

A photograph of two male miners in a dark underground tunnel. They are wearing blue hard hats with bright headlamps, orange high-visibility shirts with reflective stripes, and safety harnesses. They are both smiling and looking down at a large blueprint or map they are holding together. The background shows the rough, rocky walls of the tunnel and some metal support structures.

STRATEGIC VISION

for Mining Development in Québec

Economy

Environment

Society

Diffusion

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A WORD FROM THE MINISTER

A UNIFYING VISION OF MINING DEVELOPMENT IN QUÉBEC

In the summer of 2014, the premier of Québec entrusted me with a mandate to elaborate a strategic and unifying vision for mining development in Québec. We started the process by heading out to meet a variety of stakeholders in mineral resource development. We asked them to reflect on this issue and share their concerns with us — and then we listened.

We have established a list of conditions we think will lead to the successful development of Québec's mining industry. Notably, we must:

- ▶ Ensure rules and operating conditions are clear and predictable, particularly on issues such as land access;
- ▶ Promote responsible mining development and the implementation of best practices;
- ▶ Leverage the Plan Nord (Northern Plan) structuring project;
- ▶ Help local communities benefit from mining projects;
- ▶ Pay close attention to developing a qualified workforce, particularly among Aboriginal youth; and
- ▶ Develop a network of suppliers and equipment manufacturers across all regions of Québec.

We have also picked up on a new development paradigm taking shape in Québec. Mining companies have challenges to meet; be it to develop expertise in new metallurgical processes, to adapt their business model to comply with responsible mining initiatives, to design new techniques to valorize mine tailings or better control greenhouse gas emissions.

Moreover, new niche markets are emerging. With that in mind, a number of new mining projects now focus on commodities that have rarely or never been mined in Québec, such as apatite, lithium, diamonds, rare earths and graphite. With these projects shaping up, new opportunities are opening for value-added industries such as electric transportation.

Québec's strategic vision for mining development gives as much consideration to the conditions for success as it does to the challenges and opportunities that lie ahead. It puts forth clear lines of action that will reinvigorate the mining industry and solidify Québec's position among the leaders of responsible mining development. Without a doubt, every person in Québec will gain from the social and economic benefits of a revamped and proactive mining industry.

Luc Blanchette
Minister for Mines



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LIST OF ABBREVIATIONS

AEMQ:	Association de l'exploration minière du Québec (Québec Mineral Exploration Association)
CONSOREM:	Consortium de recherche en exploration minérale (a mineral exploration research consortium)
COREM:	Consortium de recherche minérale (a mineral research consortium)
CSMO-Mines:	Comité sectoriel de main-d'œuvre de l'industrie des mines (sector workforce committee on manpower in the mining industry of Québec)
CSR:	Corporate social responsibility
DEP:	Diplôme d'études professionnelles (vocational studies diploma)
EDDEC:	Institut de l'environnement, du développement durable et de l'économie circulaire (Institute for Environment, Sustainable Development and Circular Economy)
FRONT:	Fonds de recherche du Québec – Nature et technologies (Québec's nature and technology research fund)
FTQ:	Fédération des travailleurs et travailleuses du Québec (Québec's labour federation)
GESTIM:	Système de gestion des titres miniers (Québec's mining title management system)
GHG:	Greenhouse gas
IRME:	Institut de recherche en mines et en environnement (Research Institute on Mines and Environment)
MAMOT:	Ministère des Affaires municipales et de l'Occupation du territoire (Municipal Affairs and Land Occupancy)
MDDELCC:	Ministère du Développement durable, de l'Environnement et de la Lutte contre les changements climatiques (Sustainable Development, Environment and the Fight against Climate Change)
MEES:	Ministère de l'Éducation et de l'Enseignement supérieur (Education and Higher Learning)
MERN:	Ministère de l'Énergie et des Ressources naturelles (Energy and Natural Resources)
MESI:	Ministère de l'Économie, de la Science et de l'Innovation (Economy, Science and Innovation)
MFFP:	Ministère des Forêts, de la Faune et des Parcs (Forestry, Wildlife and Parks)
MFO:	Ministère des Finances (Finance)
MISA Group:	Réseau d'expertise en innovation minière Mines, Innovations, Solutions et Applications (a network of mining innovation experts)
MSSS:	Ministère de la Santé et des Services sociaux (Health and Social Services)
MTMDET:	Ministère des Transports, de la Mobilité durable et de l'Électrification des transports (Transport, Sustainable Mobility and Transport Electrification)
RCM:	Regional county municipalities
SIDEX:	Société d'investissement dans la diversification de l'exploration (Diversification of Exploration Investment Partnership)
SIGÉOM:	Système d'information géominière du Québec (geomining information system)
SME:	Small and medium enterprise
SOQUEM:	Société québécoise d'exploration minière (State-owned mineral exploration company)
SPN:	Société du Plan Nord (State-run company with a mandate to deploy the Plan Nord)
TSM:	Toward Sustainable Mining (an initiative of the Mining Association of Canada)
UQAC:	Université du Québec à Chicoutimi
UQAM:	Université du Québec à Montréal
UQAT:	Université du Québec en Abitibi-Témiscamingue



Photo: Mathieu Dupuis

INTRODUCTION



Photos from top to bottom:
Mathieu Dupuis
MERN
MERN

In 2009, the government adopted its first mineral strategy. The strategy aimed to increase mining activity and multiply the economic spin-offs while adhering to the principles of sustainable development in a way that would benefit all Quebecers. Six years later, most of the proposed measures have been implemented.

In the meantime, the economic climate has changed: there have been large fluctuations in metal prices and some sectors have experienced significant slowdown, whereas the demand has been growing for emerging commodities, particularly those with applications in new technologies. Québec has adopted a new mining tax regime and a new Mining Act (CQLR, chapter M-13.1). Notions of environmental protection, land-use compatibility, social acceptability, benefit sharing and transparency have become standards in the mining world.

The Strategic Vision for Mining Development in Québec is the outcome of consultations held between the Ministère de l'Énergie et des Ressources naturelles (MERN) and other ministries, government organizations and stakeholders in November 2014; the regional tour by the Minister for Mines in spring 2015; and the ongoing cooperation between members of the Mines Advisory Committee¹. The proposals in this government strategy are closely linked with measures already presented in other government strategies, such as the Plan Nord toward 2035 (the "Plan Nord") and the Maritime Strategy.

The Strategic Vision has a broader scope than the Mineral Strategy. It covers the full range of the mining spectrum, from exploration and extraction, to suppliers and equipment manufacturers, to primary metal manufacturing². It involves almost a dozen ministries and organizations, such as the Ministère de l'Économie, de la Science et de l'Innovation (MESI), which is responsible for several measures that apply to primary metal manufacturing and to equipment manufacturers. The Strategic Vision defines three broad guidelines that adhere to the principles of sustainable development:

- ▶ Advance existing mining industries and develop new ones;
- ▶ Prevent and mitigate environmental impacts; and
- ▶ Promote transparency and citizen participation.

These guidelines are broken down into 38 objectives and 50 actions. The timescale given for the Strategic Vision is five years.

- 1 The presentations that formed the basis of the MERN's consultations can be found in the Strategic Vision section of the MERN website. They include a document disclosing KPMG's findings that was presented to ministries, organizations and other stakeholders in November 2014; a document presented by the Minister for Mines during his regional tour in January and February 2015; and the MERN's presentation on guidelines given to the Mines Advisory Committee in May 2015. The website also provides the list of consulted organizations.
- 2 The Strategic Vision covers the processing of ore mined in Québec. Aluminum is covered by a separate strategy. Relevant documents are available on the MESI website.



GUIDELINE 1 – ADVANCE EXISTING MINING INDUSTRIES AND DEVELOP NEW ONES

4 FOCUS AREAS

- ▶ 19 OBJECTIVES
- ▶ 27 ACTIONS

FOCUS AREA – EXPLORATION



In 2014, 204 mining and exploration companies carried out exploration work in Québec. They can be broken down as follows:

- ▶ 178 were small companies known as “juniors” whose principal activity is exploration. This category includes prospectors.
- ▶ 24 were large mining companies, known as “majors”, or companies who are not producers but who draw revenue from royalties.
- ▶ 2 were public companies.

Exploration and deposit appraisal expenditures amounted to \$317.4 million of which \$154.8 million was spent by juniors, \$130.3 million by majors and the remainder by public companies. They employed roughly 3,000 people.

Objective 1 – Provide more effective support to exploration companies

Since 2011, the market value of several metals has declined significantly. This situation makes it much more difficult for exploration companies to acquire the financing they need to carry out their work. Financing for junior companies comes mostly from the stock markets. Market capitalization for mining industry companies on the TSX Venture Exchange (TSXV) dropped by 44% between 2011 and 2013. Investors are increasingly turning to less risky sectors.

Exploration and deposit appraisal expenditures have also declined significantly, particularly for areas outside mine sites, where they have dropped by 64% between 2011 and 2014. This problem is made worse by the fact that large mining companies have been gradually reducing their exploration activities.

Action – Renew SIDEX’s mandate

To facilitate the financing of exploration companies, the government renewed SIDEX’s mandate until 2025. SIDEX is a limited partnership that invests in mineral exploration in Québec. It is sponsored by the Québec government and the Fonds de solidarité FTQ.

In November 2015, the Caisse de dépôt et placement du Québec, through its Sodémex exploration mining fund, SIDEX and the Fonds de solidarité FTQ announced the launch of Action-Exploration, a financing plan for junior exploration companies in Québec. The plan allows admissible companies to obtain \$300,000 in financing per year for a three-year period. The program has a global budget of \$10 million. Admissible companies must have their head office and principal exploration project in Québec. Other factors are also taken into account, such as capital structure and costs, the quality of the project, its social acceptability, and the expertise and composition of the management team.

Photo: MERN

Action – Reduce statutory work expenditures by 35%

The amount that must be spent in statutory work on a claim will be reduced by 35% for the years 2016 and 2017, representing an overall reduction of \$8.3 million for all claim holders. This means exploration companies will be able to work on their most promising sites longer.

Québec's tax assistance for mineral exploration is substantial. In 2014, the net cost to a junior company for a \$1,000 investment was between \$578 and \$605, depending on the region. Moreover, the net cost to acquire \$1,000 of flow-through shares was only \$372, compared to \$467 in Ontario.

Despite a 20% reduction in exploration tax assistance in the 2014-2015 Budget, the province remains very competitive. Outside Québec, only British Columbia offers exploration assistance in its corporate income tax system. Of course, it is important to ensure this fiscal aid is effective.

Tax assistance for mineral exploration is cyclical: higher during upswings and lower in downturns. In its current form, it helps to fuel the up-cycles, but proves insufficient when markets slow down. It would be more effective if it had a counter-cyclical effect.

It would also be more desirable if tax assistance for exploration considered the remoteness of a project from infrastructure. According to a study carried out by the Mining Association of Canada in the Northwest Territories, Nunavut and Yukon, exploration costs are proportional to the distance from transport infrastructure, with the most remote projects costing six times more than closer projects. This fact is corroborated by the Association de l'exploration minière du Québec (AEMQ). According to the AEMQ, an exploration project in Val-d'Or costs an average of \$125 per metre to drill. For a similar project in Radisson, near a highway, drilling will cost \$250 per metre, whereas a project north of the 49th parallel and more than 50 km from the nearest transportation route requires helicopter support, and the cost per metre jumps to about \$500. Tax assistance would be more effective if it took into consideration the distance of exploration projects from infrastructure.

Action – Assess the effectiveness of tax support measures for exploration

The MERN and the Ministère des Finances (MFQ) will study tax support measures for exploration to ensure they have a counter-cyclical effect and that the credit and deduction rates take into consideration the remoteness of infrastructure.

Objective 2 – Encourage the transfer of technology to junior exploration companies and develop entrepreneurship

Over the past 20 years, there has been much investment in exploration, but few discoveries. Reserves of metals other than gold have been in constant decline in Québec since the beginning of the 1990s. Investment in exploration must continue to be encouraged if companies are to discover deeper deposits in mature regions (Abitibi-Témiscamingue), and new deposits in emerging regions (Nord-du-Québec) or a region like Saguenay–Lac-Saint-Jean where several non-traditional commodities have been found, such as tantalum, rare earths and niobium.

Investment in new technologies must also be encouraged to improve the performance of deep drilling. Certain technologies, such as robotization, drones and lidar, also deserve our attention as they make exploration more effective. In addition, the findings of studies on new technologies should be shared so that all exploration companies can benefit.

Action – Continue to support CONSOREM

The government contributes \$150,000 annually to CONSOREM, a mineral exploration research consortium that unites stakeholders from the industry, government and universities. The government's financial participation, renewable in 2016-2017, will allow the consortium to widen its field of research to keep track of cutting edge methods and technologies in mineral exploration, particularly those that target deep mineralization. CONSOREM will also have a mandate to test the application of these methods in Québec.

This involvement complements the FRQNT's Joint Research Program on Sustainability in the Mining Sector, which has been allocated \$16.5 million over five years.

There are very few mining entrepreneurs in Québec, most of which are baby boomers who will soon retire. To make the province more appealing to investors and to advance mining development, Québec must attract skilled entrepreneurs and train the next generation so they may secure the capital needed to develop the province's mining sector.

The UQAT-UQAM Chair in Mining Entrepreneurship pursues research that promotes entrepreneurship among the youth as well as those working for junior companies. It organizes activities during which it discloses its research findings, and it helps develop study programs that focus on management applied to the mining industry. The Chair initiated the *Mines d'avenir* working committee in collaboration with industry partners to train and mentor new mining entrepreneurs.

Objective 3 – Acquire more geoscience knowledge and make it easier to access

Acquiring good-quality geoscience information is the first step in the long process of mining development. For two-thirds of land in Québec, the level of geological knowledge is fairly rudimentary. Building geological knowledge is essential as it provides a solid basis with which exploration companies can seek market financing in order to conduct their work; in other words, a better knowledge base reduces exploration risk.

In the re-launch of the Plan Nord, this is a crucial phase in the discovery of new ore deposits and the emergence of new mining camps, particularly in lesser-known and underexplored regions. During periods of funding reductions, exploration companies can use the additional geoscience knowledge to continue their exploration activities for the benefit of all of Québec.

Québec has major strengths that can be used to develop its mineral potential. In 2015, it was ranked 14th among 109 jurisdictions for the quality of its geoscientific database. This database would not be as complete without recurring budgets dedicated to acquiring and sharing new geoscience knowledge (mining heritage component of the Natural Resources Fund) and compiling the statutory work performed by exploration companies.

Québec's geoscience data are stored in the MERN's geomining information system SIGÉOM. This unique georeferenced system contains all data collected over the past 150 years. It was built with the annual results of research, prospecting and exploration work conducted by the MERN, exploration and mining companies, and universities. The SIGÉOM information system is a valuable asset for promoting the province's mineral potential, and an important tool for exploration companies.

It is important to continue investing in knowledge acquisition in order to stimulate exploration work in new areas, to reduce the risks related to exploration and to increase the chances of discovering new ore deposits.

To date, the MERN has spent an average of \$12 million each year to acquire new geoscience data, and another \$8 million annually to support R&D and entrepreneurship in various forms. Innovation has made it possible for Québec companies to remain competitive by staying on the cutting edge of worldwide technological advances, and to maximize the economic, environmental and social benefits for all Quebecers.

The mining heritage component of the Natural Resources Fund was established in 2008, funded by mining taxes. In the 2015-2016 Budget, the government added another \$3 million per year, for three years, to the geology knowledge acquisition budget for the land covered by the Plan Nord.



Photo: MERN

Action – Continue to fund the mining heritage component of the Natural Resources Fund

To ensure stable knowledge acquisition programming and to continue R&D funding in the mining sector, the government will extend, for ten more years and under the same conditions, the funding it has provided to the mining heritage component of the Natural Resources Fund.

Action – Improve the SIGÉOM information system to adhere to new standards

To improve the user-friendliness of the SIGÉOM information system and allow exploration companies and the general public to use it to its full potential, the system will be updated to meet standards that will make it Web 2.0 compatible. The MERN will dedicate \$368,000 to this project in 2015-2016.

Action – Add a new peat moss component to SIGÉOM

The MERN will add a new peat moss component to SIGÉOM. Information gathered from 1950-2000 will be gradually entered into the system until its completion in 2016. Making these data available to the peat industry will reduce their wetland mapping and research costs.

Objective 4 – Stimulate R&D investments

Research and development (R&D) activities require considerable company investments. The amount of R&D expenditures varies from one industry to another. In the mining, petroleum and natural gas sector, companies buy equipment that was developed through R&D conducted by other sources, such that R&D costs are lower for this sector.

Companies may deem R&D investments too risky, especially considering they may not benefit from the results in the short term. In addition, funding R&D may be difficult for companies with few assets to offer as security to financial institutions, or those dealing with adverse economic conditions.

In Québec, more than a third of financial aid intended to stimulate R&D in the mining sector is provided as tax credits. The remainder is in the form of grants. In 2011, \$3.42 million was given to mining and exploration companies through Québec's R&D tax credit. The majority, \$3.1 million, went to mining companies.

R&D credits granted to the mining sector represent only 0.5%, on average, of all R&D credits granted to companies. However, the situation is highly dependent on company size: exploration companies received 0.07% of the amount provided to SMEs, whereas mining companies received 1.1% of the amount provided to big businesses.

Action – Optimize R&D support for exploration companies

The MERN and the MFO will evaluate the R&D support provided to mineral exploration companies to ensure they benefit as much as other SMEs.

Objective 5 – Reduce administrative formalities and delays related to claim acquisition

Companies are working in increasingly competitive environments. Regulatory and administrative formalities are considered the second-biggest concern of SMEs, behind taxation. Most OECD countries have adopted strategies and policies meant to limit the regulatory and administrative burden faced by mining companies.

The MERN has enacted several measures to reduce the administrative burden for exploration companies. The mining title management system GESTIM allows companies to complete claim-related transactions online. The average delay involved in processing a map-designated claim — which used to vary between 90 and 180 days in the year 2000 — has been brought down to a maximum of 20 days in 2015.

Action – Simplify administrative processes and reduce claim acquisition delays

The MERN will implement a series of measures to simplify the claim acquisition process and reduce processing delays. Requests for claims on which there are no mining activity constraints will be processed within one business day. Claim acquisition delays will be published on the MERN's website.

Action – Implement measures to reduce sources of discontentment related to the application of the Mining Act

As part of its role on the Mining Advisory Committee, the MERN will, with other members, examine the causes for discontent that have resulted from the application of the Act and will identify measures to remedy the situation. This committee is composed of representatives from the Association de l'exportation minière du Québec, the Québec Mining Association, the Québec Peat Moss Producers Association, the Union des municipalités du Québec, the Fédération québécoise des municipalités du Québec, the "*Pour que le Québec ait meilleure mine!*" coalition and academia.

FOCUS AREA – MINING

The first commercial mines in southern Québec, principally for zinc, silver, copper and asbestos-chrysotile, date back to the mid-19th century. During this period, the State declared ownership of the province's subsoil and, by introducing various legislative and administrative measures, acted to govern and promote exploration and mining in Québec.

The mining industry experienced a boom when, starting in 1845, several mines opened in the Outaouais region for industrial minerals such as graphite, mica, feldspar and apatite. But the industry really took off in the 1920s in the Abitibi region with copper and gold. After World War II, the first segment to experience growth was asbestos-chrysotile, followed by copper and, some time later and farther north, iron. Around the turn of the 21st century, nickel mines began opening in Nunavik, in Québec's Far North.

ACTIVE MINES

In 2016, Québec has 26 active mines, 14 of them underground. Mines are found in all regions of the province, even the Îles-de-la-Madeleine, home to Québec's only salt mine. Québec also has two functional mine sites where operations have been suspended: Lake Bloom (iron) and Québec Lithium.



Photo:
Agnico Eagle

Commodities extracted in Québec

Metals	Non-metallic minerals
Antimony	Clay (bricks)
Silver	Lime
Bismuth	Cement
Cadmium	Graphite
Cobalt	Ilmenite
Copper	Mica
Iron	Stone
Nickel	Sand and gravel
Niobium	Salt
Gold	Silica
Platinum	Sulphur
Lead	Talc
Selenium	Titanium (dioxide)
Tellurium	Peat moss
Zinc	

Source: *Institut de la Statistique du Québec*

The wide range of commodities mined in Québec, from antimony to zinc (29 in all), reflects the province's great geological diversity. And it makes Québec the most diversified mining industry in Canada.

Québec's total value of mineral production is the second highest in Canada, behind Ontario. It is the leading Canadian producer of iron ore and zinc, and the second-biggest producer of gold.

MINING PROJECTS

In 2016, Québec has 28 mining projects that had reached at least the deposit appraisal stage. Some of these projects are focused on commodities that are no longer mined in Québec, such as apatite and lithium, or those that have never been mined in the province, such as diamonds and rare earths. The realization of some of these projects will yield promising prospects for growth industries; for example, the manufacture of electric battery components for use in the electric transportation industry.

In 2015, two projects were at the development phase: DSO (iron) and Renard (diamonds). These projects should reach commercial production in 2016. Renard will become the fifth active diamond mine in Canada, making Stornoway the only junior exploration company to develop a diamond mine in Canada.

Five expansion projects were also underway at operating mines over the course of the year: Raglan (nickel), Lac Tio (ilmenite), Bracemac-McLeod (zinc), Canadian Malartic (gold) and Goldex (gold).

PEAT MOSS PRODUCTION

Québec's annual peat moss production is approximately 10 million 170-dm³ bags worth about \$100 million. Québec has a dozen producers that extract peat moss from about 30 peat bogs, mainly in the Bas-Saint-Laurent, Centre-du-Québec and Côte-Nord regions.

The Québec peat moss sector represents 2,150 direct jobs, 600 of which are related to peat moss harvesting and 1,550 to other activities in the industry. Aside from harvesting, the industry also manufactures value-added products (horticultural substrates), designs harvesting and packaging equipment, and targets environmental applications (biofilters for treating wastewater; absorbents).

SAND AND GRAVEL PRODUCTION

More than 18,000 sand or gravel extraction sites in Québec are regulated by the MERN. Not all these sites are being worked; some are inactive or closed. The province's sand and gravel production has diminished over the past decade. From 32.8 million tonnes in 2004, production dropped to 22.2 million tonnes in 2013. That same year, more than 250 producers employed an average of 800 person-years, and sales reached \$121.4 million. The price of sand and gravel has been rising: from only \$4.11 per tonne in 2004, the price had climbed to \$5.66 in 2014.

Objective 1 – Build new infrastructure and share existing infrastructure

Northern Québec is hindered by a substantial infrastructure deficit. To remain competitive, Québec's mines must ship their production to market in the most efficient manner possible, at a competitive price and using suitable road, rail and port infrastructures.

The government intends to better organize its transport infrastructure and promote different modes of transportation in the Plan Nord territory. This approach will improve existing transport networks and identify complementary infrastructure that should be constructed.

As part of Québec's Maritime Strategy, the government has pledged \$200 million over five years to accelerate investment in port infrastructure, and it will invest up to \$100 million over the next five years to decontaminate industrial land situated near ports.

As part of the Plan Nord, the government will ensure mining projects have access to suitable rail services, and it will examine the possibility of increasing the capacity and efficiency of rail services between the Labrador Trough and the port of Sept-Îles.

To this end, the government – through Investissement Québec and the Société du Plan Nord (SPN) – will acquire rail and port infrastructure belonging to Wabush Mines Joint Venture and Cliffs Quebec Iron Mining, located in the Pointe-Noire area of Sept-Îles. The government will invest \$66.75 million to acquire these assets.

The government also proposes a model for air transportation that ensures all users, including exploration companies, have access and share costs. The cost of using Hydro-Québec's airfields will be agreed upon between Hydro-Québec and the users. Moreover, the current road network will be fortified by investments to improve highways 389 and 128 in the Côte-Nord region and the James Bay Road in the Nord-du-Québec region.

The Ministère des Transports, de la Mobilité durable et de l'Électrification des transports (MTMDET) will establish a new statute for Northern roads, complete with standards suited to the particular context of the North. It will also implement a new infrastructure-sharing approach in the North, in partnership with the users of such infrastructure. This approach will include specific rules and procedures about how the costs of construction, usage and maintenance will be shared among the different users.

Objective 2 – Promote lower-cost clean energy sources

Mining in a Northern environment costs between 1.7 and 2.8 times more than anywhere else. Because Québec is far from the major markets, particularly the Asian markets, transport costs can easily double the cost of mining. Reducing operating costs, such as energy costs, is an important consideration for Québec mining companies if they are to be more competitive.

Energy expenditures rank 3rd among a mining company's expenditures. In 2011, the cost of energy for mining companies in Québec represented 18.4% of the operating cost. From 2000 to 2013, the cost of energy grew from \$235.5 million to \$569.3 million, mainly due to the remoteness of mine sites, the lack of infrastructure and the higher price of diesel.

During this period, the average cost of diesel fuel more than doubled whereas electricity increased by only 17%, and the fossil fuel share of the total energy cost increased from 49% to 70%. Since then, the cost of fossil fuels has dropped, along with the price of some metals.

Hydroelectricity, after geologic potential, is one of Québec's biggest assets for attracting foreign mining companies. Hydro-Québec charges a preferential rate (the "L" rate) to industrial customers with high power demands (more than 5 MW). Among 22 provinces and American states, Québec has the second-lowest electricity cost for high-consumption customers.

Power supply in remote regions where the majority of mining projects occur is a major issue. The Plan Nord proposes that Hydro-Québec examine the possibility of extending its transport network to supply power to new mining projects and communities that are not on its grid.

The government has taken several initiatives to provide an alternative to traditional fossil fuels. In September 2014, it acquired an equity interest of \$50 million in shares in Gaz Métro (LNG), a \$118-million project. In August 2015, it gave the green light to the construction of a liquefied natural gas plant in Bécancour, an \$800-million project. In September 2015, it announced a \$3.8-million investment from Ressources Québec to allow Pétrolia and its business partner, Tugliq Energy, to set up a pilot plant that will extract and liquefy natural gas. These projects could supply energy at competitive costs to companies in Northern Québec while reducing greenhouse gas emissions.

Objective 3 – Address the high number of retirements

The mining sector employed 13,496 people in 2014. Gold mines and iron mines accounted for more than 50% of direct jobs at 4,046 and 3,257, respectively. Women represent about 17% of the workforce, but they are still under-represented in production trades and occupations (roughly 4%). Total salaries amounted to \$1.4 billion. The average hourly wage, at \$46.07, was among the highest among industries in Québec, for an average annual income of \$101,376.

The number of jobs, although cyclical, increased by 50% since 2001. The increase was much higher for metal mines (84%). Jobs in the non-metallic mineral sector saw a lower increase, on the order of 5%, within the same timeframe.

The mining sector is a major employer in many regions of Québec. The mining industry is often the determining factor in making land-use profitable in remote parts of the province. The Abitibi-Témiscamingue region plays a central role, with 2,983 jobs. The other regions are Nord-du-Québec with 2,885 jobs and Côte-Nord with 3,627.

Just as Québec businesses as a whole must deal with the high retirement rate, so too must the mining industry. Emploi-Québec estimates that 17,150 jobs in the mining sector will need to be filled during the 2015-2025 period. Of this number, 59% will be lost due to labour turnover, particularly through retirements. The jobs that will need to be filled are mainly in the regions of Nord-du-Québec (9,192 jobs), Côte-Nord (4,760 jobs) and Abitibi-Témiscamingue (2,154 jobs). However, if the price of iron regains its level of December 1, 2014, at around \$68 per tonne, the projection will drop to 11,411 jobs, a reduction of 40.6% compared to the initial estimate for the Côte-Nord region and 41.4% for the Nord-du-Québec region.

The mining industry is also confronted with major difficulties in recruiting skilled labour, whether they be metallurgists, mining engineers, geologists, computer specialists, mechanical technicians or heavy equipment operators.

The 10 most in-demand occupations in the mining industry in Québec, 2015-2015

Profession	Percentage of women	Required training
Specialized heavy equipment operator (shovel and truck)	3%	DEP
Heavy equipment mechanic / Hydraulic mechanic / Mobile heavy equipment mechanic	2%	DEP
Metal and ore processing machine operator / Stationary equipment operator	5%	DEP
Industrial mechanic/ Ore processing equipment repairman	2%	DEP
Labourer (services)	9%	-
Long hole driller / Miner-blasters / Truck and scoop-tram operator (underground mines)	1%	DEP
Building caretaker and maintenance worker	16%	-
Mine labourer (surface)	4%	-
Surface driller / Miner-blasters (surface)	0%	DEP
Driller for drift and raise securing	1%	DEP

Source: CSMO-Mines, *Estimation des besoins de main-d'oeuvre du secteur minier au Québec*

Québec is capable of meeting these challenges as it has all the elements to satisfy manpower needs in the mining and metallurgy sectors: specialized institutions, a close relationship between educational institutions and companies, and funding for apprenticeships and continuing education through the Workforce Skills Development and Recognition Fund.

Continuing education plays an important role in preparing the next generation in the mining and metallurgy sectors. It makes it possible to respond swiftly and effectively to the needs of companies, and takes full advantage of the equipment provided to colleges. Colleges can offer current workers and future workers in the industry a means to have their skills and competencies recognized or a program that leads to a college diploma. Nevertheless, developing continuing education in the mining sector must be accompanied by strong financial support from ministry partners and companies.

Another way of addressing the imminent labour shortage in the mining sector is to attract and retain women. To do so, it will be necessary to promote the sector's training programs and professions, and to increase the recruitment, hiring and integration of women as students and workers, particularly in production-related trades and jobs. CSMO-Mines works toward this objective by developing a strategy to communicate with target audiences.

Objective 4 – Financially support mining projects

Mining is an economic sector for which capital requirements are very high. Investments in major mining projects amount to hundreds of millions or even billions of dollars. One of the biggest challenges facing the mining industry is financing. The magnitude of investments needed to develop a natural resource project means that promoters turn to stock markets as their preferred source of financing. However, stock market volatility complicates financing for mining companies, even more so for junior companies.

The large number of institutional and State-based investors gives Québec a distinct advantage over other provinces. For example, the Caisse de dépôt et placement du Québec and the Fonds de solidarité FTQ are involved at every stage of the cycle of mining project development. Ressources Québec, through its own funds and as an agent for the Economic Development Fund and the Mining and Hydrocarbon Capital Fund, is involved with projects starting at the preliminary economic assessment stage. SOQUEM is involved in projects at earlier stages. Other sources of financial assistance for exploration-stage projects include SIDEX, which has a mandate to support the diversification of exploration in Québec, and the James Bay Development Corporation.

To encourage the responsible mining and processing of mineral substances for the benefit of all Quebecers, the government set up the Mining and Hydrocarbon Capital (MHC) Fund. The main purpose of this fund, with a budget of \$1 billion, is to acquire equity interests on behalf of the government in companies that extract mineral substances in Québec and, under certain conditions, companies that process them within the province. At least \$500 million will be invested in companies that are active in the Plan Nord territory.

The investment policy of the MHC Fund, recently approved by the government, specifies guidelines for project assessment, investment and divestment decisions, and fund management. The policy, which was adopted on July 14, 2015, represents a collaborative effort between the Minister of Economy, Science and Innovation, the Minister of Finance, the Minister of Energy and Natural Resources, and the Minister for Mines. The investment committee is composed of representatives from the three ministries and Investissement Québec. The investment policy establishes the criteria to be used by the committee as the basis for its investment or divestment recommendations. Of the \$1-billion budget, a maximum of \$800 million will be reserved for mining projects, \$200 million of which is intended for pre-feasibility and feasibility studies.

Québec is not the only government to invest directly in mining companies. From 2009 to 2012, state-held investments around the world have grown at an annual rate of 22%. Some countries use these investments to secure procurement, in some cases even by running foreign mines. The majority of these investments are made by Asian investors.



Photo:
Stornoway Diamonds



Objective 5 – Accelerate the processing of authorizations required to start a mining project

The mining industry is highly regulated. The gradual increase in regulations and associated administrative procedures may represent a heavy burden on companies.

The government has made a clear commitment to restoring the climate of confidence needed to attract investments. The rules governing mining development are in the public domain. They will stay in place to ensure stability and predictability, which are vital to mining investors. That said, it is still possible to improve in other ways, such as simplifying administrative processes and reducing claim processing delays.

Bringing a mining project to fruition requires multiple permits and authorizations. About twenty provincial acts may apply at one stage or another of the project. A dozen ministries and organizations are directly involved. Different levels of government come into play along the way, and a number of environmental protection laws and regulations may also apply, depending on the nature of the mining project.

The regulatory context is so complex it can be easy for a project proponent to lose their way. Add to this the problems of delays, duplication and coordination difficulties.

Furthermore, in 2013, the Mining Act introduced new obligations that could incur additional delays if the process is not properly synchronized, particularly the obligation to hold public hearings. Moreover, the conditions to obtain a mining lease were tightened: the proponent must obtain their certificate of authorization from the Ministère du Développement durable, de l'Environnement et de la Lutte contre les changements climatiques (MDDELCC) and ensure their rehabilitation and restoration plan has been approved before submitting a lease application; the proponent must also submit a feasibility study and a scoping and market study for processing within Québec.

Action – Make public a normative framework for the mining industry

The MERN will make public a normative framework for the mining industry that outlines the steps to obtain the main permits, leases and authorizations necessary for project development.

Action – Set maximum delays to process mining leases and exclusive leases to produce peat

The MERN will set maximum delays for granting mining titles and for approving rehabilitation and restoration plans. These delays will be published on the MERN's website and in the Ministry's annual report. Guides will be made available to inform project proponents and the general public about the new provisions in the Mining Act.

Action – Create a single point of access to facilitate the processing of mining leases and exclusive leases to produce peat

The MERN, the MDDELCC and the Ministère des Forêts, de la Faune et des Parcs (MFFP) will create a single point of access to coordinate the delivery of the various permits required for mining projects and peat harvesting projects. This will ensure permits are received within a reasonable timeframe. By using a single point of access, it will be possible to identify incomplete files upon application, quickly detect any situations that may lead to additional delays, and ensure each ministry respects the processing deadlines.

This action does not change the MERN's obligation to consult and, if necessary, accommodate Aboriginal communities before granting an authorization. As such, the Ministry continues to implement the principles and modalities announced in the Interim Guide for Consulting Aboriginal Communities. Likewise, the Ministry's other existing obligations or commitments with regards to the rights of Aboriginals will not be affected.

Objective 6 – Ensure stable and predictable research funding and integrate research findings

Currently, eight research organizations have ratified financial assistance agreements with the MERN. The total grants planned for 2015-2016 are on the order of \$4.8 million.

Action – Establish a normative framework for research

To better plan research grants in the mining industry, the MERN will establish a normative framework early in the 2016-2017 fiscal year. These grants will support research projects that rely on some form of specialized technical assistance. The minimum contribution from the company will be 30% of the project cost. The MERN's contribution, 40%, will be provided by the mining heritage component of the Natural Resources Fund. The remaining 30% will come from other ministries and organizations. The results will be evaluated every five years.

The program will comprise six research themes: improving productivity; ore processing methods; technologies that reduce the environmental footprint, including the transition to a low-carbon economy; social acceptability; mine site rehabilitation; and local and Aboriginal workforce training.

The program will make it possible for organizations such as Consortium de recherche et d'innovation en transformation métallique (CRITM) and PROMPT-Québec, to conduct collaborative and precompetitive research. PROMPT-Québec is a non-profit organization that financially supports R&D and ICT partnerships between companies and universities. Project funding may be implemented through an agreement between the MERN and the MESI.

The MERN will ensure that research on the best practices for documenting social issues and on the social accountability of projects will be integrated into research initiatives focusing on social acceptability.

Action – Integrate the findings of the Joint Research Program on Sustainability in the Mining Sector

As part of the FRQNT's Joint Research Program on Sustainability in the Mining Sector, the MERN will set up a knowledge integration committee to ensure project monitoring, and to establish connections between results, their dissemination and knowledge transfer.

The MERN is funding the Joint Research Program on Sustainability in the Mining Sector in the amount of \$15.25 million over five years (2012-2017) through the mining heritage component of the Natural Resources Fund. The FRQNT contributed \$1 million and manages the program. The mining industry must provide at least 10% of a project's cost, either financially or in the form of goods and services. Having industry partners involved in developing the projects makes it easier to integrate the research findings.

Research subjects are grouped along five main lines: deep exploration and mining; mining sector development in Northern environments; energy economy and greenhouse gases; environmental and community impacts of mining development; and development and optimization of geomatics tools.

Objective 7 – Improve productivity in the mining industry and support the commercialization of research results

There has been a significant drop in worldwide productivity in the mining sector. The mining sector invests, proportionally, 80% less for implementing new technologies or processes compared to the fossil fuel sector.

The mining industry affords little space to innovation and, when metal prices are high, the focus is on its revenues.

Furthermore, capacity utilization for underground mines is half that of open pit mines (35% vs. 70%), hence Québec's interest in developing new underground mining technologies.

Reserves for certain types of ore are being depleted and some metal grades are at levels that make processing lengthier and costlier. Québec would thus benefit from experimenting with or developing new technologies that are likely to improve mining performance.

Better communication and integration between a company's different functions (e.g., drilling, blasting) can also help improve productivity. In this regard, there are new technologies, such as the Internet of Things, which can enable the exchange of security-enhancing information and data, provide an overview of mining operations, monitor production and track ore.

That being said, companies are often reluctant to make the necessary investments to improve productivity. They generally count on the market to bounce back to make their operations cost-effective. Although gains in productivity are possible by relying on cost reductions in the short term, only innovation can yield long-term results.

In addition, Québec companies have great difficulty in commercializing their R&D techniques and products, and the efforts do not always translate into patents or intellectual property.

Tax credits and direct financing are two ways to support the commercialization of R&D techniques and products.

Action – Financially support COREM, a consortium of applied research for the processing of mineral substances

To increase the productivity of mining companies, an amount of \$1,125,000 was granted to COREM in 2014-2015 by the MERN and the MESI. The government will continue to financially support COREM in 2015-2016 and 2016-2017. COREM is a consortium of applied research for the processing of mineral substances, whose mandate is to improve the competitiveness of industrial operations by developing and transferring innovative technologies in accordance with the goals of sustainable development.

Action – Examine the possibility of implementing support measures for the commercialization of research results

The Québec Taxation Review Committee recommends implementing budgetary measures to help SMEs commercialize their R&D results. The MERN, with the MFQ and the MESI, will examine the possibility of following up on the committee's recommendation.

Action – Ensure access to commercialization support services and funding for innovation

The MISA Group, a network of mining innovation experts and a niche of excellence in the ACCORD program, will become the Québec arm of the Center for Excellence in Mining Innovation (CEMI), a pan-Canadian network that provides commercialization support services. This project will ensure mining-sector companies in Québec have access to such services, as well as funding for innovation.

FOCUS AREA – PRIMARY METAL MANUFACTURING

Primary metal manufacturing constitutes a strategic sector for economic development in Québec, particularly in outlying regions.

This sector — essentially the metallurgy industry — comprises establishments that primarily engage in smelting and refining ferrous and non-ferrous metals from ore, pig iron or scrap metal. Metal alloys are made by introducing other chemical elements.

The main metals manufactured in Québec are aluminum, steel and cast iron, copper, zinc and iron alloys. The processes used are pyrometallurgy (heat), hydrometallurgy (chemical products), electrometallurgy (electrolysis) or mechanical methods (force).

It is interesting to note that primary metal manufacturing in Québec uses not only ore that is extracted in Québec, but also ore or metals from elsewhere in the world that are shipped to the province.

According to the 2013-2015 portrait of the Québec metallurgy industry issued by the sector workforce committee, the province's industry is composed of more than 20,000 workers in 124 establishments. Among the major employers are multinationals Alcoa, ArcelorMittal, Glencore and Rio Tinto. The economic value of primary metal manufacturing in Québec and Canada is significant. In Québec, it represents 2% of the province's GDP and accounts for 44.8% of Canada's GDP generated by the industry.

As an important component of the Strategic Vision, the metallurgy industry in Québec will play an even bigger role in the province's economic growth. To achieve this, the industry must meet various challenges and seize opportunities for expansion.

Objective 1 – Strengthen the position of Québec's industry

Improving productivity and competitiveness is a primary concern for Québec's metallurgy industry. One of the main challenges facing companies is how to maintain a competitive position within global markets.

The issue of industry competitiveness may be broken down into specific aspects that need to be examined more closely, notably:

- ▶ workforce renewal and training – this is the mobilizing issue for CSMO-Métallurgie, the sector workforce committee on manpower in the metallurgy industry of Québec;
- ▶ sufficient procurement of electric power and natural gas to meet industry needs – this subject will be addressed by the Energy Policy 2030;
- ▶ securing the procurement of raw materials – this will become an issue for several Québec companies in the short and medium term as mining ceases at some deposits;
- ▶ the ability of the Québec subsidiaries of large multinationals to stand out and obtain growth investments, or even sustaining capital – this is an issue for most of the major processing sites in Québec;
- ▶ the difficulty in dealing with uncertainties and delays related to Québec's environmental laws and regulations (for example, the procedure for environmental impact assessments, the cap-and-trade system for greenhouse gas emissions) – this is a reality for industries with extensive environmental footprints.



Photo: Minalliance

Action – Develop an action plan for Québec’s metallurgy industry

The MESI, which has coordinated the activities of the Table de concertation de l’industrie métallurgique since 1993, will take steps to adopt an action plan for the industry. The roughly twenty member companies and associations, as well as other key players in the sector, will examine the issues facing the metallurgy industry and propose fortifying initiatives.

It is important to note that solutions to development issues specific to Québec’s aluminum industry, which includes major aluminum producers Rio Tinto Alcan, Alcoa and Aluminerie Alouette, were unveiled in June 2015 as part of the Québec Aluminum Development Strategy.

Québec Aluminum Development Strategy (QADS)

QADS proposes concrete actions in response to targeted business opportunities and concerns brought up by industry stakeholders. The implementation of 27 measures composing three main focus areas requires a \$32.5-million injection from the government over the first three years (2015-2018).

QADS gives the province’s aluminum industry a clear and unified vision to attain its ambitious goal of doubling the amount of aluminum processed in Québec over the next ten years. The strategy will also facilitate access to aluminum for processors in the province and support private investment projects that will enhance the aluminium processing value chain.

As for the manufacturing of primary aluminum, the Québec government intends to support investment projects in its role as partner to producers. Specifically, the government will make hydroelectricity available for economic development, based on the benefits of these projects for Québec.

Objective 2 – Promote the growth of primary metal manufacturing in Québec

Part of Québec’s mineral production locally undergoes primary manufacturing at one of the province’s smelters, refineries, cement plants, or lime or clay processing plants.

Market dynamics are such that many primary metal manufacturing establishments are highly specialized and adapted to large-scale production using concentrate sourced from several mines. The commissioning and maintenance of these facilities requires major investments, which is why it is so important for these companies to achieve economies of scale to ensure the continued profitability of their metal manufacturing establishments.

The Mining Act requires that an application for a mining lease be accompanied by a scoping and market study for processing in Québec. This type of study is also required before extraction commences on a mining concession and every 20 years thereafter, and upon renewal of a mining lease. A scoping and market study identifies segments of the market for which it would be possible to develop a primary metal manufacturing project in Québec.

In collaboration with Investissement Québec, the government intends to promote the advantages of doing business in Québec to the mining industry and other major investors in order to attract more primary metal manufacturing investment projects.

The projects of choice are those with a significant value-added manufacturing component and those that would result in multiple spin-offs for the entire value chain in Québec's metallurgy industry.

In addition to the focus on processing more of Québec's resources, projects with access to ore or metals elsewhere in the world will also be encouraged providing these projects also generate wealth for the province.

To achieve this, a number of tools are available that build on private investments.

Action – Finance companies that process ore and metals from Québec

The Mining and Hydrocarbon Capital (MHC) Fund can be used to finance projects that were envisioned in a scoping and market study with regards to processing in Québec. The goal of the fund is to maximize the benefits arising from contributions made by the government to companies that extract mineral substances in the domain of the State, as well as those that process such substances provided that the mineral substances being processed were first mined in Québec by the same company or an affiliated company.

Hydro-Québec's economic development rate

In fall 2014, Hydro-Québec implemented an economic development rate that applies to new clients who consume at least 1,000 kW and existing clients who are expanding their facilities. It provides for a reduction of 20% applied to the "L" rate. To qualify, companies must attest that this rate is a determining factor in their decision to locate their facilities or increase their production in Québec.

Tax measures that promote primary metal manufacturing

Processing allowance: Mining Tax Act (CQLR, chapter I-0.4)

To encourage mining investment, an operator that processes ore mined in Québec may receive an allowance based on cost of the assets used to process the ore (processing assets). This allowance corresponds to 10% of the cost of the processing assets for an operator who produces concentrate, 10% for an operator who processes ore from a gold or silver mine, 13% for an operator who engages in smelting or refining outside Québec, and 20% for an operator who engages in smelting or refining within Québec. The amount is capped at 75% of the annual earnings from a mine.

Investment tax credit: Taxation Act (CQLR, chapter I-3)

To encourage the processing of ore extracted in the province, the government set up an investment tax credit for the goods used in smelting, refining or hydrometallurgy operations involving ore other than gold or silver. Starting on January 1, 2017, the credit can reach 24% providing the admissible goods are obtained in a remote resource region (Abitibi-Témiscamingue, Côte-Nord, Nord-du-Québec or Gaspésie—Îles-de-la-Madeleine). The admissible goods must be worth at least \$12,500.

A tax holiday for large investment projects: Taxation Act (CQLR, chapter I-3)

A 15-year tax holiday is offered to companies that process metals. To qualify, the investment threshold is \$100 million, or \$75 million if the investment is made in outlying regions. The tax assistance cannot exceed 15% of the admissible investment.



Photo: Minalliance

The growth of the metallurgy industry in Québec can also be spurred on by the rapid expansion of innovative companies and by technological developments.

Companies can count on the support of the government through the implementation of assistance programs adapted to their type of project. One such program is Créativité Québec.

Créativité Québec

This program is aimed at companies with innovative projects that need additional financing to acquire new products or processes. Companies in the primary sector are eligible provided they have secondary or tertiary processing. The program offers a loan or a loan guarantee covering up to 70% of the shortfall, short- or long-term financing (up to 10 years) for anywhere between \$50,000 and \$5 million, a possible moratorium on repayment of the principal for up to three years, and a possible equity interest in certain cases. The financing of each project must include a component from private sources that is equivalent to at least 20% of the total cost of the project.

The emergence of new metallurgical processes, notably in the fields of hydrometallurgy and electrotechnology, will lead to a greater demand for skilled labour and related training programs. Companies will have to turn to areas of new expertise, both in terms of plant operators (chemical engineering) and consultants (feasibility studies, plant engineering).

Action – Support research into metallurgical processes for lithium and rare earths

The Institut national des mines will set up a working group composed of university researchers and resource people from mining companies who are interested in conducting research into new metallurgical processes for commodities with applications in new technologies.

This working group will conceive and supervise pre-competitive research projects to accelerate the development of original metallurgical processes that consume less energy and minimize environmental impacts, particularly for lithium and rare earths. The Institute for Research on Mining and the Environment (IRME UQAT-Polytechnique) will be approached to help achieve this goal.

Special attention will be given to the pilot phase, an essential step in developing new processes or technologies.

This step uses scaled-down industrial equipment to scale up laboratory results. By reproducing the commercial production line as faithfully as possible, the pilot phase can be used to correct technical problems related to the process.

More emphasis needs to be placed on this prerequisite phase, as it leads to successful industrial-scale implementation and reduces technical and technological uncertainties.

Action – Develop pilot-plant services for hydrometallurgical processes

Mining companies have access to in-province hydrometallurgical services at research institutions (universities and colleges) and collegial centres for technology transfer (*centres collégiaux de transfert technologique*). However, certain specialized hydrometallurgical services are only available outside Québec.

Several initiatives are currently underway to offer new subcontracted pilot-plant services to the metallurgy industry. The Québec government has agreed to support such an offer. Companies would have access to equipment, services and technical knowledge at the pilot plant centre, which would reduce costs and reassure potential investors about the performance of their new processes.

Metal manufacturing companies in Québec also need be able to count on reliable and innovative suppliers and partners to meet their needs.

In this regard, the ACCORD program, which has been in place since 2002 in 15 regions of Québec, continues to play a major role in the development of many economic sectors.

In the mining and metallurgy industries, with the exception of aluminum, there are three niches of excellence: the MISA Group; *Ingénierie des procédés industriels, miniers et métallurgiques* (IPIMM), which specializes in niche engineering and is based in the Côte-Nord region; and *Valorisation de la tourbe*, a peat moss organization in the Bas-Saint-Laurent region.

The ACCORD program aims to build a regional system that is both competitive and productive at the North American and global level. The participating companies provide full coverage of the value chain in each activity sector. The program has private and public stakeholders, including universities and research centres. It brings together business people and contractors in the same region who have a common vision for their activity sector, and who will work together to elaborate a long-term development strategy.

A critical link in the value chain of Québec's mining and metallurgy sectors is the network of suppliers and equipment manufacturers who provide a wide range of goods and services to companies working in these sectors.

FOCUS AREA – NETWORK OF SUPPLIERS AND EQUIPMENT MANUFACTURERS

Objective 1 – Improve SME recognition and focus on networking and complementary expertise

In the mineral resource supply chain, equipment manufacturers and suppliers of goods and services are mostly small and medium enterprises (SME): 90% have revenues below \$10 million, and 84% have fewer than 100 employees. They do not only operate in resource regions; one-third are located in the regions of Montréal and the Montérégie.

According to Sous-traitance industrielle du Québec (STIQ), a multi-industry association of Québec-based manufacturers, there are several business opportunities in the Côte-Nord region, but the suppliers and equipment manufacturers are too small to take advantage of them.

In a context where supply chains are global and the prime contractors place orders with big businesses, it is difficult for SMEs to obtain contracts without combining forces. Therefore, they must count on their key competencies and find partners with complementary expertise.

Slowdowns in the mining industry pose a big risk for suppliers and equipment manufacturers. However, the risk is lower for those who also have contracts with businesses in other activity sectors. Industrial suppliers work with several other sectors, notably pulp and paper, electric power, construction and transportation.

This diversification provides several advantages. It makes suppliers more flexible and thus better able to withstand the difficult periods that often hit the mining industry. And it also allows them to share technological expertise with other sectors.

The most dynamic SMEs among the suppliers and equipment manufacturers with growth projects may qualify for support through a MESI program known as PerforME — *Stratégie d'accélération des projets d'entreprises performantes*.

Five investment partners — Caisse de dépôt et placement du Québec, Capital régional et coopératif Desjardins, Fondation de la CSN, Fonds de solidarité des travailleurs FTQ and Investissement Québec — have created a \$50-million fund to provide companies with easier access to capital that can be used to finance and carry out projects.

The MESI, through its regional branches, offers strategic consulting support to companies anywhere in Québec. This service consists of analyzing the different functions of a business and determining priority interventions for each, while taking into consideration the needs of the organization.



Photo: Mines Richmond

Action – Encourage partnerships between suppliers and equipment manufacturers in different regions

The mining and metallurgy niches of excellence in the ACCORD program will be contacted to help forge partnerships between suppliers and equipment manufacturers with complementary products and expertise. This will increase their critical mass and improve performance and competitiveness, resulting in a greater impact on both domestic and foreign fronts.

As an example, the Réseau de la transformation métallique du Québec (RTMQ), a niche of excellence in the ACCORD program, is currently conducting a strategic surveillance project in natural resource sectors to better position Québec suppliers for major projects. The RTMQ is also conducting a networking program between Aboriginals and manufacturing companies to facilitate the bidding on set-asides during major projects.

Furthermore, the Société du Plan Nord (SPN) will set up a commercialization office to inform local and regional companies, as well as all companies across the province, about the goods and services needs of prime contractors when working in the Plan Nord territory.

Objective 2 – Promote continuous improvement of operations

Suppliers and equipment manufacturers must strive to improve performance and keep close ties with prime contractors to better understand their priorities and the reality in which they operate.

In recent years, the majority of mining companies implemented operational optimization and continuous improvement services. Continuous improvement techniques should be applied and adapted to the entire industry.

Action – Test the application of an industry-wide continuous improvement process

The MISA Group will partner with Mouvement québécois de la qualité to coordinate three continuous improvement pilot projects that will be carried out with companies in the mining sector. The MISA Group will also partner with a university to produce a map of the mining value chain, and a customized continuous improvement training program will be developed for the mining sector.

Objective 3 – Intensify foreign marketing efforts

Half of all SME manufacturers have attempted to develop an export market. They succeed 50% of the time.

In the mining sector, exported products are targeted at exploration (drilling equipment, geomatics software, remote sensing instruments), mining (drilling equipment, communications equipment for confined spaces, mine support structures, ventilation systems, portable crushing plants, mining platforms) and ore processing (devices for measuring ore loads, grinders, flotation plants).

Export projects are increasingly numerous and varied. The experience gained on the metal manufacturing market by some of Québec suppliers places them in a position to take over from foreign suppliers. In addition, the province's suppliers are more competitive when the Canadian dollar is weak. Thus, Québec suppliers and equipment manufacturers must be open to the idea of exporting, and should increase their marketing efforts outside the province. As they endeavour to gain a better foothold in foreign markets, Québec companies will have the advantage if certified according to quality and environmental standards.

In addition to being properly certified, these companies want the added advantage of being both well-informed about the international competition and prepared when they meet potential customers and partners outside Québec. For this, they can count on the MESI, which offers services to the province's SMEs through its Québec Export agency in collaboration with federal ministries and organizations — such as the Foreign Affairs, Trade and Development (MFATD), Export Development Canada (EDC), Canada Economic Development (CED) — and ORPEX, a regional organization in Québec that promotes exports. The objectives are to help SMEs reach technological and commercial partnership agreements, to integrate Québec businesses into the global supply chain for the mining industry, and to export their products and services. The services include, among other things, consulting advice and assistance adapted to the target markets, participation in trade missions, and hosting or organizing events for international buyers visiting Québec.

Action – Elaborate a development strategy for markets outside Québec for mining-sector equipment manufacturers and service providers

Export-Québec, the MESI's team dedicated to helping exporters, will collaborate with government and regional partners to prepare a new development strategy for 2016-2019 aimed at markets outside Québec for equipment manufacturers and service providers in the mining sector. The strategy will represent a concerted approach that draws on the synergy between players in export development to support mining-sector SMEs that export.

Objective 4 – Improve the ability of Québec companies to stand out through sustainable development

The majority of mining, oil and gas companies are equipped with corporate social responsibility strategies (CSR), and they strive to incorporate CSR performance requirements into their tendering and procurement procedures. SME suppliers in the mining sector should position themselves as key players that can satisfy the CSR strategies of prime contractors, on local and international markets, similar to what is happening in other sectors, such as the aerospace, plastics and aluminum industries.

Action – Address the issue of corporate social responsibility awareness and positioning for SMEs

Several of the actions in the Strategic Vision will address concerns about the positioning of Québec's suppliers and equipment manufacturers in terms of meeting the eco-responsible requirements of mining companies. Moreover, as part of the Government Sustainable Development Strategy 2015-2020, the government will implement initiatives to support and train SMEs on incorporating sustainable development into their business models to gain a stronger foothold in responsible supply chains.

Objective 5 – Respond to skilled labour needs in the metal manufacturing sector in outlying regions

New provisions of the Mining Act emphasize the importance of ore processing in Québec. Metal manufacturing companies generate significant economic benefits. Some of these benefits translate to job creation with suppliers and equipment manufacturers. Thus, 68% of jobs with suppliers are generated by the metal manufacturing sector, 26% by the mining sector and 6% by the exploration sector.

These jobs are very diverse: specialized technical services (surveying, geophysics, drilling, machining, assay laboratory, logistics, environment), professional services (legal services financial services, insurance), specialists in structures, machinery specialists (crushers, grinders, travelling cranes), information technology and telecommunications, transportation services and transportation equipment, energy, R&D, consulting engineering, health and safety, and training.

In 2013, the mineral resources supply chain consisted of a total of 490 companies that generated nearly 35,000 jobs and \$30 billion in annual revenue. The trades in this sector require professional training. SMEs in some regions have difficulty finding candidates.

In the two main trades, welder and machinist, the number of graduates continues to decline. Moreover, very few workers without a vocational studies diploma reach expert status. Many experienced workers are retiring, but the next generation will be too few to replace them. Although many companies offer attractive working conditions, it is not enough to solve the skilled labour shortage problem in this sector. Thus, many companies recruit foreign workers.

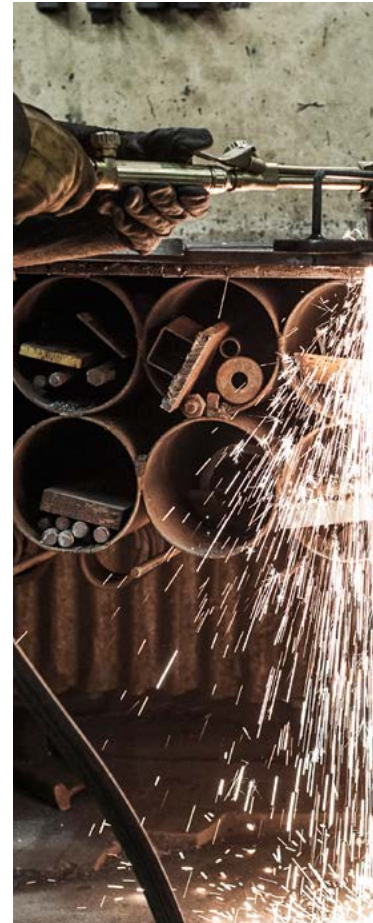


Photo: Mines Richmond



Action – Offer apprenticeships to welders and machinists

The Ministère de l'Éducation et de l'Enseignement supérieur (MEES) is paying special attention to welder and machinist trades. Projects that will lead to more apprenticeship opportunities in welding-fitting and machining techniques will be implemented in 2015-2016. Projects likely to increase training enrollment in the Côte-Nord and Nord-du-Québec regions could be envisaged for Northern Québec.

Main trades and occupations in the metal transformation sector

- Welders and Related Machine Operators
- Machinists and Machining and Tooling Inspectors
- Metalworking Machine and Forging Machine Operators
- Labourers in Metal Fabrication
- Manufacturing Managers
- Senior Managers - Goods Production, Utilities, Transportation and Construction
- Other Metal Products Machine Operators
- Contractors and Supervisors, machining, metal forming, shaping and erecting trades and related occupations
- Other product assemblers, finishers and inspectors
- Material Handlers
- Industrial Painters, Coaters and Metal Finishing Process Operators
- Administrative Officers
- Industrial Mechanics
- Sheet Metal Workers
- Drafting Technologists and Technicians
- Ironworkers
- Shippers and Receivers
- Sales Representatives - Wholesale Trade (Non-Technical)
- Machining Tool Operators
- Structural Metal and Platework Fabricators and Fitters

Source: *Perform, Diagnostic sectoriel de la fabrication métallique industrielle au Québec*, April 2014



GUIDELINE 2 – PREVENT AND MITIGATE ENVIRONMENTAL IMPACTS

- ▶ 8 OBJECTIVES
- ▶ 8 ACTIONS

Objective 1 – Continue to rehabilitate abandoned mine sites

To date, the direct and indirect benefits related to rehabilitating abandoned mine sites have amounted to nearly \$50 million per year. Most expenditures are in the form of contracts to the following: consulting firms that provide engineering services (civil and geological engineering); specialized firms with multidisciplinary teams to conduct environmental work (biology, wildlife and plants); consulting engineering firms; universities; research institutions; specialized laboratories; construction contractors; companies that lease heavy equipment; transport companies and lodging services.

Rehabilitation activities were carried out in different regions of Québec, mainly in outlying regions, resulting in greater economic spin-offs for the regions with the greatest number of abandoned mine sites.

Action – Rehabilitate priority sites

The cost of cleaning up the province's abandoned mine sites will be cut in half by 2022. The government will carry out rehabilitation work on a priority basis for the most problematic sites in terms of human health and safety and the environment.

Action – Make public the list of contracts awarded for abandoned mine site rehabilitation

The MERN will post on its website the list of contracts awarded for abandoned mine site rehabilitation.



Photo: Mathieu Dupuis

Institute for Research on Mining and the Environment

The Institute for Research on Mining and the Environment (IRME) is a joint research program between the universities of UQAT and Polytechnique Montréal, in association with several mining partners. IRME focuses on the environment and mine waste management to develop environmental solutions for all stages in the life cycle of a mine. IRME's work yields solutions that have the potential to reduce the financial burden related to mine site restoration and produces environmental technologies adapted to conditions specific to Northern Québec.

Objective 2 – Increase awareness of the new rules concerning active mine sites

In 2013, the MERN set up new regulatory tools to provide a framework for the rehabilitation of active mine sites. The financial guarantee deposited by mining companies must now cover the entire anticipated cost to restore the mine site, and the amount must be paid during the first two years following the approval of the rehabilitation and restoration plan. Moreover, a mining lease cannot be granted before the rehabilitation and restoration plan is approved by the MERN and the MDDELCC has delivered the environmental certificate of authorization. Approved rehabilitation and restoration plans and the amounts required as financial guarantees must be made public.

Action – Make public approved rehabilitation and restoration plans and the amounts of financial guarantees

The rehabilitation and restoration plan approved by the Minister and the amount required as a financial guarantee for each mine site will be made available on the MERN's website through the claims management system GESTIM. Moreover, in its annual report, the Ministry will disclose the global amount of financial guarantees deposited over the course of the year by mining companies.

Objective 3 – Implement land conservation measures

One of the government's commitments in the Plan Nord is to establish and specify conservation measures to protect 50% of the land lying north of the 49th parallel from industrial activities by 2035, including a measure to establish protected areas. More specifically, the government aims to protect 20% of the territory by creating protected areas by 2020, and to introduce a mechanism for allocating the remaining 30% of the area.

The mineral potential of the Nord-du-Québec region is just beginning to emerge. Mineral titles cover only 4% of this territory. Just 15 years ago, nobody would have believed that Québec contains diamond deposits. The same holds true for several other metals and minerals that may one day be discovered in the North. The annual value of mineral production from mines is \$77 million per square kilometre. This is by far the most productive natural resource industry per square kilometre in Québec, despite occupying the smallest area. Therefore, it is necessary to find solutions that establish a climate conducive to mining-related investments while achieving the government's goals for conservation.

Propose solutions to reach government targets for protecting the Plan Nord territory and reconciling economic development, social well-being and environmental protection over 30% of its area

A committee has been formed to propose solutions that would allow the government to reach its targets for protecting the Plan Nord territory and reconciling the economic development, social well-being and environmental protection over 30% of its area. The committee is composed of representatives from the MERN, the MDDELCC, the MFFP, the Secrétariat aux affaires autochtones, the SPN, the forestry and mining industries, Aboriginal communities, non-profit environmental protection organizations and universities.

Objective 4 – Optimize how the mining industry operates within a sustainable development context

Between 2000 and 2010, the international trade in metals quintupled. Using linear economic projections, it would not be feasible to meet the growing needs of emerging countries without compromising the ability of future generations to meet their own. A paradigm shift is needed to move from a linear economy to a circular one.

The circular economy aims to provide goods and services by minimizing the consumption and waste of non-renewable raw materials and energy sources as much as possible. Its diagnostic tools are material flow analysis and life cycle analysis.

The circular economy responds to priority issues through a number of players: governments, who want to secure their procurement of strategic resources; manufacturing companies, who are looking to secure their supply chains; workers, who are looking to safeguard local jobs; and consumers, who need more durable products.

Several countries are currently engaged in a circular economy approach, such as the United Kingdom, France, the Netherlands and Germany. The European Commission intends to assign its members the objective of increasing raw material productivity by 30% by 2030.

Although the mining industry directs its efforts at increasing output in the short and medium term, it is clear that, sooner or later, it will need to adapt to this new trend. In doing so, the industry may find opportunities through new business models to reduce costs and optimize its operations.

The mining industry affects water, land, air and biodiversity. The life cycle analysis approach can be used to better measure these effects. This approach places mining-related impacts in perspective with the entire value chain, from ore extraction and processing to the manufacture of metal products, their applications and the end of their useful life. For example, the carbon footprint, which represents the total amount of greenhouse gases emitted over the life cycle of a product, can be used to steer mining companies to renewable energy sources.

Mechanisms to monitor the environmental and social performance of the mining industry must be developed and indicators must be set. In this regard, the mining industry is already involved in the MDDELCC's environmental monitoring program.

Action – Determine ways to optimize metal consumption and document the impacts of the Québec mining industry on the environment

The Institute for the Environment, Sustainable Development and the Circular Economy (EDDEC) will evaluate the circular potential of selected strategic metals for Québec and identify the main environmental impacts in the value chain for these metals. An amount of \$300,000 per year over three years will be dedicated to this project, funded through the mining heritage component of the Natural Resources Fund. The EDDEC brings together researchers from École Polytechnique de Montréal, HEC Montréal and Université de Montréal.



Photo: MERN



Objective 5 – Stimulate research into mine waste valorization

Between 1970 and 2003, the MERN supported about 50 projects on valorizing mine waste, whether it was waste rock generated by mining operations or tailings from a mill. Only one of these projects reached the commercial stage. Among the initiatives was that of ITEC Minerals, which processed mine tailings at the Manitou site in Val-d'Or to extract metals, particularly gold, silver and copper. More recently, waste rock at the former Sigma mine site in Val-d'Or, belonging to Integra Gold, was used as aggregate for embankments, foundations, concrete and as a source of crushed stone.

Re-using waste rock and mine tailings reduces the mining industry's environmental footprint by reducing the amount to be stored on surface. It also increases the economic potential of the mineral substances they contain.

In 2013, the Regulation Respecting Industrial Depollution Attestations (CQLR, chapter Q-2, r.5) was modified to apply annual duties on tailings deposited in accumulation areas. This regulation creates an incentive for mining companies to reduce the volume of tailings by improving their processes or re-using the tailings in a safe manner. Some projects that were considered economically infeasible just a few years ago could now be profitable.

Action – Add a research niche on mine tailings valorization to the Joint Research Program on Sustainability in the Mining Sector

A research niche on mine tailings valorization was added to the FRQNT's Joint Research Program on Sustainability in the Mining Sector. The research will be funded by the mining heritage component of the Natural Resources Fund up to a maximum of \$500,000 per year over three years.

Objective 6 – Support energy efficiency

The smelting and refining industries in the primary metal manufacturing sector reduced their energy needs by 6.7% between 1990 and 2011, primarily by converting to electric power and natural gas. Greenhouse gas (GHG) emissions dropped by 14% over the same period. However, since marginal abatement costs are growing, it will be increasingly difficult over the years to maintain these same reduction rates.

In drawing up the new Québec Energy Policy 2030, the government declared its intention to influence the energy choices of industrial companies. The Policy should therefore include greater support for converting industrial processes and boilers and improving their energy efficiency, and should encourage energy-efficient practices, particularly by reducing the use of generators that run on diesel or gasoline.

Objective 7 – Develop renewable energy sources

Part of the environmental impact arising from metal production is directly related to the use of fossil fuels in the mining industry. Given that ore grades are increasingly lower and ore deposits increasingly remote, it is reasonable to expect greater energy costs for the industry. Renewable energies may provide a solution to mitigate the negative effects of this trend.

Renewable energies not only reduce the industry's environmental footprint, they also lower energy costs, increase energy security and improve the level of social acceptability for a project.

In order to improve the energy budget of the Raglan nickel mine, which is not linked to the Hydro-Québec grid, the mine undertook a wind turbine pilot project in Nunavik. This project, with an estimated cost of \$22.5 million, was made possible through a \$6.5 million grant awarded to the Tugliq Energy Limited Partnership as part of the Technoclimat and EcoPerformance programs. The company expects to save 2.5 million litres of diesel fuel per year, the equivalent of 6,700 tonnes of CO₂.

The Plan Nord outlined the government's intention to focus on developing clean energies that will allow off-grid power plants that run on diesel to be converted into renewable energy sources.

Action – Evaluate the feasibility of using emerging technologies associated with renewable energy in mining operations

The MISA Group will work with its partner Ecotech Québec to coordinate a project that will evaluate the feasibility of using emerging technologies associated with renewable energy in mining operations. This project will map energy consumption throughout the mining value chain and provide a strategic vision for energy industries that takes into consideration the energy consumption of the mining industry.

Objective 8 – Adopt clean technologies

The Plan Nord represents an opportunity for Québec to become a model of responsible mining development. The adoption of clean technologies will yield new domestic and foreign business opportunities for technologies developed in Québec.

Clean technologies make it possible for companies to reduce costs and improve productivity by adopting new ways of operating, using new products and adjusting their business model. Clean technologies help companies meet environmental standards, particularly those for water safety, and reduce their environmental footprints and green house gas emissions.

Clean technologies should be incorporated into several aspects of mining development, such as energy (replacing diesel-fired generators at off-grid sites for example), waste water treatment, residual materials management and the manufacturing of high-performance construction materials used for Northern roads.

Action – Make mining companies aware of Québec's technological innovations

Ecotech Quebec, the province's cleantech cluster, will hold workshops to bring together mining sector companies with Québec entrepreneurs who have developed technological innovations that could make mining cleaner and more competitive. Ecotech will also hold practical workshops to better understand the clean technology needs of the mining industry. The MERN will dedicate \$24,000 to this initiative during 2015-2016 and 2016-2017.

In addition, Ecotech Québec has set up a virtual forum to help mining companies find solutions to their technological problems. This forum will provide mining companies, suppliers and equipment manufacturers with access to an international network so they may benefit from foreign expertise.



Photo: Justin Bulota, Tugliq Énergie Co.



GUIDELINE 3 – PROMOTE TRANSPARENCY AND CITIZEN PARTICIPATION

- 11 OBJECTIVES
- 15 ACTIONS

Objective 1 – Promote corporate social responsibility

Over the past two decades, international non-governmental organizations, standardization bodies and mining associations launched several sustainable development initiatives.

Towards Sustainable Mining (TSM) is the Mining Association of Canada's commitment to responsible mining that applies to all the association's members. The Québec Mining Association elected to participate as well. The aim is to improve relations with Aboriginals and communities where mining operations are taking place. Other objectives are to find better ways to manage energy and minimize greenhouse gas emissions; to promote responsible mine tailings management; and to have mining companies commit to conservation and biodiversity, emergency measures planning and occupational health and safety protocols. External audits determine whether companies have honoured their commitments. Results are made public.

The AEMQ is currently developing a certification standard to encourage companies to apply sustainable development principles in Québec's exploration sector. To achieve this, the AEMQ is collaborating with the UQAT-UQAM Chair in Mining Entrepreneurship and the MISA Group. The AEMQ's member companies will also participate. The work to date has focused on knowledge acquisition and stakeholder expectations. The design, validation and updating of the standard will take place in the coming months.

Action – Contribute to the preparation of sustainable development certification in Québec's exploration sector

The MERN will contribute to the last phase of the AEMQ's sustainable development certification project, and the MESI will also be involved. The objective of the last phase is to develop a publication and dissemination system for the standard.

As part of the Plan Nord 2015-2020 program, the Ministère de la Santé et des Services sociaux (MSSS), the MESI, the MDDELCC and the MERN have made a commitment to promote corporate social responsibility. They will guide proponents of major development projects in their obligations to the development and well-being of communities in the regions in which their projects are located.



Photo:
Stornoway Diamonds

Action – Create indicators to monitor the social impacts of mining projects

The government will ensure social acceptability is taken into consideration during project assessment, and it will develop indicators to monitor the social impacts of a project as it unfolds.

Moreover, the employment of women should be one of the indicators for monitoring the social impact of a mining project. Mining companies should implement measures to encourage the hiring of women and to monitor hiring objectives, as well as procedures to assess their effectiveness. Other indicators should also be proposed to monitor working conditions.

Action – Monitor labour developments in the mining sector

To improve the cost-benefit analysis of mining development projects, the MERN will collaborate with the Québec Mining Association and the Commission de la construction du Québec to collect data that can be used to build a profile of workers in the mining and construction sectors based on their trade and association with an Aboriginal community. The data will be made public through the MERN's scoreboard on sustainable development indicators for the mining industry, which will be available on the Ministry's website.

As with the equal access program for women in the construction industry, the data can be used to provide a global portrait of the mining industry by trade.

Action – Apply responsible investment criteria to projects submitted to the Mining and Hydrocarbon Capital Fund

The Mining and Hydrocarbon Capital (MHC) Fund will analyze investment projects using social acceptability criteria. Specifically, the MHC Fund will look for clear and transparent communication; a formal collaboration process with local communities, including Aboriginal communities; proper management of the environmental footprint during and after activities; site restoration in compliance with laws and regulations; a financial guarantee payment; an occupational health and safety management process; and an emergency measures plan.

Furthermore, before deciding whether to finance a mining company, the government may assign special consideration to a formal screening and hiring process that promotes the hiring of local and Aboriginal workers as well as the full participation of women in its mining activities.

Objective 2 – Implement the Mining Act

The Mining Act represents important advances in sustainable development and social acceptability by giving local communities access to all information on mining and exploration activities and by encouraging them to be involved through all stages of a mining project.

Claim holders must now notify the landowner and municipalities involved that a claim has been obtained within 60 days after its registration, and they must be informed of any work to be carried out at least 30 days before it starts.

Moreover, the threshold above which proponents of metal mining projects are subject to the environmental assessment procedure has been lowered to 2,000 tonnes per day, and proponents of smaller projects must hold a public consultation in the region in which the project is located. This obligation also extends to applicants for leases to produce peat or leases to extract sand, gravel or stone related to an industrial activity or commercial export.

Mining lease holders must establish a monitoring committee to foster the involvement of the local community in the project as a whole.

Furthermore, several provisions of the regulation focus on citizen participation and the importance of taking into consideration their requests; for example, a proponent is obliged to disclose information on their project, both its advantages and disadvantages, as well as any mitigation measures; the proponent of a small metal mining project must produce a consultation report; and other proponents who initiated public consultations are obliged to provide to the MERN, upon request, all documents necessary to ensure regulatory compliance of said consultations.

The regulation also lays out rules of governance to ensure the members of monitoring committees are independent of the mining company, and it outlines the obligations of monitoring committees to produce annual reports on their activities and expenditures, and to make these reports available online. It gives monitoring committees all the latitude they need to establish rules of functioning that they deem necessary to fulfil their role. Moreover, the composition of the monitoring committee can reflect regional particularities.

These new obligations will be monitored.

Action – Establish a framework for evaluating the new provisions of the Mining Act

The MERN will establish an evaluation framework to ensure the new provisions in the Mining Act are effective and efficient, and it will develop an action plan to assess the results of such provisions (e.g., those relating to claim acquisitions, public hearings and monitoring committees).

Objective 3 – Promote the harmonious co-existence between mining activities and other land uses

One of the major changes in the Mining Act allows regional county municipalities (RCMs) to designate portions of their territory as incompatible with mining activities.

To steer the RCMs in this exercise, the Ministère des Affaires municipales et de l'Occupation du territoire (MAMOT) and the MERN will recommend that the government establish land-use planning guidelines to ensure the harmonious co-existence between mining activities and other land uses. These guidelines will replace the section in the 1994 guidance document on mineral resource development.

In accordance with these guidelines, RCMs would be able to identify and delimit mining-incompatible territories after taking into consideration the concerns of residents and any existing mining rights. They must also avoid allowing sensitive land uses near mine sites. The government will establish a list of activities likely to trigger a designation of incompatibility. An RCM will not be able to withdraw its entire territory from mining activities.

An RCM that modifies its land-use and development plan must do so in accordance with the Act Respecting Land Use Planning and Development (CQLR, chapter A-19.1). This law, which is the responsibility of the MAMOT, allows municipal authorities to regulate or prohibit land uses, structures or works located near zones with specific restrictions in order to mitigate harmful effects, reduce risks and avoid land-use conflicts in their territory. It stipulates that an RCM must hold public consultations before it amends or reforms the plan.

Before a withdrawal of land from mining activity comes into effect, the MERN may temporarily suspend, for up to six months, the right to stake or map-designate claims on territories targeted by incompatible land-use projects. Once an RCM has sent the government the proposed change to its land-use and development plan, the MERN will then study each parcel of land to evaluate its compliance with the government's guidelines. Territories deemed incompatible with mining activities, according to those guidelines, would be withdrawn from mining activities once the boundaries are published on the MERN's map of mining titles.

Action – Submit land-use guidelines and monitor the delimitation of mining-incompatible territories

The MERN and MAMOT will recommend that the government adopt land-use guidelines. To ensure the harmonious co-existence between mining activities and other land uses. The MERN will then monitor the delimitation of mining-incompatible territories.

A number of Aboriginal communities and nations would like to participate in planning mining activities. As the Eeyou Istchee James Bay Regional Government and the Cree Nation Government can exercise their jurisdiction in land use, the delimitation of territories deemed incompatible with mining activities may, if applicable, fall under the procedures set up by one of these authorities with regards to land-use matters.

North of the 55th parallel, the eventual delimitation of territories deemed incompatible with mining activities will depend on prior discussions concerning the powers and responsibilities of the Kativik Regional Government in land-use matters.

Action – Identify the conditions under which authorities with municipal jurisdiction over land covered by the James Bay and Northern Québec Agreement could delimit mining-incompatible territories

The MERN and MAMOT will continue to work with the authorities with municipal jurisdiction over lands covered by the Agreement to identify the conditions under which they could eventually delimit mining-incompatible territories.

In territories not covered by the Agreement, it is the responsibility of RCMs to enter into discussions with Aboriginal communities about areas the RCMs would like to delimit as incompatible with mining activity.

Objective 4 – Better define the factors that influence social acceptability

The mining industry must deal with the public's negative perception of its activities: abandoned mining sites, coal, oil, pollution, contaminant spills, regulatory violations, breaches in social responsibility, etc. Moreover, people across the globe are increasingly attentive to the environmental effects of mining development and to the socioeconomic impacts of mineral extraction.

Public acceptance is increasingly difficult to attain for mining proponents as they must, among other things, manage negative impressions often fuelled by the poor practices of past developers and the heavy media attention paid to mining accidents (ruptured dykes, deadly accidents, contaminant spills).

Although the term *social acceptability* appears frequently in the research literature, the ways in which it applies to mining have yet to be properly established. Additionally, some studies have demonstrated that the public's perception of mining development is highly variable and depends greatly on the sample groups, the areas polled, the type of mine, the type of ore and the operator. Therefore, it is important to better define the different elements that can influence the social acceptability of mining projects.

Action – Fund research projects on social acceptability and the public perception of the mining industry

A call for research proposals for studies on social acceptability and the public perception of the mining industry was launched in spring 2015 as part of the FRQNT's Joint Research Program on Sustainable Development in the Mining Sector. Three projects are being funded through this initiative developed by the FRQNT. The total budget, \$450,000 over two years, was provided by the mining heritage component of the Natural Resources Fund.

Objective 5 – Social acceptability factors to consider when evaluating mining projects

Given that lands and mineral and energy resources in the domain of the State are increasingly in demand for a variety of activities, and keeping in mind the economic importance to the province of developing its territory, land-use compatibility is of pivotal importance and can in no way be considered separately from social acceptability.

Moreover, although an early consensus of social acceptability can garner project support from local communities, this does not ensure that companies will invest in reducing the negative social impacts their project may have on the host communities, nor does it make them accountable for their social performance throughout the project.

In November 2014, the Minister of Energy and Natural Resources and Minister responsible for the Plan Nord announced the launch of a broad-reaching project on the social acceptability of natural resource extraction projects. This initiative — alongside other steps taken by government — aims to ensure Québec's economic prosperity while advancing projects that operate in harmony with their host communities. A Green Paper was presented to the National Assembly in February 2016 in order to pursue deliberations about the capacity of the MERN's tools and practices to assign greater weight to social acceptability factors when evaluating energy, mineral resource or land development projects.

When it comes to the mining industry, many of the projects — mines, peat harvesting operations, quarries or sandpits — are confronted with opposition among citizens. In some cases, issues arise when information about a project is only communicated to the citizens once the initiative is already underway and quite advanced. Therefore, the best practice is to work ahead of time by planning strategic actions with municipalities, citizens and Aboriginal communities.

Action – Implement an action strategy with municipalities, citizens and Aboriginal communities

The MERN will guide and assist citizens, municipalities, Aboriginal communities and RCMs through the process of developing new mining, quarry, sandpit or peat harvesting projects. It will keep all stakeholders informed through information activities.

Objective 6 – Find solutions to fly-in/fly-out issues and help municipalities respond to the infrastructure and service needs created by mining projects

Given the current circumstances of depressed market prices for mineral substances, mining companies must deal with fierce competition. In this context, the fly-in/fly-out (FIFO) system is a suitable solution for both companies and employees, whose needs are also met by such initiatives

That said, this solution is not advantageous for municipalities confronted with a vicious circle: the fewer residents they represent, the less taxes they collect and the more difficult it becomes to maintain services at a level that will retain their original population. FIFO commuters are fed and housed by mining companies and therefore do not contribute to the economic development of surrounding municipalities. Yet these workers have full access to local services, notably health services.

As announced in the Plan Nord, the government will study how FIFO commuting affects businesses, workers, their families and local communities in the Plan Nord area. The study will cover the real impacts of FIFO commuting and the advantages of settling in outlying regions.

Finding solutions to FIFO commuting will not only lead to new employment opportunities in local communities and to the development of new public services, but it will respond to the labour needs of companies operating in Northern territories while encouraging new businesses to take root.

Moreover, in order to encourage local communities to welcome mining development projects in their area, the government has made a commitment to share mineral, oil and gas extraction revenues with local communities.

As specified in the 2016-2019 municipal partnership agreement, the government will dedicate \$25 million per year towards royalty-revenue sharing on natural resources. This measure has two parts.

In the first part, for every new project scheduled to enter into production in 2016 or later, an amount of up to \$10 million per year will be allocated to communities that welcome the new mineral, oil or gas extraction project. The total amount allocated to the municipality will be calculated by applying a pre-determined percentage to the discounted amount of the anticipated net royalties. The financial aid will be granted over the course of a five-year period, spanning the three years before production begins and the two years thereafter.

In this second part, an annual budget equalling the total budget of \$25 million minus the amounts allocated in the first part will be divided among regions using a prorata distribution based on the regional GDP of the forestry, mining, petroleum, natural gas and fishing industries, with a per capita limit of \$25, and among the admissible RCMs or RCM towns (excluding those with more than 100,000 inhabitants) using a prorata distribution based on population.

Sharing royalties will give communities the means they need to face the challenges brought on by the economic and demographic growth related to these activities. These same communities will therefore be in a better position to meet the service and infrastructure needs created by these projects.

Sharing royalties will benefit the citizens most directly impacted by the projects. It will help fund professional training programs, diversify local economies and develop outlying regions.

Objective 7 – Engage aboriginal people in mineral resource development

Aboriginal communities must be engaged for mineral resource development to advance. This endeavour poses several challenges, including a better understanding of the mining sector, entrepreneurship and workforce development.

In 1997, the government established Aboriginal mining funds to encourage the participation of Aboriginal communities in Québec's Near North and Far North in developing the mineral potential of these territories. This incentive is ongoing, with a contribution of \$300,000 per year to each of the Cree and Inuit mining funds.

These agreements support the involvement of Aboriginal communities in mineral resource development. They aim to develop prospecting and exploration skills in relatively underexplored areas by fostering expertise in Aboriginal communities, thereby generating local jobs. They also aim to raise awareness so that local communities are better informed about exploration and mining development on their territory, to stimulate the creation of Aboriginal companies in the mineral resource field and to foster business ties between Aboriginal communities and exploration companies.

Action – Conclude new agreements for Aboriginal mining funds

The MERN will conclude new agreements on mineral resource development in the James Bay and Kativik territories for 2016-2017, 2017-2018 and 2018-2019.

Objective 8 – Promote hiring of local and aboriginal workers

Mine site development work – whether it be the construction of access infrastructure or surface facilities – is subject to the Act Respecting Labour Relations, Vocational Training and Workforce Management in the Construction Industry (CQLR, chapter R-20).

In 2014, 54.7% of hours worked by construction workers in the Côte-Nord region were by workers residing in the region. Despite being one of the lowest rates in Québec, it is still a definite improvement compared to the rate of 46.1% in 2013. Low rates are characteristic of resource regions in which large-scale construction sites create a high demand for workers over a short period of time, leading the construction industry to implement rules on mobility to help it deal with these peak periods.



Photo:
Stornoway Diamonds



The action plan from the Comité sur l'embauche de la main-d'œuvre régionale sur la Côte-Nord, unveiled by the MERN and the Ministère du Travail, de l'Emploi et de la Solidarité Sociale (MTESS) in August 2015, primarily targets the construction industry. It specifies that the province's construction commission, the Commission de la construction du Québec, shall personalize its advice and assistance to every employer declaring a workforce need in the Côte-Nord region through its *Carnet référence construction* (CRC), a Web platform that brings together workforce referral services in the construction sector. It also specifies that Hydro-Québec shall hold contract start-up meetings with contractors to discuss the importance of regional employment, and shall encourage contractors to take advantage of a measure that promotes the hiring of Côte-Nord graduates as apprentices. The MTMDDET has said it will raise the profile of civil engineering companies working in the Côte-Nord region. Union partners should encourage their members to complete their professional profile for the CRC. Similar actions should be carried out when developing major mining projects.

Action – Advise and assist mining companies to promote local workforce hiring at major mine construction sites

In order to promote the hiring of local and Aboriginal workers on the construction sites of major mining projects, the MERN and the SPN will coordinate the implementation of actions similar to those undertaken by the government in August 2015 for construction workers residing in the Côte-Nord region.

Furthermore, in the Plan Nord, the government made a commitment to promote the full participation of women in the labour market, particularly through an equal access employment program for women in the construction industry. Some companies already employ measures that favour hiring women (20.6% in 2012), as well as contractual obligation programs, notably at Agnico Eagle and IAMGOLD. Some mining companies have also implemented measures that promote Aboriginal hiring (13.1% in 2012).

Objective 9 – Make mine training more accessible in mining regions

About fifteen institutions offer vocational or technical training in mining. Only half are located in mining regions. Many young people must leave their region to study in this field. For Aboriginal people, this situation is particularly problematic.

In terms of university education, nine institutions offer a total of 42 programs related to mining: UQAT offers two programs and UQAC offers four.

In the 2014-2015 Budget, the government announced an investment of \$100 million to the Cree School Board, the Kativik School Board and the Naskapis School for training Aboriginal people to work on structuring projects.

In the Plan Nord, the government's primary objective is to promote student retention and academic success up to the highest level of school, and to encourage as many young people and adults as possible obtain basic qualifications. An amount of \$18.65 million was allocated in the Plan Nord's financial framework to build or renovate training centres in Sept-Îles and Chibougamau, and to acquire and set up a mobile modular metallurgical plant-school in Chibougamau. These construction projects were completed and have been operating since 2015.

In addition, the MEES 2015-2020 action plan also includes several projects that promote student retention and academic success in the Plan Nord territory, namely through a forward-looking assessment of college- and university-level offerings in the Plan Nord territory; a study on the implementation of a combined mobile training program for the mining industry and large-scale hydroelectric projects; and an increase in support services available to Aboriginal people for adult education and vocational training.

Action – Offer distance education in mining

To increase the distance education offer, the Institut national des mines will lead a working group of resource persons from all Québec universities, colleges and school boards offering specialized courses in mining. This group will be responsible for selecting and prioritizing the mining courses to offer as distance education.

The Institute will also supervise a community of practice supported by university researchers engaged in technology-enhanced learning to document the best teaching practices and promote exchanges between teachers using the new tools.

Objective 10 – Specify the modalities for consulting aboriginal communities

Giving special consideration to the needs of Aboriginal people, Québec supports the involvement of Aboriginal communities in mining development. A new chapter of the Mining Act focuses on Aboriginal issues: one of the measures requires the MERN to develop and make public a Native Consultation Policy specific to the mining sector.

To act upon the rulings of the Supreme Court of Canada on the obligation to consult and, if necessary, accommodate Aboriginal communities where the government contemplates action that may adversely affect established or asserted Aboriginal or treaty rights, the Québec government has published the Interim Guide for Consulting Aboriginal Communities. This document proposes reference points for government departments, agencies and corporations that should make the obligation of consultation more effective.

The MERN has followed the Interim Guide since its adoption. The Native Consultation Policy specific to the mining sector will be consistent with the Interim Guide. The main objectives will be to address the expectations of Aboriginal communities and the mining industry regarding mineral resource development issues; to consider the concerns raised by the communities; to outline consultation procedures; to help coordinate government actions; and to strengthen relations and promote dialogue between Québec, Aboriginal communities and mining developers.

More specifically, the policy should clearly set forth and make public the consultation procedures involved in the granting of rights, permits and authorizations, or when certain types of activities are undertaken, in order to ensure the concerns of Aboriginal communities are taken into account at all stages of the mining development process. Under this framework, Québec will continue to identify and apply, where necessary, appropriate accommodation measures.

The policy should also express Québec's intention to demonstrate openness and transparency with Aboriginal communities in matters of mineral resource development. As such, the policy will seek to encourage the exchange of information between Aboriginal communities and mining developers, starting from the moment the claims are issued and continuing throughout the mining development process.

Once adopted, the policy will apply to all government authorities involved in the development of mineral resources. It will facilitate the coordination of government actions and provide greater transparency throughout the process.

Finally, the policy will not supersede existing agreements between Québec and Aboriginal communities or nations. For example, certain measures introduced by the Agreement on Governance in the Eeyou Istchee James Bay Territory, signed in 2012 with the Crees of Québec, already provide specific mechanisms for communicating information about mining projects. The policy will not seek to define, recognize or replace Aboriginal or treaty rights.

In 2015, the government published a background paper for developers. It provides a general introduction to relations with Aboriginal communities during natural resource development projects, and also offers some practical advice for developers.

Action – Adopt a Native Consultation Policy specific to the mining sector

The MERN will publish a Native Consultation Policy specific to the mining sector in the fall of 2016. The consultations with Aboriginal communities on the draft policy will be concluded by spring 2016.

Objective 11 – Implement measures that promote transparency

The Act Respecting Transparency Measures in the Mining, Oil and Gas Industries (CQLR, chapter M-11.5) was adopted on October 21, 2015. It aims for greater accountability by requiring mining, oil and gas companies to disclose payments made to different levels of Canadian and foreign government, as well as to Aboriginal communities. It aims to reinforce the integrity of these companies while ensuring that citizens are better informed and share in the economic benefits of projects.

The information obtained while implementing the Act will be made public. Payments to Aboriginal communities will only be included in the disclosure obligations starting June 1, 2017. The Autorité des marchés financiers (AMF) will administer the Act.

The Act is in line with similar initiatives taken by G8 countries, including Canada. The federal law (Extractive Sector Transparency Measures Act (S.C. 2014, c. 39, s. 376)) came into force in June 2015. Provisions were included in the Québec law to recognize the requirements of another jurisdiction as an acceptable substitute so that companies with facilities in several jurisdictions will not have to make separate declarations.

Action – Implement the Act Respecting Transparency Measures in the Mining, Oil and Gas Industries

The government will adopt the attendant regulations of the Act Respecting Transparency Measures in the Mining, Oil and Gas Industries, and guidelines will be published on the websites of the MERN and the AMF. Furthermore, Québec will enter into an agreement with the federal government to specify how the two levels of government will collaborate in applying their respective legislations, and the MERN will continue its discussions with Aboriginals regarding the implementation of the Act.

Action – Publish annual disclosures on the quantity and value of ore extracted in Québec

The MERN will publish annual disclosures on the information it obtains from mining lease and concession holders on the quantity and value of ore extracted in Québec, as well as the amount of mining duties paid over the fiscal year. These annual disclosures will also provide the corresponding information about leases to extract surface mineral substances.



CONCLUSION

The Strategic Vision for Mining Development in Québec builds on the Mineral Strategy adopted in 2009, and is in line with the implementation of new provisions in the Mining Act adopted in December 2013. However, its scope is broader than that of the Mineral Strategy because it not only covers mineral exploration and mining, but also primary metal manufacturing and the network of suppliers and equipment manufacturers, as well as innovation, research and development.

Nearly a dozen ministries and organizations worked on this document, which drew upon the consultations held with the industry, interest groups and municipalities in November 2014, as well as a regional tour by the Minister for Mines in February and March 2015.

The Strategic Vision encompasses the following three broad guidelines that are based on the principles of sustainable development: advance existing mining- industries and develop new ones, prevent and mitigate environmental impacts, and promote transparency and citizen participation. It corresponds very well with other government policies, such as the Plan Nord and the Maritime Strategy, and many of the actions proposed in those policies are reiterated in this Strategic Vision.

The first guideline focuses on economic development measures for exploration and mining, primary metal manufacturing, and the network of suppliers and equipment manufacturers.

For exploration, even though several measures were announced in the 2015-2016 Budget, certain fiscal measures will be re-examined to improve their effectiveness, if necessary. In addition, the MERN will simplify the process to acquire mineral claims, and along with industry representatives, it will look into ways to reduce sources of discontentment related to the application of the Mining Act.

For mining, the Strategic Vision reiterates the principal commitments made by the government in the Plan Nord, particularly those for infrastructure. To accelerate the permitting process for new mining projects, the MERN, the MDDELCC and the MFFP will set up a system with a single point of access to coordinate the delivery of the various permits involved.

For primary metal manufacturing, the MESI will develop an action plan for the metal-lurgy industry in Québec, and will develop pilot-plant services for hydrometallurgical processes. The Strategic Vision also proposes actions that should bolster the network of suppliers and equipment manufacturers across all regions of Québec. While the niches of the ACCORD program will foster partnerships with suppliers and equipment manufacturers, Export Québec will elaborate a development strategy for markets outside Québec for mining-sector equipment manufacturers and service providers.

Back in 2009, the Mineral Strategy placed great importance on sustainable development. The Strategic Vision continues to build on that progress. Measures are included for mine site rehabilitation, the optimization of metal consumption, the valorization of tailings, reductions in greenhouse gas emissions and the adoption of clean technologies.



Photos from top to bottom:
Stornoway Diamonds
MERN
Stornoway Diamonds



Several objectives revolve around the notions of social acceptability and transparency. The Strategic Vision includes measures for corporate social responsibility and citizen participation; for example, the implementation of government guidelines for land-use planning to ensure a harmonious co-existence between mining activities and other land uses, an approach advocated by the MAMOT in collaboration with the MERN. Other measures aim to provide municipalities with tools that will help them face the needs created by mining projects.



As in the Mineral Strategy, the Strategic Vision provides for measures that respond to workforce needs and the demand for mining-specific training. Finally, it also highlights two of the MERN's important actions: the Native Consultation Policy specific to the mining sector, and the implementation of the Act Respecting Transparency Measures in the Mining, Oil and Gas Industries.

The Strategic Vision aims to mobilize all stakeholders in the mining industry to create a business environment that is conducive to its advancement. It will implement inter-ministerial cooperation to foster the development of the entire sector using best practices. The Strategic Vision integrates the notions of environmental protection, social acceptability and transparency, while contributing to the government's objective of regulatory simplification.



REFERENCES

KPMG, *Vision stratégique du développement minier au Québec*, PowerPoint presentation, 2014; *Conseil d'intervention pour l'accès des femmes au travail (CIAFT)*, prepared for the MERN.

Mineral Exploration: Institut de la statistique du Québec, Mining by the Numbers, November 2014, and special compilations; UQAT-UQAM Chair in Mining Entrepreneurship, Bulletin, November 2014; Fraser Institute Annual Survey of Mining Companies: 2015; KPMG, *Le soutien fiscal à la R-D au Québec, État des lieux et analyse comparative avec d'autres territoires, étude en appui aux travaux de la Commission d'examen sur la fiscalité québécoise*, December 2014; *Groupe de travail sur la simplification réglementaire et administrative*, report, December 2011.

Mining: Institut de la statistique du Québec, special compilation; The Mining Association of Canada, Levelling the Playing Field: Supporting Mineral Exploration and Mining in Remote and Northern Canada, April 2015; Hydro-Québec, Comparison of Electricity Prices in Major North American Cities, April 1, 2014; CSMO-Mines, *Estimation des besoins de main-d'œuvre du secteur minier au Québec, 2015-2025*; Thomson One, PWC, KPMG; Ernst Young in collaboration with Sustainable Minerals Institute of University of Queensland and Imperial College London, Productivity in Mining: Now Comes the Hard Part, a Global Survey, MaRs Market Insights, Mining & Metals + Internet of Things: Industry Opportunities and Innovation, November 2014.

Ore Processing: Comité sectoriel de main-d'œuvre de la métallurgie du Québec, *Portrait de l'industrie de la métallurgie au Québec*, 2013-2015.

Network of Suppliers and Equipment Manufacturers: Sous-traitance-industrielle (STIQ), *Baromètre industriel québécois*, 5th edition; STIQ, CATE Côte-Nord, *Investissements dans les infrastructures de production, défis technologiques des grands donneurs d'ordres de la Côte-Nord et opportunités de développement des PME, rapport synthèse*, October 2012; Association minière du Québec and Association de l'exploration minière du Québec, *La filière minérale au Québec, contribution socioéconomique au développement du Québec et de ses régions*, 2010; Comité sectoriel de la main-d'œuvre dans la fabrication métallique industrielle, *Diagnostic sectoriel 2014*.

Environmental Impact Prevention and Mitigation: United Nations Environment Programme (UNEP), Sustainable Innovation and Technology Transfer Industrial Sector Studies, Critical Metals for Future Sustainable Technologies and their Recycling Potential, 2009, Metal Stocks in Society, Scientific Synthesis, 2010, Recycling Rates of Metals, A Status Report, 2011, Metal Recycling, Opportunities, Limits, Infrastructure, 2013, Environmental Risks and Challenges of Anthropogenic Metals Flows and Cycles, 2013.

Promoting Transparency and Citizen Participation: Commission de la construction du Québec, *Statistiques annuelles 2013, SEGMA Recherche, Le secteur minier et le développement durable*, report mandated by the MERN-Mines, February 2012; Secrétariat aux affaires autochtones, Information for Developers and General Information Regarding Relations with Aboriginal Communities in Natural Resource Development Projects, http://www.autochtones.gouv.qc.ca/publications_documentation/publications/2015-02-document-intention-promoteurs-en.pdf

