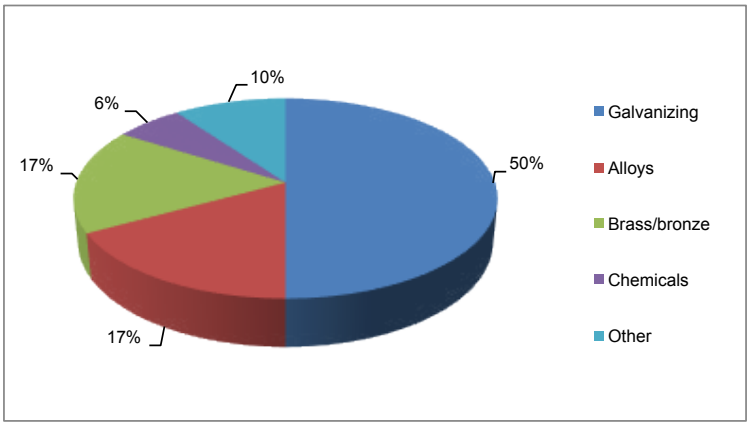
Source: The Ux Consulting Company, LLC (UxC).

Zinc

USES

- The primary use of zinc (50% of total use) is to protect iron and steel from rusting (galvanized steel).
- Die casting into shapes such as door handles and faucets accounts for 17% of its use.
- Zinc is also alloyed with copper to make brass and with copper and tin to make bronze. Brass fittings are used in plumbing and heat exchange equipment.
- Zinc oxide is an ingredient in skin cream and is also used in the manufacture of tires.
- Zinc is an essential nutrient in the body that assists with nutrition and is also added to fertilizers to increase crop yields.

Figure 1. Zinc, Global Uses, 2015

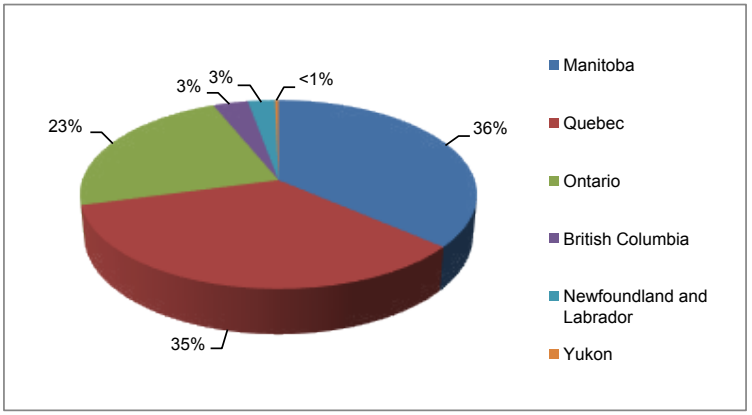


Source: International Lead and Zinc Study Group.

CANADIAN PRODUCTION

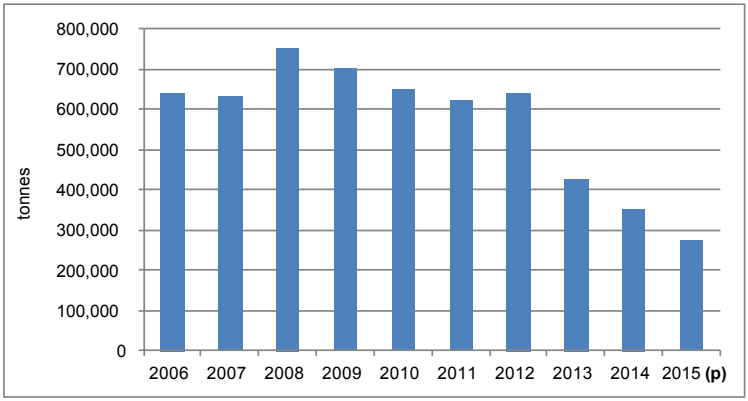
- In 2015, zinc was produced from mines located in Yukon, British Columbia, Manitoba, Ontario, Quebec, and Newfoundland and Labrador.
- Canadian mines produced 271,916 tonnes (t) of zinc in concentrate in 2015, compared to 352,745 t in 2014, a 23% decrease.
- The decrease can be attributed to closures of the Wolverine mine in Yukon and the Duck Pond mine in Newfoundland and Labrador, and to lower zinc production during the year at the LaRonde and Bracemac-McLeod mines in Quebec and the Myra Falls mine in British Columbia.
- Refined zinc metal is produced at refineries in British Columbia, Manitoba, and Quebec. In 2015, refined production was 683,052 t, compared to 647,881 t in 2014.

Figure 2. Canadian Mine Production of Zinc, by Province and Territory, 2015 (p)



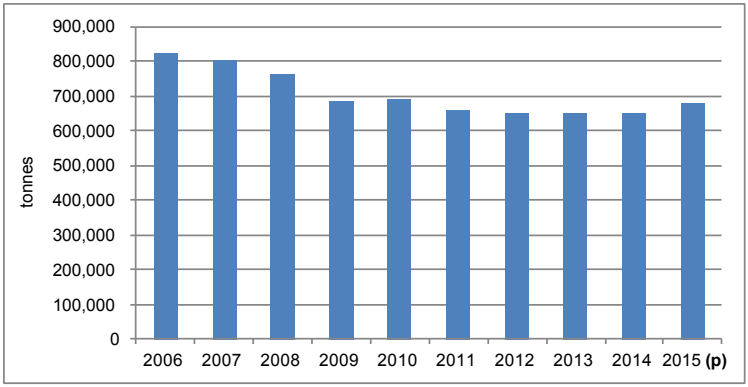
Source: Natural Resources Canada.
(p) Preliminary.

Figure 3. Canadian Mine Production of Zinc, 2006-15



Source: Natural Resources Canada.
(p) Preliminary.

Figure 4. Canadian Refined Production of Zinc, 2006-15



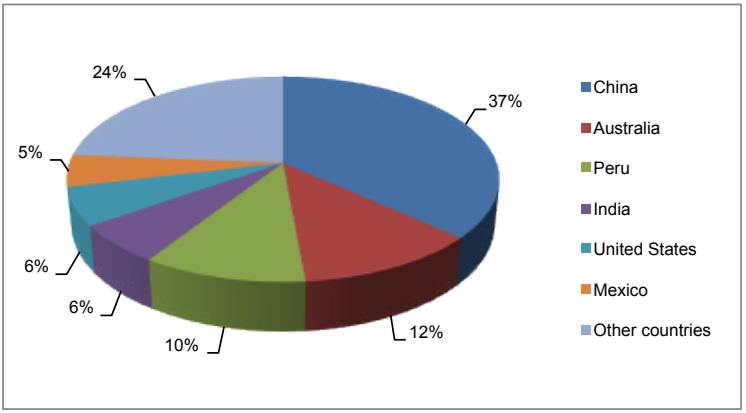
Source: Natural Resources Canada.
(p) Preliminary.

WORLD PRODUCTION

- World mine production of zinc reached 13.5 million tonnes (Mt) in 2015. China was the world's largest mine producer followed by Australia, Peru, India, the United States, and Mexico, which collectively produced more than 75% of global mined zinc. Canada ranked ninth in global mined zinc production.

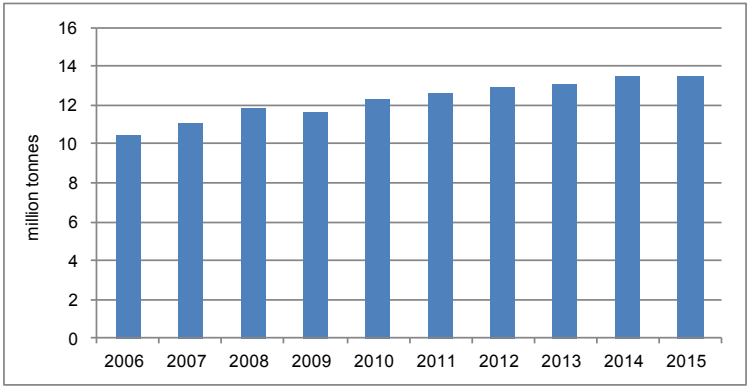
- World refined zinc metal production, which includes zinc from both mined sources and recycled material, totaled 13.9 Mt.
- China was the world's largest producer of refined zinc metal, accounting for 44% of world production. Together with South Korea, India, Canada, Japan, Spain, and Australia, these top seven countries accounted for more than 70% of world refined zinc metal production in 2015.
- Canada was the fourth largest producer of refined zinc.

Figure 5. World Mine Production of Zinc, by Country, 2015



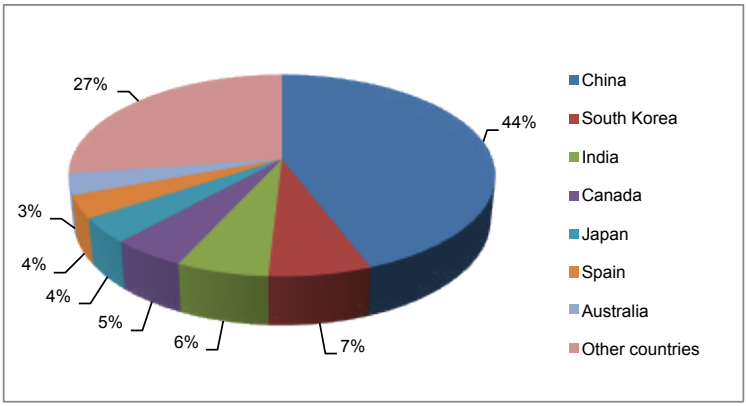
Source: International Lead and Zinc Study Group.

Figure 6. World Mine Production of Zinc, 2006-15



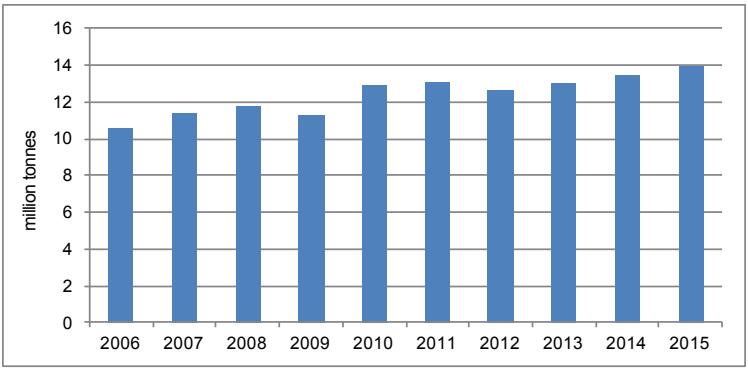
Source: International Lead and Zinc Study Group.

Figure 7. World Refined Production of Zinc, by Country, 2015



Source: International Lead and Zinc Study Group.

Figure 8. World Refined Production of Zinc, 2006-15

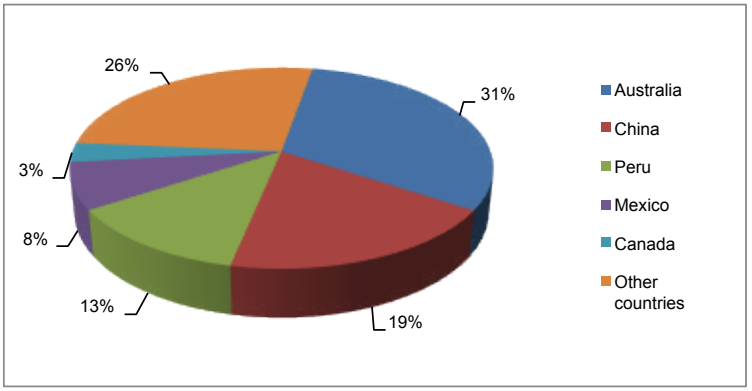


Source: International Lead and Zinc Study Group.

WORLD RESERVES

- The world's total zinc reserves, as calculated by the U.S. Geological Survey, were an estimated 200 Mt in 2015.
- Australia ranked first with 63 Mt of contained zinc, or 31%.
- China was second with 38 Mt, or 19%.
- Peru was third with 25 Mt, or 13%.
- Canada was eighth with 6.2 Mt, or 3%.

Figure 9. World Zinc Reserves, by Country, 2015



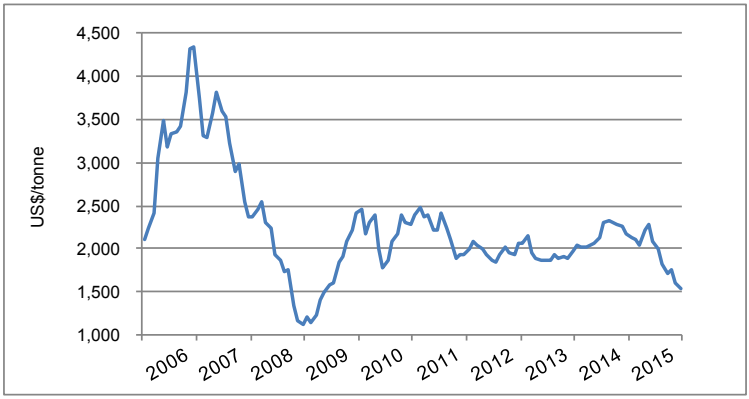
Source: U.S. Geological Survey.

TRADE

- Total exports of zinc and zinc products from Canada were valued at $2.6 billion in 2015; imports were valued at $843 million.
- Canadian smelters imported 532,000 t of zinc in concentrates in 2015, compared to 487,000 t in 2014. Concentrates were imported mainly from the United States, Peru, Australia, Mexico, and Ivory Coast.
- Canada exported 513,000 t of unwrought zinc and other zinc metal products in 2015, compared to 473,000 t in 2014. Zinc metal was exported primarily to the United States (93%) with minor amounts shipped to Taiwan, China, Hong Kong, and Malaysia.

PRICES

Figure 10. Zinc, Monthly Average Three-Month Prices, 2006-15



Source: London Metal Exchange.

RECYCLING

- Approximately 25% of global zinc demand is supplied from recycled materials.
- Sources of recycled zinc include scrap galvanized steel and zinc contained in batteries.
- Zinc contained in products such as galvanized steel has a long service life, which affects the amount of material available to the marketplace for recycling in any given year.

Table 1. Canada's Mining and Mineral Processing Sector Real Gross Domestic Product, 2006-15

Year	Mining and Quarrying (Except Oil and Gas)	Nonmetallic Mineral Product Manufacturing	Primary Metal Manufacturing	Fabricated Metal Product Manufacturing	Total Mining and Mineral Processing
	(2007 $ billions)				
2006	22.4	6.4	15.9	14.3	59.1
2007	23.6	6.5	15.6	14.4	60.1
2008	23.9	6.2	15.2	13.1	58.5
2009	18.2	5.3	11.5	11.1	46.1
2010	19.9	5.4	12.8	11.6	49.7
2011	22.5	5.5	13.6	12.5	54.2
2012	22.1	5.6	13.5	13.5	54.7
2013	22.9	5.3	13.1	13.0	54.3
2014	24.2	5.6	13.4	13.2	56.4
2015	24.6	5.4	12.9	12.6	55.6

Source: Statistics Canada, CANSIM Table 379-0031.
Note: Values at basic prices in 2007 constant dollars.

Table 2. Canadian Mining, Mining-Related Support Activities, and Mineral Processing Employment, 2006-15 (p)

Year	Mining and Quarrying (Except Oil and Gas)	Mining-Related Support Activities	Nonmetallic Mineral Product Manufacturing	Primary Metal Manufacturing	Fabricated Metal Product Manufacturing	Total Mining, Mining-Related Support Activities, and Mineral Processing
	(number of employees)					
2006	47,655	18,080	56,940	85,385	193,765	401,825
2007	50,925	19,515	58,250	81,740	190,680	401,110
2008	54,780	21,850	55,070	82,960	180,030	394,690
2009	48,830	18,810	52,215	66,015	164,250	350,120
2010	52,670	22,350	54,150	70,570	161,075	360,815
2011	56,330	29,985	53,490	78,980	165,465	384,250
2012	58,420	33,395	54,390	68,480	169,570	384,255
2013	56,155	29,460	54,315	72,975	163,610	376,515
2014	60,215	28,800	55,810	71,970	161,480	378,275
2015 **(p)**	60,565	26,265	56,335	71,460	158,810	373,435

Source: Statistics Canada, CANSIM Table 383-0031.
(p) Preliminary.

Table 3. Canadian Mining, Mining-Related Support Activities, and Mineral Processing Average Annual Total Compensation Per Job, 2006-15 (p)

Year	Mining and Quarrying (Except Oil and Gas)	Mining-Related Support Activities	Nonmetallic Mineral Product Manufacturing	Primary Metal Manufacturing	Fabricated Metal Product Manufacturing	Canadian All-Industry Average
	(dollars)					
2006	91,162	85,057	59,946	81,284	55,862	46,962
2007	92,664	94,616	62,284	88,742	58,946	48,859
2008	98,303	98,718	64,189	85,955	62,011	50,335
2009	107,745	95,674	62,775	87,084	60,368	50,813
2010	107,030	98,280	63,000	88,751	59,676	51,440
2011	109,682	102,357	63,620	87,439	62,359	53,195
2012	112,462	103,435	65,122	95,192	65,374	54,919
2013	127,862	101,510	68,236	94,855	68,450	56,398
2014	124,388	106,336	67,211	98,241	69,986	58,041
2015 **(p)**	121,704	105,933	68,022	104,369	70,179	59,008

Source: Statistics Canada, CANSIM Table 383-0031.
(p) Preliminary.

Table 4. Capital Investment in Canada's Mining, Mining-Related Support Activities, and Mineral Processing Industries, 2006-16 (si)

Year	Mining and Quarrying (Except Oil and Gas)	Mining-Related Support Activities[1]	Nonmetallic Mineral Product Manufacturing	Primary Metal Manufacturing	Fabricated Metal Product Manufacturing	Total Mining, Mining-Related Support Activities, and Mineral Processing
	($ billions)					
2006	4.9	0.3	0.7	1.2	0.7	7.8
2007	5.8	0.4	0.8	1.3	0.7	8.9
2008	7.3	0.4	0.7	1.6	0.7	10.8
2009	6.2	0.4	0.6	0.9	0.8	8.9
2010	9.1	0.3	0.8	1.8	0.6	12.5
2011	12.2	0.6	0.7	2.9	0.7	17.1
2012	16.9	0.6	0.6	3.9	0.5	22.5
2013	15.1	0.7	0.5	3.5	0.6	20.3
2014	11.1	0.4	1.0	3.3	0.6	16.5
2015 **(p)**	9.6	0.5	0.9	3.2	0.8	14.9
2016 (si)	9.3	0.4	1.3	2.6	0.7	14.2

Sources: Natural Resources Canada; Statistics Canada, CANSIM Table 029-0045.

(p) Preliminary; (si) Spending intentions.

Notes: (1) Natural Resources Canada estimate based on Statistics Canada data. Numbers may not add to totals because of rounding.

Table 5. Value of Canadian Mineral Trade, by Trading Partner, 2015

Trading Partner	Domestic Exports	Total Exports	Total Imports	Balance of Trade
		($ billions)		
United States	50.5	53.6	39.7	13.9
EU-28	18.3	18.8	7.9	10.9
China	4.6	4.7	8.7	-4.0
Japan	3.0	3.0	1.2	1.8
South Korea	2.0	2.1	1.1	1.0
Hong Kong	2.0	2.0	0.1	1.9
India	1.7	1.7	0.8	0.9
Norway	1.5	1.5	0.1	1.4
Mexico	1.2	1.2	3.8	-2.6
Brazil	1.1	1.2	1.6	-0.5
Other countries	6.0	6.3	14.9	-8.6
Total Canada	**92.0**	**96.2**	**80.0**	**16.2**

Sources: Natural Resources Canada; Statistics Canada.

Notes: Mineral trade includes ores, concentrates, and semi- and final-fabricated mineral products. Includes coal. Numbers may not add to totals due to rounding. European Union (EU-28): Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, and the United Kingdom.

Table 6. Value of Canadian Domestic Mineral Exports, by Commodity, 2014 and 2015

Commodity	2014	2015
	($ billions)	
Gold	17.9	17.6
Iron and steel	13.7	13.6
Aluminum	9.8	10.5
Copper	7.0	6.9
Potash and potassium compounds	5.2	6.9
Miscellaneous metal products	5.9	6.2
Nickel	5.4	5.4
Coal	4.5	3.8
Iron ore	4.4	3.6
Diamonds	2.5	2.4
Zinc	1.6	1.7
Uranium and thorium	1.4	1.7
Silver	1.3	1.7
Platinum group metals	0.6	1.2
All other minerals	8.2	8.7
Total	**89.4**	**92.0**

Sources: Natural Resources Canada; Statistics Canada.
Notes: Mineral trade include ores, concentrates, and semi- and final-fabricated mineral products. Numbers may not add to totals because of rounding.

Table 7. Mining, Mining-Related Support Activities, and Mineral Processing Business Expenditures on Research and Development (BERD), 2006-15 (p)

Year	Mining, Quarrying (Except Oil and Gas), and Mining-Related Support Activities	Nonmetallic Mineral Product Manufacturing	Primary Metal Manufacturing	Fabricated Metal Product Manufacturing	Total Mining, Mining-Related Support Activities, and Mineral Processing
	($ millions)				
2006	68	76	x	230	. .
2007	67	78	351	258	754
2008	46	66	338	260	710
2009	108	83	265	285	741
2010	. . .	76	. . .	234	. .
2011	138	78	215	221	652
2012	152	63	208	197	620
2013 **(p)**	191	60	238	188	677
2014 **(p)**	. . .	58	133	205	. .
2015 **(p)**	. . .	60	140	199	. .

Source: Statistics Canada, CANSIM Table 358-0024.

. . Not available; . . . Too unreliable to be published; **(p)** Preliminary; x Suppressed to meet the confidentiality requirements of the *Statistics Act*.

Table 8. Average Annual Prices of Select Commodities, 2007-15

Commodity	U.S. Currency	2007	2008	2009	2010	2011	2012	2013	2014	2015
Copper	¢/lb	322.83	315.47	233.67	341.75	400.10	360.58	332.29	311.13	249.52
Nickel	$/lb	16.88	9.57	6.65	9.89	10.38	7.89	6.81	7.65	5.36
Zinc	¢/lb	147.03	85.01	96.25	97.99	99.47	88.35	86.64	98.05	81.50
Lead	¢/lb	116.98	115.32	77.95	97.42	108.92	93.24	97.16	95.04	81.38
Molybdenum	$/lb	29.91	28.42	10.91	15.61	15.33	12.73	10.34	11.39	6.92
Gold	$/troy oz	696.66	871.67	972.98	1,224.66	1,568.58	1,668.81	1,411.06	1,266.12	1,160.11
Silver	$/troy oz	13.41	15.00	14.69	20.20	35.60	31.21	23.86	19.07	15.72
Platinum	$/troy oz	1,304.79	1,576.40	1,204.05	1,610.13	1,720.11	1,551.89	1,486.73	1,384.57	1,053.23
Palladium	$/troy oz	354.66	352.19	263.57	526.38	733.63	644.34	725.27	802.95	691.76
Uranium (U_3O_8)	$/lb	99.33	61.71	46.06	46.84	56.37	48.40	38.17	33.21	36.46
Coal, metallurgical	$/t f.o.b.	94.25	198.32	177.69	193.01	270.53	193.46	142.34	113.78	91.49
Coal, thermal	$/t f.o.b.	52.45	93.80	81.33	90.89	106.50	98.03	93.06	79.00	65.89
Iron ore	$/t	36.63	61.57	79.99	146.72	167.79	128.53	135.36	96.84	55.21
Potash	$/t f.o.b.	162.19	358.01	470.07	325.59	398.84	431.76	353.59	273.13	299.31

Sources: Platts Metals Week for base metals, molybdenum, and precious metals (base metals are based on London Metal Exchange [LME] Settlement prices, molybdenum on the MW Means, gold on the London Final, silver on Handy+Harman, and platinum and palladium on the PM Fix); Cameco Corporation for uranium (uranium price is the U.S. spot price); Indexmundi (www.indexmundi.com) for iron ore; metallurgical coal, thermal coal; and potash prices are based on the realized price of Canadian potash exports to offshore markets and are calculated by Natural Resources Canada.
f.o.b. Free on board; lb Pound; oz Ounce; t Tonne.