

Mining by the Numbers

April 2019

Mining investment in Québec in 2017

Annual Census on Mining Investment

The *Annual Census on Mining Investment* was carried out over the first three quarters of 2018. It aimed to collect final data for 2017 and intentions for 2018. In total, 360 questionnaires were sent to mining establishments. Among these establishments, 237 reported expenditures as project managers in 2017. Ten establishments that did not incur any expenditures in 2017 reported that they intended to do so in 2018. The other 113 establishments did not make any expenditures in 2017 and did not intend to do so in 2018.

Preliminary data for 2018 and intentions expressed by mining companies for 2019 are currently being collected. The results of that census will be made available on the Institut de la statistique du Québec's website in the winter of 2019.

Certain definitions and explanatory notes are presented at the end of this document.

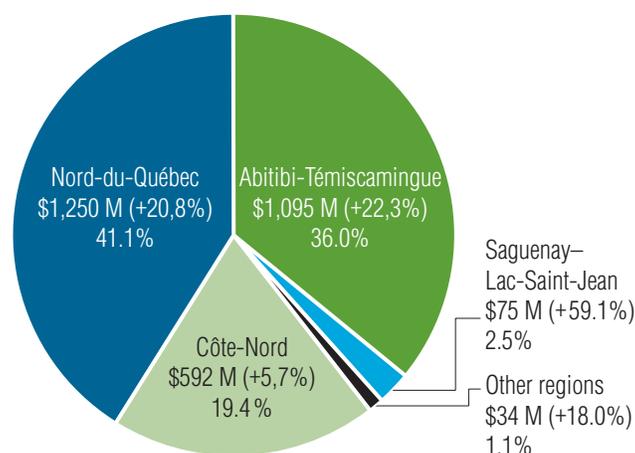
Mining investment in 2017

Following a strong decline in mining investment in Québec from \$5.13 billion in 2012 to \$2.49 billion in 2015, prospects for growth are improving. In 2016, mining investment was up 2.9% from 2015 to \$2.57 billion. This rebound in mining investment continued in 2017 as mining expenditures increased by 18.7% to \$3.05 billion.

Nord-du-Québec (\$1,250 million), Abitibi-Témiscamingue (\$1,095 million) and Côte-Nord (\$592 million), Québec's three main mining regions, received 96.4% of total mining investment in Québec in 2017 (Figure 1).

In the Abitibi-Témiscamingue region, where mining activities are mostly focused on gold, investment was up 22.3% in 2017. Investment was also up in the regions of Nord-du-Québec and Côte-Nord, by 20.8% and 5.7%, respectively.

Figure 1
Distribution of mining investment by administrative region, Québec, 2017



Total for 2017: \$3,045 M (+18.7%)
 (+ - %): Percentage change from 2016

Source: Institut de la statistique du Québec, *Annual Census on Mining Investment*.

Table 1

Distribution of mining investment by Québec administrative region, 2017

Administrative region	Exploration and deposit appraisal work		Mine complex development			Total per region
	On-mine-site work	Off-mine-site work	Work	Capital costs	Repair and maintenance	
	\$k					
01 Bas-Saint-Laurent	-	343	-	-	-	343
02 Saguenay–Lac-Saint-Jean	x	x	x	x	x	74,634
03 Capitale-Nationale	x	x	x	x	x	3,467
04 Mauricie	x	x	x	x	x	1,610
05 Estrie	-	2,111	-	-	-	2,111
06 Montréal	-	-	-	-	-	-
07 Outaouais	-	1,770	-	-	-	1,770
08 Abitibi-Témiscamingue	997	215,554	446,068	256,074	176,123	1,094,817
09 Côte-Nord	x	x	x	357,328	219,374	592,000
10 Nord-du-Québec	20,252	307,567	285,754	358,785	277,765	1,250,121
11 Gaspésie–Îles-de-la-Madeleine	x	x	x	x	x	11,826
12 Chaudière-Appalaches	-	237	-	-	-	237
13 Laval	-	-	-	-	-	-
14 Lanaudière	-	4,984	-	-	-	4,984
15 Laurentides	x	x	x	x	x	6,114
16 Montérégie	x	x	x	x	x	1,098
17 Centre-du-Québec	-	-	-	-	-	-
All of Québec	21,798	552,149	741,212	1,011,277	718,698	3,045,133

Source: Institut de la statistique du Québec, *Annual Census on Mining Investment*.

Intentions for 2018

According to intentions expressed by mining companies for 2018, mining investment should rise by 17.2% from 2017 to \$3.57 billion. Exploration and mineral deposit appraisal work expenditures should increase by 8.6%, to \$623 million. In addition, mine complex development expenditures are expected to grow by 19.2%, to \$2.95 billion.

Table 2

Mining investment in Québec, 2012-2018¹

	2012	2013	2014	2015	2016	2017	2018	Change 2015/2012	Variation 2017/2016	Change 2018/2017
	\$M							%		
Exploration and deposit appraisal	621	382	317	259	297	574	623	-58.2	93.0	8.6
On-mine-site work	38	72	55	38	29	22	57	-1.3	-25.3	161.1
Off-mine-site work	582	310	263	222	268	552	566	-62.0	105.8	2.5
Mine complex development	4,509	4,194	2,658	2,233	2,268	2,471	2,945	-50.5	9.0	19.2
Work at the mine	977	985	903	919	899	741	718	-6.0	-17.5	-3.1
Capital costs	2,897	2,647	1,079	653	628	1,011	1,508	-77.5	61.1	49.1
Repair and maintenance	635	563	676	662	741	719	719 ²	4.2	-3.1	-
Total	5,130	4,576	2,976	2,493	2,565	3,045	3,568	-51.4	18.7	17.2

1. 2012-2017: final data; 2018: intentions.

2. Imputed from the 2017 mining investment census.

Source: Institut de la statistique du Québec, *Annual Census on Mining Investment*.

Mine complex development

Total mine complex development investment in Québec was up 9.0% in 2017 from 2016 to \$2.47 billion. These investments included \$741 million in expenditures on work at the mine, \$1,011 million in capital expenditures, and \$719 million in repair and maintenance expenditures on non-residential construction, machinery and equipment.

2017 mining highlights

Operations at the Goodwood iron mine (Tata Steel Minerals Canada) started during the summer of 2017. This mine is located in Québec, about fifty kilometres northeast of Schefferville, in the Nord-du-Québec administrative region. The Goodwood mine is part of the DSO mining complex, where several pits are operated on both sides of the border between Québec and Newfoundland and Labrador. Mining operations at the DSO mining complex began in 2012 on the Newfoundland and Labrador side, where the main ore processing facilities are located.

In November 2017, Québec Iron Ore, a subsidiary of Champion Iron Limited, confirmed the re-opening of the Bloom Lake iron mine located near Fermont, in the Côte-Nord region.¹ Pre-commercial production was achieved in February 2018 and commercial production began a few months later, in June.²

In Abitibi-Témiscamingue, two gold mine projects at an advanced deposit appraisal stage achieved pre-commercial production in 2017. The Laronde – Zone 5 gold mine project (Agnico Eagle Mines) achieved pre-commercial production in the third quarter of 2017, then commercial production in June 2018. Also, the Lamaque South gold mine project (Eldorado Gold Corporation) produced gold from a bulk sample in 2017 before starting pre-commercial production on a recurring basis in the second quarter of 2018.

Also in Abitibi-Témiscamingue, the North American Lithium mine (formerly the Québec Lithium mine) had been in care and maintenance mode since October 2014. It was re-opened as soon as it was acquired by North American Lithium in June 2016. North American Lithium is a subsidiary of Contemporary Amperex Technology Co. Limited (CATL), a Chinese company specializing in the production and sale of electric vehicle batteries and energy storage systems. The North American Lithium mine has been producing spodumene concentrate since June 2017 and reached commercial production in July 2018. In the coming years, the company expects to re-open the processing plant located on the mine site, which would allow it to produce lithium carbonate using spodumene concentrate.

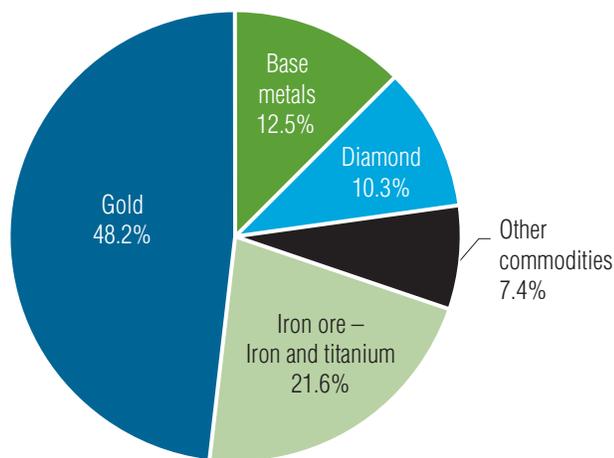
1. Champion Iron Limited, news release, November 15, 2017.

2. Champion Iron Limited, news release, August 15, 2018.

Mineral commodities

Mines in operation where gold is the main commodity extracted accounted for 48.2% of investment expenditures on mine complex development by Québec mines. Iron ore extraction and processing, including ilmenite (iron and titanium) extraction, came in second place (21.6%), followed by base metal mines (12.5%) and diamond mines (10.3%) (Figure 2).

Figure 2
Distribution of mine complex development expenditures by type of mine, Québec, 2017



Source: Institut de la statistique du Québec, *Annual Census on Mining Investment*.

Gold

In 2017, the Abitibi-Témiscamingue region had seven operating gold mines, including the LaRonde (Agnico Eagle Mines), Westwood (IAMGOLD Corporation), Beaufor (Monarch Gold Corporation), Goldex and Lapa (Agnico Eagle Mines) and Elder (Abcourt Mines) underground mines. The Canadian Malartic open-pit mine, equally owned by Agnico Eagle Mines and Yamana Gold, is also located in the Abitibi-Témiscamingue region.

The Nord-du-Québec region had four gold mines in operation in 2017. These include the Eleonore (Goldcorp), Bachelor Lake (Metanor Resources) and Vezza (Nottaway Resources) underground mines, as well as the Casa Berardi underground mine (Hecla Mining Company), in operation since 2013, where an open pit is also in operation since 2016.

Investment expenditures incurred for these 11 gold mines totalled \$1.10 billion, up 2.8% from 2016. In Abitibi-Témiscamingue, these expenditures stood at \$742 million, down 1.7% from 2016. In Nord-du-Québec, these expenditures attained \$361 million, up 13.6% from 2016.

Iron ore – Iron-titanium

In 2017, there were three operating mines in the Côte-Nord region: the Mont-Wright iron mine and Fire Lake pit (ArcelorMittal Mines Canada), as well as the Lac Tio ilmenite mine (Rio Tinto Fer et Titane). Also located in the region are the Port-Cartier iron ore pellet plant and ArcelorMittal's port facilities, as well as the Iron Ore Company of Canada's port facilities, from where iron ore extracted in Labrador is shipped. In the Nord-du-Québec region, operations at the Goodwood mine (Tata Steel Minerals Canada) started in the summer of 2017.

Iron ore prices fell between 2014 and 2015. The average price of iron ore per dry metric tonne³ decreased from \$139 (US\$135) in 2013 to \$71 (US\$55) in 2015. Since then, iron ore prices have fluctuated, averaging \$93 (US\$72) in 2017.

Over that same period, mine complex development investment related to iron and ilmenite (iron and titanium) mining fell by 61.2% in 2014, by 18.9% in 2015, and by 17.6% in 2016. In 2017, these expenditures declined 5.8% to \$495 million.

Base metals

In 2017, there were four base metal mines in operation in the Nord-du-Québec region, including two nickel and copper mines located in the north of the Ungava Peninsula: the Raglan mine (Glencore Canada Corporation), in operation since 1997, and the Nunavik Nickel mine (Canadian Royalties, a subsidiary of Jilin HOROC Nonferrous Metal Group Co., Ltd.), in operation since 2013.

South of these mines are two zinc and copper mines. In the Matagami area, the Bracemac-McLeod underground mine (Glencore Canada Corporation) achieved commercial production in July 2013. The Langlois underground mine (Nystar Canada Resources), located in the Lebel-sur-Quévillon area, was operated intermittently between 1996 and 2008. Operations at the mine resumed in 2012.⁴

Investment expenditures incurred for these four base metal mines totalled \$287 million, down 2.7% from 2016.

Other commodities

The other types of mines in operation in Québec include diamond, lithium, niobium, salt, graphite, silica, mica, and feldspar mines.

Commercial production began in December 2016 at the first diamond mine in Québec, the Renard mine (Stornoway Diamond Corporation).

3. indexmundi.com; Iron Ore 62% Fe, CFR China.

4. Nyrstar.com; Langlois fact sheet.

The North American Lithium mine (formerly the Québec Lithium mine), located near La Corne in Abitibi-Témiscamingue, is the first lithium-producing mine in Québec. RB Energy had started producing lithium carbonate in November 2013 and made a first commercial shipment in August 2014, then halted its operations in October of the same year due to financial problems. North American Lithium acquired the mine in June 2016 and undertook its re-opening, achieving commercial production of spodumene concentrate in 2018. The company is planning on producing lithium carbonate with the spodumene concentrate in the coming years.

The Niobec mine (Magris Resources), located in the municipality of Saint-Honoré in Saguenay–Lac-Saint-Jean, produces between 8% and 10% of the annual global volume of niobium in the form of ferroniobium.

Imerys Graphite & Carbon operates the Lac-des-Îles graphite mine located near Mont-Laurier, as well as a processing plant in Terrebonne. Imerys Mica Suzorite has been operating the Lac Letondal mine in Haute-Mauricie on an intermittent basis for nearly 50 years. The ore extracted supplies the company's processing plant in Boucherville. K+S Windsor Salt extracts salt (halite) from the Seleine mine located in the Îles-de-la-Madeleine. Near Buckingham, in the Outaouais region, Dentsply Canada sporadically extracts feldspar for dental ceramic purposes from the Othmer mine. One extraction operation usually provides enough feldspar for a few years.

Small establishments with fewer than 50 employees mined silica in several Québec regions for various purposes. In the Charlevoix municipality, high-purity silica for industrial applications is extracted from the Petit-Lac-Malbaie mine owned by Silicium Québec and Sitec Quartz. In the Laurentides region, silica is mined from the Saint-Canut (Unimin Canada) and Saint-Rémi-d'Amherst (Société minière Gerdin) quarries.

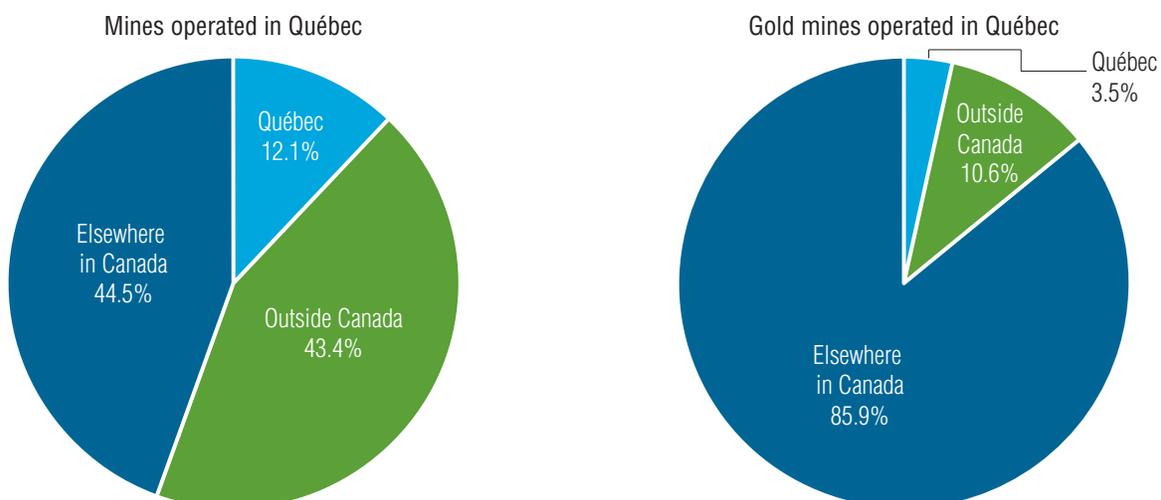
Mine complex development investment for diamond mining totalled \$236 million, down 15.2% from 2016. For other commodities overall (lithium, niobium, salt, graphite, silica, mica, and feldspar), expenditures increased by 176.9% to \$170 million, partly due to the re-opening of the lithium mine.

Country of control of mining companies

As part of the global mergers and acquisitions trend, the number of Québec and Canadian mining companies that invest in mine complex development in Québec declined in favour of companies headquartered abroad. Foreign-controlled mining investment accounted for 25.3% of these investments in 2010. In 2017, 43.4% of mine complex development investments were controlled by foreign companies.

These companies' headquarters are located in countries such as the United States, Luxembourg, Switzerland, Great Britain, France, Germany, and China. Foreign-controlled mines extract several commodities, including iron ore, base metals, ilmenite, lithium, and nonmetallic minerals. In total, 12.1% of investments by Canadian companies (56.6% of expenditures) were incurred by Québec companies (Figure 3).

Figure 3
Distribution of mine complex development expenditures by location of company head office, Québec, 2017



Source: Institut de la statistique du Québec, *Annual Census on Mining Investment*.

Canadian companies control most gold mines in operation in Québec and rank first in terms of gold mine development expenditures, with 89.4% of these investments. These companies are headquartered in Ontario and British Columbia (85.9% of expenditures), as well as in Québec (3.5% of expenditures).

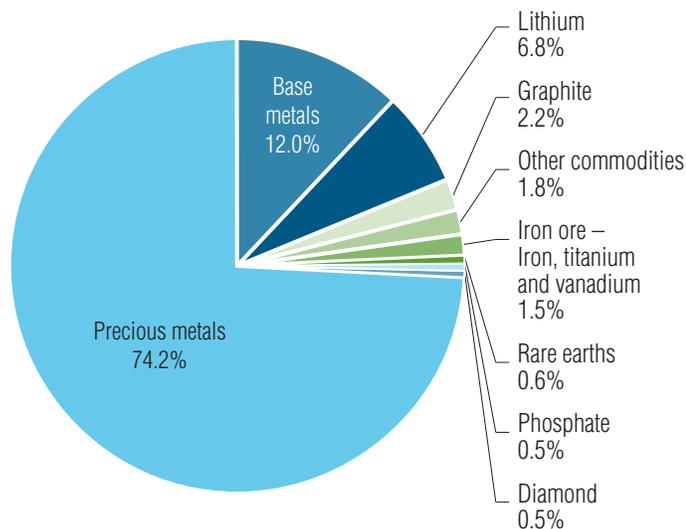
Exploration and deposit appraisal

Data for 2016 showed a 14.6% increase in exploration and deposit appraisal work expenditures compared with 2015, for a total of \$297 million. In 2017, these expenditures increased by 93.0% to \$574 million. According to intentions expressed by mining companies, these expenditures could reach \$623 million in 2018, an 8.6% increase (Table 2).

In 2017, the Nord-du-Québec region ranked first in terms of exploration and deposit appraisal work expenditures, which stood at \$328 million, or 57.1% of the Québec total (Table 1). The next highest expenditures in this category were, in descending order, Abitibi-Témiscamingue with \$217 million (37.7%) and Côte-Nord with \$11 million (1.9%).

As shown in Figure 4, precious metals, gold in particular, remained the most sought-after commodities in Québec. In 2017, they accounted for 74.2% of exploration and deposit appraisal work expenditures, for a total of \$426 million. They were followed by base metals (12.0% for a total of \$69 million).

Figure 4
Distribution of exploration and deposit appraisal work expenditures by commodity sought, Québec, 2017



Source: Institut de la statistique du Québec, *Annual Census on Mining Investment*.

Table 3

Distribution of exploration and deposit appraisal work expenditures by type of company, Québec, 2017

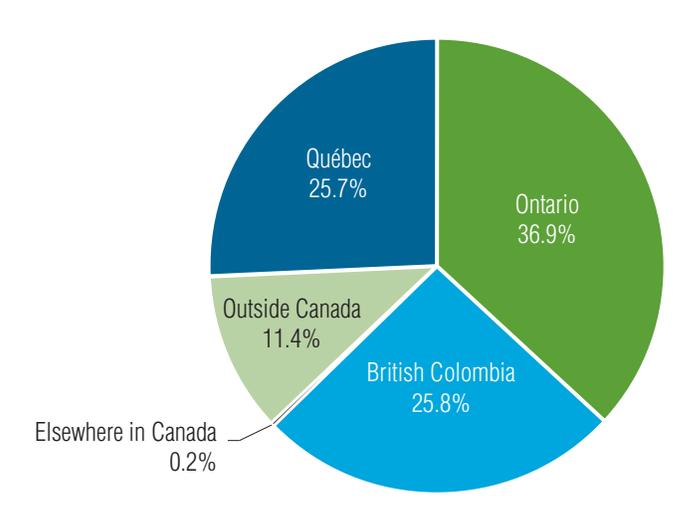
	Exploration company	Public company	Operating company	Total	Change 2017/2016
	\$M				%
Off-mine-site	339.9	14.2	198.1	552.1	105.8
Exploration work	278.9	14.2	92.1	385.3	81.5
Deposit appraisal work	60.9	-	105.9	166.9	198.3
On-mine-site	-	-	21.8	21.8	-25.3
Exploration work	-	-	6.7	6.7	-4.3
Deposit appraisal work	-	-	15.1	15.1	-31.9
Total	339.9	14.2	219.9	573.9	93.0

Source: Institut de la statistique du Québec, *Annual Census on Mining Investment*.

Although gold remained dominant in 2017, mineral exploration tends to diversify in Québec, leaving more room for other, less conventional mineral commodities. As a result, commodities related to new technologies, such as graphite, lithium and rare earths, accounted for 9.5% of exploration and deposit appraisal expenditures in Québec.

In 2017, exploration and deposit appraisal work expenditures were mainly attributable to Canadian companies—they incurred 88.6% of these investments, with Québec companies accounting for 25.7% of these expenditures (Figure 5).

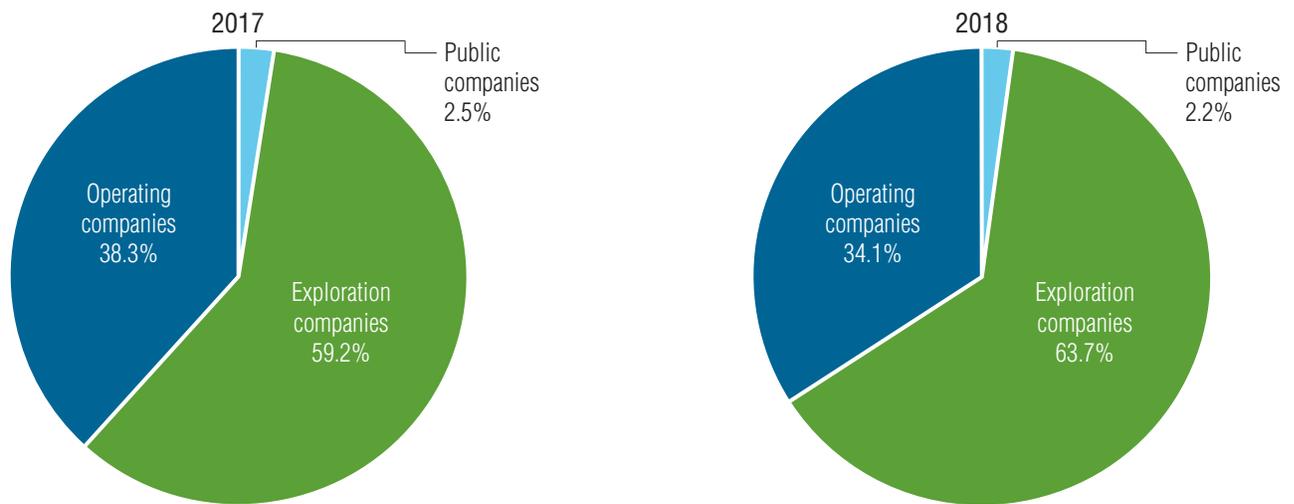
Figure 5
Distribution of exploration and deposit appraisal work expenditures by location of company head office, Québec, 2017



Source: Institut de la statistique du Québec, *Annual Census on Mining Investment*.

Figure 6

Distribution of exploration and deposit appraisal work expenditures by type of company, Québec, 2017 and 2018¹



1. 2017: final data; 2018: intentions.

Source: Institut de la statistique du Québec, *Annual Census on Mining Investment*.

Exploration companies and operating companies respectively accounted for 59.2% and 38.3% of exploration and deposit appraisal work expenditures. Public companies incurred 2.5% of these expenditures (Figure 6).

According to intentions expressed by mining companies, these proportions should remain about the same in 2018: 63.7% for exploration companies, 34.1% for operating companies, and 2.2% for public companies.

Core drilling campaign costs

Core drilling campaigns carried out by specialized enterprises to define new mineral deposits account for a large proportion of exploration and deposit appraisal expenditures in Québec. Over the past 10 years, on average, they represented 42.0% of annual exploration and deposit appraisal work expenditures. In 2017, core drilling costs for exploration and deposit appraisal projects totalled \$271 million. Drilling campaign costs include expenditures incurred for personnel and drill mobilization, site preparation, drilling, moves between drill holes, required mobile and support equipment, as well as related sampling and assaying costs.

In 2017, there were 19 enterprises specialized in exploration drilling headquartered in Québec. Out of these 19 enterprises, 16 reported drilling activities in Québec.

The total number of metres drilled for on- and off-mine-site exploration and deposit appraisal projects peaked at 2,167,013 metres in 2011. In 2017, that number stood at 1,841,670 metres, up 86.0% from 2016, but down 15.0% from the high recorded in 2011. The total number of metres drilled as part of mining operations has been rising over the past 10 years. It reached 728,067 metres in 2017, up 31.4% from 2016.

The average core drilling cost per metre for exploration and deposit appraisal purposes increased by 7.5% between 2016 (\$136.98/m) and 2017 (\$147.27/m). Over the 10-year period from 2008 to 2017, the average cost per metre drilled was \$150.64. Compared to the provincial average, core drilling costs per metre were 76.8% higher in Côte-Nord and 9.6% higher in Nord-du-Québec.

Table 4

Regional distribution of core drilling for exploration and deposit appraisal purposes, Québec, 2017

Administrative region	Drilling costs	Number of metres drilled	Cost per metre
	\$M		\$/m
08 Abitibi-Témiscamingue	84.6	691,506	122.39
09 Côte-Nord	3.5	13,509	260.34
10 Nord-du-Québec	178.5	1,106,300	161.37
Other regions	4.5	30,356	149.56
All of Québec	271.2	1,841,670	147.27

Source: Institut de la statistique du Québec, *Annual Census on Mining Investment*.

Distribution of exploration and deposit appraisal work expenditures

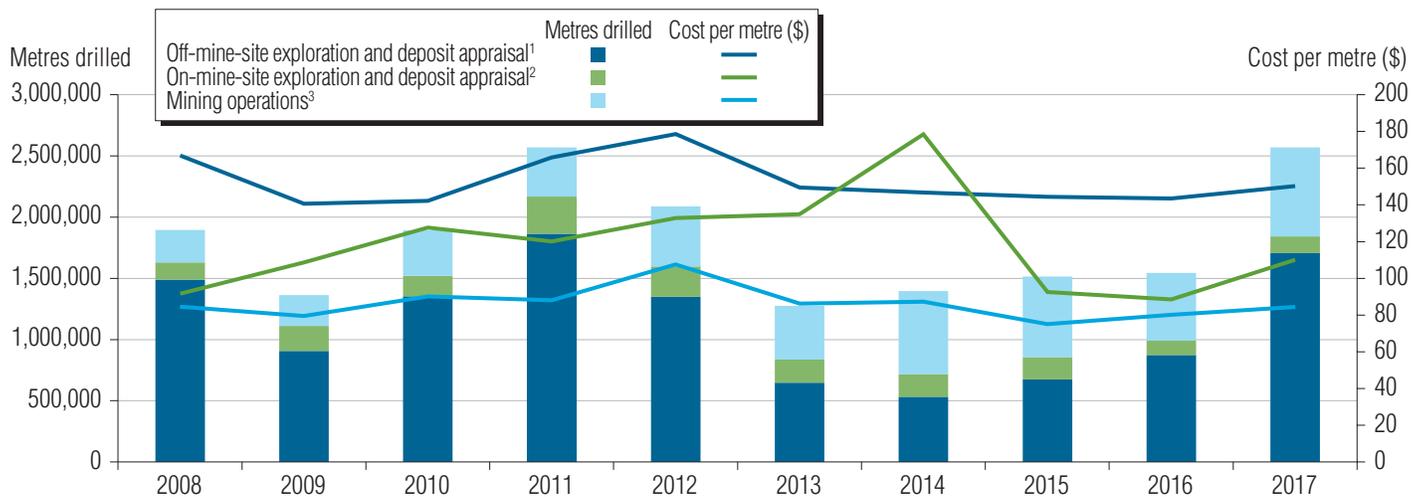
The *Annual Census on Mining Investment* identified 218 establishments that reported exploration and deposit appraisal work expenditures as project managers in 2017. In total, 811 projects generated exploration and deposit appraisal investments totalling \$574 million during the year. When only projects totalling \$100,000 or more are included, the number of projects drops

to 285. These projects were managed by 127 establishments and generated \$563 million in expenditures, accounting for 98.1% of total expenditures in this category.

The top 25 projects in terms of budget accounted for 66.8% of total exploration and deposit appraisal work expenditures incurred in Québec in 2017 (Figure 8).

Figure 7

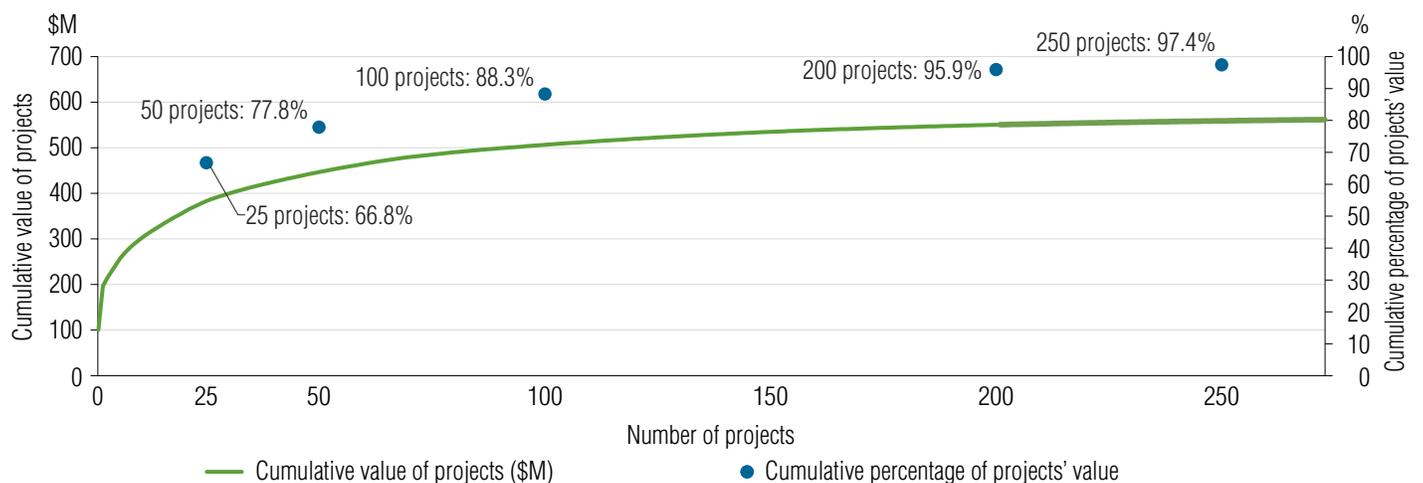
Change in number of metres drilled and cost per metre for core drilling, Québec, 2008-2017



1. Drilling outside a producing mine site, to define new mineral deposits.
 2. Drilling on a producing mine site, to define new mineral deposits.
 3. Drilling on a mine site, in the immediate vicinity of the deposit(s), to delimit and detail the ore or extend the current ore reserves.
- Source: Institut de la statistique du Québec, *Annual Census on Mining Investment*.

Figure 8

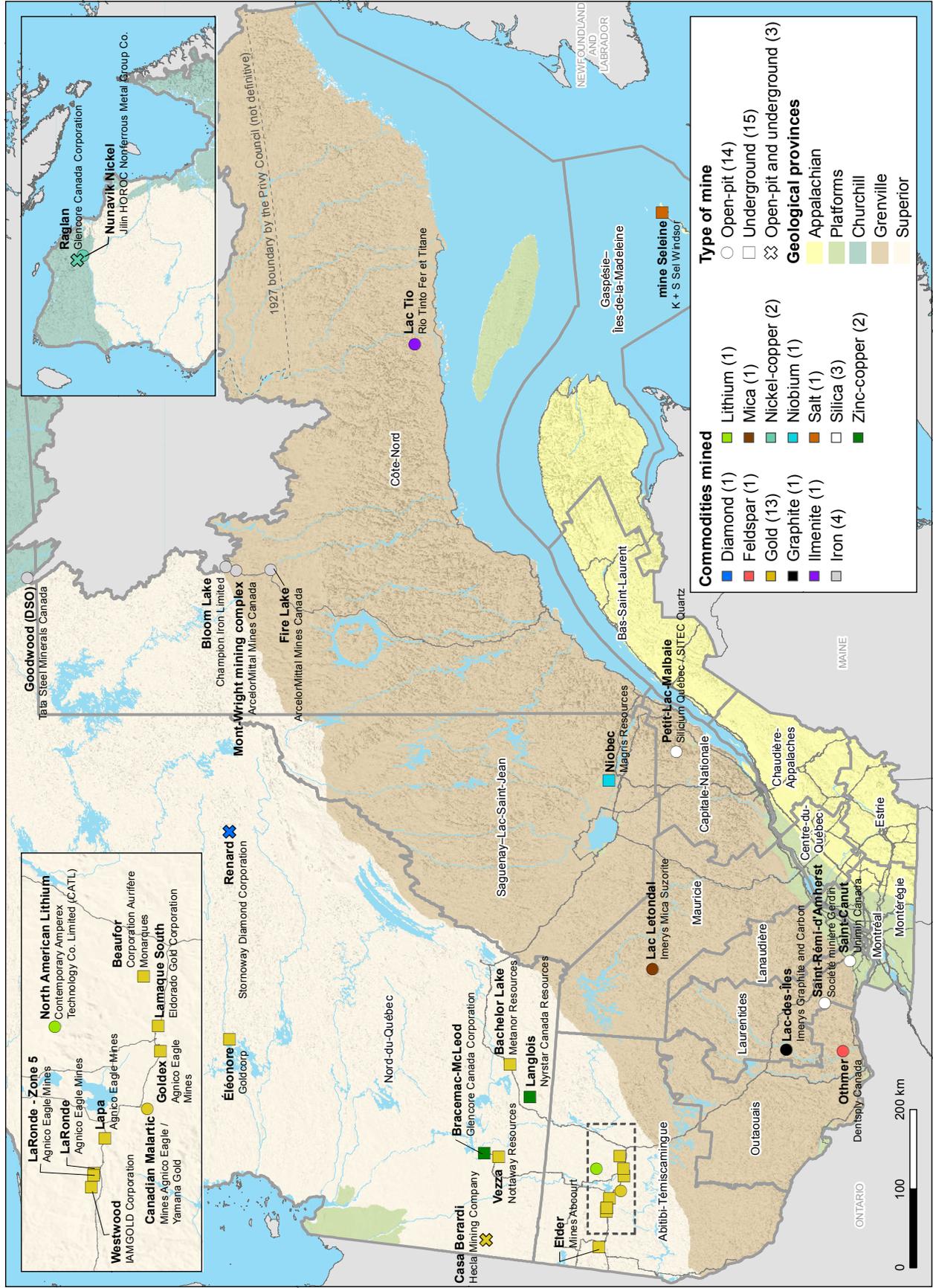
Cumulative value of exploration and deposit appraisal projects, Québec, 2017



Source: Institut de la statistique du Québec, *Annual Census on Mining Investment*.

Map 1

Mines in operation or under construction, Québec, 2017



Concepts and definitions

Mining investment

Mining investment includes all exploration and deposit appraisal work expenditures. It also includes expenditures on development work to bring a mine to production and to renew mineral reserves, on mine complex infrastructure construction and equipment and machinery acquisition, as well as on repair and maintenance required to maintain the value of capital assets.

Types of mining stakeholders

OPERATING COMPANY: Any company that carries out exploration, deposit appraisal or mine complex development work in Québec or elsewhere. This group includes producing mining companies, exploration subsidiaries of producing mining, oil or gas companies, and non-producing companies that derive significant income from royalties, investment or other similar sources and that can direct part of that income towards their mining projects.

EXPLORATION COMPANY: These include companies whose main activity is mineral exploration and who obtain financing for most of their activities from public and private markets. They also include prospectors.

PUBLIC COMPANY: This group includes Crown corporations financed by the Québec government. The amounts invested by the geological branch of the Ministère de l'Énergie et des Ressources naturelles (MERN) for the acquisition of geoscientific knowledge are excluded from statistical surveys.

Mineral resource development phases

EXPLORATION EXPENDITURES include all field activities and capital, repair and maintenance expenditures conducted on- or off-mine-site to search for, discover and carry out the first delimitation of a mineral deposit in order to enhance its potential economic interest based on delimited tonnage, grade and other characteristics and justify additional, more detailed work.

DEPOSIT APPRAISAL EXPENDITURES include all field activities and capital, repair and maintenance expenditures conducted on- or off-mine-site to bring a delimited deposit to the stage of detailed knowledge required for a feasibility study. This phase usually starts after a preliminary evaluation, as defined under Regulation 43-101 respecting Standards of Disclosure for Mineral Projects (CQLR, chapter V-1.1, r. 15), has been accepted by the appropriate regulatory authorities.

MINE COMPLEX DEVELOPMENT EXPENDITURES include all surface and underground work related to **MINE DEVELOPMENT** activities as well as capital, repair and maintenance expenditures conducted on a mine site that is in production or committed to production. Capital costs are diverse and include equipment, tooling and infrastructure. The latter comprise plants such as pellet plants, ore mills including tailings ponds, and ore transfer port facilities, but exclude metal smelting, refining plants and rail facilities.

MINE DEVELOPMENT includes all field activities carried out on a mine site to define and gain access to the ore and prepare it for extraction. It also includes drill programs, rock work and support activities aimed at extending the current ore reserves by exploring and appraising the immediate vicinity of the deposits.

Location of activities

ON-MINE-SITE expenditures represent all field activities and capital, repair and maintenance expenditures applied to exploration or deposit appraisal for an additional mineral deposit distinct from the current mine reserves and loaded strictly on an existing mine site in production or committed to production, as well as, by definition, all activities and expenditures applied to mine complex development, including those related to facilities and infrastructure located outside the mine site.

OFF-MINE-SITE expenditures represent all field activities and capital, repair and maintenance expenditures applied to exploration and deposit appraisal that are not located on a mine site that is in production or committed to production, including those on the site of temporarily or permanently closed mines, and advanced projects not yet committed to production.

A MINE SITE corresponds to the area covered by a mining lease or concession. It also includes specific components or infrastructure located outside the mining lease or concession, such as concentrators, iron pellet plants and tailings ponds.

For a mine site to be committed to production, all of the following criteria must be met:

1. The feasibility of developing the deposit(s) at a profit has been established by a study that meets the standards of Regulation 43-101 respecting Standards of Disclosure for Mineral Projects (CQLR, chapter V-1.1, r. 15);
2. A formal production decision has been made by the organization;
3. The necessary financing is on hand or has been arranged;
4. All required authorizations and permits have been obtained; and
5. Major pieces of production equipment have been purchased or ordered.

Suggested citation

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Standard symbols

..	Data not available	t	Metric tonne
...	Not applicable	n	Number
–	Void or zero	m	Metre
—	Negligible data	\$	In dollars
i	Intention	k	In thousands
p	Preliminary data	M	In millions
e	Estimate	%	Percent or Percentage
x	Confidential data		

Note

Figures may not add up to totals due to rounding.

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