

CRITICAL AND STRATEGIC MINERALS

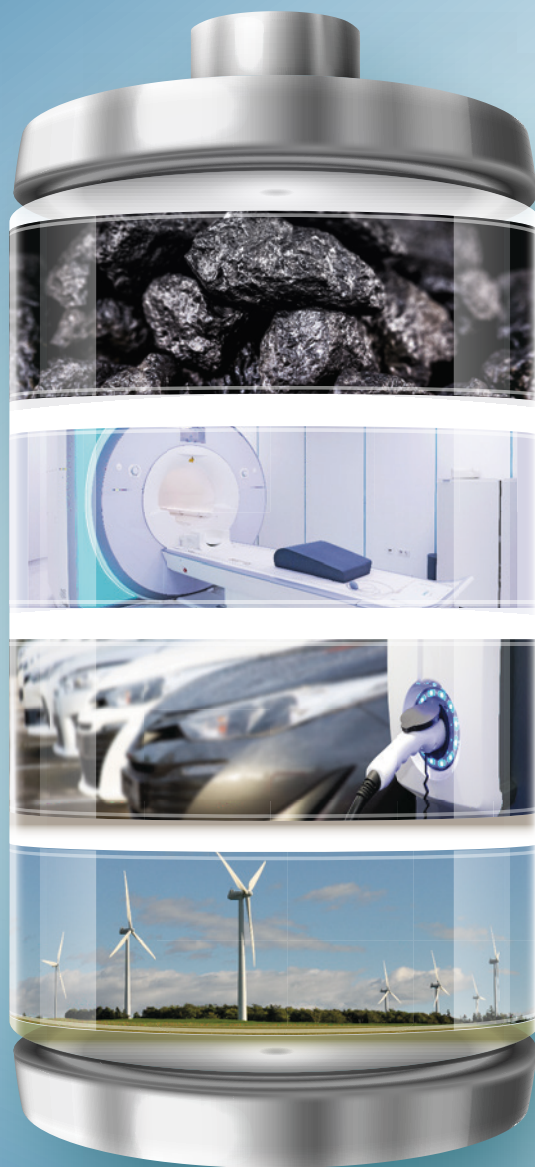
QUÉBEC PLAN

FOR THE DEVELOPMENT

OF CRITICAL AND

STRATEGIC MINERALS

2020-2025



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Premier's Message



Québec is fortunate to have immense reserves of natural resources to capitalize on in order to fuel a green economic recovery. Obviously, our great hydroelectric dams supply us with clean energy. We also have critical and strategic minerals, which are essential ingredients for the electrification of the economy.

The Québec Plan for the Development of Critical and Strategic Minerals 2020-2025 (QPDCSM) is part of this vision: it presents concrete measures to take advantage of minerals indispensable to the green energy and technological transition, both nationally and internationally. This Plan offers us the possibility to extend Québec's outreach all over the world.

The QPDCSM also offers solutions to make Québec more self-sufficient by contributing to the production of substances necessary for the development of key sectors of our economy.

This Plan will strengthen the economic vitality of our regions through the development of our mining potential. It will allow us not only to create wealth, but also to improve our infrastructures for the benefit of several northern communities. These are sustainable ways to stimulate Québec's economy!

We have an opportunity to work together to develop a brand-new sector of Québec's economy. The time has come to build a greener, more prosperous and prouder Québec!

François Legault
Premier

Minister's Message



It is with pride and enthusiasm that we launch the Québec Plan for the Development of Critical and Strategic Minerals 2020-2025. Thanks to this Plan, many opportunities are available to us. The measures it provides will not only enable Québec to have the minerals necessary for the implementation of its strategies and major policies, but also to ensure the sustainability of these resources essential to our socioeconomic security and vitality. They will be deployed in close cooperation with our partners from the scientific, industrial and mining sectors, and with the local and Indigenous communities. Local resources contributing to build prosperous regions – that is our vision!

The development of these minerals in our territory is doubly important: first to meet the supply needs here in Québec, but also internationally. This Plan will thus make it possible to attract investments, create jobs and stimulate the growth of new businesses.

Support for companies and local communities in the development of critical and strategic mineral industries, as well as compliance with rigorous standards in environmental protection and occupational health and safety, will allow Québec to rise to the rank of mineral producers recognized worldwide for their ethical and responsible practices.

This Plan will lead us to carry out one of the most significant characterization campaigns of our territory and map Québec's CSM potential. It will ensure the creation of a national R&D network, bringing together all the key players in the field to optimize investments in innovation, encourage synergies and obtain probative results.

We also anticipate improving and building multi-user strategic infrastructure that will facilitate access to the territory, both for the mining sector and for all communities. Finally, it is our ambition to capitalize on the transformation and recycling of these minerals in Québec to meet the growing demand for these resources, while reducing our carbon footprint.

More than ever, our government intends to invigorate our regional economies by capitalizing on our strengths, our competitive advantages and the development of our expertise to obtain new successes here, at home. More than ever, we are determined to make Québec a preferred location for the development of critical and strategic minerals, in order to create sustainable wealth in our communities and continue Québec's transition to a low-carbon economy.

Jonatan Julien

Minister of Energy and Natural Resources

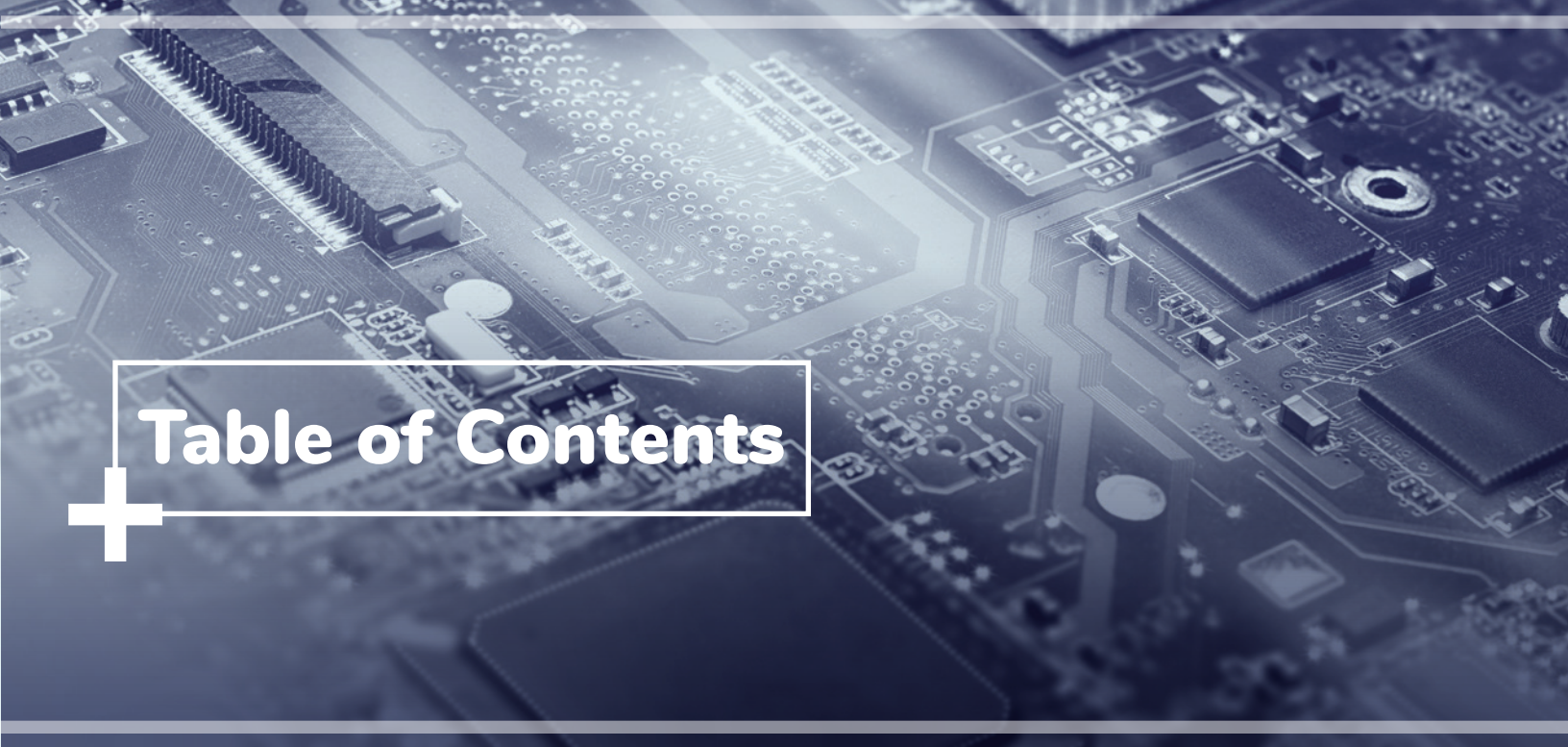


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**Continue the green energy transition,
essential to the fight against climate change.
Create wealth by developing our CSMs.**



+ Context and Issues

A CHANGING GLOBAL ECONOMY: GROWING NEEDS FOR CRITICAL AND STRATEGIC MINERALS

The global economy is evolving rapidly and new technologies are accelerating this change while transforming our lifestyles. Smart devices and equipment, aerospace, telecommunications, renewable energy, energy storage, the medical sector and transportation electrification are all high-growth sectors in which the supply of critical and strategic minerals (CSMs) is vital. CSMs play an important role in our daily lives. They are found in many everyday objects: consider the graphite, lithium, cobalt and nickel necessary to make batteries for laptop computers, smartphones and electric vehicles; platinum group elements are used in computer hard drives; rare earth elements are found in electric motors. The demand for CSMs is growing strongly and supply is becoming a strategic issue for many companies and states.



WHAT ARE CRITICAL AND STRATEGIC MINERALS?

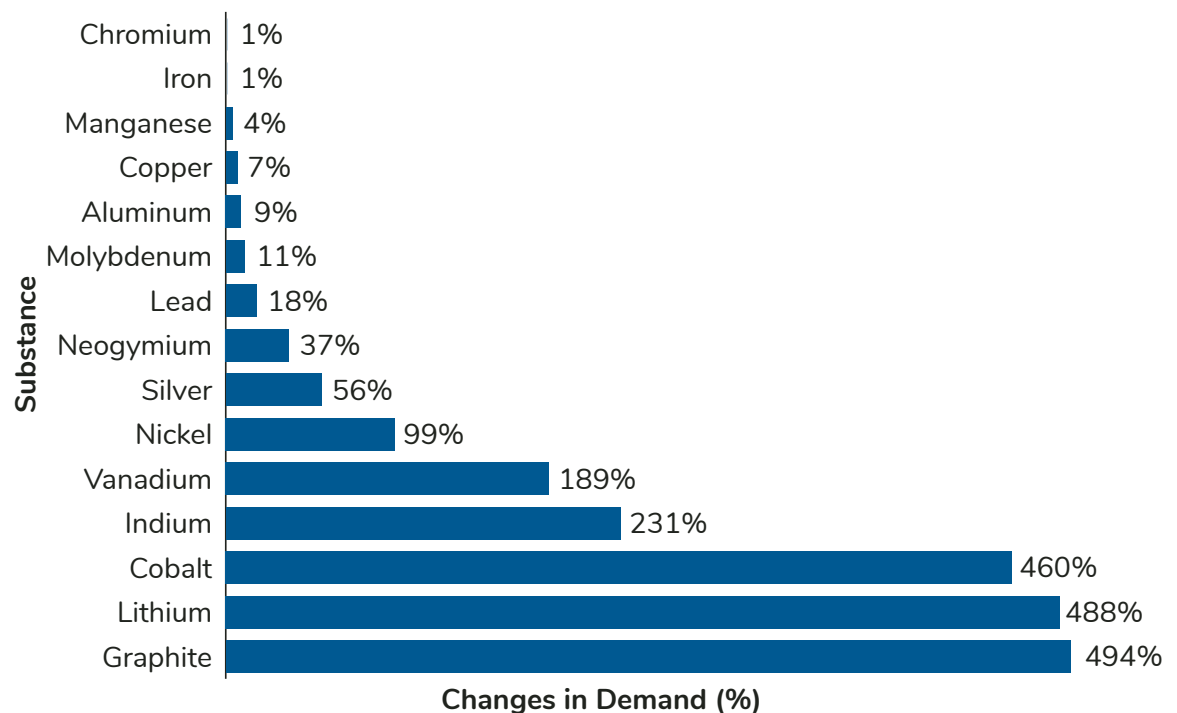
The Gouvernement du Québec considers that critical minerals have economic importance in key sectors of our economy today, present a high supply risk, and have no commercially available substitutes.

The Gouvernement du Québec considers that strategic minerals are the mineral substances necessary to implement Québec's various economic policies (see the list in Appendix 3).

The accessibility and availability of these mineral resources thus have a growing impact on political, commercial and economic relations between the major world powers. Countries such as the United States, Germany, France and Japan consider certain substances to be strategic for their economic, technological and military development, and are acting to diversify and secure access to supplies of CSMs.

According to a report by the World Bank published in 2020, the energy transition to a low-carbon economy will cause a sharp increase in the demand for minerals such as nickel, vanadium, iridium, cobalt, lithium and graphite¹. Figure 1 shows anticipated growth, from 2018 to 2050, in the demand for these minerals required for the use of technologies with low greenhouse gas (GHG) emissions.

Figure 1
Change in Demand for Minerals Necessary for the Green Energy Transition 2018-2050



Source: United States Geological Survey, 2019, and World Bank, 2020.

To meet this anticipated increase in demand, supplies from producer countries such as Canada will have to increase by 2050. Considering that the time needed to develop a mine is between 10 and 20 years, a major effort will be required over the short, medium and long terms to support exploration, deposit appraisal and mineral extraction, without forgetting recycling and optimal use.

¹ WORLD BANK GROUP, CLIMATE SMART MINING FACILITY, Minerals for climate action: the Mineral Intensity of the Clean Energy Transition [<http://pubdocs.worldbank.org/en/961711588875536384/Minerals-for-Climate-Action-The-Mineral-Intensity-of-the-Clean-Energy-Transition.pdf>] (Consulted on June 15, 2020).

MINERALS AT THE CORE OF QUÉBEC'S PRIORITY POLICIES

Strategic minerals are indispensable to implement Québec's major policies, such as the Government Sustainable Development Strategy, the 2018-2023 Québec Energy Transition, Innovation and Efficiency Master Plan, the 2030 Energy Policy, the Sustainable Mobility Policy - 2030, and the upcoming Plan for a Green Economy 2030.



THE SUSTAINABLE MOBILITY POLICY – 2030, FOR A GLOBAL VISION OF A FUTURE ECONOMIC SECTOR

The Policy presents transportation as a promising economic sector, for which the government wishes to take advantage of the current trends related to transportation electrification, the arrival of new technologies, smart transportation systems and new methods that generate development opportunities not only in Québec, but worldwide. Launched in 2018, the Sustainable Mobility Policy - 2030 proposes a global vision with an integrated approach to mobility of passengers and freight by all modes of transportation throughout the territory.



THE PLAN FOR A GREEN ECONOMY - 2030

The Plan for a Green Economy - 2030 (PGE) will define Québec's key orientations in the fight against climate change and electrification for the next 10 years. Electrification of the economy, which will allow the replacement of fossil fuels with Québec's renewable energy, is at the core of this framework policy. The green energy transition calls for the contribution of all sectors of society, and this major initiative will be deployed according to a five-year implementation plan updated annually. With the future PGE, the Government is seeking to build tomorrow's economy and adapt Québec to the impacts of climate change.

The Québec Plan for the Development of Critical and Strategic Minerals is part of a global, concerted and structured government vision, contributing to the achievement of the objectives and the creation of these policies. Indeed, not only does Québec possess the mineral resources used in battery manufacturing for electric vehicles and energy storage, but also has organizations to accelerate the development of the Québec knowhow necessary for their production and recycling.

NECESSARY ALLIANCES, STRATEGIC INITIATIVES

In 2019, the Gouvernement du Québec initiated a strategic review on the development of CSMs, resulting in this plan. Parallel to this, Québec signed a joint declaration with the United States Geological Survey with the aim of strengthening scientific and technological cooperation on mapping and analysis data on CSMs.

Subsequently, in January 2020, the governments of Canada and the United States announced the conclusion of a Canada-U.S. Joint Action Plan on Critical Minerals Collaboration. This agreement between the two countries seeks to increase mineral production and create supply chains for several critical minerals to which the United States only has access through imports.

The Gouvernement du Québec is cooperating with the Government of Canada, particularly in the implementation of the Canadian Minerals and Metals Plan, under which the first action plan refers to critical minerals.

THE OPPORTUNITY TO BECOME A LEADER IN THE CIRCULAR ECONOMY

Since the Industrial Revolution, economic growth has been associated with growing consumption of energy and natural resources, which are not all renewable. The costs and quantity of energy required to extract minerals continue to increase. The demand to meet the global population's needs is bound to double by the 2030 horizon.

In addition to the increase in demand caused by the transition to a low-carbon economy, the world is currently in the midst of an upheaval unequalled since 1945. The COVID-19 pandemic has weakened the entire global economy, particularly by breaking supply chains. Several regional, national and international organizations see this as an opportunity to change the ways things are done and establish the post-COVID-19 recovery based on a low-carbon economy and more efficient use of resources.

According to the International Energy Agency (IEA), the different lockdown measures deployed around the world, including telework, led to a progression in the use of non-emitting energy sources (wind, solar, hydroelectricity and nuclear), the only energy sources to grow in 2020². Following this trend and the decline in consumption of fossil fuels for this year, carbon dioxide (CO₂) emissions should decrease by 8% in 2020, the biggest drop ever recorded. However, the IEA forecasts a return to emissions at the pre-COVID-19 level if governments do not put renewable technologies and energy at the centre of their economic turnaround plan.

It is forecast that the post-COVID-19 measures instituted to revive the global economy will favour the renewable energy sector, and thereby the CSM sector. According to a World

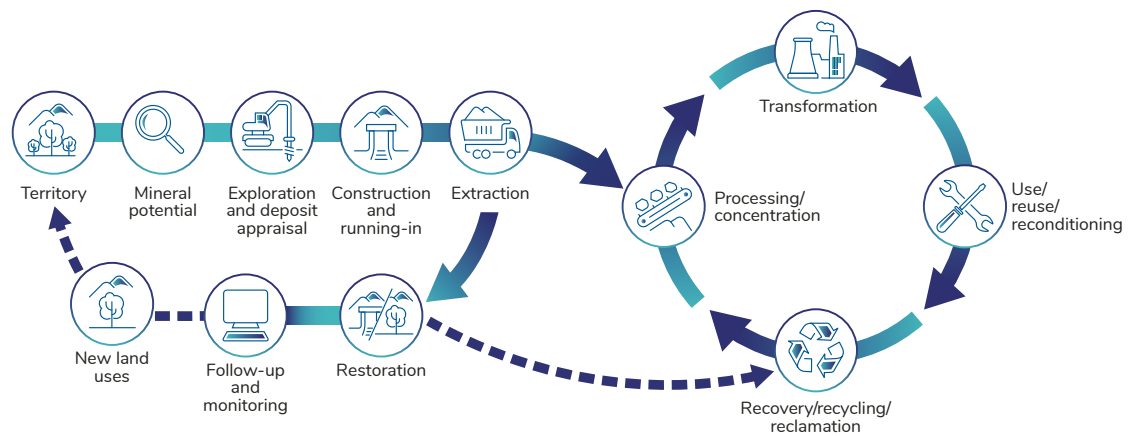
2 INTERNATIONAL ENERGY AGENCY, Global energy demand to plunge this year as a result of the biggest shock since the Second World War [<https://www.iea.org/news/global-energy-demand-to-plunge-this-year-as-a-result-of-the-biggest-shock-since-the-second-world-war>] (Consulted on May 4, 2020).

Bank study, it will be difficult to respond to the increase in this demand solely through the growth of mineral production³.

The transition to sustainable development, including the circular economy, must therefore be encouraged by governments in managing the recovery.

The circular economy concept proposes strategies for optimum utilization of the available resources, particularly by relying on recirculation of material extracted from the mines. Thus, the circular economy (Figure 2), which includes recovery and recycling of products containing CSMs, proves to be essential to contribute to satisfying the demand in a sustainable development perspective, with positive social and economic benefits for the local and Indigenous communities⁴.

Figure 2
Typical CSM Value Chain in a Circular Economy



³ WORLD BANK GROUP, CLIMATE SMART MINING FACILITY, Minerals for climate action: the Mineral Intensity of the Clean Energy Transition [<http://pubdocs.worldbank.org/en/961711588875536384/Minerals-for-Climate-Action-The-Mineral-Intensity-of-the-Clean-Energy-Transition.pdf>] (Consulted on June 15, 2020).

⁴ The expression “local and Indigenous communities” is used out of a concern for inclusion, even though their issues and legal status differ, as do the Government’s obligations in their regard.

This ambitious plan can be achieved through the cooperation of all our regional, municipal, Indigenous, national and international partners.



Québec's Advantages

AN ATTRACTIVE BUSINESS ENVIRONMENT

Québec's business environment for mining investment is one of the best in the world. Québec offers different forms of support for mining projects, such as a competitive mining tax system favouring investments and unique tax measures, especially created for mineral and metal producers and explorers: refundable tax credits, deductions and allowances in mineral resource processing and transformation activities, for example.

This competitive and predictable business climate is also supported by the action of institutional investors and by a legal framework facilitating mining development.

Moreover, the Bureau de coordination des droits (BCD) project, under the responsibility of the ministère de l'Énergie et des Ressources naturelles (MERN), is intended to ensure better government coordination for the granting of rights, permits and authorizations in order to reduce the issuance times while complying with the legal and regulatory requirements and honouring the obligations incumbent on the Government regarding consultation of local and Indigenous communities. By improving the business environment for mining proponents and facilitating their approaches, the BCD will contribute, in particular, to accelerating investments and fostering quality job creation.

Finally, access to electricity at advantageous prices, for companies connected to the Hydro-Québec grid, represents a major asset.



HYDRO-QUÉBEC: CLEAN AND RENEWABLE ENERGY AT A LOW COST

The Québec energy sector offers a clear advantage. Québec is the world's 4th biggest hydroelectric producer and supplies 52% of Canadian hydroelectricity. 99.8% of the electricity produced in Québec comes from renewable, clean and reliable energy.

RECOGNIZED PRACTICES IN SOCIAL ACCESSIBILITY

In Québec, as in the rest of the world, social acceptability stands out as one of the most important issues for development and concretization of natural resource development projects. Since 2014, work has been done to inventory and promote good practices in social acceptability for proponents and local stakeholders. In addition to disseminating several tools on this subject, the Gouvernement du Québec is increasingly integrating elements favouring the fulfillment of this concept into its legislation and regulations. The proponents who wish to do so can now benefit from increased guidance on social acceptability from the MERN. This guidance will support the development of the CSM sector while respecting local and Indigenous communities.

In addition, the Gouvernement du Québec is a signatory of two modern treaties and several agreements with the First Nations and Inuit of Québec, including the Grand Alliance, signed in 2020 with the Cree Nation.



ABORIGINAL COMMUNITY CONSULTATION POLICY SPECIFIC TO THE MINING SECTOR, A TOOL FOR DIALOGUE AND COLLABORATION

Provided under the Mining Act, the Aboriginal Community Consultation Policy Specific to the Mining Sector⁵ was made public in October 2019 with the following purposes:

- > Provide better consideration of the concerns expressed by Indigenous communities with regard to mining activities;
- > Specify guidelines specific to the mining sector as part of the Indigenous community consultation process, in order to guide the parties involved on the actions to be taken at each stage of a mining project;
- > Strengthen relations and promote dialogue between Québec, the Indigenous communities and proponents in the development of mineral resources;
- > Promote better coordination of government action in consultation of Indigenous communities specific to the mining sector.

DIVERSIFIED MINERAL RESOURCES

As a major mining producer in Canada, Québec has a wide range of natural resources, particularly in the Northern Territory. Among these resources, lithium, graphite, cobalt, the platinum group elements, the rare earth elements, niobium, titanium and vanadium are already giving rise to mining operations and deposit appraisal projects or mineral deposits (Figure 3). Although Québec does not dominate global production, it offers an additional alternative of interest to the major CSM producing countries.

⁵ Ministère de l'Énergie et des Ressources naturelles, *Aboriginal Community Consultation Policy Specific to the Mining Sector* [https://mern.gouv.qc.ca/wp-content/uploads/PO-consultation-mines_MERN-ANG.pdf] (Consulted on June 15, 2020).

TECHNOLOGICAL AND SCIENTIFIC EXPERTISE

Mining in Québec depends on the optimization and development of new metallurgical processes and the expertise of applied research centres and research networks, particularly:

- > COREM;
- > the Elements 08 Strategic Metals Excellence Centre;
- > the Agora 49 Consortium;
- > the Metal Transformation Research and Innovation Consortium.

Mineral development can also count on expertise in research and training of skilled labour at all levels:

- > Québec universities, colleges and vocational training centres offering diversified programs, services to businesses and continuing education, adapted to the market's needs;
- > college technology transfer centres: Centre technologique des résidus industriels, Centre de métallurgie du Québec, Centre national en électrochimie et en technologies environnementales, Institut technologique de maintenance industrielle, Coalia and Nergica;
- > four ACCORD niches: the MISA Group (mining, innovation, solutions, applications), mining and metallurgical industrial process engineering, Réseau de la transformation métallique du Québec and Alliance Métal Québec;
- > Institut national des mines, in a supporting and advisory role to Québec's ministers of Education and Higher Education in the implementation of an innovative training offering that contributes to the development of the full potential of the mining industry workforce.



INSTITUT NATIONAL DES MINES: 10 YEARS OF INNOVATION FOR MINING TRAINING

Thanks to research reports, pilot projects and over 120 partners, collaborators and researchers from the education sector and the mining industry, the Institut national des mines supports educational institutions and mining companies in the development of an innovative and diversified training offering.

Stand-alone mines and remote control centres can be fully operated only by a digitally competent workforce. This finding is also valid for CSM deposit appraisal. Training of personnel is a key lever in the success of the transition begun by the industry. This is the context of the activities and research of the Institut national des mines, which aims for concerted action by all stakeholders to position Québec as a national and international leader in mining training.

Figure 3
CSM Mines, Mining Projects and Mineral Deposits in Québec

Graphite

Several graphite projects are underway in Québec.

- | | |
|---|---|
| 1 Lac-des-Îles
Imerys Graphite and Canada Carbon | 5 La Loutre
Lomiko Metals Inc. |
| 2 Lac Guéret
Mason Graphite | 6 Miller
Canada Carbon |
| 3 Matawinie
Nouveau Monde Graphite | 7 Bell Graphite
Saint Jean Carbon |
| 4 Lac Knife
Focus Graphite Inc. | 8 Mousseau West |
| | 9 Lac Rainy Nord
Metals Australia Ltd |
| | 10 Lac Guéret Sud
Berkwood Resources Ltd |

Nickel, Copper, Cobalt and Platinum Group Elements

Two mines extract cobalt and platinum group elements as nickel by-products.

- | | |
|---|---|
| 11 Raglan
Glencore Canada Corporation | 15 Hawk Ridge
Nickel North Exploration Corp. |
| 12 Nunavik Nickel
Canadian Royalties Inc. | 16 Lac Menarik
Harfang Exploration Inc. |
| 13 Dumont Nickel
Magneto Investments Limited Partnership | 17 Lac Rocher
Victory Nickel Inc. |
| 14 Bravo
Jien Nunavik Mining Exploration Ltd. | 18 Nisk-1
Critical Elements Corporation |
| | 19 Grasset
Balmoral Resources Ltd |

Niobium

Québec is the second largest producer of niobium in the world and the only producer in the Northern Hemisphere.

- | | |
|--|---|
| 20 Niobec
Magris Resources Inc. | 21 Crevier
Les Minéraux Crevier inc. |
|--|---|

Titanium or Vanadium

Québec is the world's largest producer of titanium in the form of ilmenite.

- | | |
|--|---|
| 22 Lac Tio
Rio Tinto Fer et Titane | 25 Magpie
The Magpie Mines Inc. |
| 23 BlackRock
BlackRock Metals Inc. | 26 Iron-T
Vanadium Corp. |
| 24 Vanadium-Lac Doré
Vanadiumcorp Resource Inc. | 27 Mont Sorcier Iron
Vanadium One Iron Corp. |
| | 28 Lac la Blache
Splendor Titanium Inc. |

Lithium

Québec has high lithium potential.

- | | |
|---|--|
| 29 North American Lithium**
North American Lithium | 32 Rose
Critical Elements Lithium Corporation |
| 30 Whabouchi
Nemaska Lithium | 33 Moblan
Lithium Guo Ao Ltée and SOQUEM |
| 31 Authier
Sayona Québec | 34 James Bay
Galaxy Resources Limited |

Rare Earth Elements

Québec has several rare earth deposits and is recognized as having global potential.

- | | |
|---|--|
| 35 Kwyjibo
SOQUEM | 38 Kipawa (Zeus)
Corporation Métaux Précieux du Québec and Ressources Québec inc. |
| 36 Eldor (Ashram)
Commerce Resources Corporation | 39 Niobec - REE Zone
Niobec Inc. |
| 37 Strange Lake - Zone B
Torngat Metals Ltd. | 40 Carbonatite from Montviel
Geomega Resources Inc. |

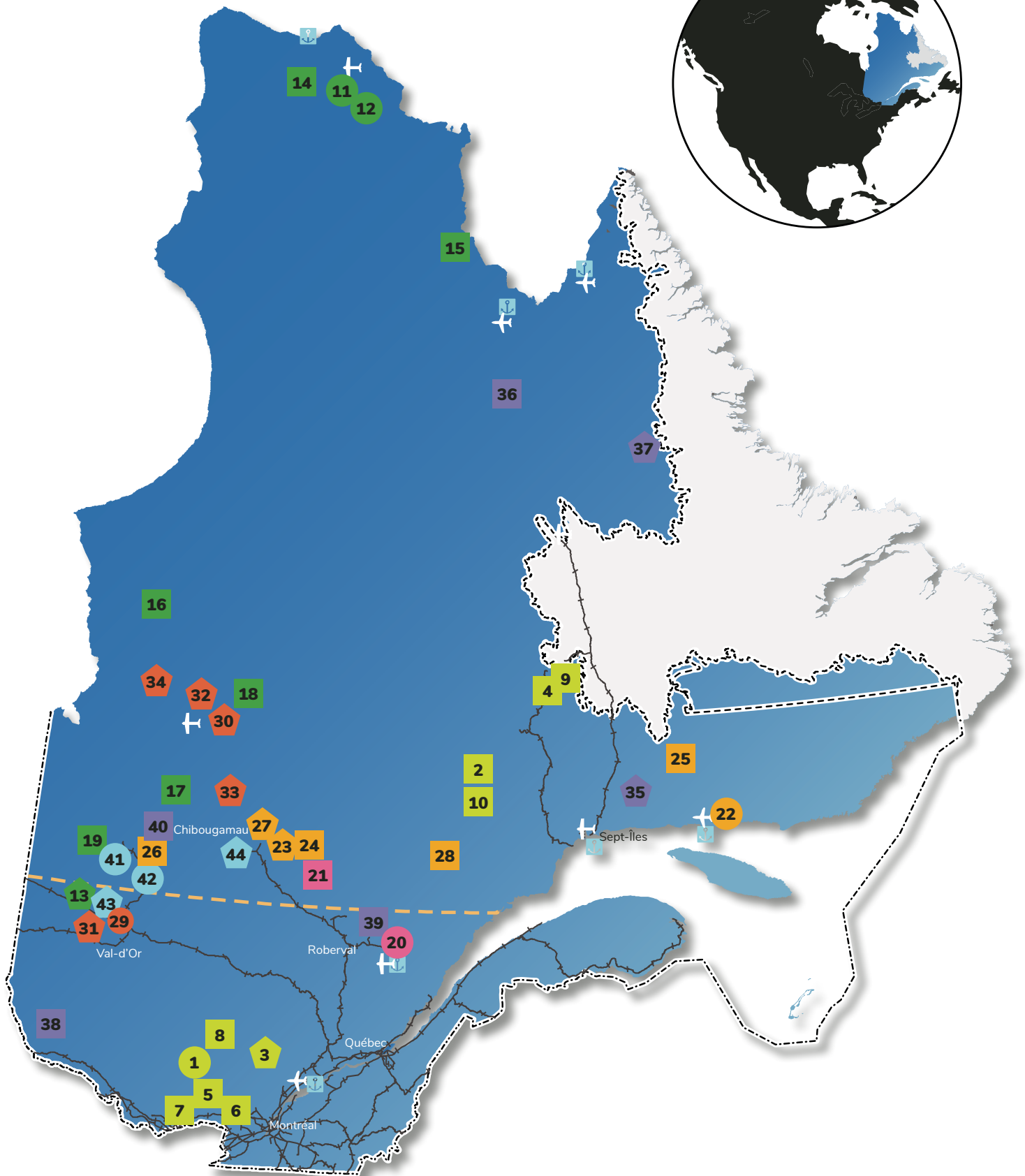
Zinc and Copper*

A copper smelter and refinery and a zinc refinery are in operation in Québec.

- | | |
|---|---|
| 41 Bracemac-McLeod
Glencore Canada Corporation | 43 Abcourt
Abcourt Mines Inc. |
| 42 Langlois (Grevet)**
Breakwater Resources | 44 Lac Scott
Les Ressources Yorbeau inc. |

* The zinc and copper resources are not represented on the map.

** Mines in maintenance



Project legend: Deposits (mineral resources) Development or construction and running-in projects Mines

The Hydro-Québec energy innovation hub is a research and development crossroads unique in the world. In addition to supporting every facet of its activities, from production to consumption of electricity, Hydro-Québec's research addresses battery materials, among other subjects. The government corporation has obtained about 800 patents, granted around sixty licences to use its technologies and published approximately 250 scientific articles. This work is carried on at the Institut de recherche en électricité du Québec (IREQ) and the Centre d'excellence en électrification des transports et stockage d'énergie. This centre of excellence is interested in different energy storage applications, both for supplying electricity complementary to intermittent energy sources and for small-scale applications, such as cell phone batteries.



SKILLED LABOUR, AN ESSENTIAL RESOURCE FOR CSM DEVELOPMENT

Skilled labour in big enough numbers to hold jobs in the CSM sector – that's one of the conditions of the plan's success. This is especially true in the current context of major technological changes, which influence the skills required on the labour market.

Given its mission concerning labour and employment, the ministère du Travail, de l'Emploi et de la Solidarité sociale (MTESS) is an essential government partner in this regard.

The MTESS proposes several measures to support the development of skills related to CSM development. For example, it may grant subsidies to businesses to cover part of the expenses incurred in training workers, to obtain the services of human resources management consultants or to cover part of the wages of people facing certain barriers to employment. It may also provide financial support to unemployed people so they can take training leading to employment in these businesses. The MTESS is also responsible for the Programme d'apprentissage en milieu de travail (Workplace Apprenticeship Program), which allows on-the-job training according to a journeyman/apprentice formula.

In addition, the Commission des partenaires du marché du travail has different financial support programs for training workers and internships. Several QPDCSM actions and projects benefit from MTESS measures and programs, such as those supported by the Comité sectoriel de main-d'œuvre de l'industrie des mines and the Comité sectoriel de main-d'œuvre de la métallurgie du Québec, the Propulsion Québec electric and smart transportation cluster, the Scale AI artificial intelligence supercluster, and several projects promoted locally by the regional branches of Services Québec.



Vision, Objective and Guiding Principles

VISION

Recognized as a reliable, ethical and sustainable partner, Québec contributes actively to the global green energy and technological transitions and to wealth creation in a greener economy by production, transformation and recycling of quality CSMs.

OBJECTIVE

Encouraging the development and sustainability of CSM value chains, which benefit from Québec's competitive advantages and knowhow, while contributing to the government green energy transition and technological orientations, in a perspective of sustainable development, social acceptability and wealth creation for the regions, including the local and Indigenous communities.

GUIDING PRINCIPLES

While relying on its exemplarity regarding the environment, protection of the land and cultural heritage preservation, the Plan will be deployed according to five principles intended to:

- > meet Québec's CSM needs to contribute to the implementation of its strategies and policies;
- > preserve Québec's economic interests by:
 - developing and ensuring access to the mineral potential of Québec CSMs;
 - prioritizing processing in Québec to promote the export of products containing CSMs;
 - maximizing the impacts in the CSM-producing regions, thus contributing to their economic prosperity;

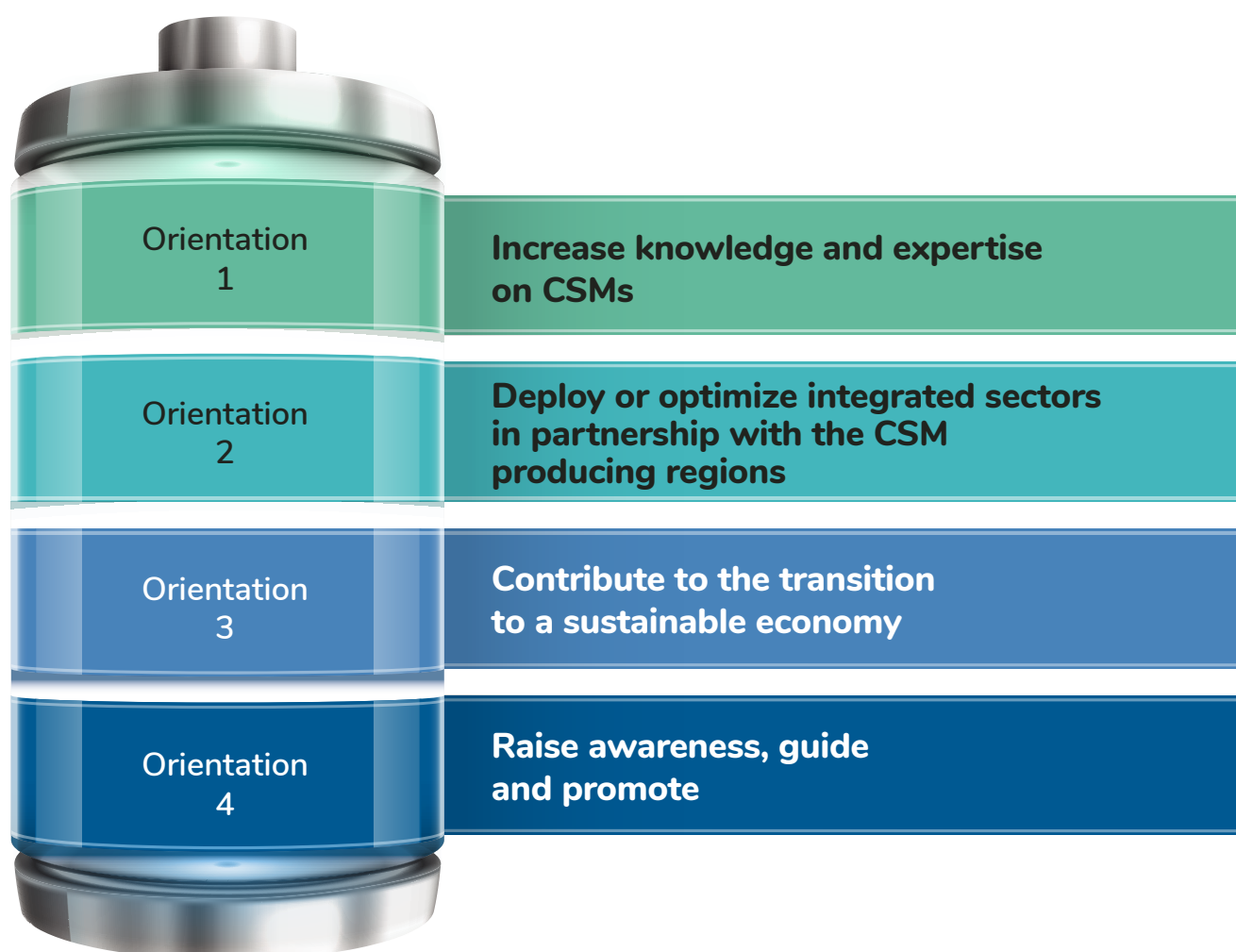
- > integrate the circular economy principles into the analysis of CSM projects throughout their value chain, particularly by encouraging the optimal use of their residues and their recycling;
- > act in partnership with the regional and Indigenous communities by engaging all stakeholders for CSM deposit appraisal;
- > foster development conditions that respect the environment and the local and Indigenous communities by:
 - protecting their living environments and workers' health and minimizing the negative impacts;
 - promoting good community relations practices with the communities and proponents⁶;
 - relying on training and quality job creation;
 - fulfilling the government's duty to consult and, if applicable, accommodate the Indigenous communities.

6 These relations are likely to lead to various forms of agreements (pre-project, cooperation, impacts and benefits, etc.). Even though no legal obligation currently exists in Québec for a proponent to enter into such agreements, the Gouvernement du Québec is generally favourable to them when the circumstances are appropriate.

Orientations



The Plan breaks down into four orientations. These include a total of 11 objectives and 22 actions in view of ensuring short-term, medium-term and long-term development of mines and structuring value chains geared to the emerging and growing CSM markets.



Orientation 1
**Increase knowledge
and expertise on CSMs**

Summary of Actions

Appraise the potential of CSM deposits in Québec:

- + Acquire new geoscientific knowledge;
- + Integrate digital innovations into geoscientific data processing and mineral potential assessment.

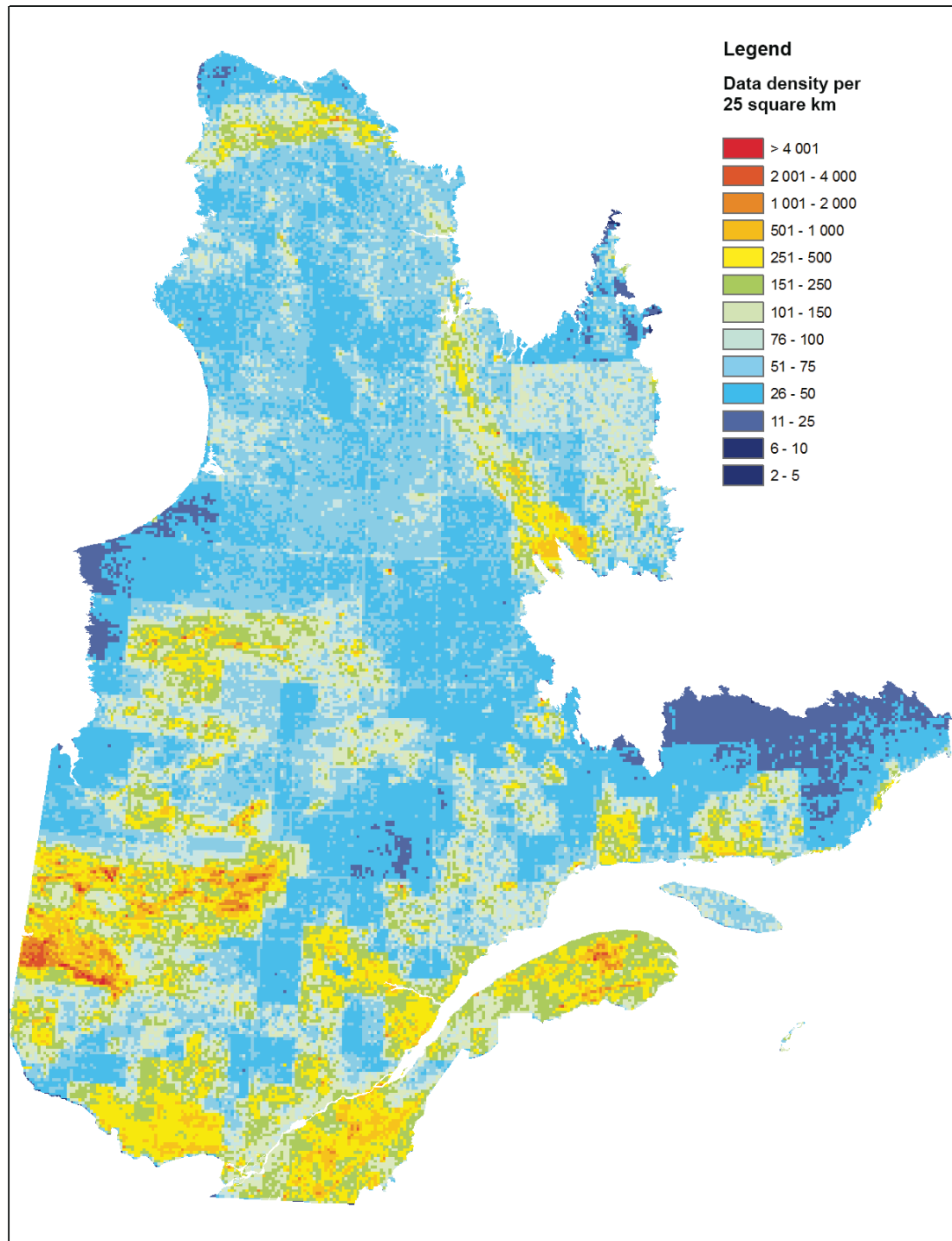
Improve knowledge of CSMs by encouraging synergies in research and development and innovation:

- + Sustain the creation of a CSM-specific scientific network;
- + Develop environmental and social management tools for CSM projects.

The need to develop knowledge and expertise in several stages of development of value chains has emerged as one of the key issues for the development of CSM sectors in Québec.

Figure 4 presents the current knowledge of Québec's territory. It must be recognized that there is a whole world to explore and wealth to discover, especially in northern and eastern Québec (blue sections on the map).

Figure 4
State of Geoscientific Knowledge



New knowledge and technologies are in development for CSM extraction, processing, transformation and recycling. The research and development efforts, particularly in CSM processing and transformation, must be more structured and concerted to maximize their impacts.

Moreover, given the complexity of certain CSMs, additional knowledge of the possible environmental impacts is essential from the first exploration phases to recognize the problems earlier and reduce the eventual environmental footprint of a mining operation.

Finally, the acquisition of this knowledge will allow the consolidation of Québec's expertise, which is strategic economic wealth in itself.



CONSOREM: 20 YEARS OF INNOVATION IN MINERAL EXPLORATION!

Founded in 2000, Le Consortium en exploration minérale (CONSOREM) carries out projects with strong economic impact and contributes to training highly-skilled personnel. Its research projects focus on the development of exploration tools to benefit the industry. CONSOREM offers technology transfer and guidance activities for its members and the industry as a whole. It also creates networking among stakeholders from the industrial, government and university communities with the aim of invigorating precompetitive research in the Québec mineral exploration sector.

Objective 1.1

Appraise the potential of CSM deposits in Québec

Action 1.1.1

Acquire new geoscientific knowledge

High-value geoscientific data is acquired and disseminated by the government to attract exploration investments. Each dollar invested in knowledge acquisition generates an average of five dollars in exploration work and contributes to reducing the risks of mineral exploration companies⁷.

Although Québec has mineral occurrences that confirm the presence of multiple CSMs in its territory, the knowledge is still partial and does not allow adequate evaluation of its full CSM potential. From 2020 to 2025, the government will intensify its geoscientific work to identify the sectors conducive to exploration for CSM deposits in order to support the discovery of new mines.

7 PROSPECTORS AND DEVELOPERS ASSOCIATION OF CANADA, Geoscience Investments Support Mineral Exploration [<https://www.pdac.ca/priorities/advocacy/federal-budget/budget-2014/geoscience-investments>] (Consulted on June 15, 2020).



SIGÉOM: A DATABASE RECOGNIZED WORLDWIDE

The data and knowledge acquired in the course of geoscientific work is disseminated in the Système d'information géominère du Québec (SIGÉOM – Geomining Information System). Recognized as one of the world's best databases for the quality and accessibility of information, SIGÉOM brings together geoscientific data from the Gouvernement du Québec, public bodies, the industry and the university research sector. This 150-year legacy of history and knowledge of geosciences in Québec gathers over one million technical and scientific observations and measures regarding Québec geology and mineral resources. This information is available free of charge on the MERN's user-friendly website.

Action 1.1.2

Integrate digital innovations into geoscientific data processing and mineral potential assessment

Thanks to digital and scientific advances, including those in artificial intelligence, SIGÉOM soon will be able to generate more knowledge on Québec's mineral potential.

The Gouvernement du Québec will invest in the development of new digital and technological tools for mass processing of geological data, in partnership with the research community and the stakeholders of the artificial intelligence ecosystem.

Moreover, the geoscientific data will be reexamined and used to improve the knowledge of the environmental characteristics associated with exploration and mining of CSM mines. Accounting for the environmental impacts caused by mining, as soon as possible in the mineral development process, ensures the deployment of an appropriate environmental management mode throughout mining operations. It also allows better planning and reduction of the site restoration costs.



QUÉBEC, PRECURSOR IN GEOLOGICAL DATA PROCESSING

Québec is a precursor in geological data processing! For over 20 years, the MERN has processed and enhanced SIGÉOM data to identify the most promising sectors for mineral exploration in Québec. The MERN produced some of the first work in geology for numerical modelling. Since then, many states have followed suit and artificial intelligence networks, such as neural networks and deep learning, are used increasingly in the mining industry.

Objective 1.2

Improve knowledge of CSMs by encouraging synergies in research and development and innovation

In a highly competitive global context, Québec must rely on promising innovations that apply the most advanced technologies, particularly in mineral processing and transformation. To maximize research efficiency, it is necessary to coordinate the efforts and work more in synergy with the mining industry.

Action 1.2.1

Sustain the creation of a CSM-specific scientific network

Despite the need to develop knowledge of CSMs, the innovation ecosystem of the CSM sector remains fragmented. Companies and research centres operate according to varied business models and collaborative networks, often working independently on the different CSM value chains. However, the intention for a better alignment and greater coordination among the stakeholders is manifest. This is why the Gouvernement du Québec intends to encourage increased coordination among the different organizations and companies active in research and development (R&D) and innovation, in two stages.

For a better understanding of the CSM research ecosystem, including the needs and the issues, mapping of all the stakeholders, their objectives and the current projects will be accomplished first.

Then, to make the research dynamic, the Gouvernement du Québec intends to deploy a knowledge sharing and development network that would allow companies and researchers to make a good impression at the national and international level. This network will particularly seek to:

- > increase the synergies among the organizations by maximizing the use of human and material resources within the established structures;
- > develop concrete and accessible solutions more rapidly for the mining industry.

Action 1.2.2

Develop environmental and social management tools for CSM projects

The ministère de l'Environnement et de la Lutte contre les changements climatiques (MELCC) plans to grow its expertise and knowledge on the environmental impacts and environmental management of CSM exploration, extraction, transformation and recycling activities. The development of environmental knowledge and expertise will make it possible to:

- > ensure that the new sectors are developed with respect to the environment and public health principles;
- > assess the potential effects of CSMs on the environment, the receiving environments (water-air-soil, terrestrial and aquatic ecosystems) and human health;

- > deepen the knowledge of tailings characterization, and of processing and restoration technologies in view of reducing the potential impacts of the CSM exploration, extraction and transformation projects;
- > ensure adapted management of industrial residues to achieve a satisfactory state after restoration of the mining site;
- > improve consideration of the environmental, social and economic impacts in analysis of the CSM projects.

With this new knowledge, the government authorities will be able to adapt and improve the tools, guides and directives supporting the environmental assessment and authorization regime in order to ensure adequate supervision of the mining and industrial projects composing the CSM value chains. Finally, this new knowledge will allow better public information on the issues and benefits of CSM-related projects.



ROBUST AND CLEAR AUTHORIZATION PROCESSES: A GAUGE OF PROJECTS THAT RESPECT THE ENVIRONMENT AND HARMONIOUS COHABITATION OF LAND USES

All mining projects must obtain authorizations from the MELCC before construction and operation, so that their environmental impacts are assessed and mitigated. The authorizations and the processes for obtaining them are different from one project to another. However, public consultations are scheduled. In southern Québec, mining projects that have a high environmental risk must follow the environmental impact assessment and review procedure. This procedure provides for different public participation mechanisms, including the public consultation conducted by the Bureau d'audiences publiques sur l'environnement (BAPE). For mining projects with moderate risks, the Mining Act provides for public consultations in the region where the project is located, which are conducted by the proponent before obtaining the mining lease.

In the territories covered by the James Bay and Northern Québec Agreement and by the Northeastern Québec Agreement, mining projects are covered by the environmental and social impact assessment and review procedure. This procedure also provides that public consultations may be held.

In all cases, due to the constitutional obligation incumbent on it, the Gouvernement du Québec must consult and, if applicable, accommodate the Indigenous peoples when it learns of a treaty right or the potential existence of a credibly claimed Aboriginal right or title and when it envisions measures that could have a prejudicial effect on this right.

Finally, the Gouvernement du Québec may also agree with an Indigenous community on a consultation and accommodation process for natural resources development projects, particularly concerning mining activities, such as the process carried out with the Abitibiwinni First Nation in 2017.

Orientation 2

Deploy or optimize integrated sectors in partnership with the CSM producing regions

Summary of Actions

Foster sustainable CSM exploration and development:

- + Protect the CSM resources of interest for Québec;
- + Improve support for basic CSM exploration;
- + Analyze the market trends of the CSM sectors.

Support the transformation and creation of value-added products associated with the CSM sectors:

- + Produce a profile of the current and future Québec value chains using CSMs;
- + Support R&D on CSM extraction, transformation and recycling;
- + Fund research on solid electrolyte batteries;
- + Promote and improve the instruments supporting the development of CSM value chains close to the resource.

Improve multi-user infrastructure and access corridors to CSM resources:

- + Develop an integrated vision for the implementation of northern transportation, renewable energy and telecommunications network.

Stimulate the implementation of structuring artificial intelligence initiatives in Québec mining companies:

- + Support the program of Mission Mines Autonomes 2030 (Stand-alone Mines 2030 Mission) for a transition to Mining 4.0

A typical mineral value chain is complex. It includes several phases, from exploration to recycling of the resource, including mining, transformation and use (Figure 2, p. 5). The implementation of this type of sector in Québec, such as the lithium-ion battery sector, is possible when the winning conditions are combined, namely availability of the resource, proximity of the market, competitive operating costs, an ecosystem of innovative companies, a growing global market, and stimulating oversight.

The development of the CSM sectors faces several economic development issues, including the following four:

- > The market development possibilities for CSMs, including the future evolution of technologies and global needs, must be documented, and the value added that may result from the CSM industry in Québec must be appraised. An intelligence watch coupled with an analysis of the markets is necessary;
- > The mines are rare and do not move, so the land use planning process must be concerted to allow CSM mining for the current and future generations, while preserving the ecosystems and living environments;
- > To discover new quality mines and ensure Québec is more competitive globally, it is essential to support basic exploration, which barely self-finances on the public and private markets;
- > The deployment of multi-user infrastructure, developed in collaboration with community stakeholders, must make it possible to support the mining sector while benefiting the local and Indigenous communities and the other economic sectors. This infrastructure must also allow routing of the resources to the processors at a competitive price.

Objective 2.1

Foster sustainable CSM exploration and development

Action 2.1.1

Protect the CSM resources of interest for Québec

Like other states, such as Sweden, the government intends to protect CSM resources of interest for Québec. To do this, legislative changes could be proposed.

For example, in exceptional situations, it might be possible to identify a CSM resource as a resource of interest for Québec and then consider designating a limited territory for its eventual deposit appraisal. A resource could be considered, based on rigorous criteria, particularly because it would be necessary to achieve the objectives of the GHG reduction policies or to ensure the supply of Québec companies. In these territories, it could be considered that deposit appraisal of these mineral resources would be favoured.

With respect to the duty of consultation and, if applicable, accommodation of Indigenous communities, the planning of these territories would be harmonized with the different government territorial plans. For example, let us mention the public land use plans and those specific to the Northern Territory; the government policy directions on land use planning, which particularly include the Québec objectives for designation of protected areas, the government policy directions on land use planning with the aim of ensuring harmonious cohabitation between mining and the other uses of the territory, which define the boundaries of the mining-incompatible territories, and the land use and development plans of the regional county municipalities (RCM).



MINING-INCOMPATIBLE TERRITORIES (MIT): AVOID CONFLICTS OF USE AND ENSURE PREDICTABILITY

Since December 14, 2016, the RCMs and the cities, agglomerations and other organizations exercising certain powers of RCMs may delimit mining-incompatible territories in their land use and development plan, in accordance with the Act respecting land use planning and development. This Act does not apply to the territories located north of the 55th parallel or Category I lands located south of the 55th parallel, contemplated in Chapter I of Title III of the Act respecting the land regime in the James Bay and New Québec territories. These mining-incompatible territories are those in which activities would be compromised by the impacts of mining. Mineral substances found on land in a mining-incompatible territory are excluded from mining. This implies, in particular, that no new mineral exploration rights may be obtained in these territories. The purpose of this measure is to avoid conflicts of use and ensure predictability for the communities and for the mineral exploration companies.



QUÉBEC TARGETS FOR PROTECTED AREAS AND NATURAL HERITAGE CONSERVATION

With the announcement of the revival of the Plan Nord on April 8, 2015, Québec undertook to achieve the target of 20% protected areas by 2020 in the territory of the Plan Nord, including at least 12% in the boreal forest extending north of the 49th parallel.

In addition, the Gouvernement du Québec is seeking to deploy an allocation mechanism for 30% of the Northern Territory, dedicated to priority protection of the environment, safeguarding of biodiversity and implementation of various types of developments. To this effect, a multipartite working group has been created (GT30%), with the mandate to propose an allocation mechanism to the Gouvernement du Québec.

Action 2.1.2

Improve support for basic CSM exploration

In Québec, 87% of the investments in exploration and development are devoted to precious, base and ferrous metals. Investments in CSM projects are comparatively modest. To remedy this situation, it is important to support the discovery of new mineral occurrences and their development to a state of progress sufficient to interest investors.

For this purpose, an exploration assistance program will allow the accomplishment of basic CSM exploration projects that stand out for their originality and the quality of the exploration model. These projects may benefit from support at the stage of value enhancement of the mineral occurrence or the property when institutional financing is not yet accessible. Subsequently, the progress of the projects could allow the most promising projects to receive support from institutional investors.

Support for the projects will be offered through a public-private partnership with SOQUEM. The projects will require systematic geometallurgical and geoenvironmental studies to account better for the issues related to their mining.



SOQUEM, A PILLAR OF MINERAL EXPLORATION IN QUÉBEC

SOQUEM, a subsidiary of Investissement Québec, is a leading player in mineral exploration in Québec. Its mission is to encourage exploration, discovery and deposit appraisal of Québec's mineral resources. It has participated in hundreds of projects that led to major discoveries of gold, diamond, lithium, niobium, rare earth elements and several other mineral substances, which makes it one of the most prolific exploration companies in Québec. SOQUEM's discoveries have led to the production launch of several mines, including the Niobec Mine, and have contributed to the creation of over 1,000 jobs in Québec.

Action 2.1.3 Analyze the market trends of the CSM sectors

To maximize the economic benefits related to CSM deposit appraisal in Québec, the MERN will develop its knowledge and expertise in economic forecasting to be able to anticipate future demand, both for materials currently recognized as critical or strategic and for those that will become critical or strategic.

This knowledge will allow the adaptation of the Plan's medium-term and long-term actions by positioning the MERN in the vanguard and prioritizing the directions for research and support for Québec's emerging sectors.

Data collection by the Institut de la statistique du Québec will be adapted to the needs of CSM knowledge to better understand the evolution of this sector and its benefits for Québec's economy. Other government departments or bodies, including Investissement Québec, the ministère des Relations internationales et de la Francophonie and the Société du Plan Nord, will also contribute.

In addition, studies could be conducted to profile certain CSMs (size, production, consumption) and the position of the Québec players on the world market, compared to other global players.



MERN-ISQ COLLABORATION: ENRICHING STATISTICS

Over time, a close collaboration has developed between the MERN and the Institut de la statistique du Québec, particularly with regard to production of Québec mining statistics and economic impact studies produced with the Québec intersectoral model developed at the Institut. This collaboration has enriched the knowledge of the mining sector and favoured the design of useful and reliable economic analysis tools. These tools allow measuring and quantification of the economic benefits of Québec's different mining projects, including those concerning CSMs.

Objective 2.2

Support the transformation and creation of value-added products associated with the CSM sectors

Action 2.2.1

Produce a profile of the current and future Québec value chains using CSMs

Production of a profile of current and future Québec value chains using CSMs can document this question, which is still unknown. This is a prerequisite for detecting the most interesting possibilities and for guiding the actions to be preferred on public policies that can foster the development of the different sectors. The portrait of Québec's sectors resulting from this exercise will also make it possible to envision the development and application of circular economy strategies.



PROPULSION QUÉBEC: POSITION QUÉBEC IN THE SMART AND ELECTRIC TRANSPORTATION MARKET

To meet the climate challenge, many states, such as Québec, are adopting ambitious electrification objectives, which have the effect of stimulating the demand for electric vehicles. The lithium-ion battery sector is being transformed at phenomenal speed to support the marked growth of the global market for electrical vehicles. With nearly 80 players distributed among all the links of the value chain, the ecosystem of lithium-ion batteries and recycling of these batteries is one of the most dynamic in Québec.

To position itself in this growth sector, Québec must act quickly. This was the overall finding of the study conducted by Propulsion Québec on the lithium-ion battery sector, published in 2019. Propulsion Québec is mobilizing all the players in the smart and electric transportation ecosystem around concerted projects with the objective of positioning Québec among the world leaders in development and deployment of smart and electric transportation modes. Strongly engaged in this race, it is conducting studies on the positioning strategies and regulatory mechanisms to be implemented for end-of-lifecycle management of electric vehicle batteries; it is also contributing to the development of a traceability system for battery materials.

Action 2.2.2

Support R&D on CSM extraction, transformation and recycling

Several programs will allow support for R&D on CSM extraction, transformation and recycling. A new collaborative research program will be instituted for precompetitive research on transformation processes. In addition, four research support programs will be modified or improved to stimulate research on CSM extraction, transformation and recycling processes:

- > Mining Research and Innovation Support Program (PARIDM);
- > Joint Research Program on Sustainable Development of the Mining Sector (FRQNT – MERN);
- > FRQNT Partnership Research Projects Program on Extraction, Transformation and Recycling (FRQNT – MEI);
- > Sectoral industrial research clusters (RSRI).



COREM, CREATOR OF INNOVATIVE ORE PROCESSING SOLUTIONS

COREM is the leading centre of ore processing expertise in Canada and one of the most important in the world. Its mission is to create innovative ore processing solutions for the benefit of the mining industry. Its business model is based on:

- > its precompetitive research program conducted with its members;
- > a vast range of professional services offered on a contractual basis, for both members and non-members;
- > its collaborative projects.

Based in the city of Québec, COREM marked 20 years of existence in 2019. Today, it benefits from the expertise of over 140 employees and infrastructure on the technological cutting edge.

The precompetitive research program is a major component of COREM's business model. Thanks to this program, COREM has generated direct economic benefits for its members of nearly \$300 million dollars (\$300M) over the past 10 years. For each dollar invested in research, \$4.27 has been obtained in economic benefits, and the average annual investment is established at \$5.5M.



ELEMENTS 08: TOWARD SUSTAINABLE MINING OF STRATEGIC METALS

On May 11, 2018, the Gouvernement du Québec granted \$7.5M in financial assistance to the Centre d'excellence sur les métaux stratégiques Éléments 08, which brings together Université du Québec en Abitibi-Témiscamingue, Cégep de l'Abitibi-Témiscamingue and Centre de technologie des résidus miniers industriels. This excellence centre seeks responsible and sustainable mining of strategic metals.

Action 2.2.3

Fund research on solid electrolyte batteries

The Centre d'excellence en électrification des transports et stockage d'énergie (CEETSE) of the IREQ is currently working on the creation of a laboratory with the Lawrence Berkeley National Laboratory, a research institution active in the battery and energy storage fields.

This partnership seeks the development of technologies for industrial-scale manufacturing and marketing of batteries intended for transportation electrification and energy storage. Ultimately, Hydro-Québec wants to arrive at the creation of all-solid-state batteries that will use CSMs. These innovative batteries, which would allow achievement of greater autonomy and quicker charging time, would be intended for the global market for electric vehicles. This is an exponential opportunity for wealth creation that could position Québec at an advantage in the battery market.

To concretize this partnership, the Gouvernement du Québec will fund the CEETSE's contribution to the project.



HYDRO-QUÉBEC, A RESEARCH PARTNER

One of the purposes of the research conducted at the Centre d'excellence en électrification des transports et stockage d'énergie is to develop new battery materials that will incorporate certain CSMs, primarily lithium, cobalt and graphite. They will allow Québec's strategic positioning in the new global economy. Research partnerships and licences on technologies developed by Hydro-Québec are already in force, with active mines or potential projects that will use CSMs.

Action 2.2.4

Promote and improve the instruments supporting the development of CSM value chains close to the resource

The Gouvernement du Québec has several instruments in view of supporting industrial initiatives. They sometimes are little known to entrepreneurs, regional public authorities and groups that could promote CSM development initiatives. These tools will be adapted to the regional reality and offered to the different stakeholders in the field.

Several economic support measures, applicable in the preliminary stages of a project to its implementation, are made available to project proponents:

- > funds are available to help the proponents get from the idea to the project. Government programs are offered on the provincial and federal scales. Once the project is defined, financial assistance is available to support the deployment of a feasibility study;
- > when the project includes an innovation component, the government proposes several programs depending on the type of innovation and its stage of advancement;
- > in the event the feasibility study proves conclusive, the setup of the business plan can be funded by programs of the Gouvernement du Québec or regional business startup programs;
- > in the case of industrial projects, when the business plan shows a certain level of profitability, Investissement Québec offers several financial solutions that can be combined with traditional bank financing, as well as the financing offered by investment funds or private strategic investors from Québec, Canada or abroad.



THE 2020-2023 NORTHERN ACTION PLAN: STRUCTURING PROJECTS FOR NORTHERN QUÉBEC

The 2020-2023 Northern Action Plan (NAP 20-23) deploys the conditions for success of territorial development that recognizes:

- > the will of the populations to fully inhabit their territory;
- > the power to act of Northern communities;
- > the territory's strengths, including the capacity of its communities;
- > the economic, social, cultural, political and historical characteristics of the realities specific to nordicity;

and that ensures benefits for the northern Territory as a whole.

PAN 20-23 is articulated around four major orientations:

- > optimized access to the Northern Territory;
- > a strong and diversified economic fabric;
- > an attractive and dynamic living environment;
- > a northern environment to conserve.

The government will carry out the targeted projects with all of the territory's stakeholders, while relying on social acceptability and sustainable development principles.

By the establishment of regional offices in the territory, the Société du Plan Nord (SPN) has the mandate, in particular, to guide and support the local and Indigenous communities in their project and contribute to maximizing the economic benefits generated by the development of natural resources in the territory.

We note that certain tax measures particularly encourage capital investments, especially in regions, such as the tax holiday for major investment projects and the investment and innovation tax credits.

Concerted action by those responsible for the tax measures deployed by the government will also be organized to assess the possibilities and adapt them to stimulate CSM industrial processing projects in the producing regions.

Objectif 2.3

Improve multi-user infrastructure and access corridors to CSM resources

Action 2.3.1

Develop an integrated vision for the implementation of northern transportation, renewable energy and telecommunications network

Access Corridors

The Gouvernement du Québec, in collaboration with the local and Indigenous communities, wishes to plan the establishment of access corridors to northern energy and mineral resources, particularly in regions with high mineral potential.

By integrating the planning of the strategic transportation axes necessary for development of the areas most conducive to mining development, it will be possible to share the costs among the users, and thus reduce the financial risks.



SOCIÉTÉ DE DÉVELOPPEMENT DE LA BAIE-JAMES (SDBJ), RESPONSIBLE FOR THE OPERATION OF THE JAMES BAY HIGHWAY AND SEVERAL JAMES BAY AIRPORTS

The development of the James Bay hydroelectric complex in the 1970s allowed Québec to equip itself with road and airport infrastructure to access a vast Northern Territory hitherto inaccessible to economic development.

Over 620 km long and completely paved, the James Bay Highway is part of the infrastructure inherited from the James Bay project. Used today by the territory's populations and various users, including mining, hydroelectric, forest and tourism industries, this is a strategic communication route for the development of Northern Québec in several regards:

- > supply line to the communities of Nord-du-Québec;
- > reduction of transportation costs;
- > access to mineral and energy resources.

SDBJ has been mandated to repair the James Bay Highway and the Chisasibi Road. This project totalling nearly \$334M is funded by the Gouvernement du Québec and the Government of Canada. It will make a more robust, more reliable and safe infrastructure available to the companies of the industrial sectors (mining, energy, forest) and the tourism sector.

SDBJ is also responsible for the operation of several airports and aerodromes in its territory of intervention. It is the owner and operator of La Grande-Rivière Airport, it operates the Matagami Aerodrome on behalf of the ministère des Transports and it is mandated by Hydro-Québec to ensure maintenance of two aerodromes.

SDBJ and Hydro-Québec are engaged in discussions with the aim of evaluating the possibility of mandating SDBJ to operate Hydro-Québec's aerodromes in James Bay. In the event of an agreement, SDBJ would convert them into multi-user infrastructure that would contribute to improving access to the territory.

Multi-User Infrastructure

Due to the immensity of the spaces and the absence of terrestrial or maritime infrastructure over a large part of Québec's territory, the exploration and operating costs are high for mining companies, especially north of the 49th parallel.

The deployment of infrastructure giving access to the resources of a remote region may generate substantial costs, often at the expense of the proponent of the first project. Once in place, these infrastructures can favour the development of other projects and also benefit the local and Indigenous populations.

In this context, the government could contribute financially to the deployment of multi-user infrastructure, on the following conditions and depending on financial availability, in compliance with the environmental and social impact review processes:

- > the infrastructure will have to serve more than one project, offer economic development potential and be acceptable for the local and Indigenous populations concerned;
- > the project, depending on the form of the contribution, will have to offer a prospect of return on investment or a repayment horizon for the government.

Telecommunications

The Gouvernement du Québec wishes to encourage the development of high-performance mines through 4.0 digital technologies and artificial intelligence. To benefit from the full potential of these new technologies, the telecommunications infrastructure must be upgraded and their access must be reliable and quick, in concordance with the needs of the local and Indigenous communities.



A GRAND ALLIANCE BETWEEN THE GOUVERNEMENT DU QUÉBEC AND THE CREE NATION

On February 17, 2020, the Premier of Québec, François Legault, and the Grand Chief of the Grand Council of the Crees and Chairperson of the Cree Nation Government (CNG), Abel Bosum, signed a socioeconomic cooperation agreement between the Cree and Québec nations, with the goal of developing and protecting the Eeyou Istchee-James Bay region. Including three phases that will extend over 30 years, offering predictability and stability of investment in mining development, this agreement provides for the creation of a grand alliance between Québec and the CNG, with the particular mission of developing projects and mechanisms that will allow the extension of the railway system, electrification of certain industrial projects, sharing of the territory's infrastructure, training of the local workforce and designation of new protected areas. The ambitious project proposed by the Cree Nation is evidence of a common commitment to deepen the collaboration between the Crees and Québec.

Objective 2.4

Stimulate the implementation of structuring artificial intelligence initiatives in Québec mining companies

Action 2.4.1

Support the program of Mission Mines Autonomes 2030 (Stand-alone Mines 2030 Mission) for a transition to Mining 4.0

The “stand-alone mine” concept is a response from the Québec mining ecosystem to the possibilities presented by Industry 4.0. Mining automation, with its promises of productivity gains, has begun all over the world, and Québec must seize all its advantages.

It is anticipated that by 2030, mining operations will be managed from the surface, from control centres. Major investments will be allocated to target and implement high-performance business solutions. Radical changes will follow within systems, processes, management modes and business models, and for the workforce.

The Mission Mines Autonomes 2030 program (MMA-2030), managed by the MISA Group, an excellence hub in mineral exploration and mining in Québec, seeks the implementation of digital transition best practices within the mining ecosystem. This program will include a portfolio of several complementary projects. It will address mine operators and SMEs of the Québec mineral sectors, particularly those present in the local and Indigenous communities:

- > for the operators, the challenge is to prepare the organization and mining activities for deployment of automation and artificial intelligence technologies;
- > for the vendor SMEs, it involves integration of knowledge and knowhow required to meet the mining operators’ new needs and adapt their solutions to capabilities related to artificial intelligence.

Orientation 3
**Contribute to the transition
to a sustainable economy**

Summary of Actions

Encourage integration of the circular economy into the CSM value chains:

- + Support the circular economy projects applied to the CSM sectors;
- + Encourage the deployment of a business environment favourable to circular economy projects applied to CSMs;
- + Innovate to favour reclamation of tailings.

Encourage the deployment of a CSM recycling industry in Québec:

- + Develop mining by-products and recycle more CSMs;
- + Assess the possibility of extending the scope of regulations on extended producer responsibilities to new products that may contain CSMs.

Stimulate the implementation of initiatives in view of the reduction of the environmental impacts of CSM mining and reclamation projects:

- + Support energy efficiency and the supply of renewable energy for CSM mining and reclamation projects.

On the global scale, less than 9% of the extracted resources are recirculated in the economy once they are used⁸, while the availability of many of these resources, including CSMs, is increasingly limited. The circular economy thus could contribute to ensure a supply of resources.

Indeed, the circular economy is a production, exchange and consumption system intended to optimize the utilization of resources at every stage of the lifecycle of goods or services, while reducing the environmental footprint and contributing to the welfare of individuals and communities (Figure 2, p. 5). This system constitutes a strategy for diversification of the activities of the stakeholders of the CSM value chain. It is also an additional argument for attracting foreign investments.

The circular economy includes the recycling ecosystem, which faces several challenges: among other factors, consider the quality and volume of material available in a small market like Québec and the complexity of the processes to be developed to separate several minerals found in small quantities in consumer goods. For example, a cell phone may contain about forty different minerals or metals.

It is proposed to integrate the principles of the circular economy into the CSM value chains and increase CSM recycling on mining sites and in transformed products to:

- > encourage the design of eco-responsible products in order to extend their lifecycle and thus reduce our dependence on the resource;
- > maximize CSM recycling;
- > Support initiatives in view of better energy efficiency and increased use of renewable energies by the stakeholders of the CSM value chains;
- > keep the metals in the production and consumption chain as long as possible;
- > meet the needs for metals which, according to the projections, cannot be met only by operation of new mines;
- > create new sustainable economic development opportunities for Québec and thus reduce our need to exploit natural resources.

8 CIRCLE ECONOMY, Circularity Gap Report 2020 [https://assets.website-files.com/5e185aa4d27bcf348400ed82/5e26ead616b6d1d157ff4293_20200120%20-%20CGR%20Global%20-%20Report%20web%20single%20page%20-%20210x297mm%20-%20compressed.pdf] (Consulted on June 15, 2020).

Objective 3.1

Encourage integration of the circular economy into the CSM value chains

Action 3.1.1

Support the circular economy projects applied to the CSM sectors

An economic opportunity study will be conducted to target the CSM-based sectors presenting the greatest short-term and medium-term concretization potential for the deployment of circular economy initiatives in Québec, including CSM recycling.

To support the innovation and investment projects in the circular economy, it is particularly envisioned to:

- > issue calls for projects in innovation specific to the CSM sectors;
- > support investments in business projects (e.g. technological acquisitions, infrastructure, fixed assets) contributing to the circular economy in the CSM sectors.
- > develop strategies to attract capital and specialized companies in the field with Investissement Québec.

Action 3.1.2

Encourage the deployment of a business environment favourable to circular economy projects applied to CSMs

Québec has every advantage in drawing inspiration from the best practices developed by the most advanced states in the circular economy. To determine the conditions that will ensure the profitability of facilities in Québec or in Canada, depending on the available sources of supply, foreign best practices will be studied. This study will highlight the most interesting technological advances and business practices (e.g. CSM recycling, mine restoration providing for future reclamation, dismantling of property, chemistry of materials, ecodesign, reverse logistics, etc.) and the strategies deployed to favour attraction of investments.

This study's recommendations will serve to develop recommendations and prioritize the actions to encourage the development of circular economy projects.

Action 3.1.3

Innovate to claim tailings

Reclamation of the tailings of these former mines, if the economic, social and environmental conditions are favourable, offers several advantages in a circular economy and recycling context:

- > reuse of substances already extracted;
- > reduction of the volume of tailings to be restored;
- > possibility of generating additional revenue.

To this end, the MERN will assess the mineral potential in old mines.



THE FORMER CHRYSOTILE ASBESTOS MINES, A NEW SOURCE OF MAGNESIUM?

The Gouvernement du Québec encourages innovation to reclaim tailings and solve certain concrete problems. For example, the former chrysotile asbestos mines have generated huge quantities of tailings in the Asbestos region, in Estrie. The Gouvernement du Québec has invested \$13.4M and granted a loan of \$12.5M for the construction of the Alliance Magnesium commercial demonstration plant. Alliance Magnesium will also recycle scrap magnesium from the metal processing industry, which it will smelt to produce ingots. This company intends to reclaim tailings to extract magnesium in high demand and produce a neutral residue. The plant's total financing is estimated at nearly \$145M. If the efficiency and viability of the process are demonstrated, a primary commercial magnesium ingot production plant will emerge.

Objective 3.2

Encourage the deployment of a CSM recycling industry in Québec

Action 3.2.1

Develop mining by-products and recycle more CSMs

Reclamation of mining by-products and metal recycling are complementary avenues to traditional ore extraction. To be environmentally and economically viable, the reclamation efforts for mining by-products and metal recycling must depend on innovation and creation of efficient processes, combined with incentives for on-site recovery of products, such as lithium-ion batteries and electronic devices.



SCANDIUM, A PROMISING BY-PRODUCT OF TITANIUM

Rio Tinto Fer et Titane (RTFT) operates an ilmenite mine in Havre-Saint-Pierre and a plant in Sorel-Tracy. In the course of a pilot project, RTFT was able to produce scandium oxide of high purity from by-products generated during titanium dioxide production, thus reducing its tailings. Parallel to this, in collaboration with Rio Tinto Aluminium, it is experimenting with the production of an aluminum-scandium alloy. The addition of a very low rate of scandium to aluminum exponentially improves the mechanical properties of aluminum. This project for reclamation of titanium by-products thus could open up new markets for scandium.

In addition to supporting research and development on CSM recycling, the deployment of economically viable technologies contributing to the reclamation of mining by-products and CSM recycling will be stimulated by:

- > financial support and guidance for the stakeholders of the value chain in their projects for development, marketing or adoption of by-product reclamation technologies or CSM recycling;
- > association with the work of Propulsion Québec in view of targeting good practices for collection, sorting and recycling of end-of-lifecycle electric vehicle batteries in Québec, while maximizing the benefits.



ELECTRIC VEHICLES AND BATTERIES: SECTORS TO PROPEL

The ministère de l'Économie et de l'Innovation (MEI) has a budget of \$55M for the implementation of measures in view of developing the electric vehicle and key EV components sectors and implementing a recycling industry

Also, the Gouvernement du Québec encourages the acquisition of electric vehicles, particularly by offering a rebate on purchase or leasing to Québec individuals, companies, organizations and municipalities of up to \$8,000 added to the federal program for which the eligible maximum may reach \$5,000.

Action 3.2.2

Assess the possibility of extending the scope of regulations on extended producer responsibilities to new products that may contain CSMs

Extended producer responsibility (EPR) is an approach that seeks to transfer the responsibility for recovery and reclamation of the residual materials generated by consumption of various products to the companies at the origin of their marketing. Moreover, EPR creates incentives for the producers to account for the environmental aspects during product design in order to reduce their toxicity, improve their dismantling and reclamation potential and ensure the circularity of resources.

With the goal of facilitating the circularity of the CSMs used in the products marketed in Québec and encouraging the development of outlets for recycling of these products, the Gouvernement du Québec will assess the opportunity to extend the applicability of EPR to other categories of products containing CSMs, including batteries and electronic products and batteries currently excluded from the applicable regulations. Marketing studies and end-of-life cycle management of these products are anticipated to analyze the value chains and inform the Government in the exercise of their potential designation under EPR.



METAL RECYCLING: CREATE SUSTAINABLE WEALTH DIFFERENTLY

Metal recycling makes it possible to draw resources from urban mines and reintroduce them into the value chains. The recycling industry also has the advantage of being sustainable, because it can benefit from a continuous long-term supply of products arriving at the end of their lifecycle. This is why the Gouvernement du Québec actively supports the development of innovative methods to recycle metals and minerals. In this perspective, financial support was granted recently:

- > On December 10, 2019, the Gouvernement du Québec granted financial assistance of \$4.8M to Lithion Recycling Inc. for its Lion project, which seeks to develop a recycling technology for lithium-ion batteries. The overall cost of the project is around \$12M;
- > In 2020, the Gouvernement du Québec granted a loan totalling \$3M to Geomega Resources Inc. to support construction of a demonstration plant for recycling of rare earth elements from magnets in Saint-Bruno-de-Montarville and for the purchase of equipment. Thanks to this project valued at \$4.8M, Geomega could become the leading recycler of rare earth elements in North America.

Objective 3.3

Stimulate the implementation of initiatives in view of the reduction of the environmental impacts of CSM mining and reclamation projects

The development of new sectors will see the appearance of environmental issues related both to the composition of CSM deposits and the implementation of new concentration, separation and transformation processes. In response to these issues, the government already offers several programs to fund the environmental component of research in the mining and transformation sectors.

Action 3.3.1

Support energy efficiency and the supply of renewable energy for CSM mining and reclamation projects

Mining involves its share of challenges for the green energy transition. Although it contributes first to the production of minerals involved in the composition of green technologies, this industrial sector must also adapt to minimize its ecological footprint. To support the deployment of energy efficiency solutions and allow a better renewable energy supply for the different CSM mining products, the government will continue to:

- > support companies in the implementation of the ISO 50001 standard for energy management systems;
- > involve the established networks in guiding companies and sharing information;
- > implement eco-performing industrial projects in energy savings and energy conversion;
- > support the use of bioenergies and new technologies allowing GHG reduction.

The local and Indigenous communities could benefit from these new energy solutions, if applicable.

Orientation 4
**Raise awareness, guide
and promote**

Summary of Actions

Raise the awareness of the population and the local and Indigenous stakeholders about the issues, impacts and implications related to CSM development for Québec and its regions:

- + Develop and implement a communication strategy.

Promote the CSM sectors:

- + Promote Québec's mineral potential and attract more foreign investment in the different phases of the CSM value chain;
- + Carry out a pilot project for the implementation of a traceability system for the minerals necessary to battery manufacturing.

The development of CSM sectors is an emerging phenomenon in the global economy, so it requires the implementation of awareness, guidance and promotion actions for the population, entrepreneurs and the sector's international players.

Québec stands out on the international level with cutting-edge expertise and a mining industry achieving the highest standards in environmental matters and good practices in ethics and occupational health and safety. However, the general public is still unaware of these advantages.

Moreover, it is a priority for Québec to promote the CSM sectors top national and international financial, banking and institutional stakeholders in order to promote foreign investments.

It is in our interest to multiply the activities to increase knowledge of Québec's CSM potential, advantages and values, which fit into a global economic transition based on renewable energy.

Objective 4.1

Raise the awareness of the population and the local and Indigenous stakeholders about the issues, impacts and implications related to CSM development for Québec and its regions

Action 4.1.1

Develop and implement a communication strategy

The mining sector's image has been stained, particularly by the legacy of the past, which can cause apprehension regarding the development of certain sectors. A two-part communication strategy should allow better information for the general public and the local and Indigenous populations concerning modern mining methods.

The first component will seek to raise awareness and inform the public about the necessity of CSMs in their everyday lives.

The second component will involve the promotion of CSMs. To demystify these resources and present their potential, the MERN, with the assistance of partners, intends to deploy information tools presenting the role CSMs can play in the economic development and protection of the environment.

It is also proposed to design a Québec brand image. This brand image can contribute to the industry's outreach and support the marketing and export of products extracted or transformed here. It will be based notably on the recognition of good environment and social practices in Québec and industry sustainable development certifications.



THE OFFER OF GUIDANCE IN SOCIAL ACCEPTABILITY: FOSTER A CLIMATE OF COOPERATION

Québec encourages the establishment of a climate of confidence between the mining sector stakeholders and the local and Indigenous communities near which mining is conducted.

This is the perspective in which the MERN has deployed an offer of social acceptability services primarily provided by its network of project managers, implemented in all of Québec's regional branches. The project managers have the mission to guide:

- > the proponents who want their services. For example, they provide information on the stakeholders, the local issues and the good practices in social acceptability. They encourage them to deploy mechanisms for discussion with the community, in the earlier stages of their project development process;
- > the local stakeholders and the Indigenous communities who want their services. For example, the project managers provide them with information on the major projects and the authorization processes. They also inform them about the different possibilities for public participation offered in the context of analysis of the projects.

Objective 4.2

Promote the CSM sectors

Action 4.2.1

Promote Québec's mineral potential and attract more foreign investment in the different phases of the CSM value chain and their implementation

An investment promotion, prospecting and attraction strategy will be developed according to a concerted government approach with the departments and bodies concerned. It will have the goal of evaluating the possibilities and the means of supporting Québec companies in concretizing their CSM exploration, development, mining, transformation or recycling projects. This strategy will also be part of the government priority of growing foreign investments in Québec and exports. Investissement Québec (IQ) and the MERN will coordinate this strategy in collaboration with the MEI, SOQUEM, SPN and the MRIF, in particular, depending on the field of expertise and the responsibilities of each. For example, the promotion of mineral potential will be up to the MERN, while direct actions with investors will be IQ's responsibility.

To do this, it is proposed, in the first stage, to target states and foreign companies seeking to diversify and secure their supplies of CSMs for their strategic manufacturing sectors or their manufacturing activities.

Subsequently, a mining and industrial project portfolio will be shared preferentially with these investors to present Québec as a choice destination for companies that want to develop CSM projects.

In addition to facilitating the attraction of direct investments in the projects, these promotional and prospecting approaches could contribute to the conclusion of long-term commercial agreements between the economic partners of the projects presented in the portfolio and strategic partners working with CSMs. These agreements would contribute to the financing of the projects.

Action 4.2.2

Carry out a pilot project for the implementation of a traceability system for the minerals necessary to battery manufacturing

Traceability is based on artificial intelligence and management of big data. It can track a product through different stages of transformation to guarantee its origin and characteristics. For example, for a given product, a traceability system would make it possible to: verify compliance with the standards in force and ethical, governance and corporate social responsibility principles; control the quality of the product and optimize its production; manage its carbon footprint; or enhance certain distinctive features for its marketing.

A traceability system could eventually:

- > attract more investment by showing compliance with the standards in force and the principles of ethics, governance and social and environmental responsibility throughout the supply chain of a product made in Québec;
- > offer a competitive advantage to Québec companies with products that meet the end users' increasingly high eco-friendly standards;
- > support complete, sustainable and responsible CSM values chains, from mineral extraction to recycling.

It is proposed to support a pilot project to develop a CSM traceability system for the minerals necessary to battery manufacturing.



THE WORLD'S FIRST CERTIFICATION PROGRAM FOR MINERAL EXPLORATION

On October 25, 2019, the new ÉCOLOGO® certification was launched for mineral exploration. This certification gives mineral exploration companies and their service providers the opportunity to validate their responsible practices and their ability to reduce their environmental consequences. The participating companies thus can prove their performance on sustainable development. ÉCOLOGO® is an initiative of the Quebec Mineral Exploration Association and the UQAT-UQAM Chair in Mining Entrepreneurship, in partnership with the Gouvernement du Québec and the MISA Group. The program is managed by Underwriters Laboratories of Canada (ULC), an independent body specializing in certification.



TOWARDS SUSTAINABLE MINING. THE INITIATIVE FOR CONTINUOUS IMPROVEMENT OF MINING PRACTICES IN QUÉBEC

Since June 2014, the Quebec Mining Association (QMA) and its members adhere to the Towards Sustainable Mining (TMS) initiative. This initiative includes tools and indicators with a view to resulting in continuous improvement, providing transparent results to the communities of interest and ensuring that the main risks associated with mineral exploration are well managed. All companies that are members of the QMA has the obligation to implement the TMS initiative at their facilities when they begin commercial production and to disseminate the results.

To do this, they must evaluate their performance each year, related to 30 indicators classified in 8 categories, called protocols: Tailings Management, Indigenous and Community Relations, Biodiversity Management, Energy Use and GHG Emissions Management, Safety and Health, Crisis Management and Water Stewardship.

Every three years, the results are submitted to a qualified independent auditor. This process provides the local communities with a real overview of the way the mines located nearby are operated.



An excellence plan for a green and prosperous economy

The Québec Plan for the Development of Critical and Strategic Minerals has the ambition of making promising sectors emerge for Québec's economy. With the collaboration of industry partners and the Québec mining sector, as well as the scientific, local and Indigenous communities, the government is determined to make Québec a preferred haven for CSM value enhancement.

Accelerating knowledge acquisition, establishing an environment conducive to the development of these emerging sectors on the national and international scale, encouraging the development of new mining sites and ecosystems based on the circular economy, all in a sustainable development perspective: this is the roadmap we intend to follow so that Québec can develop a choice niche in the nascent and high-growth CSM industry. The challenges related to transformation and recycling in Québec therefore acquire new importance in this plan, as well as the development of a new value-added products industry.

The vision proposed in the Plan will allow Québec to take full advantage of its mineral resources and its expertise.

We can thus foster the growth of CSM value chains that will support sustainable economic development in the regions, for the benefit of the local and Indigenous populations and Québec as a whole.

Appendix 1

Mineral Development Process

Mine Development Process						
Stage	1 Geoscientific surveys	2 Exploration	3 Deposit appraisal	4 Construction and running-in	5 Extraction	6 Restoration
Objectives	Identify mineral potential in Québec's territory	Basic exploration: discovery and identification of mineral occurrence and confirmation of mineral content and continuity Advanced exploration: completion of an initial inventory of the mineral deposit and assessment of its preliminary economic potential	Appraisal of the deposit and definition of the parameters for the mine project	Mine site construction Commissioning and testing	Ore extraction and processing Marketing of the product	Closure, securing and restoration of the mine site Post-restoration follow-up
Methods	Data acquisition surveys, sampling, research and synthesis of collected data	Review and synthesis of all available information Prospecting, mapping, surveying, stripping and drilling Sampling at the surface, in trenches and in drill holes Resource estimation Laboratory-scale mineralogical and metallurgical tests Technico-economic analysis of exploration data	Delimitation of the deposit: drilling Selection of the processing method: bulk sampling, pilot-scale mineralurgical and metallurgical testing Engineering and cost estimating, market study Socioeconomic analysis of confirmed data	Project management and quality management Commissioning plan and personnel training	Production management in view of continuous improvement of quality, yield and employee safety	Management of mine site closure and restoration to satisfactory condition
Target outcomes at the end of the stage	Publication of geological information and zones conducive to mineral exploration	Preliminary economic assessment of the deposit Decision to develop the deposit	Feasibility study and decision to start production of a mine Obtaining financing	Achievement of commercial mining	Return on investment and earnings Full operation of the mine	Restored mining site meeting Québec's mine site restoration requirements
Mineral inventory	Mineral potential → Mineral resources		→ Mineral reserves			
Good practice	As early as possible in the process, the proponent should inform and consult the public, the municipalities and the Indigenous communities concerned about the progress of the work and the project to ensure their better integration with the host community and improve the project's social acceptability. Deploy responsible practices that account for the social, environmental, economic and governance issues.					
Proponent's legal obligations	Obtain the necessary permits and authorizations for every activity that has an impact on the environment or territory. Conduct the provincial and federal environmental assessment process, as the case may be. Overview of obligations to fulfill: ➤ Acquire claims and notify the landowner and the municipality ➤ Obtain approval of rehabilitation and restoration plan and deposit financial guarantee ➤ Obtain the mining lease ➤ Establish a follow-up committee ➤ Do the environmental follow-up ➤ Perform the work of the Land rehabilitation plan					
The State's obligation	The government must meet its constitutional obligations with respect to consultation with the Indigenous communities and, if necessary, accommodation.					

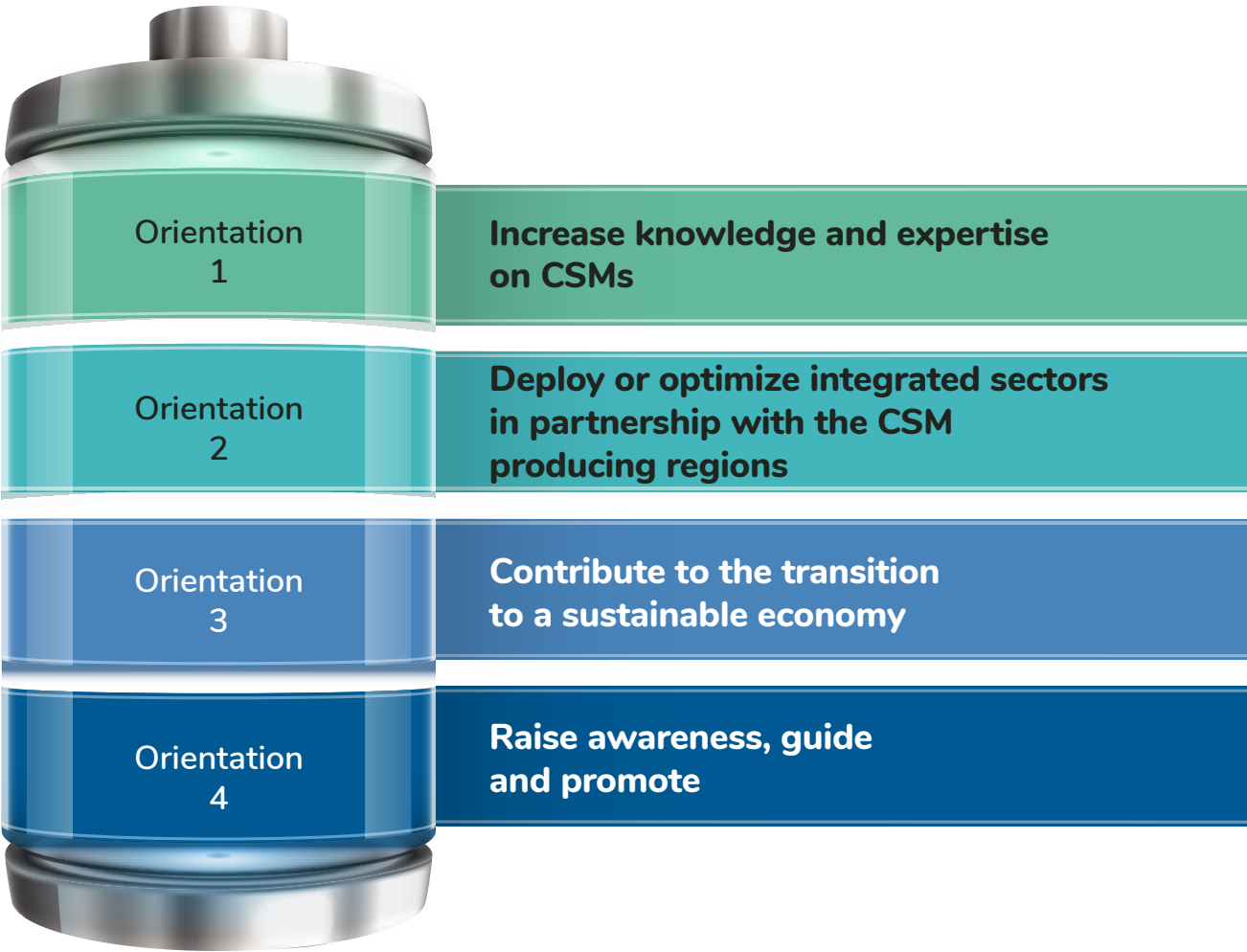
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Appendix 2

Summary of Orientations, Objectives and Financial Framework

Based on the four chosen orientations, the government has adopted objectives and targeted a set of actions, the implementation of which it announces.

This plan is based on a financial framework of \$90M for the 2020-2025 period, for which the funding was announced in the 2020-2021 Budget Plan. It will be deployed in close cooperation with the departments, bodies and partners concerned.



Orientation 1

Increase knowledge and expertise on CSMs (\$31.6M)

Objectives	Actions	Responsibility
1.1. Appraise the potential of CSM deposits in Québec	1.1.1 Acquire new geoscientific knowledge	MERN
	1.1.2 Integrate digital innovations into geoscientific data processing and mineral potential assessment	MERN
1.2. Improve knowledge of CSMs by encouraging synergies in research and development and innovation	1.2.1 Sustain the creation of a CSM-specific scientific network	MERN, MEI
	1.2.2 Develop environmental and social management tools for CSM projects	MELCC

Orientation 2

Deploy or optimize integrated sectors in partnership with the CSM producing regions (\$43M)

Objectives	Actions	Responsibility
2.1. Foster sustainable CSM exploration and development	2.1.1 Protect the CSM resources of interest for Québec	MERN
	2.1.2 Improve support for basic CSM exploration	SOQUEM, IQ
	2.1.3 Analyze the market trends of the CSM sectors	MERN
2.2. Support the transformation and creation of value-added products associated with the CSM sectors	2.2.1 Produce a profile of the current and future Québec value chains using CSMs	MEI
	2.2.2 Support R&D on CSM extraction, transformation and recycling	MERN, MEI
	2.2.3 Fund research on solid electrolyte batteries	MERN
	2.2.4 Promote and adapt the instruments supporting the development of CSM value chains close to the resource	IQ, SPN
2.3. Improve multi-user infrastructure and access corridors to CSM resources	2.3.1 Develop an integrated vision for the implementation of northern transportation, renewable energy and telecommunications network	SPN
2.4. Stimulate the implementation of structuring artificial intelligence initiatives in Québec mining companies	2.4.1 Support the program of Mission Mines Autonomes 2030 (Stand-alone Mines 2030 Mission) for a transition to Mining 4.0	MERN

Orientation 3

Contribute to the transition to a sustainable economy (\$9.4M)

Objectives	Actions	Responsibility
3.1. Encourage integration of the circular economy into the CSM value chains	3.1.1 Support the circular economy projects applied to the CSM sectors	MEI
	3.1.2 Encourage the deployment of a business environment favourable to circular economy projects applied to CSMs	MEI
	3.1.3 Innovate to claim tailings	MERN
3.2. Encourage the deployment of a CSM recycling industry in Québec	3.2.1 Develop mining by-products and recycle more CSMs	MERN
	3.2.2 Assess the possibility of extending the scope of regulations on extended producer responsibilities to new products that may contain CSMs	MELCC
3.3. Stimulate the implementation of initiatives in view of reduction of the environmental impacts of CSM mining and reclamation projects	3.3.1 Support energy efficiency and the supply of renewable energy for CSM mining and reclamation projects	TEQ

Orientation 4

Raise awareness, guide and promote (\$6M)

Objectives	Actions	Responsibility
4.1. Raise awareness of the population and the local and Indigenous stakeholders about the issues, impacts and implications related to CSM development for Québec and its regions	4.1.1 Develop and implement a communication strategy	MERN
4.2. Promote the CSM sectors	4.2.1 Promote Québec's mineral potential and attract more foreign investment in the different phases of the CSM value chain	IQ, MERN
	4.2.2 Carry out a pilot project for the implementation of a traceability system for the minerals necessary to battery manufacturing	MERN

REVIEW OF QUÉBEC'S ROLE IN DEVELOPMENT OF CRITICAL AND STRATEGIC MINERALS: A COLLECTIVE EXERCISE

Conducted in 2019-2020, the Review of Québec's Role in the Development of Critical and Strategic Minerals collected different points of view, contributing to the drafting of this plan.

Six regional meetings were held in the cities of Val-d'Or, Roberval, Montréal, Sept-Îles, Chibougamau and Québec, and were attended by approximately 140 participants representing regional elected officers, industry, regional and economic development stakeholders, municipalities, environmental groups, universities and research centres, and Indigenous communities and organizations.

The public was also invited to participate in this review by sharing their comments or completing a questionnaire available on the MERN website.

Two committees to ensure the implementation of this plan will be created, one bringing together public and private partners and regional stakeholders, and the other composed of representatives from Indigenous nations. The MERN will coordinate the implementation of the Plan in close cooperation with the departments and agencies concerned.

The MERN will publish an annual report of the results of the actions set out in the Plan. In light of these results, the Plan may be updated over the next five years. The Plan also offers the necessary flexibility to adapt the interventions based on the developments, the acquired knowledge and the economic context.

Appendix 3

Québec's Critical and Strategic Minerals List

Québec's preliminary list of 22 critical or strategic minerals

Critical	Strategic	Strategic
Necessary to supply Québec transformation plants	Linked to public policies and renewable energy	Products with good deposit appraisal potential in Québec
1. Antimony ²	11. Cobalt ²	17. Magnesium ⁴
2. Bismuth ²	12. Rare earth elements (REE)	18. Niobium ¹
3. Cadmium ²	13. Platinum group elements (PGE ²)	19. Scandium ⁴
4. Cesium	14. Graphite (natural)	20. Tantalum
5. Copper ²	15. Lithium ³	21. Titanium ¹
6. Tin ²	16. Nickel ¹	22. Vanadium ³
7. Gallium ²		
8. Indium		
9. Tellurium ²		
10. Zinc ¹		

1 Produced or transformed as a principal substance.

2 Produced as a secondary substance from concentrate or as a smelter by-product.

3 Mineral development project.

4 Transformation project.

This list was validated by a government committee of experts in June 2020 and will be reviewed periodically.

Appendix 4

Glossary

Active mine: Mine site where production has reached at least 60% of its announced (rated) capacity for 90 consecutive days.

Base metals: Metals other than iron, commonly used in consumer products, such as copper, nickel, zinc and aluminum.

Circular economy: Production, exchange and consumption system intended to optimize the utilization of resources at every stage of the lifecycle of goods or services, in a circular logic, while reducing the environmental footprint and contributing to the welfare of individuals and communities.

Deposit: Concentration at the same location of a mineral containing one or more possibly exploitable metals or mineral substances. It is described in the following technical reports: calculation of resources, preliminary economic appraisal and prefeasibility study.

Ecodesign: Product or process design approach by integration of environmental considerations in order to reduce environmental damages throughout the lifecycle of these products or processes.

Local communities: All of the people who live as a community in a given territory, such as a local municipality, an Indian reserve, an Indian establishment or a community established on Category I land under the James Bay and Northern Québec Agreement and the organizations that represent them, such as the local municipalities and the regional county municipalities (RCM).

Mine: Deposit that has been proved to be profitably exploitable.

Mineral occurrence: Traces observed on the surface or near the surface so that it can be envisioned that there is a given mineral substance in the vicinity, and ideally in a greater quantity.

Mining project under construction and running-in: Phase corresponding to construction of the mining facilities up to the start of commercial production.

Mining project under deposit appraisal: Phase when all aspects of the mining project are appraised with greater precision. During this phase, all the technico-economic studies leading to the performance of the mining project are carried out. It begins with the publication of a first preliminary economic assessment (PEA) and ends with the decision whether to continue with the construction of the mining facilities.

Mining project under monitoring and maintenance: Temporarily closed mining site where all the infrastructure is maintained in monitoring and maintenance mode in view of eventual restarting.

Northern Territory: Part of Québec's territory located north of the 49th parallel, the St. Lawrence River and the Gulf of St. Lawrence.

Precious metals: Rare metals of great economic value, including gold, silver and the platinum group elements (platinum, palladium, rhodium, ruthenium, osmium, iridium).

Public participation: All of the processes and activities related to information, consultation and active participation, allowing integration of the participants' concerns, needs and values into decision-making.

Recycling: Action of transforming a residual material into an input or a marketable product.

Reverse logistics: Collection, sorting and processing that allows management of reuse of products and materials.

Urban mine: Reserve of mineral and metal resources stored in urban infrastructure, which can be recycled and exploited for reintroduction into the economy.

Value chain: All of the steps determining the capacity of a field of strategic activity, a company or an organization to obtain a competitive advantage.

Sources:

<https://mern.gouv.qc.ca/publications/mines/processus-developpement-mineral.pdf>

<https://www.recyc-quebec.gouv.qc.ca/haut-de-page/lexique>

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Appendix 5

Acronyms of Government Departments, Bodies and Corporations

BCD: Bureau de coordination des droits

COREM: Consortium de recherche appliquée en traitement et transformation des substances minérales

FRQNT: Fonds de recherche du Québec – Nature et technologies

IQ: Investissement Québec

IREQ: Institut de recherche d'Hydro-Québec

ISQ: Institut de la statistique du Québec

MEI: Ministère de l'Économie et de l'Innovation

MELCC: Ministère de l'Environnement et de la Lutte contre les changements climatiques

MERN: Ministère de l'Énergie et des Ressources naturelles

MISA Group: Expert network in mining innovation (Mining, innovations, solutions, applications)

SDBJ: Société de développement de la Baie-James

SOQUEM: Société québécoise d'exploration minière

SPN: Société du Plan Nord

TEQ: Transition énergétique Québec

**Énergie et Ressources
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