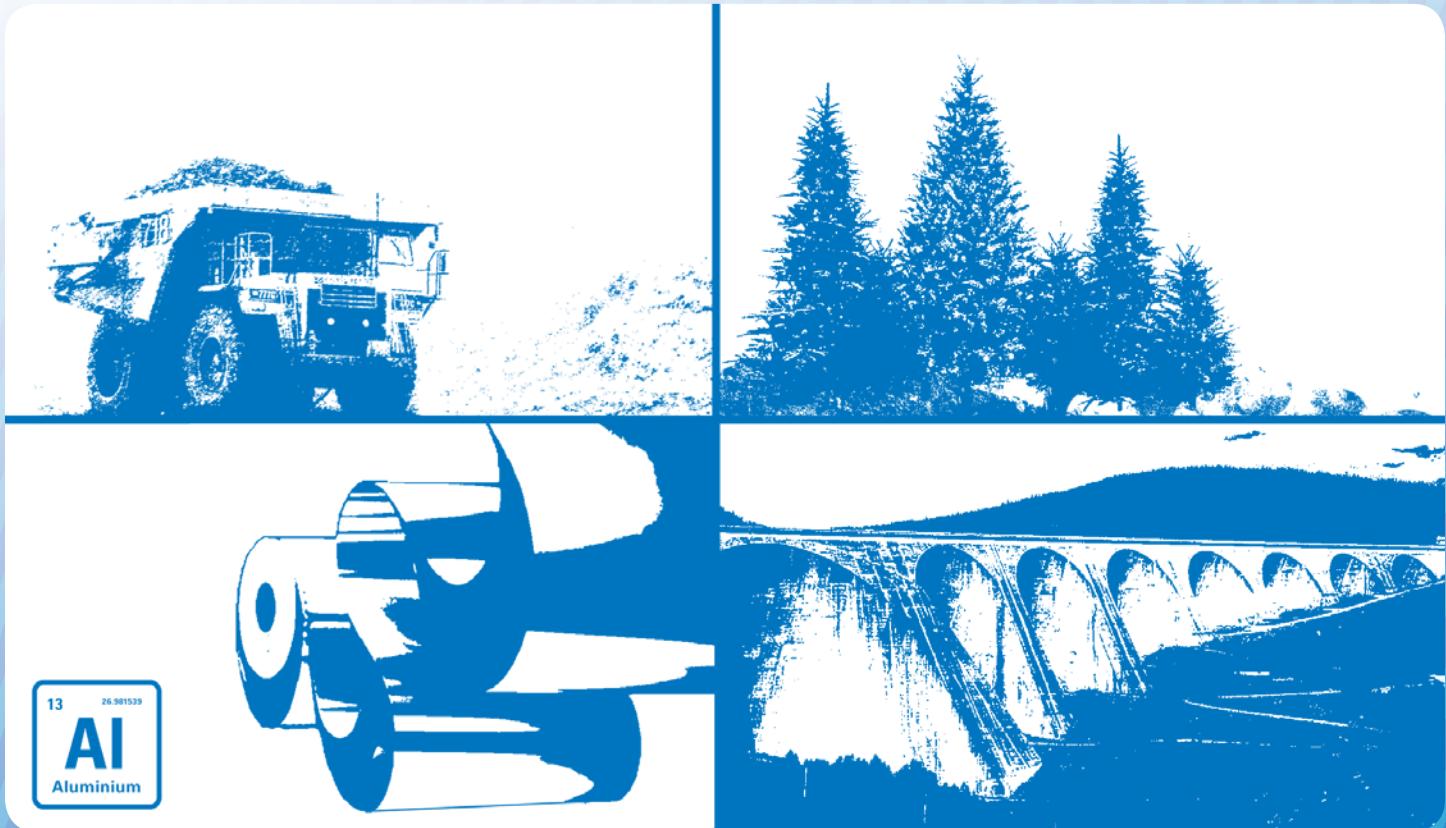




CHAMBRE DE COMMERCE  
DU MONTRÉAL MÉTROPOLITAIN  
BOARD OF TRADE OF METROPOLITAN MONTREAL



# NATURAL RESOURCES: LEVERAGE FOR THE CITY'S GROWTH

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A WORD FROM THE  
PRESIDENT AND CEO

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## SECTION 1

## A "PLAN SUD" FOR THE METROPOLITAN AREA

### The link between the knowledge economy and natural resources in the 21<sup>st</sup> century



**Michel Leblanc**  
President and CEO  
Board of Trade of Metropolitan Montreal

[...] the knowledge economy and the natural resources economy do not represent contradictory choices; in a number of cases, they are in fact interdependent.

Over the last 30 years, the Montréal metropolitan area has made a shift to the knowledge economy and to high value-added services. This strategy has made it possible to develop poles of excellence in such sectors as aeronautics, information technologies and life sciences. This transition seemed inevitable in a context where an increasing number of companies in the manufacturing and heavy industry sectors were choosing to relocate some or all of their operations to the emerging economies of Asia and elsewhere.

Today, we need to acknowledge that great changes on the international scene are calling for subtler strategic choices. The same countries that not long ago offered a refuge where companies could reduce their labour costs are now among our best customers for the natural resources that Québec has in abundance. We see the truth of this in the fact that Québec's three most important export products to China—which is already our second-largest trading partner after the United States—are iron ore, wood pulp and copper.

In the coming decades, this new worldwide demand from rapidly growing economies like China, India and Brazil will provide considerable wealth creation opportunities for societies, like ours, that can properly satisfy a part of that demand. And let us not forget that this will be added to sustained demand from the so-called developed countries, which is also growing.

In short, although our society has made a definitive transition to the knowledge economy, the natural resources sector will continue to be an essential instrument of economic development for the metropolitan area. Today, the knowledge economy and the natural resources economy do not represent contradictory choices; in a number of cases, they are in fact interdependent.

We can think in particular of the engineering consulting firms that are the pride of Québec, both here and overseas, and that know how to profit from the activity generated by the raw materials sector. Many technological innovations associated with exploiting raw materials emerged in the metropolitan area's engineering schools, universities and research centres. While making a transition to the knowledge economy, the area has continued to be a fertile ground for the natural resources economy.

### Natural resources: opportunity knocks for the metropolitan area

With the approach of the vast collective project known as the Plan Nord, it became essential for the Board of Trade to think seriously about the place of the natural resources sector in the metropolitan area. Firstly, this study aims to measure the weight and importance of this sector in the area's economy and to consider, in particular, the direct and indirect jobs that depend on it, the foreign investments that can be ascribed to it, and the expenditures that are made in the area by the firms involved in it.

Secondly, the study considers the question of the Plan Nord and of the potential spinoffs of the Plan's investments for metropolitan area companies. This part of the study identifies, in particular, business opportunities associated with the planned public infrastructure projects and with the anticipated private investments.

Finally, the reader will find a series of lines of thinking addressed to public decision-makers and other actors concerned with the success of the natural resources sector, in order to maximize the positive spinoffs of this ambitious plan for Québec and its metropolitan area.

Montréal has major assets in the knowledge economy and in services applicable to the exploitation of natural resources. It is up to us to benefit from the current favourable circumstances in order to consolidate our expertise in the natural resources field. The challenge is to identify opportunities, and to invest wisely.

## SUMMARY

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## SECTION 2

# SUMMARY

## Introduction: the natural resources context, internationally and in Québec

The stupendous economic growth of several emerging economies, including India and China, has caused an explosion in the demand for natural resources over the last fifteen years, and this demand should continue in the coming decades.

The relative scarcity of the resources, combined with this high demand, has resulted in a significant increase in the costs of raw materials. The metals index of the United States Geological Survey (USGS) shows that between 2005 and 2011, prices rose by 133%. Iron, which is the mineral resource most exploited in Québec, experienced growth of nearly 500% in the same period.

Québec has a considerable quantity of natural resources, and a socially and politically stable environment. These characteristics make the province a destination of choice for entrepreneurs in the natural resources sector. The Government has taken note of this situation, and has implemented the Plan Nord to exploit the economic value of our resources by seeing to it that over \$80 billion are invested north of the 49<sup>th</sup> parallel by 2035.

The economic spinoffs from exploiting our natural resources promise to be significant, since the businesses operating in this sector have profound ramifications within the province's industrial fabric. They provide business opportunities to many partners upstream and downstream from the value chains associated with the development of these resources.

## Québec's major economic sectors

### Mines and mineral manufacturing sector

Québec's northern territory contains significant mineral resources, such as iron, gold, diamonds and other minerals. Some forty investment projects are planned, either to develop new operating sites or to expand existing ones. The total value of these projects is \$37.6 billion, nearly 90% of which will be invested north of the 49<sup>th</sup> parallel.

The Montréal metropolitan area is one of the Québec regions that benefit the most from investments in the mines and mineral manufacturing sector, in particular because the area is home to the head offices of large consulting engineering firms, and has a high concentration of suppliers of various kinds of strategic equipment. In 2008, approximately 1,800 of the 3,800 suppliers in Québec were located in the Montréal metropolitan area, half of them on the Island of Montréal.

Of the \$37.6 billion that will be invested in this sector, both within the territory covered by the Plan Nord and in the rest of Québec, approximately \$6.7 billion (or 18%) could be spent in the Montréal metropolitan area, including:

- \$4.9 billion on construction
- \$979 million on professional services

- \$333 million on general administration
- \$246 million on other services
- \$158 million on equipment and machinery
- \$42 million on electrical equipment.

The potential spinoffs of mining sector investments and operating expenses for the Montréal metropolitan area will be \$25.2 billion and 6,191 jobs maintained or created over the next 25 years.

### Energy

In announcing the construction 8,000 MW of new electrical production facilities, Hydro-Québec confirms the role of economic powerhouse that it intends to play in the coming years.

The investments of approximately \$56.5 billion, to be made in Québec by 2035, will have significant economic spinoffs here because 70% of the companies involved in the production, transmission and distribution of electricity have their head office in the province.

The Montréal metropolitan area is one of the Québec regions that benefit the most from investments in the energy sector. This is due, in particular, to the fact that the area contains Hydro-Québec's head office, large consulting engineering firms and a high concentration of suppliers of various types of strategic equipment.

For the Montréal metropolitan area, the potential spinoffs from investments and operating expenses in the energy sector over the next 25 years will be \$16.2 billion and 5,021 jobs created or maintained per year.

Regarding the acquisition of goods and services, in 2010 Hydro-Québec spent approximately \$1.6 billion on these items in the Montréal metropolitan area. This represents about 61% of Hydro-Québec's total expenditures for goods and services.

### Aluminum

The presence of the aluminum industry has allowed the development of dynamic regional industrial ecosystems in the original equipment manufacturing sector, in particular in Saguenay-Lac-Saint-Jean and Côte-Nord. This sector has indeed developed, with the help of engineering consultants, a truly international expertise. The Québec industry has confirmed its high level of competitiveness through the announcements of its three large producers, which will be investing close to \$7 billion in the next few years.

The Montréal metropolitan area has a stake in the aluminum sector; Rio Tinto Alcan's head office is located there, as is the regional administrative office of Alcoa Canada. It is forecast that the area will enjoy potential spinoffs from the sector's outlay of \$4.7 billion in investments and operating expenses, and from the 1,000 jobs that it will create or maintain over the next 25 years.

The aluminum sector has about 1,850 industrial users throughout Québec. It is in the administrative regions of Montérégie and Montréal that we find the largest number of industrial users; these two regions contain 27% and 22% of

establishments respectively. The Island of Montréal has the greatest number of large establishments using aluminum, with 33 establishments each having over 100 employees.

Thanks to the presence of the aluminum companies, several consulting engineering firms have developed world-renowned expertise in this sector.

#### **Forest industry sector**

The Québec forest industry sector has been going through a difficult period since 2006. The problems that the industry has had to confront are due to a number of factors: decline in American demand, the rising value of the Canadian dollar, the economic crisis, and the high level of indebtedness of the companies in the sector.

With improvement in the economic situation in the United States, repositioning of the industry with regard to operating costs, and more insistence on differentiation and quality, we can believe that the situation of Québec's forest industry will improve in the coming years.

Despite certain difficulties, Québec's forest industry continues to be an important sector in the economy of the Montréal metropolitan area. It is indeed estimated that the Montréal metropolitan area will enjoy potential spinoffs from the investments and related operating expenses in the forest sector amounting to \$5 billion, and from the 1,966 jobs maintained or created over the next 25 years.

#### **Economic spinoffs for the Montréal metropolitan area, and business opportunities**

In the next 25 years, potential economic spinoffs for the Montréal metropolitan area from investments and operating expenses for all natural resources related projects in Québec are predicted to be \$51.8 billion. This is about 15% of all investments and related operating expenses.

Some economic sectors will have a higher proportion of spinoffs for the Montréal metropolitan area. These include public infrastructures (34% of spinoffs), energy (26%), and especially hydroelectricity (30%).

Furthermore, the potential spinoffs for the Montréal metropolitan area in terms of natural resources related jobs are 358,381 full-year jobs over the next 25 years, which is the equivalent of 14,335 jobs maintained or created per year for 25 years.

#### **International comparisons**

Comparison with other metropolitan areas that are well positioned in the natural resources sector opens up some lines of thinking that can help us improve our competitive position. For example, the "one stop shop" approach developed by Sydney, to facilitate the start-up of projects to exploit mining and energy resources, could be adapted to the Québec context. We could also think of putting funds in place to finance natural resources extraction projects, along the lines of the strategies adopted by Denver, Helsinki, Perth and Sydney.

Finally, although strategies to promote economic development and attract investments specifically to the natural resources sector have been put in place both nationally and provincially, it would be a good idea for the Montréal metropolitan area to develop an authentic prospecting strategy of its own, to attract foreign investments relating to this sector.

#### **Some lines of thinking and conclusions**

To maximize the economic spinoffs that the Montréal metropolitan area can derive from the exploitation of natural resources, the actors concerned will have to implement concrete strategies with four major goals in mind:

##### **1. Put in place a business environment conducive to the development of natural resources**

It is important to show that Quebecers have the desire to develop their resources over the long term. Such key elements as access to resources—and their price—must continue to be fairly predictable, so that the developers of large projects can incorporate them into their budget models. Factors such as resource royalties, the price of electricity or gas and taxation must compare favourably with other jurisdictions, so that Québec can remain competitive in the eyes of major investors, both attracting new investments and retaining and improving projects already under way.

##### **2. Propose and strengthen training programs to allow development of a sufficient number of human resources**

Access to human resources will continue to be a crucial factor in the development of the projects that have been announced, and in the economic dynamics it will engender. It will thus be essential to align training programs with the needs of the business community, in order to provide a work force that can meet demand in the coming years. This work force must include the requisite workers upstream and downstream from the value chain (machinists, welders, mechanics) and allow a flourishing processing industry to develop in Québec. To meet the future needs of our industries, we must attract qualified immigrants in addition to training our own people.

**3. Maximize linkage in the value chain, both upstream and downstream**

By raising the awareness of manufacturers in the Montréal metropolitan area, we will enable them to adapt their production facilities to the equipment and infrastructure requirements of large projects and thereby retain a larger share of capital expenditures. These domino effects should be further enhanced by the critical mass of Montréal's universities and research centres. The knowledge industry of the Montréal metropolitan area must be incorporated into all phases of development, in order to foster sustainable operations and make more effective use of Québec's resources.

**4. Highlight the distinctive qualities of our resources and enhance their value in the marketplace**

The market for natural resources has traditionally been a commodities market. It is, however, possible to find niches and to attach special value to differentiated products. For example, if we take the initiative of having Québec's electricity officially recognized as renewable energy, we can promote our aluminum as a material produced from green energy, and thus differentiate Québec aluminum on international markets. Similar initiatives will enable us to differentiate the products of Québec's mines and forests.

Our horizon for rolling out this strategy will, of course, have to extend over several years, and the strategy will need to be closely monitored by the various parties involved. The Board of Trade of Metropolitan Montreal will be attentive to these issues, and will see to it that the various actors are called upon as needed, to ensure that this strategy receives all the requisite attention.

**SECTION 3****INTRODUCTION:  
THE NATURAL  
RESOURCES CONTEXT,  
INTERNATIONALLY AND  
IN QUÉBEC**

## INTRODUCTION: THE NATURAL RESOURCES CONTEXT, INTERNATIONALLY AND IN QUÉBEC

Ultimately, the success of the Plan Nord will to a large extent depend on close cooperation between the resource regions and Québec's metropolitan area.

### 3.1. Metropolitan areas and natural resources

Metropolitan areas drive economic development in their respective regions and territories. This phenomenon has many causes: population density; number of jobs available in these areas; concentration of training centres; inter-modal transportation platforms; significant presence of head offices, etc. The Montréal metropolitan area is no exception to this rule in its relationship with Québec as a whole.

Québec's major metropolitan area has a population of 3.7 million, or nearly half of Québec's total population, and a GDP of \$103 billion, which represents about half of the economic activity in the whole province. Given this very significant relative weight, it is hardly surprising that anything having a major impact on Québec's economic development also directly affects the Montréal metropolitan area.

One particular aspect of the context for natural resources development in Québec is that the operating sites are relatively remote from the metropolitan area and from its industries and services. This remoteness is not in itself a handicap. For example, while some metropolitan areas in other parts of the world benefit from exploitable natural resources close to their territory—among them Denver in Colorado and Perth in Australia—many others, like Oslo and Helsinki, are in situations similar to that of Montréal. They can rely on a dynamic natural resources sector despite the distance that separates them from the resource regions.<sup>1</sup>

Ultimately, the success of the Plan Nord will to a large extent depend on close cooperation between the resource regions and Québec's metropolitan area. While it is obvious that this major project for creating collective wealth will have significant spinoffs for the regions directly affected by the development of the resources, it is also true that many businesses located in the metropolitan area will benefit greatly as well.

One particular aim of this study is to demystify the Plan Nord and dispel the incorrect idea that the Plan is essentially no more than a plan for developing the northern regions, which does not really concern the half of Québec's population that lives in the Montréal metropolitan area.

Of course, in the metropolitan area, the first direct spinoffs from natural resources activity are closely associated with the fact that many head offices of large corporations are located in Montréal. However, the jobs created by their presence are only the tip of the iceberg, since all these companies, to carry on their business, regularly employ the services of engineering consulting firms, lawyers, accountants, and a wide range of manufacturers or service providers.

Having considered the significant economic weight that the natural resources sector has for the Montréal metropolitan area, it is quite obvious to us that Montréal and its area have as much of a stake as the rest of Québec in ensuring that the potential spinoffs of the Plan Nord are maximized. For that reason, we wanted to conclude our study by making some recommendations in an attempt to establish broad parameters for realizing even larger profits from the colossal world demand for all the raw materials that we have in abundance.

### 3.2. Growth in international demand

For some years, we have been witnessing stupendous growth in the demand for raw materials, in large part due to the impetus from such emerging economies as India and China. The relative scarcity of the principal natural resources, combined with this strong worldwide demand, has raised the price of many ores to record levels. The following table gives an overview of the current phenomenon in the form of a side-by-side comparison of price rises and worldwide production increases in recent years.

**Table 1:**  
Changes in price and in worldwide production of certain ores between 2005 and 2010

Ores and metals	Price increase (2005-2011)	Worldwide production (2005-2010)
Aluminum	26%	30%
Silver	391%	7%
Copper	140%	8%
Tin	253%	-12%
Iron	497%	55%
Nickel	55%	5%
Gold	204%	1%
Lead	146%	18%
Zinc	59%	20%
<b>Metals Index</b>	<b>133%</b>	<b>15%</b>

Source: United States Geological Survey, Statistics and Information (<http://minerals.usgs.gov>).

The relatively slow growth of production despite high demand and price increases can be explained by various factors:

- Ores are non-renewable resources, and are not stored in equal amounts around the planet.
- Mining companies want to invest in countries that are politically and legally stable, of which there is a limited number.
- Exploration and extraction of ores require developed infrastructures and an ecosystem of services to business.

For a province like Québec, which has both significant quantities of raw materials and a stable social and political environment, it is thus of primary importance to develop its infrastructures and to maximize the capacity of its entire value chain, so that it can benefit fully from the current world economic context.

[...] we have been witnessing stupendous growth in the demand for raw materials, in large part due to the impetus from such emerging economies as India and China.

<sup>1</sup> See the comparative tables of metropolitan areas in Appendix J.

## [...] projections of total investments in natural resource related sectors within the Plan Nord territory are estimated at over \$87.2 billion.

Obviously, Québec is not the only place in the world where the extent of current demand is being measured. We should therefore predict a relatively significant increase in supply over the next few years, which will have an effect on prices.

A continuation of bullish prices would be profitable for development projects already under way, and would encourage the start-up of other projects. Conversely, a relative decline in prices could thwart the plans of companies that are currently investing in exploration, exploitation, reconstruction or expansion projects.

In this context, we shall briefly analyze the influence factors affecting the major sectors in which significant mining company investments are anticipated over the period in which the Plan Nord will be implemented. These sectors are iron ore and gold.

### 3.3. Natural resources development: the Québec context

The history of Québec is directly tied to the development of its natural resources. Indeed, mining exploration goes all the way back to the first explorers and colonists in North America. We are thinking back, in particular, to Jacques Cartier and to Cap Diamant—on which Québec City now stands—and to the time when the discovery of quartz caused frenzy among the explorers, who had mistaken this common mineral for diamonds.

Today, natural resources still play an important role in creating wealth in Québec society. Aluminum production, which uses and exploits hydroelectric energy, exploration and exploitation of mining sites and the metal processing to which they give rise, and the development of forest resources all have an important place in the contemporary economy of Québec. These sectors have profound ramifications within the industrial fabric of our society, and many companies pursue activities upstream and downstream from the value chains associated with the exploitation of these resources.

#### **The Plan Nord**

In the spring of 2011, the Québec Government unveiled the Plan Nord, which it intends to implement over the next 25 years in order to exploit the economic potential of Northern Québec. The territory covered by this plan is located north of the 49<sup>th</sup> parallel, and comprises approximately 1.2 million km<sup>2</sup>.

The distinguishing features of the region include a large quantity of fresh water, high hydroelectric production capacity, a significant presence of forests and ore-rich subsoil. The Plan Nord will facilitate and speed up the exploitation of these natural resources.

When it was launched, the Plan Nord anticipated public and private investments of more than 80 billion dollars over 25 years. The preferred fields of development particularly concern energy production, mining exploration and exploitation, and exploitation of forest resources. The tourist industry, the food industry, health, social services and education, and road and transportation infrastructures are also concerned, but to a lesser extent. These estimates of public and private investments were increased to 82 billion dollars in the Government of Québec's 2012-2013 Budget. On the basis of the analyses carried out in connection with this study, projections of total investments in natural resource related sectors within the Plan Nord territory are estimated at over \$87.2 billion.

In addition, projections of investments associated with the exploitation of natural resources in the rest of Québec, in other words outside the Plan Nord territory, are nearly \$31 billion. Total natural resources investments for all of Québec are thus predicted to be \$118.2 billion.

**According to the most up-to-date information and the estimates that have been done, investments associated with the natural resources sectors within the territory of the Plan Nord are estimated to be \$87.2 billion over the next 25 years, including:**

- \$47 billion for renewable energy
- \$33.5 billion for the mining sector
- \$3.2 billion for the production of primary aluminum
- \$1.8 billion for the forest sector
- \$1.8 billion for public infrastructures.

[...] projections of investments associated with the exploitation of natural resources in the rest of Québec, in other words outside the Plan Nord territory, are nearly \$31 billion [...]

The government bodies that led to the creation of the Plan Nord, and that will ensure its implementation and follow-up, are the Comité ministeriel du Plan Nord, the Table des partenaires, the Table des partenaires autochtones, the working groups, the steering committee and the support networks. To better coordinate the work of all these bodies, an agency to be known as the Société du Plan Nord will be created. At the time of writing this report, the draft legislation to create the Société du Plan Nord is being considered at the National Assembly.

The mission of the Société du Plan Nord will thus "to coordinate the realization of public investments in strategic transportation and telecommunications infrastructures, and in the social domain."<sup>2</sup>

More precisely the Société du Plan Nord will:

- coordinate implementation of the infrastructure projects;
- define the scheduling of projects and plan their implementation; and
- coordinate deployment of the Plan with the various partners: the departments, Hydro-Québec and the other government agencies.

Moreover, the Government of Québec has announced the creation of Ressource Québec, a subsidiary of Investissement Québec, as part of its 2012-2013 Budget. Ressource Québec will participate directly in some projects so that Québec society may benefit from the revenues associated with the exploitation of natural resources. A billion-dollar fund is planned, to conclude participations in various projects through 2017.

Lastly, no implementation of an economic development project in the northern part of the province can succeed unless it takes into account the impact of such projects on the inhabitants of this territory and on the environment of the northern ecosystems. Any project for exploiting natural resources must therefore abide by the agreements and treaties signed over the years with the First Nations and the Inuit.

**Table 2:**  
Interventions within the territory of the Plan Nord – Plan Nord five-year plan, 2011-2016

Source: GOUVERNEMENT DU QUÉBEC, Cadre financier du Plan Nord 2011-2016, 2011.

		Total from 2011 to 2016 (\$ million)
<b>Investments in infrastructures</b>		
Roads		821.1
Parks		24.1
Social housing and major renovations		184.4
Cultural Infrastructures		25
Other		136.7
<b>Subtotal – Investments in infrastructures</b>		<b>1,191.3</b>
<b>Expenditures</b>		
Social housing		
Operating deficit of housing in Nunavik		12.4
Access to property program in Nunavik		68.2
<b>Subtotal – Social housing</b>		<b>80.6</b>
Socioeconomic projects		
Contribution of the Fonds du Plan Nord		85
Contribution of the departments, agencies and partners		42
<b>Subtotal – Socioeconomic projects</b>		<b>127</b>
Measures funded by the departments and agencies		
Self-financed measures		156
Measures of the 2010-2011 Budget		18
<b>Subtotal – Self-financed measures</b>		<b>174</b>
Operating budget of the Société du Plan Nord and investment prospecting		52
<b>Subtotal – Expenditures</b>		<b>434.2</b>
<b>Total – Interventions within the Plan Nord territory</b>		<b>1,625.5</b>

### 3.4. Positioning of our study

Several reports and studies on the potential economic spinoffs of the Plan Nord and of natural resources exploitation have recently been published in Québec, including those of IRIS and of the consulting firm SECOR.<sup>3</sup> We think it is important to position our study in relation to these studies, in order to explain the observed differences in the results.

Our study deals with the economic impact for the Montréal metropolitan area—in terms of added value and potential jobs—of investment in and exploitation of natural resources in Québec, both within the territory covered by the Plan Nord and in the rest of the province. Consequently, the sectors of economic activity analyzed in the study comprise the following industries: mining, forestry, energy production (hydroelectric, wind energy, other), and primary aluminum production. These natural resources-related industries do not correspond exclusively to the sectors covered by the implementation of the Québec Government's Plan Nord. In this sense, the topic that our study deals with is broader than those of the two other studies, embracing as it does the major natural resources-related industries in Québec.

An in-depth analysis was initially carried out for each of the sectors covered by our study, based on a thorough literature search and on the results of nearly 30 interviews with actors involved in the exploitation of natural resources in Québec. This analysis led to the construction of a model to evaluate the spinoffs of the planned new investments and of their exploitation over the next 25 years, specifically on the Montréal metropolitan area. The planned new investments and their operating expenditures were estimated from the most up-to-date data available for each of the sectors studied.

The IRIS study provides an overview of the economic, environmental and social costs of investments in the mining and energy sectors and in the public infrastructures provided for in the Plan Nord. These include, in particular, the costs of protecting territory and the social repercussions of a boom in the exploitation of mineral resources. The methodology adopted by the IRIS in its study does not try to evaluate economic and social spinoffs using an analytical model, but limits itself to assessing the fiscal spinoffs of the estimated public and private investments for the Québec Government, to doing a historical analysis of some repercussions of investments in the mining sector, and to making a comparison with the exploitation of tar sands in Alberta.

According to the IRIS, the difference between the Government's investment over 25 years and the anticipated royalties and fiscal spinoffs amounts to \$8.45 billion. This deficit is explained, in particular, by the IRIS's assumption that mining investments of more than \$30 billion under the Plan Nord would be 50 to 80% financed out of public funds. This unrealistic scenario has been refuted by the publication of the Québec Government's 2012-2013 Budget, which confirms that mining investments will be private. The IRIS has since published a memorandum in which the authors agree that the results of the study are skewed when we take this information into account.

The SECOR study assesses the economic spinoffs of the Plan Nord for Québec as a whole in terms of added value, steady jobs, and fiscal and parafiscal receipts. SECOR's analysis uses the intersectoral model of the ISQ, and is based

<sup>3</sup> IRIS, *À qui profite le Plan Nord?*, Socioeconomic memorandum, March 2012, 8 pp.; SECOR, *Évaluation des retombées économiques du Plan Nord*, February 2012, 24 pp.

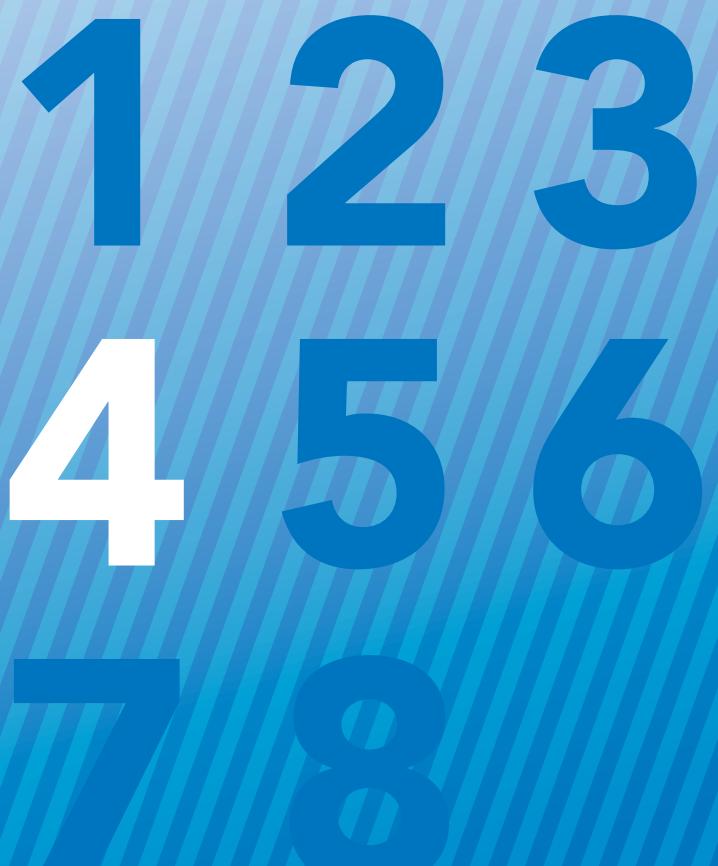
on the investments estimated by the Québec Government in its first Plan Nord action plan, namely \$80 billion over 25 years, and on the operating expenditures associated with these investments. Furthermore, the scope of SECOR's analysis is limited to the mining, hydroelectric and infrastructure projects that will take place within the territory to which the Plan Nord applies, and their impact on the province as a whole.

#### Overall context

- The stupendous economic growth of several emerging economies, including India and China, has caused an explosion in the demand for natural resources over the last fifteen years, and this demand should continue in the coming decades.
- The relative scarcity of the resources, combined with this high demand, has resulted in a significant increase in the costs of raw materials. The metals index of the United States Geological Survey (USGS) shows that between 2005 and 2011, prices rose by 133%. Iron, which is the mineral resource most exploited in Québec, experienced growth of nearly 500% in the same period.
- Québec has a considerable quantity of natural resources, and a socially and politically stable environment. These characteristics make the province a destination of choice for entrepreneurs in the natural resources sector. The Government has taken note of this situation, and has implemented the Plan Nord to exploit the economic value of our resources by seeing to it that over \$80 billion are invested north of the 49<sup>th</sup> parallel by 2035.
- The economic spinoffs from exploiting our natural resources promise to be significant, since the businesses operating in this sector have profound ramifications within the province's industrial fabric. They provide business opportunities to many partners upstream and downstream from the value chains associated with the development of these resources.

#### SECTION 4

## QUÉBEC'S MAJOR ECONOMIC SECTORS



## SECTION 4

## QUÉBEC'S MAJOR ECONOMIC SECTORS

In Québec, the natural resources sector has been of major historical importance. Our forests and mines were exploited in the very early years of our history, and thanks to our strong hydroelectric potential, the aluminum and energy sectors have been added to the major economic sectors in which our natural resources are exploited.

In the following section, we shall discuss the mining, energy, forest and aluminum sectors in more detail. For each sector, we shall offer a brief portrait of the industry, present the economic spinoffs, and analyze the major issues.



4.1.

### MINING AND MINERAL MANUFACTURING: NORTHERN QUÉBEC'S ECONOMIC DRIVER

#### 4.1.1. Portrait of the industry

In 2011, the value of the deliveries by Québec's mining industry attained \$8.2 billion, an increase of more than 20% over 2010 and of nearly 35% since 2008. In 2012, 24 metal and nonmetal mines are operating in Québec as a whole, and 43 mining projects are in the development, construction or expansion phase.

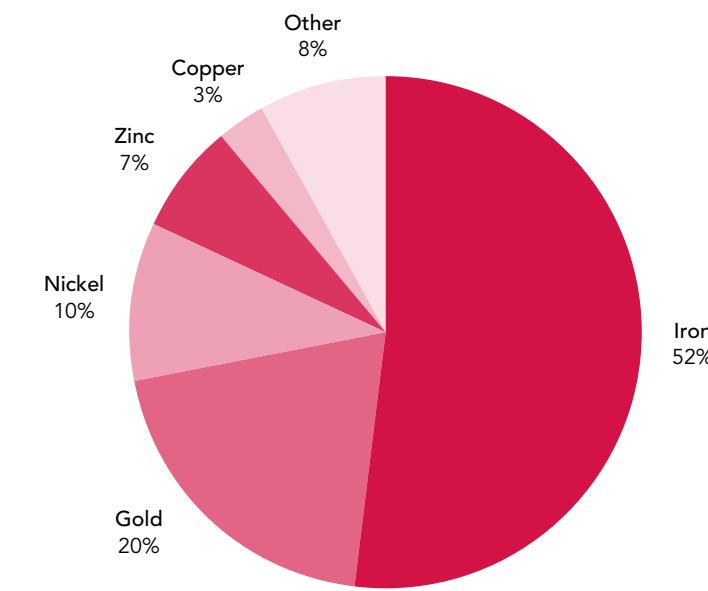
The principal mineral substances produced in Québec are iron, zinc, gold, nickel and copper. In terms of value produced, iron ore and gold account for nearly three quarters of Québec deliveries. Québec is also one of the largest producers of niobium in the world (niobium is used, in particular, in steel manufacturing).

**Table 3:**  
Types of active mines in Québec, January 2012

Types de mines	Number
Metal mines – gold, iron, zinc, nickel, copper, silver, niobium	15
Nonmetal mines – salt, silicon, feldspar, mica, graphite	9
Projects at the planning and development stage – gold, iron, zinc, nickel, copper, niobium, vanadium, tantalum, apatite, rare earths, uranium, lithium, alumina, diamonds	43

Source: MRNF and Minalliance.

**Figure 1:**  
Estimated breakdown of the value of deliveries, by ore, in Québec (2010)



Source: Québec Mining Association.

In 2008, the Ministère des Ressources naturelles et de la Faune made an inventory of nearly 600 businesses operating in the mining field. Most of them were involved in mining exploration (250) and in extraction activities in quarries, sand pits and peat bogs (300). Québec also has six major processing plants, two of which are located in the Montréal metropolitan area.

Mining and mineral manufacturing companies procure goods and services from some 3,800 suppliers based throughout Québec, both in the regions and in the large urban centres. These many suppliers operate in the following sectors in particular:

- specialized technical services (surveying, geophysics, drilling, machining)
- professional services (legal and financial services, insurance)
- structural services (materials, support, raises and related services)
- machinery and equipment

[...] approximately 1,800 of the 3,800 suppliers in Québec were located in the Montréal metropolitan area, half of them on the Island of Montréal [...]

QMA and AEMQ, Québec's mineral industry cluster: Socio-economic contribution to the development of Québec and its regions, 2010.

- transportation services (road, rail, sea and air) and transportation support (transportation equipment, mechanics, and other maintenance activities)
- energy (natural gas, electricity, fuel oil)
- research and development (productivity improvement, new machinery, new processes)
- engineering consulting firms
- other (health, safety, training).

Although basic mineral industry activities, such as exploration and mining, are for the most part concentrated far from the major urban centres, the networks of suppliers of mineral companies are not necessarily located close to the sites. In 2008, for example, approximately 1,800 of the 3,800 suppliers in Québec were located in the Montréal metropolitan area, half of them on the Island of Montréal<sup>4</sup>.

**Table 4:**  
Principal processing plants in Québec, 2012

Company	Plant	Location	Substance	Jobs
Rio Tinto Iron and Titanium	Sorel-Tracy Metallurgical Complex	Sorel	Remelt iron, titanium (dioxide), ilmenite	>500 – 999<
Xstrata Copper	CCR Refinery	Montréal	Copper (wires, anodes, etc.), sulphur	>500 – 999<
Xstrata Copper	Horne Foundry	Rouyn-Noranda	Copper, sulphur, selenium, tellurium	>500 – 999<
Xstrata Zinc	CEZ Refinery	Valleyfield	Zinc	>500 – 999<
ArcelorMittal Mines Canada Inc.	2 steel mills (formerly SIDBEC)	Contrecoeur	Reinforcing steel	>500 – 999<
Sorel Forge	Steel mill	Sorel	Moulds and stamped steel	>200 – 499<

The number of companies actively involved in exploration and in development of mining projects greatly increased between 2000 and 2008. However, the proportion of firms with their head office in Québec slightly declined in this period, from 55% to 51%.

As far as actual mining is concerned, the number of active companies that had declared investments slightly decreased between 2000 and 2008, from 31 to 24. The number of companies with their head office in Québec also declined, from 18 in 2000 to 12 in 2008. Companies from outside Canada and the United States were primarily the ones that increased their presence during the period. The graphs in Appendix B show the origins of the companies that were active in exploration and in mining.

#### 4.1.2 Economic impact

##### Jobs and wages

The number of direct jobs generated by mine production activities in Québec for 2008 is estimated to be 16,400, of which nearly 2,200 (12%) involved mining support activities. More than half of the direct jobs (55%) were concentrated in mining operations (9,940), primarily in metal mines (3,520). Nearly a quarter of them involved primary processing activities (4,290).

Furthermore, investments for the construction of fixed assets and for repairs created 1,873 direct jobs in Québec in 2008; this was 10% of all direct jobs created in the province's mining industry.

In addition to the 16,400 direct jobs created by mine production activities, total expenditures made by mining companies in connection with production activities generated some 14,000 indirect jobs in Québec in 2008.

Of this number, 7,000 indirect jobs were created among first-tier suppliers (direct suppliers of mining companies), and 7,300 among other suppliers (suppliers of first-tier suppliers). It is thus estimated that for each direct job created by the mining industry in Québec, 0.9 of an indirect job is created.

This employment multiplier is very high compared to the average multiplier of 0.6 for all the productive industries of the Québec economy. One explanation for the size of the employment multiplier in this industry is the high number of external contractors and subcontractors used by mining companies, particularly in metal mining.

Wages and other compensation of workers in the mining industry are generally very much higher than those of Québec workers as a whole. For 2008, the average amount of wages and other compensation (including bonuses and overtime) of mining sector employees was \$74,000 per annum. This was 1.5 times the average compensation of workers in the manufacturing sector (\$45,905), and more than twice the average wage of all workers in the province, which was \$32,809 in 2008.

Moreover, wages and compensation of the employees of first-tier suppliers of goods and services to mining companies (\$50,000 per annum on average) are also generally higher than those of employees in the manufacturing sector and of all workers in Québec.

<sup>4</sup> QMA and AEMQ, Québec's mineral industry cluster: Socio-economic contribution to the development of Québec and its regions, 2010.

Source: MRNF, 2011.

**Table 5:**  
Average employment income of workers associated with mining activities in Québec (2008)

Types of jobs		Direct jobs	First-tier suppliers
Mining support activities		\$74,500	\$46,000
Mining	Metal mines	\$91,000	\$49,000
	Nonmetal mines	\$44,000	\$52,000
	Average	\$74,500	\$49,500
Primary processing	Foundries	\$70,000	\$46,500
	Refineries	\$72,500	\$58,000
	Lime, cement and clay plants	\$74,000	\$44,500
	Average	\$72,000	\$52,000
General average		\$74,000	\$50,000

#### Operating expenses and investments

In the period from 2000 to 2008, nearly 60% of the operating expenses of mining companies in Québec was for buying goods and services (subcontracting, other services, and miscellaneous operating expenses), and 25% was for wages and other compensation.

In the same period, since the mining industry uses large quantities of energy, an average of 16% of total operating expenses of mining companies was for energy (fuel and electricity).

**Table 6:**  
Breakdown of operating expenses of mining companies in Québec  
(average from 2000 to 2008)

Activities	Energy expenses		Wages and other compensation	Subcontracting and other services	Other operating expenses	Total by sector
	Fuel	Electricity				
Metal mines	9%	6%	30%	25%	30%	46%
Nonmetal mines	3%	11%	36%	23%	27%	10%
Primary processing	5%	12%	18%	13%	52%	44%
Average by activity	7%	9%	25%	20%	39%	100%

Source: MRNF, 2011.

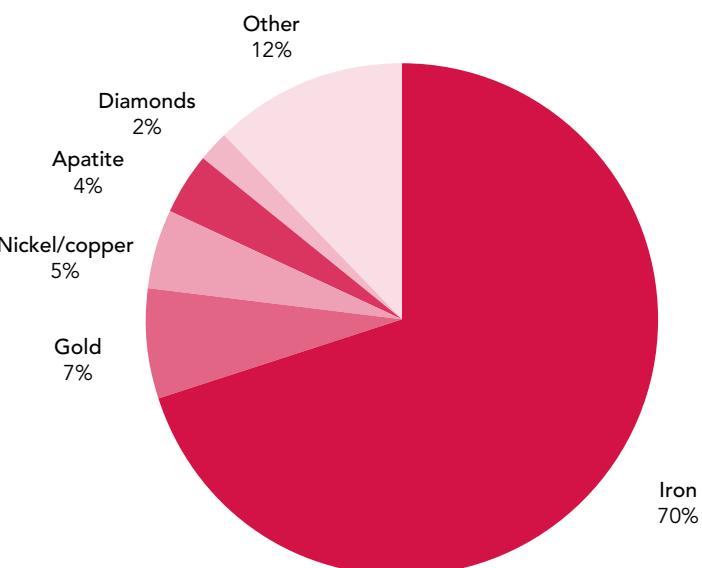
Between 2000 and 2010, the annual value of investments made by mining companies for exploration and development of mining properties grew significantly, from \$103 billion to \$639 billion. The total value of investments made by mine operators, in particular for the development of mine complexes and for construction and repair work, amounted to over \$2 billion in 2010. In 2000-2010, investments in mine complexes totalled over \$7.1 billion.

Mining and mineral manufacturing companies operating in Québec are planning to make large investments over the next few years. The current level of metal prices is encouraging them to move forward with many projects to develop new mine sites, to expand existing sites and to enlarge processing facilities.

In January 2012, 43 investment projects worth nearly \$38 billion were inventoried within the territory of Québec. The iron ore projects alone were worth \$26.6 billion, or 70% of all planned investments. Next in order of importance are projects for mining gold, nickel, copper and apatite (which is used in making fertilizers). Appendix C presents the industry's major investment projects.

**In January 2012, 43 investment projects worth nearly \$38 billion were inventoried within the territory of Québec.**

**Figure 2:**  
Proportion of the dollar value of the investment projects of mining and mineral manufacturing companies, by substance (January 2012)



Source: Minalliance and Québec Mining Association.

#### Metal processing

In addition to metal mining and primary metal processing activities, Québec has a great number of secondary and tertiary processing companies. All of these activities together form the Québec metals sector.

The primary metal processing sectors and the sectors involved in manufacturing metal products, machines and transportation equipment account for 34% of Québec's manufacturing added value. These sectors comprise over 5,000 establishments in Québec as a whole, or nearly one quarter of manufacturing establishments. Moreover, the metals sector employs 30% of Québec's manufacturing work force, and pays 36% of its manufacturing sector production wages.

**[...] the metals sector employs 30% of Québec's manufacturing work force, and pays 36% of its manufacturing sector production wages.**

Establishments active in manufacturing metal products, machines and transportation equipment use a large proportion of metals in their production processes, and also act as suppliers for the operators of new mining projects. In this regard, more than 50% of investments in new construction are spent to acquire new equipment. In addition, approximately 15% of the value of the investments required for the construction of mines comes from local subcontractors that make structural elements and metal products<sup>5</sup>.

Increased demand for equipment in the mining sector will create significant development opportunities for the suppliers of sectors that do not have such a high profile in Québec, as is shown by the high rate of imports. These sectors where the import rate is high are equipment, machines and electrical equipment. They include such assets as conveyors, rolling stock, tanks, grinders, crushers, etc.

Opportunities to increase added value for Québec's mining sector concern activities associated with increasing the quality and value of exported minerals. For example, the Québec Government's 2012-2013 Budget proposes fiscal measures to encourage investment in manufacturing and processing activities. The tax credit for the manufacturing and processing equipment used by the secondary and tertiary processing sectors has been extended to goods employed for primary metal processing, in other words casting, refining and hydrometallurgy activities. The new credit is offered as a complement to the existing credits for other primary processing activities.

**Table 7:**  
**Economic importance of metal processing in Québec**

Sectors	Establishments	Jobs	Production wages (\$K)	Total deliveries (\$K)	Manufacturing added value (\$K)
Primary metal processing	263	16,151	1,062,769	15,119,557	4,460,693
Metal products	2,619	29,473	1,154,881	7,077,751	3,296,874
Machines	1,462	18,279	855,710	5,620,537	2,611,945
Transportation equipment	691	22,448	1,285,084	13,364,743	5,702,330
<b>Québec's manufacturing sector as a whole</b>	<b>21,154</b>	<b>290,049</b>	<b>12,008,704</b>	<b>125,584,485</b>	<b>47,545,954</b>
Proportion of the metal processing sector	24%	30%	36%	33%	34%

Source: Institut de la statistique du Québec.

**Spinoffs for Québec**

The three major administrative regions of Québec that benefit from the activities of mining companies are Côte-Nord, Abitibi-Témiscamingue and Nord-du-Québec. In 2008, these three regions contained more than half the direct jobs generated by the mining industry (8,900). To this were added 8,150 indirect jobs created by the expenditures of Québec's mining companies. In all, 17,000 direct and indirect jobs were created in these three regions, or nearly half of all jobs created by this industry.

In 2008, nearly 60% of the total payroll in the mining and primary processing sector was paid out in these three administrative regions, including almost 25% in Côte-Nord alone.

Moreover, the mining industry plays an important role in the economy of each of these regions, and is a leading employer. In 2008, the mining sector paid out nearly 20% of its total payroll in Nord-du-Québec and approximately 14% in Côte-Nord. For the three regions as a whole, nearly 10% of the total payroll was attributable to mining and primary processing activities.

**Fiscal and parafiscal spinoffs**

When we add the contribution that mine production activities make to Québec's GDP (\$4.4 billion) to the contribution of the mining companies' investments in fixed assets and repairs (\$328 million), we find that as a whole, the mining sector contributed nearly \$4.8 billion to Québec's GDP in 2008. This represents 1.6% of the province's GDP, which was estimated to be \$302 billion in that year.

The activities of metal mines, which represent almost 60% of mine production activities in Québec, accounted for 0.8% of Québec's GDP, or \$2.5 billion, in 2008. Also in 2008, primary processing activities represented 20% of all mine production activities and 0.3% of the province's GDP, with a total contribution of \$910 million.

Taxes on wages and other compensation of mining sector workers (direct and indirect jobs) produce a little over \$200 million per year for the Québec Government, and tax revenue from the expenditures of mining sector businesses amounts to over \$40 million per year. Levies associated with parafiscality have attained \$300 million per year for the provincial government.

In addition to the fiscal and parafiscal spinoffs, the mining industry contributes to the Québec economy by paying mining royalties. Mining fees amounted to \$305 million in 2011, a significant increase over previous years.

Québec's taxation of the mining industry is among the highest in Canada: 40.9% of mining profits were collected in the form of taxes and royalties in 2011, if we take into account all taxation (both provincial and federal). This level is the highest among the four major producing provinces, namely Ontario, Saskatchewan, British Columbia and Québec.

**Increased demand for equipment in the mining sector will create significant development opportunities for the suppliers of sectors that do not have such a high profile in Québec [...]**

<sup>5</sup> Sources: E&B Data, Québec's mineral industry cluster: Socio-economic contribution to the development of Québec and its regions, 2010; DELOITTE, Le métal, créateur de richesse pour les Québécois, for the Réseau de la transformation métallique, 2011.

### Role and participation of the Government

In addition to the fiscal and parafiscal receipts it collects, the Québec Government also benefits from mining activity through the significant assets it possesses in businesses.

- Ressource Québec, a subsidiary of Investissement Québec that was created under the 2012-2013 Budget, has total assets of \$236 million and a billion-dollar budget envelope for investing in new projects until 2017 of which \$500 million for projects related to the Plan Nord. The Société québécoise d'exploration minière (SOQUEM) and a new version of Société québécoise d'initiative pétrolière (SOQUIP) will become subsidiaries of Ressource Québec, and will have an overall budget of approximately \$500 million.
- The Société d'investissement dans la diversification de l'exploration (SIDEX) manages a \$50 million fund, and is 70% funded by the Québec Government.
- The Société de développement de la Baie-James manages a regional fund of \$7 million.

The Caisse de dépôt et placement du Québec does not report directly to the Government, but does manage a large share of Québec's public retirement plans, and at December 31, 2010 had investments of nearly \$300 million in mining companies operating in Québec, including \$95 million through Gestion Sodémex, not including the Caisse's holdings in multinationals operating in Québec (like Xstrata or ArcelorMittal).

### Spinoffs of a project

To assess the economic impact of implementing a mining project in Québec, analysis of an operating project is relevant.

The Canadian Malartic project of the Osisko Mining Corporation, located in the Abitibi-Témiscamingue region, started in 2004. This open-pit mine project has proven and probable reserves of 10.7 million ounces of gold. The project's capital cost is \$788.9 million, and its operating expenses are \$189.2 million per annum.<sup>6</sup>

The following table summarizes the breakdown of the capital costs of such a project. A more detailed breakdown of the capital costs and operating expenses is available in Appendix D.

**Table 8:**  
Capital costs of the Canadian Malartic gold mine project

Category	Capital costs (\$million)	Proportion of capital costs (%)
General administration	14.5	2%
Community resettlement	87	11%
Mining operation	136.7	17%
Electric power and communications	19.5	2%
Infrastructures	29.7	4%
Ore processing	348	44%
Residue processing and water management	15.3	2%
Indirect costs	72.7	9%
Contingencies	65.6	8%
<b>Total</b>	<b>788.9</b>	<b>100%</b>

Source: OSISKO, Feasibility Study: Canadian Malartic Project (Malartic, Québec), 2008.

### Spinoffs for the metropolitan area

Thanks to a large network of suppliers and industrial users, many of which are located in the Montréal metropolitan area, mining sector investments planned for the coming years will have a significant impact in the area.

Of the \$37.6 billion that will be invested in this sector, both within the territory covered by the Plan Nord and in the rest of Québec, approximately \$6.7 billion (or 18%) will be spent in the Montréal metropolitan area, including:

- \$4.9 billion on construction
- \$979 million on professional services
- \$333 million on general administration
- \$246 million on other services
- \$158 million on equipment and machinery
- \$42 million on electrical equipment.

The potential spinoffs of mining sector investments and operating expenses for the Montréal metropolitan area will be \$25.2 billion and 6,191 jobs maintained or created over the next 25 years.

6

Sources: OSISKO, Feasibility Study: Canadian Malartic Project (Malartic, Québec), 2008; OSISKO, press release, March 31, 2011.

#### 4.1.3. The major issues of the Québec mining industry

##### Attractiveness for investors

According to the Fraser Institute's annual survey of mining companies, Québec has recently moved from first to fifth place on the list of most attractive regions for mining companies. This change is due not only to the announced increase in the level of royalties and taxation for mining companies, but also to the Government's intentions to review the legislation on mining operations<sup>7</sup>. But in spite of this recent setback, Québec remains one of the most favourable places for mining operations.

##### Work force availability

In the mining field, it is often hard to fill skilled worker and expert positions, especially those of mining engineers, geologists and heavy equipment operators. Companies also face stiff competition to attract skilled workers from other Canadian provinces. In recent years, Alberta has had a significant offer of highly paid jobs in the natural resources sector, and this has attracted many Québec workers.

Nonetheless, we do have an opportunity to repatriate many of these workers with the development of the Plan Nord, which will allow us to offer many jobs with wages well above the Québec average.

Lastly, the location of many mining projects often results in workers travelling between southern Québec and northern projects, in accordance with the "fly in, fly out" model. This employee placement model requires a larger number of individuals to ensure continuity of operations during periodic breaks.

##### Relations with Aboriginal people

Throughout Canada, mining projects are often located within or close to the traditional territories of First Nations communities. Construction of a mining project in these territories—as will be the case for a number of projects within the territory covered by the Plan Nord—cannot go forward without extensive negotiations with the Aboriginal communities. Such a process of negotiation and consultation ensures that the values, traditions and concerns of these communities regarding their territory are respected.

In recent years, important partnerships have been created between various mining companies and Aboriginal communities. For example, Xstrata Nickel, in connection with its Raglan Mine operation in Nunavik, concluded a partnership agreement with the Inuit that provides, in particular, that priority be given to employing Inuit and to making contracts with Inuit businesses. Under this agreement, the Inuit have benefited from economic spinoffs (in the form of income from employment, contracts with businesses and profit-sharing) on the order to \$80 million for 2010 alone<sup>8</sup>.

#### 4.1.4. Conclusion

The mines and mineral manufacturing sector will account for a large share of the investments to be made in developing natural resources in Québec over the next 25 years. As of January 2012, there were plans for 43 projects to invest in developing new mine sites or in expanding or enlarging existing sites. The total value of these plans is nearly \$38 billion, of which 91% is to be invested in the Plan Nord territory.

The Montréal metropolitan area is one of the Québec regions that benefit the most from investments in the mines and mineral manufacturing sector, in particular because the area is home to the head offices of large engineering consulting firms, and has a high concentration of suppliers of various kinds of strategic equipment. In 2008, approximately 1,800 of the 3,800 suppliers in Québec were located in the Montréal metropolitan area, half of them on the Island of Montréal.

#### THE MINES AND MINERAL MANUFACTURING SECTOR AT A GLANCE

- Contributed nearly \$4.8 billion to Québec's GDP (1.6%) in 2008.
- 43 mining projects in the development, construction or expansion phases.
- 51% of the 204 companies involved in exploration and mining project development in Québec have their head office in Montérégie.
- 16,400 direct jobs and nearly 14,000 indirect jobs. The average wage is \$74,000 per year.
- \$639 million of investments in mining exploration and development in 2010.
- Over \$2 billion invested in operating mining complexes in 2010.
- Over 5,000 establishments involved in secondary and tertiary metal processing.
- 34% of Québec's manufacturing added value, 30% of the work force and 36% of wages.

<sup>7</sup> Fred McMahon and Miguel Cervantes, *Annual Survey of Mining Companies 2011-2012*, Fraser Institute, 2012.

<sup>8</sup> "Aborigines and mining companies unite", *Mining & Exploration Magazine*, 2011; QUÉBEC MINING ASSOCIATION, *Démarche d'intégration de développement durable en entreprise de l'industrie minière québécoise*, press release, April 2011; GOUVERNEMENT DU QUÉBEC, *Plan Nord, premier plan d'action 2011-2016*, 2011.



## 4.2.

## ENERGY: A PILLAR OF OUR ECONOMY

**4.2.1 Portrait de l'industrie**

Québec is the leading energy producer in Canada, and Hydro-Québec is the biggest player in the country's electricity market. In 2009, Hydro Québec generated almost 31% of the volume of electricity produced in Canada, followed by B.C. Hydro with around 10%. More than 70% of electrical industry firms have their head office in Québec.

The Québec electrical industry is made up of companies that fall into five major categories:

1. Producers, transmitters and distributors of electricity.
2. Manufacturers of equipment used for the production, transmission and distribution of electricity.
3. Manufacturers of electrical equipment.
4. Engineering consulting services whose activities are wholly or partly associated with the production, transmission and distribution of electricity.
5. Businesses offering other services associated with the production, transmission and distribution of electricity.

**Producers, transmitters and distributors of electricity**

This category corresponds to "businesses whose principal activity consists of producing block electricity, transmitting this electricity from power plants to distribution centres and/or distributing it to end users"<sup>9</sup>.

Some businesses that fall into this category include Hydro-Québec, Brookfield Renewable Energy Partners, Hydro-Jonquière, Rio Tinto Alcan Power and TransCanada Power.

**Manufacturers of equipment used for the production, transmission and distribution of electricity**

This category corresponds to businesses whose principal activity consists of manufacturing turbines and turbogenerators, internal combustion engines and variable speed drives, high-speed drive mechanisms and industrial clutches. This category also includes enterprises manufacturing wind or solar energy turbogenerators, or wind turbines and solar panels.

Some businesses that fall into this category include ABB, Alstom Canada, Detroit Diesel Allison, LM GlasFiber, Siemens Canada, and Voith Siemens Hydro Power Generation.

**Manufacturers of electrical equipment**

This category includes businesses whose principal activity consists of manufacturing or reconditioning power and distribution transformers, motors, generators, and connection, switching, relay or control equipment for industrial use. Enterprises whose principal activity is manufacturing of electricity storage and transmission equipment and accessories for current transmission, such as batteries, cells, wires, and electrical or communication cables, are included in this category.

Some businesses that fall into this category include Alcan Cable, Cicame Énergie, Surplec, Cummins, Delstar Power, GE Canada, Gentec, Nexans Canada, TermacoAnister, Schneider Electric, Weir Canada, and 3M.

**Engineering consulting services**

This category corresponds to the engineering consulting firms that perform engineering work (civil and other) for the construction of electrical power plants or hydroelectric dams and the construction of wind power farms or solar power plants.

Some businesses that fall into this category include BBA, BPR, Cegertec, Cima+, Dessau, Genivar, Roche, RSW, SNC-Lavalin, Tecsuit and Teknika HBA.

**Other service businesses**

This last category of businesses that are part of the Québec electricity industry ecosystem includes businesses that work on the architecture associated with the construction of power plants, dams, wind power farms or solar power plants, for environmental analysis and for prospecting or geophysical surveys<sup>10</sup>.

In recent years, the needs for electricity in Québec have grown at a steady rate of 250 MW per year on average, while electricity availabilities have increased less rapidly. This delay is causing a shortfall in electricity production in Québec, and at some periods of the year, Québec must import electricity from outside the province and pay a high price for it.

The electricity export volume has also fallen off considerably from the peak attained in 1987 because Québec is having trouble meeting its own domestic demand. Exports of electricity depend on the production of electricity surpluses, which enable Québec to benefit from current and predictable business opportunities on external markets.

In 2010, Hydro-Québec's electricity exports were worth \$1 billion, compared to \$1.2 billion in 2009. In Ontario and in New England, current and predictable needs for electricity are growing rapidly. At the time that Québec's most recent energy strategy was published in 2006, the Ontario Power Authority estimated that Ontario would need 24,000 MW in new power capacity by 2025, and the US federal Department of Energy likewise forecasts that the Northeastern United States would require 12,400 MW in additional capacity by 2025.

Although the natural gas sector has not been examined in detail in this study, natural gas is an important form of energy, especially in secondary and tertiary mineral processing. Mineral processing requires intense heat, and natural

[...] the US federal Department of Energy likewise forecasts that the Northeastern United States would require 12,400 MW in additional capacity by 2025.

<sup>9</sup> AIEQ, *Étude économique de l'AIEQ : L'industrie électrique, génératrice de prospérité pour le présent et l'avenir du Québec*, 2009.

<sup>10</sup> AIEQ, *Étude économique de l'AIEQ : L'industrie électrique, génératrice de prospérité pour le présent et l'avenir du Québec*, 2009.

gas is the main source for the very great majority of processing facilities. The Government's recent decision to support feasibility studies for building a gas pipeline to serve the Côte-Nord region is an important step forward in promoting mineral processing in Québec. Given the fact that several iron mines are located on the Labrador Trough and that iron ore is transported further south to deepwater ports, the availability of natural gas would be the next essential stage in promoting local processing of mineral resources.

#### 4.2.2. Economic impact

##### Jobs and wages

According to the Association de l'industrie électrique du Québec (AIEQ), the energy industry comprises over 1,000 businesses spread throughout Québec's 17 administrative regions, and accounts for more than 5% of Québec's GDP. This industry is experiencing strong growth, with corporate sales increasing by an average 10 to 20% per year between 2003 and 2008. Moreover, the companies in this sector have proven know-how that enables them to make over 30% of their sales outside Québec, in more than 180 countries.

Québec has a world-class electrical industry, primarily based on exploitation of the natural resources located in the northern part of the province. In 2010, the electricity production, transmission and distribution sector—which is one of the five categories of the electrical industry—alone accounted for 3.6% of Québec's GDP, with nearly 27,000 jobs. Furthermore, wages in this industry are 110% higher than those in Québec industries as a whole; in 2008, the average wage was \$32,809, well above the Québec average.

##### Operating expenses and investments

A capacity of nearly 30,000 MW is already installed within the territory covered by the Plan Nord, this being 76% of the installed power in Québec's major hydroelectric power plants.

More recently, in Québec's 2009-2013 energy strategy, Hydro-Québec forecast a 4,500 MW portfolio of hydroelectric projects, 97% of which are to be located within the territory of the Plan Nord. To these 4,500 MW of hydroelectricity, the Plan Nord anticipates adding 3,500 MW of renewable energy by 2035.

These additional projects will reflect additional investments of approximately \$25 billion, as stipulated by the Québec Government, and will comprise:

- 3,000 MW of hydroelectricity (86%)
- 300 MW of wind power (8.5%)
- 200 MW from other renewable sources, such as underwater generators, wind power-diesel coupling, etc. (5.5%).

In total, the renewable energy projects to be carried out within the territory of the Plan Nord will reflect approximately \$47 billion in investments, as described in the Plan Nord action plan tabled by the Québec Government (this includes the portfolio already forecast by Hydro-Québec and the additional 3,500 MW of the Plan Nord).

Regarding the impact of wind power projects, the 2,000 MW call for tenders put out by Hydro-Québec in 2008 provided for projects in eight regions of Québec, both north and south of the Saint Lawrence River. The estimated

investments for these projects would be \$5.5 billion. These projects were to have a minimum Gaspé content of 30% for the wind turbines themselves, and a minimum Québec content of 60% for each wind farm as a whole.

For this call for tenders, eight suppliers operating in Québec were selected:

- Invernegy Wind Canada
- Enerfin Sociedad de Energía
- 3Ci Énergie
- Kruger Énergie
- Venterre NRG
- Consortium Boralex – S.E.C. Gaz Métro
- B&B VDK Holdings
- Saint-Laurent Énergies.

In addition, two makers of wind turbines were selected:

- ENERCON
- Repower.

A project such as the Massif du Sud wind farm, to be built by EDF EN Canada, which involves overall investments of \$350 million (commissioning scheduled for December 1, 2012), will have estimated spinoffs for Québec of \$210 million. These expenditures amount to approximately 60% of the investments required for the construction of a wind farm.

Overall investments of about 30% or \$105 million are expenditures for civil and electrical engineering, for environmental services, and for food services and accommodation. Some 80% of these expenditures can be made locally, in the RCM of Bellechasse-Etchemins (Lower St. Lawrence).

[...] the renewable energy projects to be carried out within the territory of the Plan Nord will reflect approximately \$47 billion in investments [...]

**Table 9:**  
Description of power production projects planned in Québec by 2035

Territory covered	Type of energy	Forecast investment (\$million)	Forecast power (MW)	Notes
<b>Plan Nord</b>	Hydroelectricity	44,012	7,365	(a), (b)
	Wind power	1,793	300	
	Other (biomass, underwater generator, etc.)	1,195	200	
	<b>Total</b>	<b>47,000</b>	<b>7,865</b>	(c)
<b>Outside Plan Nord</b>	Hydroelectricity	750	135	(d)
	Wind power	7,200	2,505	(e), (f)
	Other (biomass, underwater generator, etc.)	1,640	275	(g)
	<b>Total</b>	<b>9,590</b>	<b>2,915</b>	
<b>Total</b>	Hydroelectricity	44,762	7,500	
	Wind power	8,993	2,805	
	Other	2,835	475	
	<b>Total</b>	<b>56,590</b>	<b>10,780</b>	

Sources: GOUVERNEMENT DU QUÉBEC, *Plan Nord, premier plan d'action 2011-2016*, 2011; HYDRO-QUÉBEC, *Plan stratégique 2009-2013*, 2009; MRNF, *Projets éoliens au Québec*, November 2011; HYDRO-QUÉBEC PRODUCTION, *Complexe de la Romaine : Étude d'impact sur l'environnement*, Vol. 9, Méthodes, 2007.

(a) Includes 97% of the projects already planned in Hydro-Québec's 2009-2013 strategy (4,500 MW) and the additional 3,000 MW provided for in the Plan Nord.

(b) The estimate of investments is based on the proportion of power, according to type of energy, in the Plan Nord action plan (86% hydroelectricity, 8.5% wind power and 5.5% other energies).

(c) The total forecast investment is taken from the first Plan Nord action plan.

(d) Represents 3% of the projects provided for in Hydro-Québec's 2009-2013 strategy.

(e) The power and the forecast investments for wind power are based on the second call for tenders of 2,005 MW, and on the community projects of 500 MW.

(f) The investments in wind turbines do not include the cost of connection to the electric network by Hydro-Québec.

(g) Includes Hydro-Québec's calls for tenders and current purchasing programs for 125 MW of biomass and 150 MW from a small hydraulic device.

[...] almost  
\$44.7 billion will  
be invested in  
hydroelectricity in  
Québec by 2035.

#### Spinoffs for Québec

Our analysis of the proportion of expenditures made locally in the construction of various recent projects, in other words, expenditures made in the region where the project is located, seems to show that between 67 and 83% of expenditures on these projects are made outside the local region. The administrative regions of Québec that are generally located near urban centres derive a significant benefit from the realization of projects that are often located within the territory covered by the Plan Nord.

Considering the 4,500 MW in hydroelectric projects contemplated in Hydro-Québec's 2006-2015 energy strategy for Québec (worth approximately \$22.7 billion) and the 3,000 MW of hydroelectricity in the Plan Nord (worth about \$21.5 billion), we can say that almost \$44.7 billion will be invested in hydroelectricity in Québec by 2035. Of this amount, approximately \$32.3 billion will be spent on construction, of which \$23.2 billion, or 72%, will be spent directly in Québec in the form of added value.

The main activities that will benefit Québec are: engineering and project management services (\$7.3 billion); construction of infrastructures and mitigation measures (\$5.8 billion); backfilling (\$2.6 billion); open cut excavation (\$2.6 billion); concrete construction (\$2.4 billion); and heavy mechanics, auxiliary services, and mechanical, electrical and control appliances (\$2.3 billion).

In 2010, Hydro-Québec paid a dividend of nearly \$1.9 billion to its sole shareholder, the Québec Government. In 2009, the dividend had been \$2.1 billion. The difference is due in part to lower levels of precipitation in 2009, which reduced the volume of water in the reservoirs.

#### Role and participation of the Government

The Government regulates production and distribution of electricity in Québec through the Ministère des Ressources naturelles et de la Faune (MRNF), which acts as manager of public lands and resources. The MRNF must secure Québec's energy supply, within a sustainable development perspective. To this end, the MRNF develops and coordinates government energy policy, and manages the use of hydraulic resources in the public domain and the granting of the necessary rights for the construction and operation of other sources of energy (wind power, solar energy, etc.).

To ensure conservation of natural resources and their development to create wealth, the MRNF has given Hydro-Québec a mandate to produce, transmit and distribute electricity in Québec. Hydro-Québec, the world's largest producer of hydroelectricity, thus enjoys a virtual monopoly in this field in Québec. Almost all the energy consumed in Québec (95%) comes from hydroelectric power plants. Hydro-Québec is also responsible for applying government energy policy, in particular in planning the construction of electrical production facilities.

#### Spinoffs of a project

Analysis of a hydroelectric project now being carried out will help us evaluate the economic impact of implementing all these projects by 2035.

The La Romaine project involves building a 1,550 MW hydroelectric complex on the Romaine River, near Havre-Saint-Pierre. The work will take place between 2009 and 2020, and the first development is scheduled to be commissioned in 2014. This project plans to mobilize an average of 975 workers per year for 11 years. It is estimated that the project will ultimately cost around \$6.5 billion, exclusive of power transmission equipment. Of this amount, \$4.9 billion are associated with the costs of building the complex.

In addition to the cost of construction, other costs and expenses are associated with operating the complex: hydraulic taxes and royalties; operation and maintenance of power plants; expenses relating to the agreements with the community; environmental follow-up after the work is completed; and undertaking to purchase and transmit power. To this must be added the surplus cost of connection.

According to Hydro-Québec Production, the Côte-Nord region will benefit from \$1.3 billion in expenditures on the project. The participation rate of this region's workers on the sites of the La Romaine Complex will reach 60%.

[...] a typical hydroelectric project will generate added value for Québec amounting to 73% of expenditures.

Source: HYDRO-QUÉBEC PRODUCTION, Complexe de la Romaine : Étude d'impact sur l'environnement, Vol. 9, Méthodes, 2007.

#### Principal expenditures in terms of activities

Analysis of the La Romaine hydroelectric project by type of activity shows that construction activities account for approximately 78% of total expenditures. The most important construction activities are:

- infrastructures and attenuation measures (25%)
- heavy mechanics and other appliances (19%)
- concrete construction (13%)
- backfilling (8%).

Moreover, about 22% of expenditures correspond to engineering and project management activities. Depending on the particular project, these expenditures usually vary between 20 and 25%..

**Table 10:**  
Economic impact of carrying out a hydroelectric project, by type of activity – La Romaine Complex (a)

Type of activity	La Romaine Complex		
	Jobs (person-years) Direct and indirect effects	Expenditures (\$million) (b)	Proportion of total expenditures
<b>Construction activities (total):</b>	<b>22,676</b>	<b>3,829</b>	<b>78%</b>
Open cut excavation (overburden and rock)	2,262	316	6%
Underground excavation	2,047	316	6%
Backfilling	2,367	372	8%
Concrete construction	4,800	658	13%
Heavy mechanics, auxiliary services, and mechanical, electrical and control appliances	3,097	932	19%
Infrastructures and mitigation measures	8,103	1,235	25%
<b>Engineering and management</b>	<b>10,737</b>	<b>1,079</b>	<b>22%</b>
<b>Total (construction activities, engineering and management)</b>	<b>33,413</b>	<b>4,908</b>	<b>100%</b>

(a) 2004 dollars.

(b) Current dollars (includes inflation over the entire period of the project).

To evaluate the impact of building a hydroelectric project on Québec, we have to make a distinction between added value, namely the economic spin-offs for Québec, and the value of imports coming from outside Québec. From the flow of forecast expenditures by type of activity, a calculation based on the data of the Eastmain-1 project was applied to the La Romaine Complex.

This exercise shows that a typical hydroelectric project will generate added value for Québec amounting to 73% of expenditures. Moreover, the total value of imported goods and services is equivalent to 27% of the project's total value.

**Table 11:**  
Estimate of the added value of all hydroelectric projects carried out in Québec by 2035, by type of activity

Type of activity	Expenditures (\$million)	Proportion of expenditures (%)	Added value (\$million)	Ratio of added value to expenditures (%)	Value of imports (\$million)	Ratio of imports to expenditures (%)
<b>Construction activities (total):</b>	<b>23,699</b>	<b>73%</b>	<b>15,940</b>	<b>67%</b>	<b>7,142</b>	<b>30%</b>
Open cut excavation (overburden and rock)	3,966	12%	2,599	66%	1,251	32%
Underground excavation	366	1%	212	58%	135	37%
Backfilling	4,139	13%	2,618	63%	1,367	33%
Concrete construction	3,196	10%	2,406	75%	732	23%
Heavy mechanics, auxiliary services, and mechanical, electrical and control appliances	3,870	12%	2,349	61%	1,386	36%
Infrastructures and mitigation measures	8,163	25%	5,756	71%	2,272	28%
<b>Engineering and management</b>	<b>8,567</b>	<b>27%</b>	<b>7,258</b>	<b>85%</b>	<b>1,213</b>	<b>14%</b>
<b>Subtotal (construction, engineering and management activities) (a)</b>	<b>32,266</b>	<b>100%</b>	<b>23,198</b>	<b>72%</b>	<b>8,355</b>	<b>26%</b>
<b>Interest and inflation (around 27% of the total cost) (b)</b>	<b>11,934</b>					
<b>Total cost of the projects</b>	<b>44,200</b>					

(a) Totals may differ from the sum of the values because of rounding.

(b) The cost of interest and inflation is based on an average of the La Romaine Complex, Eastmain-1-A and Rupert Diversion projects.

Sources: GOUVERNEMENT DU QUÉBEC, Plan Nord, premier plan d'action 2011-2016, 2011; HYDRO-QUÉBEC, Plan stratégique 2009-2013, 2009; HYDRO-QUÉBEC PRODUCTION, Complexe de la Romaine : Étude d'impact sur l'environnement, Vol. 9, Méthodes, 2007.

[...] Hydro-Québec procures most of the professional services it requires in the Montréal metropolitan area. Of the \$337 million it disbursed for such services in 2010, 80% was spent on the Island of Montréal.

In the next few years, construction of hydroelectric projects will create significant development opportunities for the suppliers of sectors that do not have such a strong presence in Québec, in particular suppliers of heavy mechanics, suppliers of mechanical, electrical and command appliances, and the sector associated with underground excavation. These types of construction activities have import rates of 36% and 37% respectively.

#### Spinoffs for the metropolitan area

Regarding the acquisition of goods and services, in 2010 Hydro-Québec spent approximately \$1.7 billion on these items in the Montréal metropolitan area<sup>11</sup>. This represents about 61% Hydro-Québec's total expenditures for goods and services.

Companies from the five administrative regions located partly or entirely within the boundaries of the Montréal metropolitan area supplied over \$503 million worth of "strategic assets", which are goods and equipment directly associated with Hydro-Québec's basic mission (to produce, transmit and distribute energy).

These are highly specialized items in the energy field and include, for example, a turbine generator set, a power transformer or a submersible cable. The Montréal metropolitan area alone supplied \$264 million worth of these goods (for a detailed breakdown, see the table in Appendix E).

Moreover, Hydro-Québec procures most of the professional services it requires in the Montréal metropolitan area. Of the \$337 million it disbursed for such services in 2010, 80% was spent on the Island of Montréal.

These two categories of high added value goods and services account for over 50% of Hydro-Québec's acquisitions in the area.

For the Montréal metropolitan area, the potential spinoffs from investments and operating expenses in the energy sector over the next 25 years will be \$16.2 billion and 5,021 jobs created or maintained per year.

#### 4.2.3. Industry issues

Apart from the issues relating to the increased demand for energy in Québec and to the fluctuation of electricity prices in North America, which affect Québec's exports of electricity, one of the major issues for the energy sector in Québec is the availability of skilled workers to carry out the projects planned from now until 2035 under the Plan Nord and Québec's energy strategy.

These large-scale construction projects will be carried out in parallel with all the other construction, natural resources exploitation and energy projects being realized within the territory of the Plan Nord in the mining, aluminum and forest industry sectors. These developments might put pressure on the work force available for construction. Moreover, the geographical remoteness of the construction projects is a major challenge for recruiting large numbers of workers.

#### THE ENERGY SECTOR AT A GLANCE

- Hydro-Québec, the largest producer in the electricity market in Canada, with 31% of the volume produced in 2009.
- Existence of businesses with a world-class reputation in all parts of the value chain: production, transmission and distribution of power, manufacturing of electrical equipment and materials, engineering consulting services, etc.
- 27,000 direct jobs.
- An average annual wage of \$96,740.
- The sales of the businesses in this industry grew by 10 to 20% per year between 2003 and 2008.
- 30% of the sales were made outside Québec, in over 180 countries.
- 61% of Hydro-Québec's expenditures for acquisitions are made in the Montréal metropolitan area, amounting to \$1.7 billion.
- Approximately 40% of suppliers are located in the Montréal metropolitan area.
- Plans to build electrical production equipment to generate more than about 8,000 MW by 2035.
- Planned investments of over \$56.5 billion by 2035, of which approximately \$47 billion will be invested within the territory of the Plan Nord, including hydroelectric, wind power and other projects.

<sup>11</sup>

The estimate for the Montréal metropolitan area is based on the sum of the amounts spent in the five administrative regions of which the area is composed, namely Montréal, Laval, Montérégie, Laurentides and Lanaudière. The Laurentides and Lanaudière regions do not fall entirely within the territory of the Montréal metropolitan area.



### 4.3.

## ALUMINUM: AN INSPIRATION FOR ALL

### 4.3.1. Portrait of the industry

The aluminum industry has existed in Québec for over a hundred years. The principal activities of the establishments in this industrial group are: extracting aluminum from bauxite ores; producing aluminum from alumina; refining, laminating, drawing and extruding aluminum; and making aluminum alloys.

The Québec industry accounts for over 90% of Canada's primary aluminum production capacity, and generates significant economic spinoffs in several regions of Québec, in particular Saguenay-Lac-Saint-Jean and Côte-Nord. In 2010, Canada ranked third among primary aluminum producing countries, after China and Russia. Canadian production represents more than 7% of the annual worldwide volume.

The three major companies operating Québec in the aluminum sector are Rio Tinto Alcan, Alcoa Canada and Aluminerie Alouette. They are represented by the Association de l'aluminium du Canada (AAC), based in Montréal.

These three companies spend over \$3 billion annually in Québec. Their presence has resulted in the development of a province-wide industrial cluster comprising research centres, centres of excellence in large engineering firms, original equipment manufacturers, and approximately 1,000 SMEs involved in aluminum processing. The AAC estimates that about 4,500 firms act as suppliers to Québec's aluminum plants. Over 40% of these firms are located in the administrative regions of Montréal, Laval and Capitale-Nationale.

Aluminum makes up 8% of the Earth's crust, and is the most abundant metal element. It comes primarily from bauxite. Three quarters of the known reserves of bauxite are located in Australia, China, Brazil, Guinea and India. Worldwide production reached 41.1 million tonnes in 2010, an increase of about 11% over 2009. China is by far the largest producer of aluminum, with more than 40% of world production.

Aluminum is the most consumed non-ferrous metal in the world. The major importing countries are the United States, Japan and Germany. About half the produced volumes are used in the construction and automobile industries. Consequently, demand for aluminum is sensitive to worldwide economic growth, and more specifically to the needs of households in emerging economies.

The world market for aluminum looks promising for the coming years, with a predicted average annual growth in volume of 4% through 2030. However, the growth in business volumes is more uncertain, as the real price of aluminum has declined in the last 20 years. A restructuring of worldwide production aimed at reducing operating costs is thus in progress. Investments are being increasingly directed towards countries that offer lower production costs in

terms of labour and energy, in particular China, India, and countries in the Persian Gulf region<sup>12</sup>.

### 4.3.2. Economic impact

#### Jobs and wages

According to the Comité sectoriel de main-d'œuvre de la métallurgie du Québec, Québec currently has 35 establishments involved in producing and processing alumina and aluminum. The three large aluminum companies have a total of nine aluminum production facilities, three of which employ over 1,000 people.

According to the AAC's estimates, the aluminum sector generates over 30,000 jobs in Québec, of which some 10,500 are direct jobs. The industry offers good wages, and in 2007, the average salary reached over \$68,000.

#### Operating expenses and investments

In 2010, to maintain its operations, the industry spent \$3.4 billion in Québec in the following sectors:

- \$1.3 billion on wages and benefits, retirement pensions and training
- \$1 billion on expenditures on goods and services
- \$1.1 billion on electricity.

The industry also invests large amounts of money every year in research and development. In 2010, the industry spent \$319 million on fixed assets apart from acquisitions, while its research and development expenditures topped \$100 million.

It is anticipated that over the next few years, Québec will see significant investments in establishments producing primary aluminum.

Rio Tinto Alcan is currently in the process of investing over \$3.6 billion for the AP60 project on the Jonquière site. Phase 1, to cost \$760 million, will enable the company to complete the pilot plant for its new technology. These investments, initially announced in December 2010, will raise total annual production to 460,000 tonnes.

In October 2011, Aluminerie Alouette also announced major investments in its Sept-Îles facilities. The estimated injection of \$2 billion will increase annual production of aluminum from 575,000 to over 930,000 tonnes. The company anticipates that this project will create 300 new jobs at its Sept-Îles plant.

In November 2011, Alcoa Canada announced a five-year \$2.1 billion investment plan for its aluminum plants in Baie-Comeau, Deschambault and Bécancour. These investments will reduce the plants' operating costs and increase annual production capacity by 120,000 tonnes.

In total, nearly \$7.6 billion will be invested in Québec aluminum plants over the next few years, \$3.2 billion being invested within the territory of the Plan Nord.

[...] the aluminum sector generates over 30,000 jobs in Québec, of which some 10,500 are direct jobs.

[...] nearly \$7.6 billion will be invested in Québec aluminum plants over the next few years, \$3.2 billion being invested within the territory of the Plan Nord.

12

ASSOCIATION DE L'ALUMINIUM DU CANADA (AAC), 2010 report on sustainable development, 2011; AAC, *L'aluminium au Québec, un bref portrait*, July 2011; Comité sectoriel de la métallurgie du Québec – www.metallurgie.ca; E&B Data, *Portrait économique de l'industrie de l'aluminium primaire au Québec*, December 2011.

### Spinoffs for Québec

The value of the primary aluminum industry's deliveries in Québec was \$6.6 billion in 2009 and \$7.8 billion in 2010. The sector thus accounted for approximately 2.6% of Québec's GDP in 2010. Primary aluminum was also, in 2010, Québec's leading source of export revenues, bringing in over \$6 billion. Over the last ten years, the primary aluminum industry has, on average, ranked third among Québec's exporting industries, with 11% of total exports.

Rio Tinto Alcan operates five plants, four of which are located in Saguenay-Lac-Saint-Jean, and an alumina production plant. The company's plants employ over 4,000 people in Québec, and produce more than 40% of Québec's aluminum. The port and rail facilities required for these operations employ another 300 people or so, and the Montréal head office has close to 700 employees. Rio Tinto has a total of over 7,000 employees in Québec, including the employees of Rio Tinto Iron & Titanium in Sorel-Tracy.

Alcoa Canada has three plants, which employ around 3,000 people and produce over 35% of Québec's aluminum. The company also operates an aluminum rod factory in Bécancour. In total, Alcoa Canada has almost 3,200 employees in Québec.

Aluminerie Alouette, located in Sept-Îles, is the largest aluminum plant in the Americas. It has about 1,000 employees, and is the biggest employer in the city of Sept-Îles.

A number of other firms are active in the aluminum sector, in particular in the Montréal metropolitan area. Many foundries, whose main activity is pouring molten metal into moulds or matrices to manufacture parts, provide several hundred jobs in the metropolitan area. Among them are EDC inc., Fonderie d'aluminium et modélerie, Fonderie Shellcast, the Sapa Group, Industries Luxor inc., Metra Aluminium and Moulage d'aluminium Howmet Ltd<sup>13</sup>.

**Table 12:**  
**Establishments in the aluminum sector in Québec**

Plant	Company	Production capacity (tonnes/year)	Number of jobs
<b>Aluminum plants</b>			
Alma	Rio Tinto Alcan	438,000	907
Arvida (Jonquière)	Rio Tinto Alcan	176,000	982
Baie-Comeau	Alcoa Canada	400,000	1,630
Bécancour	A.B.I. (Alcoa Canada/Rio Tinto Alcan)	400,000	995
Deschambault	Alcoa Canada	253,000	515
Grande-Baie	Rio Tinto Alcan	218,000	650
Laterrière	Rio Tinto Alcan	238,000	552
Sept-Îles	Aluminerie Alouette	600,000	1,000
Shawinigan	Rio Tinto Alcan	100,000	490
Total		2,823,000	7,721
<b>Production of alumina</b>			
Vaudreuil	Rio Tinto Alcan	1,500,000	700

Source: Association de l'aluminium du Canada (2011) and Rio Tinto Canada (2011).

### Fiscal and parafiscal spinoffs

In 2011, on annual expenditures of over \$3 billion, the industry's fiscal and parafiscal spinoffs were estimated to be around \$356 million.

**Table 13:**  
**Estimated fiscal spinoffs of Québec's primary aluminum production sector in 2011 (\$million)**

	Provincial fiscal spinoffs	Federal fiscal spinoffs	Parafiscality and other fiscal spinoffs	Total
Electricity	76	39	169	284
Wages	18	9	9	37
Carbon	2	1	3	6
Other services	7	4	20	30
Total	103	53	200	356

Source of data: E&B data, *L'aluminium primaire au Québec*, 2011 (2010 data with constancy hypothesis), calculations by Raymond Chabot Grant Thornton

Source for the electricity proportion: CRU, *Aluminium smelting cost service*, 2011.

### Role and participation of the Government

Energy represents nearly 35% of the costs of producing primary aluminum. The Québec Government thus plays a central role in ensuring the success of this industry in Québec by granting large blocks of energy to these large electricity users. Historically, the granting of these blocks of energy helped attract major investments to the province. Recently, through Hydro-Québec, the Government has undertaken to meet the demand from the new industrial projects by requiring job creation guarantees upstream from the value chain or in the secondary and tertiary processing sectors.

<sup>13</sup> E&B Data, *L'aluminium primaire au Québec, un leadership mondial en question*, December 2011; ASSOCIATION DE L'ALUMINIUM DU CANADA, 2010 report on sustainable development, 2011; Comité sectoriel de la métallurgie du Québec – [www.metallurgie.ca](http://www.metallurgie.ca).

The Québec Government thus plays a central role in ensuring the success of this industry in Québec by granting large blocks of energy to these large electricity users.

[...] the Montréal metropolitan area contains approximately 41% of all the Québec suppliers to the industry.

The economic development and job creation programs put in place by Aluminerie Alouette and Alcoa Canada are clear examples of these agreements made between the Québec Government and the industry.

#### Spinoffs for the metropolitan area

The Québec aluminum industry has been able to create an ecosystem with a rich variety of suppliers and users. The aluminum sector has contributed, in particular, to the emergence of Québec's world-renowned consulting engineering expertise.

It is, however, in the Montréal administrative region that we find the largest number of suppliers to the Québec aluminum industry, a little over 25% of the total. If we add in the establishments located in Laval, in Montérégie and in the Laurentides and Lanaudière regions, we can say that the Montréal metropolitan area contains approximately 41% of all the Québec suppliers to the industry.

To take the specific case of Rio Tinto Alcan, this aluminum producer estimated that in 2007, it had 2,000 suppliers in Québec and that the annual value of its orders was \$1.2 billion. Suppliers in the regions of Montréal, Laval and Montérégie accounted for over 41% of this amount.

Rio Tinto Alcan has identified the major strengths of its Québec suppliers for the development of its AP Technology. Québec's particular distinction is to have many suppliers in the fields of consulting engineering, vehicles and special equipment, and machining.

The Montréal metropolitan area will enjoy potential spinoffs from the outlay of \$4.7 billion in investments and operating expenses, and from the 1,000 jobs that will be created or maintained over the next 25 years.

The increasing demand for equipment and services associated with the construction or improvement of primary aluminum production facilities will create significant development opportunities for suppliers of sectors whose presence in Québec has not been so strong. These sectors, in which the rate of imports is high, are equipment and machines, and electrical equipment. They include such assets as tanks, equipment for power stations, anodes, overhead travelling bridge cranes, etc.

In addition to a network of suppliers well established throughout the regions of Québec, the primary aluminum industry has a developed market of industrial users. These are primarily concentrated in the metal products manufacturing, transportation equipment and machinery sectors.

The aluminum sector has about 1,850 industrial users throughout Québec. It is in the administrative regions of Montérégie and Montréal that we find the largest number of industrial users; these two regions contain 27% and 22% of establishments respectively. The Island of Montréal has the greatest number of large establishments using aluminum, with 33 establishments each having over 100 employees.

Thanks to the presence of the aluminum companies, several consulting engineering firms have developed world-renowned expertise in this sector.

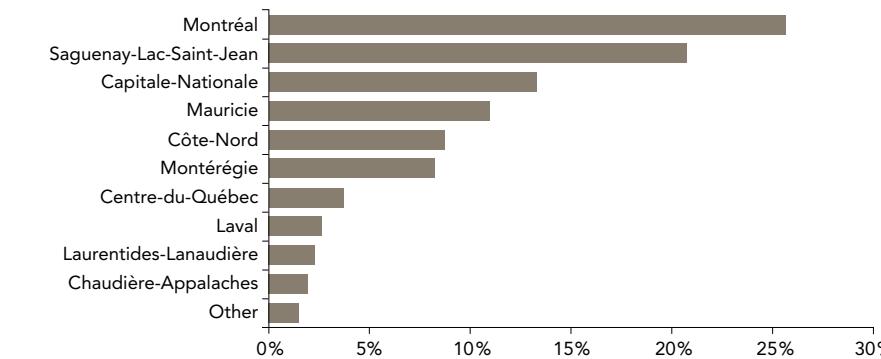
The firm SNC-Lavalin enjoys international recognition, and exports worldwide its expertise in the construction of aluminum plants, which it originally developed by building Rio Tinto Alcan's plant in Grande-Baie. Moreover, the multinational consulting engineering firm Bechtel set up its global Aluminum Centre of Excellence in Québec, and recently moved its North American headquarters operations from Denver to Montréal for its mining and metallurgical activities. Lastly, the principal Québec offices of the Hatch Corporation are located in Montréal.

Because of the aluminum sector's large network of suppliers and industrial users, which is heavily concentrated in the Montréal metropolitan area, the investments planned for the sector in the next few years will have a significant economic impact there.

Some \$7.6 billion will be invested in this sector, both within the territory covered by the Plan Nord and in the rest of Québec, and approximately \$1.4 billion (or 18%) will be spent in the Montréal metropolitan area, including:

- \$918 million on construction
- \$388 million on professional services
- \$53 million on electrical equipment
- \$20 million on other equipment and machines.

**Figure 3:**  
Distribution of aluminum industry suppliers in Québec (2011)



Source: E&B Data, Répartition régionale statistique des fournisseurs, for the Association de l'aluminium du Canada, February 2011.

#### 4.3.3. Industry issues

The sector is experiencing a context in which reducing costs and increasing productivity are key. The main concern of the aluminum companies is to maintain electricity costs at levels that are competitive compared to those of other producing countries. Research and development activities associated with the industry also aim to improve processes, in order to make production more competitive.

The Island of Montréal has the greatest number of large establishments using aluminum, with 33 establishments each having over 100 employees.

Québec retains an advantage in environmental terms because it uses hydroelectricity [...]

## THE ALUMINUM SECTOR AT A GLANCE

- Nine aluminum plants representing over 90% of Canada's production capacity.
- The alumina and aluminum production and processing sector accounted for approximately 2.6% of Québec's GDP in 2010, or nearly \$6.7 billion.
- The aluminum sectors ranks third among Québec's major exporting industries, with 11% of total exports.
- A network of 1,000 SMEs active in processing and 4,500 suppliers that support the industry.
- The three large producers have plans to invest over \$7 billion in the next few years, including more than \$3 billion in the territory covered by the Plan Nord.
- Approximately 40% of suppliers are located in the Montréal metropolitan area.

In recent years, the global aluminum market has been characterized by the growing power of emerging economies like China, India, and certain countries of the Middle East, which offer more attractive operating costs—and in particular lower energy costs—than the countries that have traditionally produced aluminum, like Canada.

Consequently, Québec must increasingly stand out from its competitors, which are growing in number, by making sure to keep total production costs below the world average. These new competitors are primarily operating their aluminum plants using low-cost thermal sources, and this is putting energy costs for Québec aluminum producers above the global average for the sector. Québec retains an advantage in environmental terms because it uses hydroelectricity and offers better working conditions, but its worldwide competitive advantage is being eroded by countries that offer lower production costs.

It is thus essential to increase the productivity of Québec aluminum plants in a context where modern new plants built in emerging economies offer significant economies of scale. Modernization of Québec's production capacity, which will allow an increase in productivity, becomes imperative in a context where new countries are emerging as competitors, with modern plants that offer high economies of scale.

Québec must also benefit from the expertise that has been developed in terms of work force, subcontractors, original equipment manufacturers and research groups<sup>14</sup>.

### 4.3.4. Conclusion

The aluminum industry is a major natural resources sector in Québec. It has allowed the development of a Québec sector that includes, in addition to producers of alumina and aluminum, thousands of SMEs active in processing and suppliers that support the day-to-day activities of the aluminum plants.

The Montréal metropolitan area, benefits, in particular, from the presence of Rio Tinto Alcan's head office (with 700 jobs) and of Alcoa Canada's regional administrative office. Several hundred suppliers and subcontractors are also established in the area, and benefit from the hundreds of millions of dollars that the three large producers spent every year on goods and services.

The Québec industry has confirmed its high level of competitiveness through the announcements of its three large producers, which will be investing more than \$7 billion in the next few years.

## 4.4.

### FOREST INDUSTRY SECTOR: A HERITAGE, AND A FUTURE

#### 4.4.1. Portrait of the industry

With nearly 140 sawmills, some forty pulp, paper and cardboard mills and approximately 90 plants producing panels, veneer and plywood, the forest industry is central to the development of Québec's regions. The processing of wood and of pulp and paper is indeed the main economic activity for over 250 of Québec's 1,500 or so municipalities, and over 100 of them are entirely dependent on this activity.

**Table 14:**  
Number of mills in Québec, by type of forest industry activity (2010)

Type of activity	Number of mills
Sawing	135
Pulp and paper	38
Panels, veneer and plywood	87

Source: CIFO, Statistiques – Sciege de résineux et de feuillus, pâtes, papiers, cartons et panneaux, 2010.

Québec's production of various forest products is an important part of Canadian production as a whole. Québec is Canada's second largest producer of softwood lumber after British Columbia, and since 2006 has accounted for approximately 20% of Canadian production. In 2010, Québec produced 4.7 billion bd ft (board feet), total Canadian production in that year being 22.2 billion bd ft.

In the area of hardwood lumber production, Québec's share of Canadian production has increased in recent years, from 57% in 2006 to 66% in 2010. Québec's production of hardwood lumber, much smaller than that of softwood lumber, was 267 million bd ft in 2010, total Canadian production being 405 million bd ft.

For both types of lumber, Québec and Canadian production has fallen off considerably in recent years. Between 2006 and 2010, Québec suffered a drop in production of 33% for both hardwood and softwood lumber combined.

As is the case for lumber, Québec's pulp, paper and cardboard production represents a considerable share of total Canadian production. Over the last ten years, Québec accounted for 32 to 34% of Canadian production, attaining 7 million metric tons in 2010. Like lumber production, pulp, paper and cardboard production has gone down in recent years, both in Québec and in Canada as a whole. In the case of Québec, this decline was on the order of 26% between 2007 and 2010.

**Québec's share of Canadian newsprint production increased from 42% in 2000 to 57% in 2010.**

14

E&B Data, *Portrait économique de l'industrie de l'aluminium primaire au Québec*, December 2011; ASSOCIATION DE L'ALUMINIUM DU CANADA, *Développement durable et impact économique*, on the website *Dialogue sur l'aluminium*, 2011.

As far as newsprint is concerned, Québec has the largest share of total Canadian production, and this proportion has been increasing since 2000. Québec's share of Canadian newsprint production increased from 42% in 2000 to 57% in 2010. Québec produces more than three times as much newsprint as Ontario, which is Canada's second largest producer. On the other hand, Québec's production fell to 2.6 million metric tons in 2010, a decline of 14% compared to the 3.1 million metric tons produced in 2007.

Canada is the world's largest producer of newsprint, with 14% of global production in 2010. As Table 15 shows, Québec's share of world newsprint production in 2010 was 8%, and Québec exported 2.2 million metric tons, a little over half of total Canadian exports of this product.

#### **Suppliers**

Despite some difficulties, Québec's forest sector is a mature industry in which many suppliers are well established and efficient. More particularly, secondary wood processing (manufacture of furniture, moulds, cabinets, etc.) is well developed, but must cope with heavy competition from other countries and a strong Canadian dollar, which does not favour exports.

Upstream, a number of large worldwide equipment suppliers are active on the Québec market, such as Finland's METSO and the US company Prater-Sterling. Among the large suppliers whose head office is located in Montréal's metropolitan area, let us mention GLV, which markets technological solutions for pulp and paper production and has recently enjoyed strong growth.

**Table 15:**

**Principal worldwide newsprint producers in 2010** (millions of metric tons)

#### **4.4.2. Economic impact**

Source: CIFQ, Statistiques – Sciege de résineux et de feuillus, pâtes, papiers, cartons et panneaux, 2010.

	Production	%	Imports	Exports
<b>Canada</b>	<b>4,639</b>	<b>14</b>	<b>74</b>	<b>4,441</b>
<b>Québec</b>	<b>2,632</b>	<b>8</b>	<b>–</b>	<b>2,248</b>
United States	3,111	9	2,312	775
Japan	3,455	10	138	114
Sweden	2,258	7	74	1,713
Germany	2,561	8	1,068	869
China	4,369	13	538	211
Russia	2,000	6	2	1,442
South Korea	1,556	5	2	661
Finland	227	1	74	180
United Kingdom	1,195	4	806	297
<b>Subtotal</b>	<b>25,371</b>	<b>76</b>	<b>5,088</b>	<b>10,703</b>
Other countries	8,220	24		
<b>World total</b>	<b>33,591</b>	<b>100</b>		

#### **Jobs and wages**

In 2010, the Québec forest products industry generated over 64,000 direct jobs in hundreds of the province's municipalities, nearly half of which were in the wood products sector. This was, however, a decline of 25% in the number of jobs compared to 2006, and of one third since 2000. In recent years, all three sectors of the forest industry, namely wood products, paper and related products, have suffered significant job losses.

Since 2005, permanent plant closings or reduction of positions have affected over 15,000 jobs in the wood products, pulp, paper and wood furniture sectors. In addition, 6,250 jobs have been affected by temporary plant closings or temporary personnel reductions over the same period.

Despite the crisis that has affected Québec's forest industry for the last several years, direct jobs associated with wood and paper processing still represent 13% of all manufacturing sector jobs in Québec. Moreover, with the coming market recovery in the United States, the sector should gain ground in the next few years. Indeed, three major investment projects have been announced:

- Tembec has announced the first phase of a \$310 million investment to strengthen its position in the specialty cellulose sector.
- The recent revival of the Thuro mill is a fine example of industry conversion, with investments of over \$150 million and the creation of some 300 jobs.
- Fortress Paper's investment of \$232.7 million at Lebel-sur-Quévillon will revive the Domtar plant, with more than 300 direct jobs and 400 indirect jobs.

Looking at the overall picture, we see that total payroll resulting from employment in the Québec forest industry reached \$2.5 billion in 2009, which was 13% of the payroll for the entire Québec manufacturing sector. Over 85% of the industry's total payroll in 2009 was almost equally divided between the wood products manufacturing sector and the pulp and paper products manufacturing sector.

However, between 2005 and 2009, the payroll for the industry as a whole dropped by 30%. This decline was associated with the difficulties encountered by Québec's forest industry in recent years, and with the many challenges the industry must deal with.

#### **Operating expenses and investments**

For all three subsectors considered, namely forestry and forest operations, wood products manufacturing and papermaking, average annual investments rose to over \$1.44 billion from 2005 to 2009, in spite of the very difficult circumstances faced by the sector.

If we consider only the average expenditures on fixed assets between 2006 and 2010 and assume that this level of investment will be maintained for the next 25 years, we can predict that almost \$14.7 billion will be invested in Québec's forest industry, generating major economic spinoffs.

#### **Spinoffs for Québec**

The forest industry makes a large contribution to Québec's economy, with sales of over \$17 billion. In 2007, the forest operations sector had sales of \$3 billion, and in 2010, sales in the wood products manufacturing and papermaking sectors were \$5.6 billion and nearly \$9 billion respectively. Primary processing activities of the forest industry account for an estimated 2.7% of Québec's GDP.

[...] average annual investments rose to over \$1.44 billion from 2005 to 2009, in spite of the very difficult circumstances faced by the sector.

Québec exporters of forest products rang up a total of \$7.5 billion in sales in 2010. This was 13% of the total exports (\$57.8 billion) that Québec generated that year. While Québec's overall exports declined from \$70 billion in 2006 to close to \$58 billion in 2010 (a drop of 16.5%), exports of forest products fell by 32% in the same period, having been \$11.1 billion in 2006. Moreover, Québec forest products' share of the province's total exports shrunk from nearly 14% in 2006 to less than 11% in 2010.

Since a large part of forest products exports is destined for the American market, a strong Canadian dollar and the economic crisis in the United States also contributed to reducing the exports of forest products from Québec and from the rest of Canada.

#### Fiscal and parafiscal spinoffs

In 2010, workers in the forest industry sector paid over \$608 million in taxes on their wages to the Québec Government, and some \$491 million to the federal government. Workers in the forest industry sector thus paid \$1.1 billion in taxes.

Nearly half these taxes, both federally and provincially, were paid by workers in the pulp and paper manufacturing subsector, primarily because of their higher average wages.

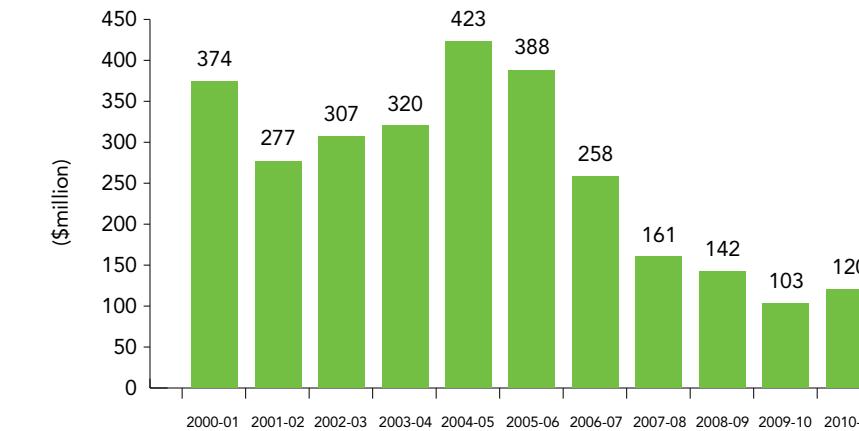
In 2010-2011, the forest industry paid \$120 million in royalties to the Québec Government for harvesting trees on state-owned land. This figure was up 17% over the previous year. These royalties are calculated from the market value of the board feet sold on the private forest market.

Figure 4 shows the changes in royalty payments over the last few years. Large harvests of over 33 million cubic metres and a high average royalty rate (\$12.60) drove royalties to a peak of \$423 million in 2004-2005.

The following years saw a gradual decrease in the quantities of wood harvested by the forestry industry on public lands, and a decline in the average royalty rate as wood prices dropped on the markets from 2005-2006 on. As a result, the industry paid less money in royalties. Since 2000, forest royalties paid by the industry have averaged \$261 million per year.

**Figure 4:**  
Changes in gross royalties paid by the forest industry

Source: MRNF



#### Role and participation of the Government

As of April 2013, the Forest Act will be replaced by the Sustainable Forest Development Act, which was passed in April 2010. The new legislation makes significant changes to the forest management mode currently in force. Under the new Act, the Ministère des Ressources naturelles et de la Faune, as the entity responsible for the sustainable development and management of public forests, will be responsible for forest planning, for the monitoring and control of forest interventions, and for timber scaling. By the same token, this Department will continue to be responsible for granting forest rights. On the other hand, the Government will be authorized to auction off a portion of the wood in state-owned forests, and will also be empowered to delegate the management of certain territories or resources to a municipality, an Aboriginal community, an organization or a corporate body, for example, by delimiting adjacent forests. Ressource Québec, a subsidiary of Investissement Québec that was created under the 2012-2013 Budget, has total assets of \$236 million and a billion-dollar budget envelope for investing in new projects until 2017.

Since 2000, forest royalties paid by the industry have averaged \$261 million per year.

### Spinoffs for the metropolitan area

Thanks to a large network of industrial suppliers located to a large extent in the Montréal metropolitan area, the investments planned for the coming years in the forest sector will have a significant economic impact in the area.

For example, of the \$14.7 billion to be invested in the fixed assets of plants in the forest sector, both within the territory covered by the Plan Nord and in the rest of Québec, about \$2.8 billion, or 19%, will be spent in the Montréal metropolitan area, including:

- \$1.9 billion on construction
- \$401 millions on general administration
- \$373 million on professional services
- \$114 million on equipment and machinery.

Furthermore, the Montréal metropolitan area will receive nearly \$2.3 billion in potential economic spinoffs associated with the operating expenses of these investment projects. This represents 19% of total operating expenses.

The Montréal metropolitan area will enjoy potential spinoffs from the investments and related operating expenses in the forest sector amounting to \$5 billion, and from the 1,966 jobs maintained or created over the next 25 years.

Although the direct exploitation of forest resources is rather limited in the Montréal metropolitan area, the forestry and forest operations sector employed some 1,700 workers in the area in 2010 but the manufacturing sector employed more people there. In the same year, the wood products industry employed 6,700 people, and the papermaking sector employed 8,800. There were thus a total of 17,200 jobs supported by the forest industry in the Montréal metropolitan area in 2010.

Moreover, several large companies in the forest industry have their head office in the metropolitan area. Among the most important of these is Domtar, which has sales of nearly \$6 billion, and employs 8,500 people in Canada and the United States. Also worthy of mention is Resolute Forest Products, formerly AbitibiBowater, with sales of \$4.7 billion and over 10,000 employees. Other large employers in the Québec forest industry also have their head office in Montréal, including Tembec (total of 9,000 employees) and Kruger (total of 9,400 employees).

The table in Appendix F lists the principal Québec companies operating in the forest sector whose head office is located in the Montréal metropolitan area.

### 4.4.3. Industry issues

#### Competitiveness

Since 2006, the industry has had to grapple with problems caused by a rapid and significant rise of the Canadian dollar against the US dollar, and by reduced demand for forest products in Québec's principal market, the United States. Subsequently, Canadian and Québec exporting companies were generally hard hit by the financial crisis and recession, which had an even stronger impact on forest industry firms since quite apart from the prevailing conditions of the time, some forest products were undergoing significant structural changes.

At the present time, it is difficult for the industry to attract capital, when processing costs in other world markets are pursuing a long-term downward trend. Producers in the southern United States, in particular, are very competitive, and have access to abundant resources for which prices are very much lower than the prices in Québec.

Procurement is a major issue. The existing Québec model, which is based on Timber Supply and Forest Management Agreements (TSFMA), market regulation and the use of wood from both public and private lands, will be considerably modified over the next few years. These developments appear to be causing some concern within the industry.

With improvement in the economic situation in the United States, repositioning of the industry with regard to operating costs, and more insistence on differentiation and quality, we can believe that the situation of Québec's forest industry will improve in the coming years.

Newspaper production is currently dropping worldwide, and it is in Canada, and more particularly Québec, that the effects of this decline are being felt. If this reduction in production continues, there may be more mill closings in Québec, where newspaper mills have production costs that are \$200 per tonne higher than they are in China's mills and \$140 per tonne above the costs in the most efficient American mills.

On the other hand, worldwide demand for newspaper continues to grow at a rate between 1 and 2% per year despite a significant drop in North American demand. In theory, then, Québec mills should be able to increase their market share by meeting the overseas demand. However, few of the province's mills have an opportunity to increase their export market share because of their geographic positioning, their high production and transportation costs, and the strength of the Canadian dollar.

A diagram showing new opportunities for developing the Québec forest section is presented in Appendix G<sup>15</sup>.

[...] we can believe that the situation of Québec's forest industry will improve in the coming years.

#### Work force

The forest industry will suffer a significant labour shortage, and in a number of companies, up to 30% of employees will be retiring by 2020. Moreover, the industry is currently experiencing a low rate of enrolment in training programs associated with the forest sector. This is likely to make it even more difficult to give the necessary reboot to the industry.

Furthermore, the additional activities that would be generated by implementation of the Plan Nord might make labour shortages in the Québec forest sector even worse over the next few years, in particular because of competition from the mining sector.

#### Protection of the territory and the Plan Nord

A little over half of the continuous boreal forest that overlaps the territory of the Plan Nord is currently under forest management, and provides 53% of the wood supplies used by all the processing mills in the province. Thirty-two wood processing plants procure some 11.7 million cubic metres of roundwood per year from the territory covered by the Plan Nord. Nearly 15,000 jobs depend on the wood harvesting activities in this specific territory, including 5,600 jobs in forestry and 9,300 in primary processing plants, not to mention the many secondary and tertiary processing companies that benefit from these fibre resources.

The Québec Government wishes to innovate in the area of sustainable development by devoting 50% of the area of the Plan Nord territory to protecting the environment, maintaining biodiversity, developing the territory's natural heritage and pursuing various types of development that do not involve industrial activities. This 50% objective must be realized by 2035, but as a first stage, by 2020, the Québec Government is proposing to devote 20% of the territory to protected areas, including 12% within the continuous boreal forest.

The orientations that the Québec Government is proposing are therefore raising questions and concerns within the forest sector, both in the industry itself and in the communities that benefit directly from the socioeconomic spinoffs of forest industry activities.

#### 4.4.4. Conclusion

The Québec forest industry sector has been going through a difficult period since 2006. The problems that the industry has had to confront are due to a number of factors: decline in American demand, the rising value of the Canadian dollar, the economic crisis, and the high level of indebtedness of the companies in the sector.

With improvement in the economic situation in the United States, repositioning of the industry with regard to operating costs, and more insistence on differentiation and quality, we can believe that the situation of Québec's forest industry will improve in the coming years.

Despite certain difficulties, Québec's forest industry continues to be an important sector in the economy of the Montréal metropolitan area. It is indeed estimated that the Montréal metropolitan area will enjoy potential spinoffs from the investments and related operating expenses in the forest sector amounting to \$5 billion, and from the 1,966 jobs maintained or created over the next 25 years.

#### THE FOREST INDUSTRY SECTOR AT A GLANCE

##### Sales of:

- **\$3 billion in forestry industry operations (2007)**
- **\$5.6 billion in wood products manufacturing**
- **\$8.8 billion in papermaking**

**\$7.5 billion in exports of forest products (13% of total exports)**

**An average of \$1.4 million in annual investments in capital assets and repairs between 2005 and 2009**

##### 64,200 jobs:

- **11,300 jobs in the forestry sector**
- **28,300 jobs in wood products manufacturing**
- **24,600 jobs in papermaking**

**Payments of \$120 million in royalties in 2010-2011**

**\$608 million paid in taxes on workers' wages at the provincial level, and \$491 million at the federal level**

**ECONOMIC SPINOFFS  
FOR THE MONTRÉAL  
METROPOLITAN  
AREA, AND BUSINESS  
OPPORTUNITIES**

1 2 3  
4 5 6  
7 8

## SECTION 5

## ECONOMIC SPINOFFS FOR THE MONTRÉAL METROPOLITAN AREA, AND BUSINESS OPPORTUNITIES

### 5.1. Potential economic spinoffs in Québec and for the Montréal metropolitan area: \$51.8 billion for our future prosperity

In the next 25 years, potential economic spinoffs for the Montréal metropolitan area from investments and operating expenses for all natural resources related projects in Québec are predicted to be \$51.8 billion. This is about 15% of all investments and related operating expenses.

Some economic sectors will have a higher proportion of spinoffs for the Montréal metropolitan area. These include public infrastructures (34% of spinoffs), energy (26%), and especially hydroelectricity (30%).

Furthermore, the potential spinoffs for the Montréal metropolitan area in terms of natural resources related jobs are 358,381 full-year jobs over the next 25 years, which is the equivalent of 14,335 jobs maintained or created per year for 25 years.

Appendix H provides the more detailed data and methodology that were used to perform these calculations of potential spinoffs.

**Table 16: Summary of potential economic spinoffs of natural resources related projects in Québec for the Montréal metropolitan area over the next 25 years (\$million)<sup>16</sup>**

ECONOMIC SECTOR	All of Québec				
	Investments			Total operating expenses of the investment projects	Sum of investments and operating expenses for all of Québec
	Territory covered by the Plan Nord	Rest of Québec	TOTAL		
Mining	\$33,507	\$4,096	\$37,603	\$187,058	<b>\$224,661</b>
Energy	\$47,000	\$9,590	\$56,590	\$4,878	<b>\$61,468</b>
Hydroelectricity	\$45,207	\$2,390	\$47,597	\$561	\$48,159
Wind power	\$1,793	\$7,200	\$8,993	\$4,273	\$13,266
Other	\$0	\$0	\$0	\$44	\$44
Aluminum	\$3,200	\$4,400	\$7,600	\$23,008	<b>\$30,608</b>
Forest industry	\$1,786	\$12,888	\$14,675	\$11,716	<b>\$26,391</b>
Public infrastructures	\$1,752	-*	\$1,752	\$0	<b>\$1,752</b>
Total	<b>\$87,245</b>	<b>\$30,974</b>	<b>\$118,219</b>	<b>\$226,661</b>	<b>\$344,880</b>

\* Note: Investments for the rest of Québec are not taken into account in the public infrastructure sector.

### 5.2. Sensitivity analysis

If Québec succeeds in reducing its imports when making investment and operating expenditures for the natural resources related projects in the coming years, the Montréal metropolitan area could benefit more than it already has from these projects.

A 1% reduction in the rate of imports and procurement outside Québec for investments and operating expenses would increase the potential spinoffs for the Montréal CMA by 2.5%, and the number of jobs potentially maintained or created by 2.4%.

If the metropolitan area succeeded in increasing its production in relation to Québec as a whole, it would enjoy a greater increase in potential spinoffs from investments and the operation of projects associated with natural resources.

For example, a 1% increase in Montréal's production capacity, in comparison with Québec as a whole, would have a positive impact of 3.5% on the potential economic spinoffs from investments and operating expenses. It would also produce a 2.7% increase in the number of jobs potentially maintained or created.

**Table 16 – continued**

	Montréal metropolitan area						
	Potential economic spinoffs			Proportion of spinoffs, for the Montréal metropolitan area, of the sum of investments and operating expenses for all of Québec	Socioeconomic spinoffs (number of full-year jobs)		
	Investments	Operating expenses	TOTAL		Investments	Operating expenses	
	\$6,714	\$18,500	<b>\$25,214</b>	11%	\$52,270	\$102,517	<b>\$154,787</b>
	\$15,197	\$1,030	<b>\$16,226</b>	26%	\$116,194	\$9,335	<b>\$125,529</b>
	\$14,032	\$176	<b>\$14,208</b>	30%	\$105,300	\$1,526	<b>\$106,826</b>
	\$1,165	\$840	<b>\$2,005</b>	15%	\$10,894	\$7,690	<b>\$18,584</b>
		\$14	<b>\$14</b>	31%	\$0	\$119	<b>\$119</b>
	\$1,379	\$3,291	<b>\$4,671</b>	15%	\$11,139	\$13,851	<b>\$24,989</b>
	\$2,827	\$2,256	<b>\$5,083</b>	19%	\$24,144	\$25,016	<b>\$49,160</b>
	\$602	\$0	<b>\$602</b>	34%	\$3,916	\$0	<b>\$3,916</b>
	<b>\$26,719</b>	<b>\$25,077</b>	<b>\$51,796</b>	15%	<b>\$207,663</b>	<b>\$150,718</b>	<b>\$358,381</b>

This is, then, a unique opportunity that can be exploited by Québec firms, [...] that will be able to upgrade their offer of goods and services

### 5.3. Business opportunities: a chance to create wealth

The exploitation of natural resources in Québec offers many Québec companies business opportunities in various economic sectors. Implementation of the Plan Nord will have the effect of increasing the demand for goods and services associated with the various natural resources sectors. The Québec industrial sectors of mining, metal processing, energy, aluminum and the forest industry will be among the major beneficiaries of this initiative.

To identify the best opportunities for Québec firms producing goods and services associated with these industrial networks, we performed an in-depth analysis of trade flows in the province.

To assess the importance of supply in Québec, we created an indicator that established, for each category of goods and services, the relationship between the total production of Québec businesses and total demand in Québec.

The prospects offering the greatest potential for development are to be found in the specific sectors for which the supply produced by companies established in Québec only manage to meet a limited proportion of Québec's total demand for goods and services. Consequently, Québec businesses must look to fill the gaps that are presently observable.

#### Categories of goods and services where the Québec supply is limited

The main discrepancies between supply and demand in Québec primarily concern the following categories of goods and services:

- wrought metal products
- primary processed metal products
- chemicals
- electrical and electronic products
- transportation equipment and parts
- machinery.

Since the supply produced by the Québec companies that deal with these categories of goods and services is unable to meet the Québec demand, some portion of these items must be imported from outside the province. The additional demand for these goods and services that will be generated by the development of industrial projects under the Plan Nord is likely to increase the import shares of these items.

This is, then, a unique opportunity that can be exploited by Québec firms, and more particularly by those in the metropolitan area that will be able to upgrade their offer of goods and services to include the above-mentioned categories. This opportunity might also attract foreign companies looking to fill these supply gaps by means of local production, thus optimizing the spin-offs for Québec and the Montréal metropolitan area.

#### The categories of goods and services that will benefit the most from increased demand associated with the exploitation of natural resources.

There is, nonetheless, a strong presence of Québec companies in the following categories of goods and services:

- construction
- professional, scientific and technical services
- other services.

Businesses operating in these sectors, and first and foremost our consulting engineering firms, which are powerfully established in the metropolitan area, will benefit from the growing demand associated with the exploitation of natural resources in Québec.

#### Favourable prospects for Québec businesses

To identify more precisely the favourable prospects that Québec firms have for filling the gap between supply and demand for different categories of goods and services, we created an indicator of the intensity of the Québec supply, compared to the Canadian supply. This indicator allows us to see how significant Québec production is compared to Canadian production for the categories of goods and services, associated with the exploitation of natural resources, for which demand will increase in the coming years.

The complete list of categories of goods and services associated with the exploitation of natural resources, in terms of the intensity of their Québec production, is given in Appendix J.

#### Goods and services for which production is the most intense

The implementation of the Plan Nord will primarily benefit the Québec enterprises established in the sectors where demand will be strongly increasing. The categories of goods and services that have the greatest production intensity in Québec thus represent the prospects that will have the greatest impact on the economy of the province and of the Montréal metropolitan area.

The greatest production intensity for goods and services in Québec concerns the following:

- manufacturing of engines, turbines and power transmission equipment
- manufacturing of electrical equipment, appliances and components
- engineering work associated with electrical energy
- primary processing of metals
- engineering work associated with transportation
- forging and stamping.

**Businesses operating in these sectors, and first and foremost our consulting engineering firms, which are powerfully established in the metropolitan area, will benefit from the growing demand associated with the exploitation of natural resources in Québec.**

#### 5.4. An opportunity to give our manufacturing sector a boost: getting our plants back on track

In the early 2000s, the manufacturing sector began a period of decline, and the importance of its fabrication sector has declined rapidly over the last decade. While the contribution of the manufacturing sector to Québec's GDP was over 20% between 1997 and 2003, and even peaked at 23.6% in 2001, the economic weight of this sector had fallen to 16.3% in 2010, which is equivalent to a decrease of over 30% in ten years. If this downward trend were to continue, the relative weight of the manufacturing sector in the Québec economy could decline further to 13.5% in 2015, and be no more than 11.1% in 2025.

While in Québec, 26,000 establishments employed some 500,000 workers in 2004, by 2009 there were only 21,000 establishments, which employed a little over 400,000 people. This represents a loss of nearly one fifth of manufacturing jobs in barely five years.

Nonetheless, the fact that deliveries and their total added value in the fabrication sector experienced a decrease that was considerably less important than the decline in the number of establishments and manufacturing jobs in this period shows a recent improvement in the productivity of the companies in this sector.

**Table 17: Manufacturing sector in Québec**

	2004	2005	2006	2007	2008	2009	CAGR
Number of establishments	26,070	23,042	22,629	22,324	21,853	21,154	-4.1%
Direct jobs	500,675	482,821	466,581	451,125	429,643	401,401	-4.3%
Wages and other compensation (thousands of dollars)	21,323,005	20,950,925	21,041,020	20,745,466	20,325,113	19,052,615	-2.2%
Total deliveries (thousands of dollars)	147,470,739	152,348,158	157,670,122	155,681,738	158,795,449	138,042,934	-1.3%
Total added value (thousands of dollars)	133,621,862	138,029,620	145,606,527	144,339,158	147,106,003	125,921,844	-1.2%

CAGR: Compound annual growth rate

Source: Institut de la statistique du Québec.

The decline of the Québec manufacturing is attributable to the following factors and issues:

- Increasing competition from emerging economies, and in particular from China after it joined the World Trade Organization (WTO) in 2001.
- The strength of the Canadian dollar, especially after its significant appreciation against the US dollar between 2002 and 2007.
- Persistent economic problems in Québec's major export markets, the United States and Europe.
- A shortage of labour and replacement workers, which many industries in Québec had to confront, aggravated by the moribund impression conveyed by this sector as it experienced a slowdown.

The decline of the manufacturing sector was particularly intense in the Montréal metropolitan area. The Montréal urban agglomeration alone had lost 40% of its manufacturing work force since 2001. The most affected industries included the textiles and garments sector, which had lost 68% of its workers since 2001, primarily due to the massive opening of markets and the disappearance of the textile import quota system brought about by termination of the Multi-Fibre Arrangement of the World Trade Organization (WTO) on January 1, 2005. More recently, the household appliance sector (Electrolux and Mabe) has been particularly affected.

Implementation of the Plan Nord represents a good opportunity for our manufacturing sector. What now has to be done is to grasp the opportunities that will arise in the sectors where Québec production is lower.

#### Conclusion

In the next 25 years, Montréal metropolitan area could enjoy an estimated \$51.8 billion in potential economic spinoffs from investments and operating expenses incurred in connection with all the natural resources projects planned for Québec. This amount represents about 15% of total investments and their related operating expenses.

Moreover, the potential spinoffs for the Montréal metropolitan area in terms of jobs related to natural resources amount to 358,381 full-year jobs over the next 25 years, which is the equivalent of 14,335 jobs maintained or created per year for 25 years.

Several economic sectors of the Montréal metropolitan area could benefit greatly from the planned investments in natural resources in Québec, both in the territory covered by the Plan Nord and elsewhere in the province. Total potential economic spinoffs are mainly distributed among the following sectors: construction, financial services, professional services, electrical equipment, and equipment and machinery.

The Montréal metropolitan area's strategy for maximizing the economic spinoffs will have to focus on making the most of the potentials illustrated in the preceding model. The area will also have to work to increase spinoffs in the sectors where Montréal's economic retention is very weak.

#### Potential economic spinoffs for the Montréal metropolitan area over the next 25 years, at a glance

Potential economic spinoffs from investments	Potential spinoffs of \$26.7 billion. Nearly 57% of spinoffs come from the energy sector, 52.5% of them from hydroelectricity alone. More than 25% of spinoffs come from the mining sector. The largest categories of investment are construction, professional services (including engineering), and financial services.
Potential economic spinoffs from the operating expenses of projects	Potential spinoffs of \$25 billion. Approximately 74% of potential spinoffs come from the mining sector. Apart from the mine operating and electricity expenses, the largest categories of expenses are miscellaneous services, such as administrative services.
Spinoffs in terms of jobs maintained or created	A potential of 358,281 full-year jobs, or 14,335 jobs per year.

**Total potential economic spinoffs are mainly distributed among the following sectors: construction, financial services, professional services, electrical equipment, and equipment and machinery.**

## INTERNATIONAL COMPARISONS

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7 8

**SECTION 6**

## INTERNATIONAL COMPARISONS

This section presents the results of an international benchmarking exercise covering metropolitan areas that have a natural resources sector that is among the most dynamic in the world. These areas were selected to ensure a diversity of the natural resources being exploited (mines, petroleum, gas, renewable energies, primary aluminum production, and forests). The aim of this international benchmarking is to verify what the most important success factors are for the best metropolitan areas in the world in this field, and also to assess how the Montréal metropolitan area can be compared for each of the factors.

The benchmarking of six international metropolitan areas has enabled us to determine the fundamental conditions for developing a dynamic natural resources sector and for attracting investments associated with this sector within a metropolitan area. The methodology employed and the summary tables for each of the metropolitan areas studied may be consulted in Appendices K and L.

The metropolitan areas studied are:

- Denver, United States
- Oslo, Norway
- Helsinki, Finland
- Perth, Australia
- Brisbane, Australia
- Sydney, Australia.

### **Access to natural resources**

It is not essential that the natural resource be located close to the metropolitan area. It is, however, necessary that the resource exist in large quantities, and that it be accessible and exploitable at competitive costs within the same territory (e.g., province, state, or country).

For example, significant mining and energy resources are available in Colorado, and this has enabled Denver, the capital and principal metropolitan area of this American state, to benefit from exploiting these resources. The same is true of the considerable energy resources located in Western Australia, New South Wales and Queensland, which have furthered the economic development of Perth, Sydney and Brisbane, the respective metropolitan areas of these Australian states. Although the Montréal metropolitan area is not located close to Québec's abundant natural resources, the fact that the area is the principal economic pole of the province gives it the opportunity to further develop its industry associated with the exploitation of these resources.

### **Strategic positioning of the metropolitan area**

Another condition for development and for attracting investments is the competitive positioning of the metropolitan area in relation to other cities located nearby.

In the case of the Scandinavian metropolitan areas that were benchmarked, namely Oslo and Helsinki, they are by far the largest cities in their respective countries. Helsinki indeed has a larger population than the next six most

populous cities of Finland combined. As for Denver, it is the largest metropolitan area in its region of the American Midwest. Companies exploiting natural resources in these regions will thus tend to set up their head office or business office in these metropolitan areas, in order to benefit from the advantages they offer. For its part, the Montréal metropolitan area can rely on its industrial fabric, its services, and the many strategic advantages it offers for the location of head offices.

### **Access to a skilled labour pool**

One of the important advantages that companies in the natural resources sector seek, and that is offered by a metropolitan area like that of Montréal, is access to a pool of educated, skilled workers. The metropolitan areas that have a developed natural resources sector often have educational institutions offering various training programs associated with the exploitation of these resources.

For example, Denver is the home of the Colorado School of Mines, which offers one of the best mining engineering programs in the United States, and is the only university in the country to offer energy-related programs at all levels of university studies. In Helsinki, several universities have departments and faculties dedicated to the forestry field, and Perth, Sydney and Brisbane are all home to university institutions offering training programs specifically concerned with the fields of mines and energy. These institutions thus dispense training adapted to the manpower needs of the companies exploiting the natural resources of the territory where they are located.

Several programs of study relating to the exploitation of natural resources are offered in the universities of Montréal. For example, McGill University offers a mining engineering program, and the École Polytechnique de Montréal has a department of civil, geological and mining engineering. Along the same lines, in November 2011, the Université du Québec à Montréal (UQAM) announced, jointly with the Université du Québec en Abitibi-Témiscamingue (UQAT), the creation of a Chair of Mining Entrepreneurship.

### **Presence of research centres**

The majority of metropolitan areas considered in this benchmarking exercise are home to research institutes that specialize in fields associated with the principal natural resources exploited in their respective regions.

For example, the Finnish Forest Research Institute, Metla, is located in the Helsinki metropolitan area, and the National Renewable Energy Laboratory, which is the principal centre for research into renewable energies and energy efficiency in the United States, is based in Golden, in the Denver metropolitan area. In Australia, Brisbane is home to the Sustainable Minerals Institute of the University of Queensland, and the offices of the Australian Institute of Energy are located in the three Australian cities considered in the benchmarking exercise. These research institutes, which are often associated with educational institutions and funded by businesses in the natural resources sector, contribute to the research and development efforts that allow the industry to develop and to become more competitive.

Montréal universities—and a number of other university teaching institutions in Québec—have research chairs and are part of research institutes having a connection to the natural resources sector. For example, some twenty research chairs are dedicated to the mining industry, and several Québec

universities are grouped together in six research consortiums. Among them, let us mention the Consortium de recherche en exploration minière (CONSOREM), the Consortium de recherche minérale (COREM), and the Société de recherche et de développement minier (SOREDEM). In addition, REGAL, which brings together researchers from several Québec universities, is a research centre associated with the production, processing and use of aluminum and its derivatives.

Also, the École Polytechnique de Montréal, the École de technologie supérieure and McGill University are among the leading members of the Centre de recherche sur l'aluminium (REGAL), and Montréal's four universities are members of the Centre d'étude de la forêt (CEF).

#### **Formation of an industrial cluster**

The creation of an industrial cluster has made a positive contribution to the development of a dynamic natural resources industry in several metropolitan areas. Denver and Perth, in particular, have such clusters. An industrial cluster helps to stimulate industries related to this sector, such as those involved in the design and manufacture of machinery, equipment and specific components. It goes without saying that creation of a sectoral cluster requires the presence of a critical mass of businesses working within that sector.

Furthermore, the formation of an industrial cluster allows the development of many related professional and technical services to which the companies in the sector must have access in order to become established in a particular metropolitan area. For example, legal, consulting, engineering or specialized training services in the field of natural resources enable the industry to operate more effectively, and make the industrial cluster more dynamic. Our analysis of the metropolitan areas benchmarked in connection with this study has enabled us to see that most of them benefited from the existence of well-established industrial clusters in the mining, forest and energy sectors.

At the present time, the Montréal metropolitan area benefits from the presence of a certain pool of businesses operating in the natural resources sector, and from an ecosystem of professional services related to the industries. In addition, various structured industrial clusters are already in place or are under development at the provincial level, in particular in the mineral processing, aluminum and forest industry sectors.

#### **Additional success factors**

##### **Access to different modes of financing**

Another essential condition for the development of a significant natural resources sector in a metropolitan area is access to various modes of financing. Since the exploitation of natural resources usually requires large capital investments, easy access to capital markets, stock markets, and banking and financing institutions is necessary to foster the development of businesses operating in this sector.

#### **Existence of high-quality transportation infrastructures**

In addition, in order to allow mined or harvested resources to be efficiently transported, a dynamic natural resources industry requires high-quality transportation infrastructures. Apart from Denver, all the cities we benchmarked have access to port infrastructures, and of course have all the road and rail infrastructures that enabled their industry to develop.

#### **Adoption of incentive policies**

Our benchmarking study has shown that most of the metropolitan areas considered have adopted incentive policies to facilitate and encourage investments and the establishment of businesses in the natural resources fields in their respective territories. These range from tax incentives to create jobs in the mining and energy sectors in Denver to funds for stimulating mining, petroleum and gas exploration in Perth and Sydney.

#### **General strategies**

In spite of the many intrinsic advantages enjoyed by the Montréal metropolitan area, it might be worthwhile to examine the relevance and feasibility of certain measures inspired by our international benchmarking exercise, so that the Montréal metropolitan area can become a true pole of attraction for businesses and investments in the natural resources sector. For example, we need to be able to provide a stable, welcoming environment for the companies operating in this sector. In this regard, the "one stop shop" approach developed by Sydney, to facilitate the start-up of projects to exploit mining and energy resources, looks interesting.

In the next section of our study, we shall discuss in more detail the strategies for maximizing spinoffs from the exploitation of natural resources for the Montréal metropolitan area.

<b>International comparisons at a glance</b>	
<b>Six metropolitan areas studied</b>	
<b>Success factors identified</b>	
	Denver, United States
	Oslo, Norway
	Helsinki, Finland
	Perth, Australia
	Brisbane, Australia
	Sydney, Australia
	Access to significant quantities of exploitable resources
	Strategic positioning of the metropolitan area in relation to other cities located nearby
	Access to a sufficiently large pool of highly skilled labour
	Strong presence of university and industrial research centres
	Presence of structured industrial clusters in the natural resources sector
	Access to various sources of funding
	High-quality transportation infrastructures
	Establishment of various incentive policies, in particular in the fiscal area.

**AREAS FOR DISCUSSION  
AND CONCLUSIONS:  
MAXIMIZE THE SPINOFFS,  
MAXIMIZE OUR  
COLLECTIVE WEALTH**

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## AREAS FOR DISCUSSION AND CONCLUSIONS: MAXIMIZE THE SPINOFFS, MAXIMIZE OUR COLLECTIVE WEALTH

Given the magnitude of the projected investments in the natural resources sector over the next 25 years, which undoubtedly offers Québec and the Montréal metropolitan area a unique opportunity to benefit from the current ferment, it appears fundamental to deploy strategies to maximize the economic spinoffs from these projects. This section seeks to contribute to this collective discussion.

### Favourable opportunities related to the Plan Nord

The Plan Nord represents a unique opportunity for Québec to:

- Consolidate and attract new head offices and principal business offices of major corporations;
- Develop and strengthen the industrial fabric, particularly by supporting the manufacturing sector, which is currently in decline;
- Consolidate and strengthen the expertise of Québec companies in professional and technical services, such as consulting engineering, legal services, financing services, etc.

These projects obviously will have to be carried out in a spirit of sustainable development and in respect for and with the collaboration of the Aboriginal communities and regions involved.

### Maximize the economic spinoffs by the consolidation and development of new industries

In general, to ensure maximization of the economic spinoffs of the projects related to the Plan Nord, it will be important to ensure that the investments by the prime contractors in different sectors generate expenditures with companies upstream in their value chain. In addition, to consolidate or develop new industries, the presence of natural resources development projects will have to encourage the processing of these resources, in order to create value downstream in the value chain.

By way of example, the aluminum industry has succeeded in creating a world-class ecosystem around major prime contractors, by fostering the development of the service sectors, particularly in consulting engineering, as well as the development of equipment manufacturers and secondary processing.

### Draw inspiration from the aluminum industry's example to maximize the spinoffs

The strength of the aluminum industry is largely explained by the presence in Québec of giants in this sector, which have contributed to the development of first-rate equipment manufacturers in Québec and in the

metropolitan area. For example, several Québec engineering firms have developed world-renowned expertise in this sector, due to the presence of the aluminum smelters.

SNC-Lavalin is recognized around the world and exports its expertise in construction of aluminum smelters to almost every continent, expertise originally developed during the construction of Rio Tinto Alcan's Grande-Baie Works. The multinational consulting engineering firm Bechtel established its global Centre of Aluminum Excellence in Québec and recently moved its North American head office for mining and metallurgical activities from Denver to Montréal. Finally, Hatch, which has its principal office in Montréal, is currently collaborating with Rio Tinto Alcan on the construction of an aluminum smelter in Jonquière to demonstrate the new AP60 technology, one of the most advanced technologies in the field. Other examples include companies such as The Roche Group, BBA, Cegertec, etc.

### The major aluminum smelters have also established procurement policies favouring purchasing in Québec.

In addition, a great many companies involved in secondary aluminum processing, i.e. processing of primary aluminum into other higher value-added products, have developed in Québec and export their expertise around the world, to several end markets such as aerospace and transportation.

The economic activity related to aluminum production is therefore beneficial for Québec as a whole, whether by hiring and training of a skilled workforce, generating economic spinoffs or exporting knowhow developed here.

Thus, the example of the aluminum industry can be an indicator of the potential value creation from the presence of large-scale projects related to natural resources. In this sense, it is relevant to suggest that this economic development model of an industrial fabric on the margins of the leading natural resources development and processing activities be advocated by the decision-makers. It is realistic for an industry operating around the mining sector to develop in Québec, including suppliers to mining companies and mined ore processing companies.

### Bring together the suppliers and equipment manufacturers serving the prime contractors

To strengthen the industrial fabric around projects related to natural resources, it will be important to favour closer relationships and exchanges among all the companies composing the natural resources value chain.

The information is asymmetrical regarding the companies that could become suppliers and the prime contractors. In other words, the local companies do not have an adequate knowledge of the prime contractors' needs and, conversely, the prime contractors do not know that companies have potential to support their activities with innovative products and services.

These factors would facilitate the consolidation and establishment of major corporations in Québec, while maximizing the economic spinoffs.

This study, and all the activities related to the natural resources strategy of the Board of Trade of Metropolitan Montreal, precisely seek to bring these companies closer together.

#### **Attract companies to Québec to strengthen the industrial fabric**

Beyond the closer relationship between the prime contractors and the companies already present in Québec and in the metropolitan area, certain needs of the prime contractors for equipment and services cannot be fulfilled locally, given the lack of expertise in these sectors.

In this regard, the targeting strategies of foreign investment prospecting bodies, such as Investissement Québec and Montréal International, should integrate companies that can transfer their knowhow or manufacturing technologies to contribute to the establishment of new businesses, capable of compensating for the deficiencies described and thus maximizing the economic spinoffs from development of natural resources at the local level.

#### **Ensure the development of all natural resources-related sectors**

Considering the strong employment needs in several sectors, it is important to ensure that growth in the mining and energy sectors is not detrimental to the other economic sectors, particularly the forest industry, where future investments will be strongly correlated to the economic recovery in the United States and the availability of wood.

Any subtraction of forest harvesting territory that would result from the preservation of continuous boreal forest territories south of the northern timber allocation limit would risk causing the loss of many jobs and would have major socioeconomic impacts.

It thus will be necessary to ensure, in particular, that Northern development is not detrimental to the forest industry, which remains extremely important for Québec and the Montréal metropolitan area.

#### **A four-axis strategy to maximize the economic spinoffs**

To maximize the economic spinoffs in the Montréal metropolitan area from natural resources development, we believe that the players concerned will have to implement a concrete strategy articulated around four axes.

##### **1. Establish a business environment conducive to natural resources development**

Most of the projected investments for the natural resources sector will be spread over amortization periods of 10 to 25 years, and even up to 50 years in the case of aluminum smelters. Most of these projects also present high risk levels and necessitate major capital investments.

To reduce the uncertainty related to the activities of the mining companies, in particular, it is necessary to stabilize their legislative and fiscal framework for

several years to come. This also involves minimizing the uncertainty related to mining royalties and regulation. We should note that the level of royalties in Québec is currently 28% higher than in the rest of Canada, and that the industry is concerned about the measures stipulated in Bill 14.

The long-term stability of royalties at a fixed rate could reassure investors about the possibility of carrying out projects in Québec. This stability would allow Québec to retain its position as a place for the world's most interesting mining investments.

It could prove useful to consider long-term agreements with mining companies in order to stabilize the profitability of projects and ensure local economic spinoffs.

It is therefore important to show the intention of Quebecers to develop their sources in the long term. The key factors, such as access or the price of resources, must remain relatively predictable, so that they can be integrated into the budget models of developers of major projects. Factors such as resource royalties, the price of electricity and taxation must compare favourably so that Québec can remain competitive for major investors, both for attraction of new investments and for retention and improvement of projects in development.

##### **2. Offer and strengthen training that will allow the development of skilled human resources in sufficient numbers**

Access to human resources will remain a crucial factor in the development of the announced projects and the economic dynamics it will generate. Training programs will have to be established and more people will have to be trained in various sectors, both in initial training and in continuing education, to meet the many labour needs that will arise from the development of natural resources and the implementation of the Plan Nord.

Alignment of the training programs with the companies' needs thus will be essential to supply a workforce corresponding to the demand in the years ahead, which includes the necessary workers downstream and upstream in the value chain (machinists, welders, mechanics), and to allow the development of a flourishing processing industry in Québec.

##### **3. Maximize the linkages in the value chain, both upstream and downstream**

To maximize the economic spinoffs of the projects related to the Plan Nord, it will be important to ensure that the investments of the prime contractors from the different sectors generate expenditures for companies upstream in their value chain. In addition, to consolidate and develop new industries, the natural resources development projects will have to encourage processing of these resources to create value further downstream in the value chain.

For this purpose, better sensitization of metropolitan manufacturers will allow adaptation of production tools to the equipment and infrastructure needs of major projects, and thus greater retention of capital expenditures. These linkages should be multiplied by the critical mass of Montréal universities and research centres. The metropolitan area's knowledge industry should be inte-

grated into every development phase to favour sustainable development and allow better valorization of Québec resources.

## SECTION 8

#### **4. Valorize our resources by ensuring that they stand out in the market**

The natural resources market is traditionally a commodity market. However, it is possible to find niches and valorize differentiated products. For example, the initiative to obtain official recognition of Québec electricity as renewable energy makes it possible to promote Québec aluminum as a material produced from green energy, and thus differentiate Québec aluminum on the international markets. Similar initiatives can differentiate Québec mineral and forest production.

This spinoff maximization strategy will have to be deployed over a horizon of several years, of course, and will necessitate diligent follow-up by the different parties involved. The Board of Trade of Metropolitan Montreal will pay attention to these questions and will address the different players, when required, to ensure that this strategy receives all the attention it requires.

##### **Maximize the spinoffs**

Consolidate and create new companies upstream and downstream in the value chain of the major economic sectors. Draw inspiration from the aluminum industry in this matter.

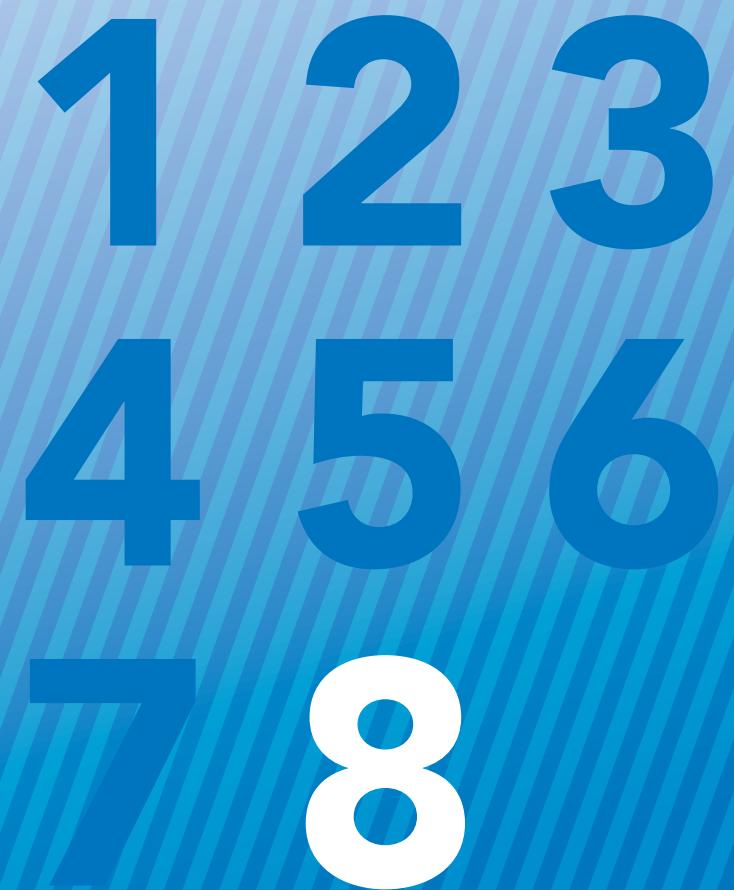
Bring together the prime contractors, the suppliers and the equipment manufacturers. The Board of Trade of Metropolitan Montreal's Natural Resources Sector Enhancement Initiative is a good example of a measure favouring this closer relationship.

Attract companies to strengthen our industrial fabric. To meet the demand of the major prime contractors in natural resources development, the attraction strategy of Investissement Québec and Montréal International, in particular, should integrate industries that are observed to be lacking in Québec.

Ensure harmonious development of all the natural resources sectors, particularly by implementing strategies allowing them to benefit from a sufficient workforce.

<b>Implement a four-axis strategy:</b>	<ul style="list-style-type: none"> <li>Take advantage of a business environment conducive to development of natural resources;</li> <li>Create or strengthen the training programs that will make it possible to benefit from a sufficient skilled workforce;</li> <li>Maximize the linkages upstream and downstream in the value chain;</li> <li>Valorize our resources by ensuring differentiation from other markets.</li> </ul>
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## **APPENDICES**



## Appendix A

### List of the main study sectors

The economic importance of the natural resources and energy sector in the Québec economy was evaluated by analyzing statistical data from Statistics Canada and the Institut de la statistique du Québec.

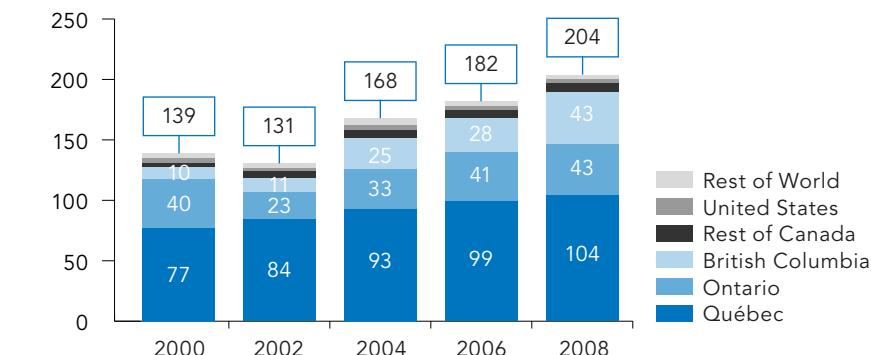
The economic sectors of the North American Industry Classification System (NAICS) were used to establish the economic portrait of the following industries: Mining and Mineral Product Manufacturing, Logging and Wood and Pulp and Paper Industries, and Electric Power Generation, Transmission and Distribution.

### List of industries considered according to the NAICS Code

Source: STATISTICS CANADA, North American Industry Classification System (NAICS), 2002.

Industries	NAICS Code	Economic Sectors
Mining and Mineral Product Manufacturing	212	Mining and Quarrying (except Oil and Gas)
	327	Non-Metallic Mineral Product Manufacturing
	331	Primary Metal Manufacturing
	3313	Alumina and Aluminum Production and Processing
	332	Fabricated Metal Product Manufacturing
Logging and Wood and Pulp and Paper Industries	113	Forestry and Logging
	321	Wood Product Manufacturing
	322	Paper Manufacturing
	323	Printing and Related Support Activities
	337	Furniture and Related Product Manufacturing
Electric Power Generation, Transmission and Distribution	2211	Electric Power Generation, Transmission and Distribution
	2212	Natural Gas Distribution
Professional, Scientific and Technical Services	541	Professional, Scientific and Technical Services
	5411	Legal Services
	5413	Architectural, Engineering and Related Services
	5416	Management, Scientific and Technical Consulting Services
Construction	237	Heavy and Civil Engineering Construction
	2371	Utility System Construction
	2379	Other Heavy and Civil Engineering Construction
Equipment manufacturers	4162	Metal Service Centres
	41721	Construction and Forestry Machinery, Equipment and Supplies Wholesaler-Distributors
	41722	Mining and Oil and Gas Well Machinery, Equipment and Supplies Wholesaler-Distributors

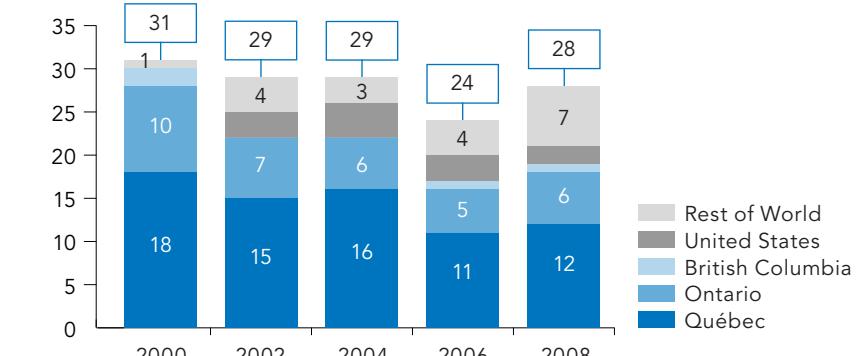
### Origin of Enterprises active in Québec in exploration and development of mining projects, 2000 to 2008



Source: Institut de la statistique du Québec, 2012.

## Appendix B

### Origin of enterprises active in Québec in mining and which made investments during the year, 2000 to 2008



Source: Institut de la statistique du Québec, 2012.

## Appendix C

### Main investment projects of mining and mineral product manufacturing companies in Québec, January 2012

Project	Company	Origin (Head office)	Offices in Québec	Investment forecast (in millions of dollars)	Plan Nord Territory
Lac Otelnuk – Iron	Adriana Resources / Wuhan Iron & Steel	Ontario / China	-	12,900	Yes
Taconite – Iron	New Millennium / Tata Steel	Alberta / India	Montréal	4,400	Yes
Hopes Advance – Iron	Oceanic Iron Ore Corp.	British Columbia	Montréal	3,700	Yes
Mont-Wright and Port-Cartier – Iron	ArcelorMittal Mines Canada	Multinational	Montréal	2,100	Yes
Fire Lake North – Iron	Champion Minerals	Ontario	-	1,370	Yes
Éléonore – Gold	Goldcorp	British Columbia	Rouyn-Noranda	1,400	Yes
Dumont – Nickel, Copper	Royal Nickel Corporation	Ontario	Amos	1,100	No
Westwood – Gold	IAMGOLD	Ontario	Longueuil	518	No
Renard – Diamonds	Stornoway Diamonds	British Columbia	Québec	850	Yes
Nunavik Nickel – Nickel, Copper	Jilin Jien Canada Mining / Canadian Royalties	British Columbia / Québec	Montréal, Val-d'Or	800	Yes

Source: Minalliance.

### Breakdown of the capital costs of the Canadian Malartic gold mine project

Category	Capital costs (millions of dollars)	Proportion of costs (%)
<b>GENERAL ADMINISTRATION</b>		
General management	4.2	0.5%
General services	4.1	0.5%
Preproduction mill	2.3	0.3%
Insurance	1.4	0.2%
Mobile equipment	2.5	0.3%
<b>Subtotal:</b>	<b>14.5</b>	<b>1.8%</b>
<b>COMMUNITY RESETTLEMENT</b>		
Golf courses	1.4	0.2%
Municipal infrastructures	13.7	1.7%
Elementary schools	12.9	1.6%
Adult education facilities	5.1	0.6%
Cultural and recreation centres	5.9	0.7%
Long-term care hospitals	14.9	1.9%
Daycare	4	0.5%
Low-rent housing	3.1	0.4%
Social housing	2.1	0.3%
Home relocation	20.8	2.6%
South district rehabilitation	3	0.4%
<b>Subtotal:</b>	<b>87</b>	<b>11%</b>
<b>MINING</b>		
Mine preproduction	36.6	4.6%
Major equipment	85.7	10.9%
Support equipment	14.4	1.8%
<b>Subtotal:</b>	<b>136.7</b>	<b>17.3%</b>
<b>ORE PROCESSING</b>		
Crushing	21.9	2.8%
Conveying	8.9	1.1%
Ore handling	14.3	1.8%
Construction of processing facilities	54.8	6.9%
Grinding	130.7	16.6%
Leach thickening	9.6	1.2%
Oxygen plant	0.5	0.1%
Leaching	31.7	4%
Gold recovery	29.1	3.7%
Detoxification circuit	5.3	0.7%
Reagent handling and distribution	3.4	0.4%
Tailings pumping	15.1	1.9%
Mill services	7.5	1%
Mill shops	0.8	0.1%
Mill office	1.3	0.2%
Mill laboratory	2.4	0.3%
Mill mobile equipment	1.9	0.2%
Main electrical room	8.6	1.1%
<b>Subtotal:</b>	<b>348</b>	<b>44.1%</b>

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## Appendix D

## Breakdown of the capital costs of the Canadian Malartic gold mine project (continued)

POWER SUPPLY AND COMMUNICATIONS		
120 kV transmission line	0	0.0%
Main substation	11.3	1.4%
Electric site load dispatching	1.7	0.2%
Secondary substation	4.1	0.5%
Emergency generator	0.8	0.1%
Telecommunications and IT systems	1.6	0.2%
<b>Subtotal:</b>	<b>19.5</b>	<b>2.5%</b>

INFRASTRUCTURE		
Site preparation	4.1	0.5%
Public road	1.9	0.2%
Green fence	3.7	0.5%
Highways	1.4	0.2%
Main entrance control	0.4	0.1%
Mine administration services	16.2	2.1%
Fuel warehousing facilities	1.9	0.2%
Weather and surveillance station	0.3	0%
<b>Subtotal:</b>	<b>29.7</b>	<b>3.8%</b>

TAILINGS TREATMENT AND WATER MANAGEMENT		
Tailings basins	0.6	0.1%
Tailings pipeline	0.7	0.1%
Effluent treatment plant	1.4	0.2%
Polishing basin	3.8	0.5%
Treatment system	2.5	0.3%
Freshwater pipeline	2.2	0.3%
Fire protection system	3	0.4%
Drinking water	0.4	0.1%
Wastewater evacuation	0.5	0.1%
Emergency spill pond	0.3	0%
<b>Subtotal:</b>	<b>15.3</b>	<b>1.9%</b>

INDIRECTS		
Construction of temporary facilities	8.6	1.1%
Construction equipment	1.6	0.2%
Construction equipment maintenance	1.2	0.2%
Feasibility engineering	7	0.9%
Obtaining permits	0.5	0.1%
Detailed engineering	12.8	1.6%
Construction management	20.5	2.6%
Marine freight	10.7	1.4%
Training	0.5	0.1%
Sales force representation	0.3	0%
Initial filling	5.6	0.7%
Capital spares	3.4	0.4%
<b>Subtotal:</b>	<b>72.7</b>	<b>9.2%</b>
<b>TOTAL:</b>	<b>723.3</b>	<b>91.7%</b>
<b>CONTINGENCY:</b>	<b>65.6</b>	<b>8.3%</b>
<b>GRAND TOTAL:</b>	<b>788.9</b>	<b>100%</b>

Source: OSIKO, Feasibility Study: Canadian Malartic Project (Malartic, Québec), 2008.

## Breakdown of operating costs of the Canadian Malartic gold mine project

Category	Average annual cost (millions of dollars per year)	Proportion of costs (%)
<b>MINING</b>		
Electricity	1.6	0.9%
Explosives	15.4	8.2%
Fuel	14.3	7.6%
Lubricants	2.1	1.1%
Parts and equipment	12.4	6.5%
Tires	9.2	4.9%
Labour	18.9	10%
Training	0.3	0.2%
Services	0.6	0.3%
<b>Subtotal:</b>	<b>74.9</b>	<b>39.6%</b>
<b>ORE PROCESSING</b>		
Labour	7	3.7%
Liner	8.8	4.7%
Grinding media	30.7	16.2%
Mill reagents	13.8	7.3%
Detoxification reagents	6.4	3.4%
Maintenance	8	4.2%
Energy	24.8	13.1%
<b>Subtotal:</b>	<b>99.6</b>	<b>52.6%</b>
<b>TRANSPORTATION AND REFINING</b>		
<b>Subtotal:</b>	<b>1.7</b>	<b>0.9%</b>
<b>GENERAL SERVICES AND ADMINISTRATION</b>		
Labour	5.9	3.1%
Management	0.6	0.3%
Municipal taxes	0.7	0.4%
Insurance	1.4	0.7%
Telecommunications and IT systems	0.9	0.5%
Environmental services	1.7	0.9%
Community relations	0.2	0.1%
Purchasing	0.1	0.1%
Warehousing	0.1	0.1%
Surface support	0.8	0.4%
Public communications	0.2	0.1%
Human resources	0.2	0.1%
Health and safety	0.2	0.1%
<b>Subtotal:</b>	<b>13</b>	<b>6.9%</b>
<b>GRAND TOTAL:</b>	<b>189.2</b>	<b>100%</b>

Source: OSIKO, Feasibility Study: Canadian Malartic Project (Malartic, Québec), 2008.

## Appendix E

### Breakdown of the value of acquisitions of goods and services in the Montréal metropolitan area, by type

Type of goods and services	Value (in millions of dollars) by administrative region					
	Montréal (06)	Laval (13)	Montérégie (16)	Laurentides (15)	Lanaudière (14)	Total
<b>Non-strategic goods and leasing (a)</b>	246.4	27.5	48.5	8.1	27.7	<b>358.1</b>
<b>Strategic goods (b)</b>	263.9	10	213.3	12.1	4.1	<b>503.4</b>
<b>Professional services (c)</b>	267.8	36.1	29.4	1.8	1.6	<b>336.7</b>
<b>Specialty services (d)</b>	77.9	4.6	28.2	4.2	21.1	<b>136</b>
<b>Labour (e)</b>	65.2	150	64.5	38.7	8.7	<b>327</b>
<b>Total</b>	<b>921.1</b>	<b>228.2</b>	<b>383.8</b>	<b>64.9</b>	<b>63.2</b>	<b>1,661.2</b>

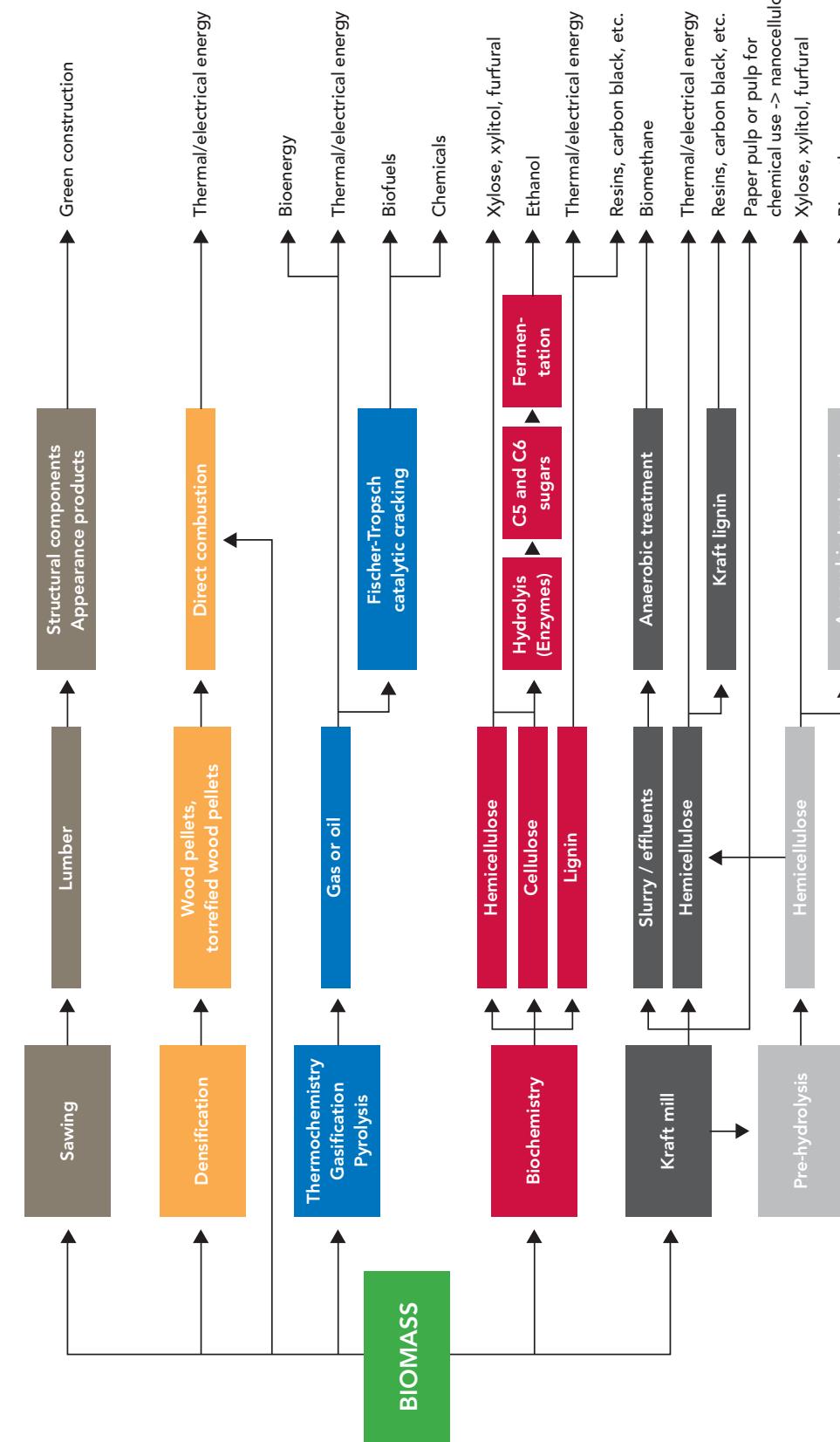
Source: HYDRO-QUÉBEC, *Profil régional des activités d'Hydro-Québec*, 2010.

- (a) Non-strategic goods: all goods and material purchased by Hydro-Québec that are not directly related to its basic mission (power generation, transmission and distribution), for example, office supplies, general hardware, and parts for vehicles.
- (b) Strategic goods: all goods and materials purchased by Hydro-Québec that are directly related to its basic mission (power generation, transmission and distribution) and that require a high level of reliability or specialization in the energy field, for example, a turbine generator set, a power transformer and a submersible cable.
- (c) Professional services: category of services including intellectual work performed by specialists with university or technical training, for example, preparing reports, providing advice, writing specifications, and producing studies, designs or other creative work.
- (d) Specialty services: category of services provided by labour not governed by construction industry collective agreements, for example, building maintenance, aircraft chartering, specialized transportation, pruning, etc.
- (e) Labour: category of services including work performed by labour governed by construction industry collective agreements, for example, construction or renovation of buildings, power stations and substations, etc.

### Main forest sector enterprises having their head office in the Montréal metropolitan area

Name of enterprise	Main activities	Head office location	Turnover (in millions of dollars)	Total number of employees
<b>Domtar</b>	Pulp and paper	Montréal	5,850	8,500
<b>Resolute Forest Products</b>	Forest operations Wood products Pulp and paper Recycling Energy	Montréal	4,746	10,500
<b>Kruger</b>	Forest products Pulp, paper and cardboard Packaging Energy Recycling Wines and spirits	Montréal	2,103.8	9,000
<b>Tembec</b>	Lumber Pulp, paper and cardboard Specialty cellulose Newsprint Chemicals	Montréal	1,566.8	9,400
<b>Stella-Jones</b>	Industrial wood products (railway ties, wood beams and poles)	Saint-Laurent	544.5	940
<b>Goodfellow</b>	Lumber Wood materials Floors Cladding Panels	Delson	471.7	880
<b>Arbec Forest Products</b>	Lumber OSB panels	Saint-Léonard	287.5	490
<b>Fibrek</b>	Kraft pulp	Montréal	198.9	325
<b>Sefina Industries</b>	Architectural woodwork	Montréal	26	100

## Appendix F



## Appendix H

### Methodology of the analytical model for potential spinoffs for the Montréal metropolitan area

#### Stage 1:

Determine the investments forecast under the Plan Nord and for the rest of Québec, by investment category.

The mining investment data comes from the most up-to-date information available, provided by Minalliance, the Québec Mining Association and the MRNF. The investments already realized have been removed from the list, and only future investments have been retained.

The data concerning energy, i.e. hydroelectricity, wind energy and other energy projects, comes from Hydro-Québec's 2009-2013 Strategic Plan.

For public infrastructures, data from the first 2011-2016 Action Plan under the Québec Government's Plan Nord were used to determine total investments and investment sectors. The investments in local services were removed, given the absence of potential direct economic spinoffs for the Montréal metropolitan area.

For investments in primary aluminum production, the data come from the official announcements of the producing companies, namely Aluminerie Alouette, Alcoa Canada and Rio Tinto Alcan.

To estimate additional investments in the forest sector, the CIFQ capital expenditure data base was used. Only new capital expenditures were considered, such as new investments in natural resources. Other investments in repairs or maintenance are not considered because they are not new investments, but rather reinvestments. The average for the past five years was used to project investments over the next few years.

#### Stage 2:

Analyze the expenditures on typical investment projects in the natural resources and energy sector.

The breakdown of expenditures for typical hydroelectric dam construction projects is based on the La Romaine Complex and on the Eastmain-1-A and Rupert Diversion project. In addition, three typical projects were analyzed for the wind energy sector, namely the Carleton, Gros-Morne and Montagne Sèche wind farms.

The Canadian Malartic gold mine project was used as a typical project for mining investments. Finally, the data concerning public infrastructures comes from the 2011-2016 Action Plan under the Plan Nord.

The Aluminerie Alouette Phase 2 construction project was used as a typical project for investments in the primary aluminum production sector.

The breakdown of investments by economic sector for the forest economic sector was determined on the basis of a recent Tembec project.

**Stages 3 and 4:**  
**Analyze the investments in typical projects by economic sector.**

The expenditure categories broken down in the typical projects have been associated with economic sectors.

The economic sectors inventoried are

- Construction
- Equipment and machinery
- Electrical equipment
- Professional services (engineering and other)
- Services (general administration and other)
- Financial services.

Stage 4 simply allows identification of the results of the first three stages. These are the projected expenditures under the Plan Nord, by investment category and by economic sector.

**Stage 5:**  
**Determine the proportion purchased outside Québec.**

This stage indicates the proportion purchased outside Québec for each economic sector. These proportions are based on the typical projects used to determine the proportions of expenditures in each economic sector. Consequently, the proportion purchased outside Québec for professional services may differ between investments in the energy sector and those in the mining sector.

**Stage 6:**  
**Determine the industrial import rate of each economic sector.**

The import rates were derived from two sources, depending on the availability of the data. First of all, the ISQ input-output model was used to estimate the proportion of imports in the industries. The indicator used reflects the total imports in relation to the total effect. The application of this rate thus makes it possible to remove all imports of investment project suppliers from the calculation. An example would be an engine purchased in Québec, but made of parts imported from Japan and assembled in Québec. Stage 5 would indicate that it was 100% purchased in Québec. However, Stage 6 would clarify that 80% of the engine parts were imported.

For certain categories, the Statistics Canada data on imports and local demand by industry were used. The indicator used reflects interprovincial imports added to international demands in relation to total domestic demand for Québec in 2008. (Table 386-0002: Interprovincial and International Trade Flows at Producer Prices, Annual)

**Stage 7:**  
**Determine the economic retention potential of Montréal metropolitan area.**

To determine the economic retention potential of the Montréal metropolitan area, the GDP indicator of the area in relation to total Québec GDP for this sector was analyzed.

This indicator illustrates the result of the spinoffs if the Montréal metropolitan area succeeded in "economically retaining" expenditures related to investment projects in natural resources, in other words, if the spinoffs corresponded to what the area generally retains in the Québec economy.

The reference base to measure the potential economic spinoffs for the Montréal metropolitan area corresponds to the average economic retention, namely the GDP per sector in the Montréal metropolitan area in relation to the GDP for the entire province.

**Stage 8:**  
**Analyze the capacity of the Montréal metropolitan area to meet the projected demand.**

The results of the analytical model reflect the potential economic spinoffs for the Montréal metropolitan area, not the actual economic spinoffs.

Potential economic spinoffs are defined as those that the metropolitan area would be able to obtain, particularly if companies adjusted their capacity to meet the demand.

Realization of economic spinoffs for the Montréal metropolitan area will depend, in particular, on the actions taken by companies to benefit from the favourable prospects offered by investment projects in natural resources and by the actions taken by companies and public decision-makers to attract enterprises that can fill the gaps in the metropolitan industrial fabric.

## Appendix I

**Potential economic spinoffs for the Montréal metropolitan area from investments related to natural resources in Québec over the next 25 years**  
(in millions of dollars)

Type of investment	Economic sector	Total investments in Québec	Potential economic spinoffs for the Montréal metropolitan area from investments in the territory of application of the Plan Nord	Potential economic spinoffs for the Montréal metropolitan area from investments in the rest of Québec	Potential economic spinoffs for the Montréal metropolitan area from total investments	Proportion of potential economic spinoffs for the Montréal metropolitan area
<b>Wind energy</b>		<b>\$8,993</b>	<b>\$232</b>	<b>\$933</b>	<b>\$1,165</b>	<b>4.4%</b>
	General administration	\$9	\$0	\$1	\$1	0%
	Construction	\$1,946	\$109	\$437	\$546	2%
	Equipment and machinery	\$2,042	\$9	\$35	\$44	0.2%
	Electrical equipment	\$4,241	\$40	\$162	\$203	0.8%
	Professional services	\$153	\$11	\$46	\$58	0.2%
	Services	\$603	\$63	\$251	\$314	1.2%
		<b>47,597</b>	<b>\$13,327</b>	<b>\$705</b>	<b>\$14,032</b>	<b>52.5%</b>
<b>Hydroelectric</b>	Construction	\$21,354	\$4,029	\$213	\$4,242	15.9%
	Equipment and machinery	\$4,167	\$97	\$5	\$102	0.4%
	Professional services	\$9,225	\$4,123	\$218	\$4,341	16.2%
	Financial services	\$12,851	\$5,078	\$268	\$5,346	20%
		<b>\$37,603</b>	<b>\$5,982</b>	<b>\$731</b>	<b>\$6,714</b>	<b>25.1%</b>
<b>Mining</b>	General administration	\$ 754	\$297	\$36	\$333	1.2%
	Construction	\$26,011	\$4,416	\$540	\$4,956	18.5%
	Equipment and machinery	\$ 7,106	\$141	\$17	\$158	0.6%
	Electrical equipment	\$1,014	\$37	\$ 5	\$42	0.2%
	Professional services	\$2,162	\$872	\$107	\$979	3.7%
	Services	\$556	\$219	\$27	\$246	0.9%

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<b>Aluminum</b>		<b>\$7,600</b>	<b>\$581</b>	<b>\$799</b>	<b>\$1,379</b>	<b>5.2%</b>
	Construction	\$3,581	\$387	\$532	\$918	3.4%
	Professional services	\$754	\$164	\$225	\$388	1.5%
	Electrical equipment	\$803	\$8	\$11	\$20	0.1%
<b>Public infrastructures*</b>	Equipment and machinery	\$2,462	\$22	\$31	\$53	0.2%
		<b>\$1,752</b>	<b>\$602</b>	-	<b>\$602</b>	<b>2.3%</b>
	Construction	\$1,200	\$337	-	\$337	1.3%
	Professional services	\$52	\$28	-	\$28	0.1%
<b>Forest sector</b>	Financial services	\$500	\$237	-	\$237	0.9%
		<b>\$14,675</b>	<b>\$344</b>	<b>\$2483</b>	<b>\$2,827</b>	<b>10.6%</b>
	General administration	\$768	\$49	\$352	\$401	1.5%
	Construction	\$6,911	\$236	\$1,703	\$1,939	7.3%
<b>Total</b>	Professional services	\$683	\$45	\$328	\$373	1.4%
	Equipment and machinery	\$6,313	\$14	\$100	\$114	0.4%
		<b>\$118,219</b>	<b>\$21,069</b>	<b>\$5,650</b>	<b>\$26,719</b>	<b>100.0%</b>

\* Note: The proportions by economic sector do not add up to 100% because local services were removed from the analysis.

Potential economic spinoffs for the Montréal metropolitan area from projected investments related to natural resources in the territory of application of the Plan Nord over the next 25 years (in millions of dollars)

Type of investment	Projected expenditures (Stage 1)	Economic sector (Stage 2)	Proportion by economic sector (Stage 3)	Projected expenditures in the territory of the Plan Nord (Stage 4)	Projected purchased outside Québec (Stage 5)	Industry import rate (Stage 6)	Proportion of economic potential for the Montréal metropolitan area (Stage 7)	Potential economic spinoffs for the Montréal metropolitan area (Stage 8)	Proportion of potential spinoffs for the Montréal metropolitan area al
Wind power	<b>1 793\$</b>			<b>\$1,793</b>		19.8%	65.1%	<b>\$232</b>	<b>1.1%</b>
	General administration	0.1%	\$2	79.6%				\$0	0%
	Construction	21.6%	\$388	0%	32.1%	41.3%	\$109	\$109	0.5%
	Equipment and machinery	22.7%	\$407	44.2%	92%	48.2%	\$ 9	\$ 9	0%
	Electrical equipment	47.2%	\$845	44.1%	88.3%	73.4%	\$40		0.2%
	Professional services	1.7%	\$30	31.1%	21%	69.3%	\$11		0.1%
	Services	6.7%	\$120	0%	14.2%	60.7%	\$63		0.3%
Hydroelectric	<b>45 207\$</b>			<b>\$45,207</b>				<b>\$13,327</b>	<b>63.3%</b>
	Construction	44.9%	\$20,281	29.2%	32.1%	41.3%	\$4,029		19.1%
	Equipment and machinery	8.8%	\$3,958	36%	92.0%	48.2%	\$97		0.5%
	Professional services	19.4%	\$8,762	14%	21%	69.3%	\$4,123		19.6%
	Financial services	27%	\$12,206	12.3%	19.8%	59.2%	\$5,078		24.1%
Mining	<b>33 507\$</b>			<b>\$33,507</b>				<b>\$5,982</b>	<b>28.4%</b>
	General administration	2%	\$672	15.2%	19.8%	65.1%	\$297		1.4%
	Construction	69.2%	\$23,178	32.1%	32.1%	41.3%	\$4,416		21%
	Equipment and machinery	18.9%	\$6,332	42%	92%	48.2%	\$141		0.7%
	Electrical equipment	2.7%	\$903	51.7%	88.3%	73.4%	\$37		0.2%
	Professional services	5.8%	\$1,927	17.3%	21%	69.3%	\$872		4.1%
	Services	1.5%	\$496	15.1%	14.2%	60.7%	\$219		1%

	Aluminum	\$3,200	\$3,200	\$3,200	\$3,200	\$3,200	\$3,200	\$581	2.8%
	Construction	47.1%	\$1,508	8.6%	32.1%	41.3%	\$387	\$387	1.8%
	Professional services	9.9%	\$317	5.8%	21%	69.3%	\$164	\$164	0.8%
	Electrical equipment	10.6%	\$338	71.2%	88.3%	73.4%	\$8	\$8	0%
	Equipment and machinery	32.4%	\$1,037	44.1%	92%	48.2%	\$22	\$22	0.1%
Public infrastructures*	<b>\$2,134</b>		<b>\$1,752</b>				<b>\$602</b>	<b>2.9%</b>	
	Construction	56.2%	\$1,200	0%	32.1%	41.3%	\$337		1.6%
	Professional services	2.4%	\$52	0%	21%	69.3%	\$28		0.1%
	Financial services	23.4%	\$500	0%	19.8%	59.2%	\$237		1.1%
Forest sector	<b>\$1,786</b>		<b>\$1,786</b>				<b>\$344</b>	<b>1.6%</b>	
	General administration	5.2%	\$93	0%	19.8%	65.1%	\$49		0.2%
	Construction	47.1%	\$841	0%	32.1%	41.3%	\$236		1.1%
	Professional services	4.7%	\$83	0%	21%	69.3%	\$45		0.2%
	Equipment and machinery	43%	\$769	52.8%	92%	48.2%	\$14		0.1%
Total	<b>\$87,627</b>		<b>\$87,245</b>				<b>\$21,069</b>	<b>100%</b>	

\* Note: The proportions by economic sector do not add up to 100% because local services were removed from the analysis.

Potential economic spinoffs for the Montréal metropolitan area from investments related to natural resources in the rest of Québec (outside the territory of application of the Plan Nord) over the next 25 years (in millions of dollars)

Type of investment	Projected expenditures by type of investment (Stage 1)	Economic sector (Stage 2)	Proportion by economic sector (Stage 3)	Projected expenditures in the rest of Québec (Stage 4)	Proportion purchased outside Québec (Stage 5)	Industry import rate (Stage 6)	Proportion of economic potential for the Montréal metropolitan area (Stage 7))	Potential economic spinoffs for the Montréal metropolitan area (Stage 8)	Proportion of potential spinoffs for the Montréal metropolitan area
Wind power	\$7,200			\$7,200				\$933	16.5%
	General administration	0.1%	\$7	79.6%	19.8%	65.1%	\$1	\$1	0%
	Construction	21.6%	\$1,558	0%	32.1%	41.3%	\$437	\$437	7.7%
	Equipment and machinery	22.7%	\$1,635	44.2%	92%	48.2%	\$35	\$35	0.6%
	Electrical equipment	47.2%	\$3,395	44.1%	88.3%	73.4%	\$162	\$162	2.9%
	Professional services	1.7%	\$122	31.1%	21%	69.3%	\$46	\$46	0.8%
	Services	6.7%	\$482	0%	14.2%	60.7%	\$251	\$251	4.4%
Hydroelectric	\$2,390		\$2,390				\$705	\$705	12.5%
	Construction	44.9%	\$1,072	29.2%	32.1%	41.3%	\$213	\$213	3.8%
	Equipment and machinery	8.8%	\$209	36%	92%	48.2%	\$5	\$5	0.1%
	Professional services	19.4%	\$463	14%	21%	69.3%	\$218	\$218	3.9%
	Financial services	27%	\$645	12.3%	19.8%	59.2%	\$268	\$268	4.8%
Mining	\$4,096		\$4,096				\$731	\$731	12.9%
	General administration	2%	\$82	15.2%	19.8%	65.1%	\$36	\$36	0.6%
	Construction	69.2%	\$2,833	32.1%	32.1%	41.3%	\$540	\$540	9.6%
	Equipment and machinery	18.9%	\$774	42%	92%	48.2%	\$17	\$17	0.3%
	Electrical equipment	2.7%	\$110	51.7%	88.3%	73.4%	\$5	\$5	0.1%
	Professional services	5.8%	\$236	17.3%	21%	69.3%	\$107	\$107	1.9%
	Services	1.5%	\$61	15.1%	14.2%	60.7%	\$27	\$27	0.5%

Aluminum	\$4,400		\$4,400					\$799	14.1%
	Construction	47%	\$2,073	8.6%	32.1%	41.3%	\$532	\$532	9.4%
	Professional services	10%	\$436	5.8%	21%	69.3%	\$225	\$225	4%
	Electrical equipment	11%	\$465	71.2%	88.3%	73.4%	\$11	\$11	0.2%
	Equipment and machinery	32%	1,426	44.1%	92%	48.2%	\$31	\$31	0.5%
Forest sector	\$12,888		\$12,888				\$2,483	\$2,483	43.9%
	General administration	5.2%	\$674	0%	19.8%	65.1%	\$352	\$352	6.2%
	Construction	47.1%	\$6,069	0%	32.1%	41.3%	\$1,703	\$1,703	30.1%
	Professional services	4.7%	\$599	0%	21%	69.3%	\$328	\$328	5.8%
	Equipment and machinery	43%	\$5,545	52.8%	92%	48.2%	\$100	\$100	1.8%
Total	\$30,974		\$30,974				\$5,650	\$5,650	100%

Potential direct and indirect spinoffs for the Montréal metropolitan area from investments related to natural resources in the Québec over the next 25 years  
(in millions of dollars)

Economic sector	Potential direct spinoffs for the Montréal metropolitan area			Potential indirect spinoffs for the Montréal metropolitan area			Potential total spinoffs for the Montréal metropolitan area		
	Investments in the rest of Québec	Total	Investments in the rest of Québec	Total	Investments in the territory of application of the Plan Nord	Total	Investments in the rest of Québec	Total	Proportion of potential spinoffs for the Montréal metropolitan area
<b>Mining</b>				\$4,255			\$2,459		
<b>Investments</b>									<b>\$6,714</b> <span style="float: right;">25.1%</span>
General administration	\$218	\$27	\$244	\$79	\$10	\$89	\$297	\$36	\$333 1.2%
Construction	\$2,659	\$325	\$2,985	\$1,757	\$215	\$1,971	\$4,416	\$540	\$4,956 18.5%
Equipment and machinery	\$104	\$13	\$117	\$37	\$5	\$41	\$141	\$17	\$158 0.6%
Electrical equipment	\$23	\$3	\$26	\$14	\$2	\$16	\$37	\$5	\$42 0.2%
Professional services	\$619	\$76	\$695	\$253	\$31	\$284	\$872	\$107	\$979 3.7%
Services	\$168	\$21	\$188	\$51	\$6	\$57	\$219	\$27	\$246 0.9%
<b>Energy</b>			<b>\$10,400</b>			<b>\$4,797</b>			<b>\$15,197</b> <span style="float: right;">56.9%</span>
<b>Hydroelectricity</b>			<b>\$9,631</b>			<b>\$4,401</b>			<b>\$14,032</b> <span style="float: right;">52.5%</span>
Construction	\$2,426	\$128	\$2,555	\$1,603	\$85	\$1,687	\$4,029	\$213	\$4,242 15.9%
Equipment and machinery	\$72	\$4	\$76	\$25	\$1	\$27	\$97	\$5	\$102 0.4%
Professional services	\$2,928	\$155	\$3,082	\$1,196	\$63	\$1,259	\$4,123	\$218	\$4,341 16.2%
Financial services and inflation	\$3,722	\$197	\$3,918	\$1,356	\$72	\$1,428	\$5,078	\$268	\$5,346 20%
<b>Wind power</b>			<b>\$769</b>			<b>\$396</b>			<b>\$1,165</b> <span style="float: right;">4.4%</span>
General administration	\$0	\$1	\$1	\$0	\$0	\$0	\$0	\$1	\$1 0%
Construction	\$66	\$263	\$329	\$43	\$174	\$217	\$109	\$437	\$546 2%
Equipment and machinery	\$6	\$26	\$32	\$2	\$9	\$11	\$9	\$35	\$44 0.2%

Economic sector	Potential direct spinoffs for the Montréal metropolitan area			Potential indirect spinoffs for the Montréal metropolitan area			Potential total spinoffs for the Montréal metropolitan area		
	Investments in the rest of Québec	Total	Investments in the rest of Québec	Total	Investments in the territory of application of the Plan Nord	Total	Investments in the rest of Québec	Total	Proportion of potential spinoffs for the Montréal metropolitan area
<b>Mining</b>				\$4,255			\$2,459		
<b>Investments</b>									<b>\$6,714</b> <span style="float: right;">25.1%</span>
Electrical equipment	\$25	\$101	\$126	\$15	\$62	\$77	\$40	\$162	\$203 0.8%
Professional services	\$8	\$33	\$41	\$3	\$13	\$17	\$11	\$46	\$58 0.2%
Services	\$48	\$193	\$240	\$15	\$59	\$73	\$63	\$251	\$314 1.2%
<b>Aluminum</b>		<b>\$880</b>			<b>\$499</b>			<b>\$1,379</b>	<b>5.2%</b>
Construction	\$233	\$320	\$553	\$154	\$211	\$365	\$387	\$532	\$918 3.4%
Professional services	\$116	\$160	\$276	\$47	\$65	\$113	\$164	\$225	\$388 1.5%
Electrical equipment	\$5	\$7	\$12	\$3	\$4	\$8	\$8	\$11	\$20 0.1%
Equipment and machinery	\$16	\$23	\$39	\$6	\$8	\$14	\$22	\$31	\$53 0.2%
<b>Public infrastructures</b>			<b>\$397</b>			<b>\$206</b>		<b>\$602</b>	<b>2.3%</b>
<b>Investments</b>									
Construction	\$203	\$203	\$134		\$134	\$337		\$337	1.3%
Professional services	\$20	\$20	\$8		\$8	\$28		\$28	0.1%
Financial services	\$174	\$174	\$63		\$63	\$237		\$237	0.9%
<b>Forest sector</b>		<b>\$1,811</b>			<b>\$1,016</b>			<b>\$2,827</b>	<b>10.6%</b>
General administration	\$36	\$258	\$294	\$13	\$94	\$107	\$49	\$352	\$401 1.5%
Construction	\$142	\$1,026	\$1,168	\$94	\$677	\$771	\$236	\$1,703	\$1,939 7.3%
Professional services	\$32	\$233	\$265	\$13	\$95	\$108	\$45	\$328	\$373 1.4%
Equipment and machinery	\$10	\$74	\$84	\$4	\$26	\$30	\$14	\$100	\$114 0.4%
<b>Total</b>	<b>\$14,080</b>	<b>\$3,663</b>	<b>\$17,743</b>	<b>\$6,989</b>	<b>\$1,988</b>	<b>\$20,291</b>	<b>\$21,069</b>	<b>\$5,650</b>	<b>\$26,719</b> <span style="float: right;">100%</span>

**Projected operating expenditures for projects related to natural resources in Québec and potential spinoffs for the Montréal metropolitan area over the next 25 years** (in millions of dollars)

Economic sector	Operating expenditures			Local impact indicators				Potential spinoffs for the Montréal metropolitan area		
	Projects in the territory of application of the Plan Nord	Projects in the rest of Québec	Total	Proportion purchased outside Québec	Industry import rate	Proportion of economic potential for the Montréal metropolitan area	Projects in the territory of application of the Plan Nord	Projects in the rest of Québec	Total	Proportion of potential spinoffs for the Montréal metropolitan area
<b>Mining</b>			<b>\$187,058</b>						<b>\$18,500</b>	<b>73.8%</b>
<b>Operation</b>			<b>\$187,058</b>						<b>\$17,609</b>	<b>70.2%</b>
Mineral extraction	\$100,029	\$11,809	\$111,838	0%	22.6%	12.4%	\$9,590	\$1,132	\$10,722	42.8%
Transportation and warehousing	\$66,537	\$2,059	\$68,596	0%	25.6%	7.3%	\$3,634	\$112	\$3,746	14.9%
Administrative services	\$5,649	\$974	\$6,624	0%	19.8%	59.2%	\$2,679	\$462	\$3,141	12.5%
<b>Exploration</b>									<b>\$891</b>	<b>3.6%</b>
Mineral extraction	\$5,577	\$3,718	\$9,295	0%	22.6%	12.4%	\$535	\$356	\$891	3.6%
<b>Energy</b>			<b>\$4,878</b>						<b>\$1,030</b>	<b>4.1%</b>
<b>Hydroelectricity</b>			<b>\$561</b>						<b>\$176</b>	<b>0.7%</b>
Salaries	\$111	\$2	\$113	0%	34.4%	51.1%	\$37	\$1	\$38	0.2%
Equipment and machinery	\$198	\$4	\$202	44.2%	71.6%	48.2%	\$15	\$0	\$15	0.1%
Insurance	\$132	\$2	\$134	0%	12.3%	59.2%	\$69	\$1	\$70	0.3%
Administrative services	\$110	\$2	\$112	0%	19.8%	59.2%	\$52	\$1	\$53	0.2%
<b>Wind power</b>			<b>\$4,273</b>						<b>\$840</b>	<b>3.3%</b>
Equipment and machinery	\$117	\$973	\$1,090	40%	71.6%	48.2%	\$10	\$80	\$90	0.4%
Finance, Insurance	\$88	\$736	\$824	50%	12.3%	59.2%	\$23	\$191	\$214	0.9%
Professional services	\$8	\$64	\$72	0%	21%	69.3%	\$4	\$35	\$40	0.2%
Administrative services	\$57	\$478	\$535	0%	19.8%	59.2%	\$27	\$227	\$254	1%

Direct labour	\$78	\$648	\$725	0%	34.4%	51.1%	\$26	\$217	\$243	1%
Taxes and royalties	\$110	\$917	\$1,027	0%	0%	0%	\$0	\$0	\$0	0%
<b>Other</b>		<b>\$44</b>							<b>\$14</b>	<b>0.1%</b>
Salaries	\$4	\$5	\$9	0%	34.4%	51.1%	\$1	\$2	\$3	0%
Equipment and machinery	\$7	\$9	\$16	44.2%	71.6%	48.2%	\$1	\$1	\$1	0%
Insurance	\$4	\$6	\$10	0%	12.3%	59.2%	\$2	\$3	\$5	0%
Administrative services	\$4	\$5	\$9	0%	19.8%	59.2%	\$2	\$2	\$4	0%
<b>Aluminum</b>		<b>\$23,008</b>							<b>\$3,291</b>	<b>13.1%</b>
Electricity*	\$6,313	\$5,191	\$11,504	0%	15.2%	20.5%	\$1,097	\$902	\$1,998	8%
Bauxite	\$3,621	\$2,977	\$6,598	100%	100%	0%	\$0	\$0	\$0	0%
Salaries	\$743	\$611	\$1,353	0%	34.4%	51.1%	\$249	\$205	\$454	1.8%
Carbon	\$1,207	\$992	\$2,199	0%	85.5%	75.6%	\$132	\$109	\$241	1%
Other services	\$743	\$611	\$1,353	15.1%	14.2%	60.7%	\$328	\$270	\$598	2.4%
<b>Forest sector</b>		<b>\$11,716</b>							<b>\$2,256</b>	<b>9%</b>
Salaries	\$215	\$1,553	\$1,768	0%	34.4%	11.9%	\$17	\$121	\$138	0.6%
Equipment and machinery	\$74	\$534	\$608	52.8%	71.6%	48.2%	\$5	\$35	\$39	0.2%
Energy	\$113	\$814	\$927	0%	30.6%	65.1%	\$51	\$368	\$418	1.7%
Raw material	\$714	\$5,150	\$5,863	0%	52.4%	11.9%	\$40	\$292	\$333	1.3%
Other services	\$310	\$2,240	\$2,550	0%	14.2%	60.7%	\$162	\$1,166	\$1,327	5.3%
<b>Total</b>	<b>\$192,872</b>	<b>\$43,084</b>	<b>\$226,661</b>				<b>\$18,787</b>	<b>\$6,290</b>	<b>\$25,077</b>	<b>100%</b>

\* Note: The proportion of electricity spinoffs for the Montréal metropolitan area is based on the proportion of Hydro-Québec head office employees in relation to the total for the province as a whole (administrative jobs).

**Projected direct and indirect spinoffs for the Montréal metropolitan area related to natural resources in Québec over the next 25 years** (in millions of dollars)

Economic sector	Potential direct spinoffs for the Montréal metropolitan area			Potential indirect spinoffs for the Montréal metropolitan area			Potential total spinoffs for the Montréal metropolitan area			
	Projects in the territory of application of the Plan Nord	Projects in the rest of Québec	Total	Projects in the territory of application of the Plan Nord	Projects in the rest of Québec	Total	Projects in the territory of application of the Plan Nord	Projects in the rest of Québec	Total	Proportion of potential spinoffs for the Montréal metropolitan area
<b>Mining</b>			<b>\$13,400</b>			<b>\$4,881</b>			<b>\$18,500</b>	<b>73.8%</b>
<b>Operation</b>			<b>\$12,728</b>			<b>\$4,881</b>			<b>\$17,609</b>	<b>70.2%</b>
Mineral extraction	\$7,232	\$854	\$8,085	\$2,358	\$278	\$2,636	\$9,590	\$1,132	\$10,722	42.8%
Transportation and warehousing	\$2,271	\$70	\$2,341	\$1,363	\$42	\$1,405	\$3,634	\$112	\$3,746	14.9%
Administrative services	\$1,963	\$339	\$2,302	\$716	\$123	\$839	\$2,679	\$462	\$3,141	12.5%
<b>Exploration</b>			<b>\$672</b>						<b>\$891</b>	<b>3.6%</b>
Mineral extraction	\$403	\$269	\$672	\$131	\$88	\$219	\$535	\$356	\$891	3.6%
<b>Energy</b>			<b>\$697</b>			<b>\$333</b>			<b>\$1,030</b>	<b>4.1%</b>
<b>Hydroelectricity</b>			<b>\$121</b>			<b>\$55</b>			<b>\$176</b>	<b>0.7%</b>
Salaries	\$24	\$0	\$24	\$13	\$0	\$14	\$37	\$1	\$38	0.2%
Equipment and machinery	\$7	\$0	\$7	\$8	\$0	\$8	\$15	\$0	\$15	0.1%
Insurance	\$50	\$1	\$51	\$18	\$0	\$19	\$69	\$1	\$70	0.3%
Administrative services	\$38	\$1	\$39	\$14	\$0	\$14	\$52	\$1	\$53	0.2%
<b>Wind power</b>			<b>\$566</b>			<b>\$274</b>			<b>\$840</b>	<b>3.3%</b>
Equipment and machinery	\$4	\$36	\$40	\$5	\$44	\$49	\$10	\$80	\$90	0.4%
Finance, Insurance	\$17	\$140	\$157	\$6	\$51	\$57	\$23	\$191	\$214	0.9%
Professional services	\$3	\$25	\$28	\$1	\$10	\$11	\$4	\$35	\$40	0.2%
Administrative services	\$20	\$166	\$186	\$7	\$61	\$68	\$27	\$227	\$254	1%

Direct labour	\$17	\$139	\$155	\$9	\$79	\$88	\$26	\$217	\$243	1%
Taxes and royalties	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	0%
<b>Other</b>			<b>\$9</b>			<b>\$4</b>			<b>\$14</b>	<b>0.1%</b>
Salaries	\$1	\$1	\$2	\$0	\$1	\$1	\$1	\$2	\$3	0%
Equipment and machinery	\$0	\$0	\$1	\$0	\$0	\$1	\$1	\$1	\$1	0%
Insurance	\$2	\$2	\$4	\$1	\$1	\$1	\$2	\$3	\$5	0%
Administrative services	\$1	\$2	\$3	\$0	\$1	\$1	\$2	\$2	\$4	0%
<b>Aluminum</b>			<b>\$2,403</b>			<b>\$888</b>			<b>\$3,291</b>	<b>13.1%</b>
Electricity*	\$831	\$683	\$1,514	\$266	\$219	\$484	\$1,097	\$902	\$1,998	8%
Bauxite	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	0%
Salaries	\$159	\$131	\$290	\$90	\$74	\$164	\$249	\$205	\$454	1.8%
Carbon	\$77	\$64	\$141	\$55	\$45	\$100	\$132	\$109	\$241	1%
Other services	\$252	\$207	\$459	\$77	\$63	\$139	\$328	\$270	\$598	2.4%
<b>Forest sector</b>			<b>\$1,570</b>			<b>\$685</b>			<b>2,256</b>	<b>9%</b>
Salaries	\$11	\$78	\$88	\$6	\$44	\$50	\$17	\$121	\$138	0.6%
Equipment and machinery	\$2	\$16	\$18	\$3	\$19	\$22	\$5	\$35	\$39	0.2%
Energy	\$30	\$215	\$245	\$21	\$153	\$174	\$51	\$368	\$418	1.7%
Raw material	\$25	\$178	\$202	\$16	\$114	\$130	\$40	\$292	\$333	1.3%
Other services	\$124	\$894	\$1,018	\$38	\$272	\$310	\$162	\$1,166	\$1,327	5.3%
<b>Total</b>	<b>\$13,562</b>	<b>\$4,508</b>	<b>\$18,070</b>	<b>\$5,224</b>	<b>\$1,782</b>	<b>\$6,788</b>	<b>\$18,787</b>	<b>\$6,290</b>	<b>\$25,077</b>	<b>100%</b>

\* Note: The proportion of electricity spinoffs for the Montréal metropolitan area is based on the proportion of Hydro-Québec head office employees in relation to the total for the province as a whole (administrative jobs).

**Projected socioeconomic spinoffs for the Montréal metropolitan area related to operating expenditures for natural resources projects in Québec over the next 25 years**  
(in number of job-years)

Type of investment	Spinoffs for the Montréal metropolitan area from projects in the territory of application of the Plan Nord	Spinoffs for the Montréal metropolitan area from projects in the rest of Québec	Spinoffs for the Montréal metropolitan area from total operating expenditures	Proportion of potential spinoffs for the Montréal metropolitan area
<b>Mining</b>	<b>90,720</b>	<b>11,797</b>	<b>102,517</b>	<b>68%</b>
<b>Operation</b>	<b>90,720</b>	<b>11,797</b>	<b>102,517</b>	<b>68%</b>
Mineral extraction	41,523	4,902	46,425	30.8%
Transportation and warehousing*	11,229	348	11,576	7.7%
Administrative services	37,969	6,548	44,516	29.5%
<b>Exploration</b>	<b>2,315</b>	<b>1,543</b>	<b>3,859</b>	<b>0%</b>
Mineral extraction				2.6%
<b>Energy</b>	<b>2,371</b>	<b>6,964</b>	<b>9,335</b>	<b>6.2%</b>
<b>Hydroelectricity</b>	<b>1,498</b>	<b>27</b>	<b>1,526</b>	<b>1%</b>
Salaries	295	5	301	0.2%
Equipment and machinery	105	2	107	0.1%
Insurance	358	7	365	0.2%
Administrative services	740	14	753	0.5%
<b>Wind power</b>	<b>822</b>	<b>6,868</b>	<b>7,690</b>	<b>5.1%</b>
Equipment and machinery	67	556	622	0.4%
Finance, Insurance	119	998	1,117	0.7%
Professional services	46	380	426	0.3%
Administrative services	385	3,211	3,595	2.4%
Direct labour	206	1,723	1,930	1.3%
Taxes and royalties	0	0	0	0%
<b>Other</b>	<b>50</b>	<b>69</b>	<b>119</b>	<b>0.1%</b>
Salaries	10	14	23	0%
Equipment and machinery	4	5	8	0%
Insurance	12	16	28	0%
Administrative services	25	34	59	0%
<b>Aluminum</b>	<b>7,601</b>	<b>6,249</b>	<b>13,851</b>	<b>9.2%</b>
Electricity**	407	335	742	0.5%
Bauxite	0	0	0	0%
<b>Total</b>	<b>103,737</b>	<b>46,981</b>	<b>150,718</b>	<b>100%</b>

\* Note: Number of jobs for the equivalent of 1 million of revenue in the transportation and warehousing sector modulated by the mining sector's share of the economy of the Montréal metropolitan area.

\*\* Note: Use of the number of administrative jobs at Hydro-Québec in the Montréal region for the equivalent of 1 million of revenue.

	Salaries	1,976	1,625	3,601	2.4%
Carbon	135	111	246	0.2%	
Other services	5,083	4,179	9,262	6.1%	
<b>Forest sector</b>	<b>3,045</b>	<b>21,971</b>	<b>25,016</b>	<b>16.6%</b>	
Salaries	133	963	1,097	0.7%	
Equipment and machinery	33	240	273	0.2%	
Energy	52	375	427	0.3%	
Raw material	324	2,340	2,664	1.8%	
Other services	2,502	18,053	20,555	13.6%	
<b>Total</b>	<b>103,737</b>	<b>46,981</b>	<b>150,718</b>	<b>100%</b>	

## Analysis of Québec production intensity – Comparison of Québec and Canadian gross production, by sector, for industries related to extraction of natural resources (2008 data)

## Appendix J

Goods and services [NAICS Code]	Québec (millions of dollars)	Canada (millions of dollars)	Québec in proportion to Canada	Québec production intensity indicator (Québec/Canada)
<b>ALL INDUSTRIES</b>	<b>\$551,694</b>	<b>\$2,863,445</b>	<b>19,3%</b>	
<b>Construction</b>				
Oil and Gas Engineering Construction [230D]	\$270	\$49,940	0,5%	0,03
Electric Power Engineering Construction [230E]	\$3,673	\$11,252	32,6%	1,69
Other Engineering Construction [230G]	\$3,706	\$17,980	20,6%	1,07
Transportation Engineering Construction [230C]	\$5,479	\$17,860	30,7%	1,59
Non-Residential Building Construction [230B]	\$6,808	\$41,870	16,3%	0,84
Repair Construction [230H]	\$6,849	\$30,654	22,3%	1,16
<b>Equipment</b>				
Railroad Rolling Stock Manufacturing [3365]	N.A.*	\$1,883	N.A.	0,00
Other Transportation Equipment Manufacturing [3369]	N.A.	\$3,555	N.A.	0,00
Pump and Compressor or Manufacturing [33910]	\$89	\$2,534	3,5%	0,18
Mining Oil and Gas Field Machinery Manufacturing [333130]	\$162	\$4,801	3,4%	0,18
Metalworking Machinery Manufacturing [333500]	\$381	\$3,872	9,8%	0,51
Construction Machinery Manufacturing [333120]	\$392	\$1,812	21,6%	1,12
Material Handling Equipment Manufacturing [333920]	\$579	\$2,909	19,9%	1,03
Engine, Turbine and Power Transmission Equipment Manufacturing	\$1,348	\$2,709	49,8%	2,58
[333600]				
Industrial, Commercial and Service Industry Machinery Manufacturing	\$2,056	\$7,241	28,4%	1,47
Electrical Equipment, Appliance and Component Manufacturing [335]	\$3,954	\$11,316	34,9%	1,81
Machinery Manufacturing [333]	\$6,668	\$34,087	19,6%	1,02
<b>Materials and Other Inputs</b>				
Tire Manufacturing [326210]	N.A.	\$2,055	N.A.	0,00
Rubber and Plastic Hoses and Belting Manufacturing [326220]	\$125	\$674	18,6%	0,96
Cement and Concrete Product Manufacturing [3273]	\$1,921	\$9,293	20,7%	1,07
Chemical Manufacturing [325]	\$10,225	\$53,024	19,3%	1,00
Petroleum and Coal Product Manufacturing [324]	\$18,768	\$84,609	22,2%	1,15
Primary Metal Manufacturing [331]	\$20,554	\$63,694	32,3%	1,67

Source: Statistics Canada, Provincial gross output at basic prices in current dollars, System of National Accounts (SNA), benchmark values, by sector and North American Industry Classification System (NAICS), 2008.

\* Note : The unavailable data represents output or a number of companies too low to be disclosed.  
It is therefore assumed that the intensity of Québec production is almost nil for these products and services.

Metal Products				
Power Boiler and Heat Exchanger Manufacturing [332410]	\$73	\$1,150	6,3%	0,33
Metal Tank (Heavy Gauge) Manufacturing [332420]	\$179	\$1,196	14,9%	0,78
Turned Product and Screw, Nut and Bolt Manufacturing [332720]	\$187	\$673	27,7%	1,44
Spring and Wire Product Manufacturing [332600]	\$239	\$1,157	20,7%	1,07
Prefabricated Metal Building and Component Manufacturing [332311]	\$252	\$1,137	22,1%	1,15
Cutlery and Hand Tool Manufacturing [332200]	\$258	\$622	41,5%	2,15
Forging and Stamping [332100]	\$532	\$1,736	30,7%	1,59
Other Fabricated Metal Product Manufacturing [332900]	\$1,055	\$4,950	21,3%	1,11
Machine Shops [332710]	\$1,121	\$4,899	22,9%	1,19
Plate Work and Fabricated Structural Product Manufacturing [33231A]	\$1,696	\$6,811	24,9%	1,29
Ornamental and Architectural Metal Products Manufacturing [332320]	\$1,986	\$6,961	28,5%	1,48
Fabricated Metal Product Manufacturing [332]	\$8,303	\$37,011	22,4%	1,16
Services				
Support Activities for Mining and Oil and Gas Extraction [213]	\$688	\$17,925	3,8%	0,20
Legal, Accounting, Tax Preparation, Bookkeeping and Payroll Services [541A00]	\$3,987	\$25,216	15,8%	0,82
Architectural, Engineering and Related Services [541300]	\$5,109	\$27,760	18,4%	0,96
Other Professional, Scientific and Technical Services [541B00]	\$5,393	\$33,103	16,3%	0,85
Computer Systems Design and Related Services [541500]	\$6,151	\$27,093	22,7%	1,18
Professional, Scientific and Technical Services [54]	\$22,061	\$119,636	18,4%	0,96
Transportation				
Air Transportation [4810]	N.A.	\$17,723	N.A.	0,00
Water Transportation [4830]	N.A.	\$4,440	N.A.	0,00
Warehousing and Storage [493]	N.A.	\$3,428	N.A.	0,00
Rail Transportation [4820]	\$1,977	\$10,702	18,5%	0,96
Support Activities for Transportation [488000]	\$3,504	\$18,968	18,5%	0,96
Truck Transportation [484]	\$8,417	\$44,718	18,8%	0,98
Other Transportation [48A]	\$9,127	\$52,136	17,5%	0,91

## Appendix K

### International benchmarking methodology

The following diagram presents the benchmarking methodology.

#### Selection of cities

- Concerted action with the Board of Trade of Metropolitan Montreal and the expert advisors for selection of metropolitan areas benefiting from a developed and performing natural resources sector.
- Target regions: Colorado (Denver; mining and energy), Norway (Oslo; oil, energy, primary aluminum), Finland (Helsinki; forest products), Australia (Sydney, Brisbane and Perth; mining, energy and primary aluminum).

#### Content development and validation

- Establishment of factors to include in the benchmarking (e.g., resources extracted, main extraction projects, main head offices present in the metropolitan area, economic development strategy used, etc.).

#### Search for preliminary information

- Search for information based on various secondary sources (websites of cities, regional governments, companies, industry associations and research institutes).
- Search for information in various government databases.

#### Interviews with each region's specialists

- Solicitation and booking of appointments with industry specialists in the target regions within the Grant Thornton International (GTI) network.
- Conducting telephone interviews.
- Contacting experts outside the regions concerned, when necessary, according to the recommendations of the GTI industry specialists.

#### Evaluation of the relevance of each strategy in the Montréal context

- Comparison of the contexts and economic development strategies of each metropolitan area with the context of the Montréal metropolitan area.
- Analysis of the factors specific to the various strategies, which can be reproduced and adapted to the Montréal context.

## Appendix L

### International Models

#### DENVER (COLORADO), UNITED STATES

General Profile		
Population	City	600,200 (2010)
	Metropolitan area	2,552,000 (2010)
GDP	Metropolitan area	\$165 billion (2008) Montréal: \$148 billion (2008)
	Country	\$15,065 billion (2011)
Main resources extracted	Mining:	Oil and gas: - Coal - Gold - Copper - Silver - Gypsum - Limestone
	Oil and gas:	- Oil - Natural gas - Shale gas
Economic development strategy		
<ul style="list-style-type: none"> <li>Presence of industrial clusters in the mining and energy fields.</li> <li>Higher education programs offered, and presence of research centres in the mining and energy fields (Colorado School of Mines, National Renewable Energy Laboratory, private R&amp;D, etc.).</li> <li>Financial support and tax incentives for development of projects in the renewable energy field.</li> <li>Various tax incentives for job creation in the mining and energy fields.</li> </ul>		
Natural resources sector		
Contribution to the country's GDP	Mining:	<ul style="list-style-type: none"> <li>0.8% of Colorado's GDP (2007)</li> <li>Total economic spinoffs for Colorado = \$8 billion (2008)</li> <li>Coal production = 32 Mt / \$887 million dollars (2008)</li> <li>\$178.4 million dollars in tax spinoffs in Colorado in 2008, coming from royalties due to extraction of coal, various ores, oil and natural gas (half this revenue is used to fund the State's public schools)</li> </ul>
	Oil and gas:	<ul style="list-style-type: none"> <li>7.8% of Colorado's GDP (2009)</li> </ul>
Direct jobs in the industry	<ul style="list-style-type: none"> <li>Mining: 12,450 jobs in Colorado (2007)</li> <li>Oil and gas: 55,000 jobs in Colorado (2009)</li> </ul>	
Main companies having their head office in the city/metropolitan area	Newmont Mining Corporation (gold and copper)	<ul style="list-style-type: none"> <li>Revenue = \$9.5 billion (2010)</li> <li>34,000 employees (2011)</li> </ul>
	Forest Oil Corporation (oil and gas)	<ul style="list-style-type: none"> <li>Revenue = \$850 million (2010)</li> <li>680 employees</li> </ul>
	SM Energy Company (oil and gas)	<ul style="list-style-type: none"> <li>Revenue = \$830 million (2009)</li> <li>550 employees</li> </ul>
	Venoco (oil and gas)	<ul style="list-style-type: none"> <li>Revenue = \$290 million (2010)</li> <li>380 employees (2010)</li> </ul>
Results of the strategy		
<p>The Denver metropolitan area ranks among the leaders in the USA each year for concentration of employment in the energy sector.</p>		

Sources: 

- US Census Bureau;
- Colorado Mining Association;
- National Mining Association;
- Colorado Office of Economic Development and International Trade;
- Corporate websites.

**OSLO, NORWAY**

General Profile				
<b>Population</b>	<b>City</b>	612,000 (2011)		
	<b>Metropolitan area</b>	1,442,000 (2011)		
<b>GDP</b>	<b>Metropolitan area</b>	\$103 billion (2008) Montréal: \$148 billion (2008)		
	<b>Country</b>	\$479 billion (2011)		
<b>Main resources extracted</b>	<ul style="list-style-type: none"> <li>· Oil and gas</li> <li>· Hydroelectricity</li> <li>· Primary aluminum production</li> </ul>			
<ul style="list-style-type: none"> <li>· Norway is the sixth largest exporter of oil and the second largest exporter of natural gas in the world. It has major coal reserves. The Norwegian Government, through the Ministry of Petroleum and Energy, is the biggest shareholder (67%) of Statoil.</li> <li>· Over 1,000 hydroelectric dams meet more than 98% of the country's electricity needs and allow electricity exports to the countries of continental Europe.</li> <li>· Norway is one of the top 10 producers of primary aluminum in the world.</li> </ul>				
Economic development strategy				
<p><b>Norway's measured approach to management of the revenue from its oil industry involves the following key aspects:</b></p> <ul style="list-style-type: none"> <li>· Even before their operation began, the oil and gas reserves under Norwegian jurisdiction were recognized by law as the common property of all Norwegians, establishing their legal right to the revenue from these resources.</li> <li>· Over the years, this legal regime has allowed the Norwegian Government to collect nearly 80% of the revenue from these resources. While successfully using only a small portion for its current fiscal needs, the majority was paid into a pension fund dedicated to future generations (Government Pension Fund of Norway).</li> <li>· The Government established economic and ethical principles to orient the extraction and use of these resources to the benefit of present and future generations.</li> <li>· Since the beginning of extraction of Norwegian oil and gas resources, the leading political parties have shared the idea that too great an influx of "petrodollars" into the country's economy should be regulated to avoid the appearance of "the Dutch disease".</li> <li>· The Fund currently represents nearly \$400 billion, or \$85,000 per capita.</li> </ul>				
Secteur des ressources naturelles				
<b>Contribution to the country's GDP</b>	Oil and gas = 22% Manufacturing, mining, electricity, construction = 15%			
<b>Direct jobs in the industry</b>	Oil and gas industry: 47,000 in the country (2009)			
<b>Main companies having their head office in the city/metropolitan area</b>	<p><b>Statoil</b> (oil)           <ul style="list-style-type: none"> <li>· Revenue = NOK 529,7 B (~ \$90 billion) (2010)</li> <li>· 30,340 employees (end of 2010)</li> </ul> <b>Statkraft</b> (electricity)           <ul style="list-style-type: none"> <li>· Revenue = NOK 37.8 B (~ \$6.5 billion) (2008)</li> <li>· 2,000 employees (2006)</li> </ul> <b>Norsk Hydro</b> (aluminum and renewable energy)           <ul style="list-style-type: none"> <li>· Revenus = NOK 75,8 G (~ 12,9 milliards de dollars) (2010)</li> <li>· 18 900 employés (fin 2010)</li> </ul> </p>			
<b>Results of the strategy</b>	<ul style="list-style-type: none"> <li>· The geographical proximity of the resources does not fully explain the economic development of the regions, within the context of oil extraction in Norway. The industry's growth has generated a division of labour among the different regions of the country, in which each region has used its own advantages to develop and establish new activities.</li> <li>· Continuous economic growth is forecast for Norway in the years ahead.</li> </ul>			

Sources: · PwC, UK Economic Outlook, November 2009;  
 · U.S. Department of State, Bureau of European and Eurasian Affairs, 2011;  
 · CIA, The World Factbook, 2011;  
 · Statistics Norway, 2011;

· Statistics Norway, Annual statistics for oil and gas activity, 2009;  
 · Thorvaldur Gylfason, Norway's Wealth: not just oil, Vox, 2008;

· Norwegian Ministry of Petroleum and Energy, An industry for the future – Norway's petroleum activities, Report for the Storting, 2011;  
 · Corporate websites

**HELSINKI, FINLAND**

General Profile		
<b>Population</b>	<b>City</b>	589,000 (end of 2011)
	<b>Metropolitan area</b>	1,326,000 (end of 2011)
<b>GDP</b>	<b>Metropolitan area</b>	\$58 billion (2008) Montréal: \$148 billion (2008)
	<b>Country</b>	\$196 billion (2011)
<b>Main resources extracted</b>	<b>Forest products</b>	<ul style="list-style-type: none"> <li>· Wood</li> <li>· Bioenergy and biofuel (about 1/5 of the energy produced in Finland comes from wood)</li> </ul>
		<ul style="list-style-type: none"> <li>· The Helsinki area is the only urban area in Finland and the only city in the country that can be considered a metropolitan area. It has a bigger population than the six other most populous cities combined.</li> </ul>
Economic development strategy		
<ul style="list-style-type: none"> <li>· Research and development are conducted by the research institutes, universities and forest companies.</li> <li>· The forest industry is supported by the Government through investments in education and training, venture capital, and research and development.</li> <li>· The Government subsidizes forest management by private owners.</li> <li>· Individuals and families own 53% of the forests in Finnish territory. The Government holds 34% and private enterprise only 8%.</li> <li>· The highest concentration of research institutes on the forest industry and its environmental impacts is in Helsinki and in eastern Finland.</li> </ul>		
Natural resources sector		
<b>Contribution to the country's GDP</b>	<ul style="list-style-type: none"> <li>· Represents 5.5% of the country's GDP.</li> <li>· The forest industry is the second largest industry in Finland (after the electronics industry).</li> <li>· 20% of the country's exports (10.8 billion € in 2010)</li> <li>· Three quarters of forest industry revenue comes from pulp and paper and one quarter from wood products.</li> </ul>	
<b>Direct jobs in the industry</b>	90,000 jobs in Finland	
<b>Main companies having their head office in the city/metropolitan area</b>	<p><b>Stora Enso</b> (pulp and paper)           <ul style="list-style-type: none"> <li>· Revenue = \$13.7 billion (2010)</li> <li>· 27,380 employees (end of 2010)</li> </ul> <b>UP Kymmene Corporation</b> (pulp and paper, forest products)           <ul style="list-style-type: none"> <li>· Revenus = 11,8 milliards de dollars (2010)</li> <li>· 21 870 employés (fin 2010)</li> </ul> <b>Metsäliitto Group</b> (forest products, lumber, pulp and paper, cardboard, packaging)           <ul style="list-style-type: none"> <li>· Revenue = \$7.2 billion (2010)</li> <li>· 13,000 employees</li> </ul> </p>	
<b>Results of the strategy</b>	<ul style="list-style-type: none"> <li>· The forest industry is the only viable and self-sufficient economic sector in all the rural regions of Finland. It has allowed the creation of several other industries and economic activities in Finland. In one way or another, the origins of practically every major Finnish company can be linked to the forest industry.</li> <li>· Today, the performance of the Finnish forest industry is based on technology and on the quality of its equipment.</li> </ul>	

Sources: · CIA, The World Factbook, 2011;  
 · Finnish Forest Industries Federation;  
 · Ministry of Agriculture and Forestry of Finland;  
 · Finnish Forest Research Institute Metla;  
 · Corporate website

## PERTH (WESTERN AUSTRALIA), AUSTRALIA

General Profile		
<b>Population</b>	<b>City</b>	146,795 (2010)
	<b>Metropolitan area</b>	1,696,065 (2010)
<b>GDP</b>	<b>Metropolitan area</b>	\$187 billion Montréal: \$148 billion (2008)
	<b>Country</b>	\$1,300 billion (2011)
<b>Main resources extracted</b>	<ul style="list-style-type: none"> <li>Iron (\$57.3 billion)</li> <li>Oil (\$23.2 billion)</li> <li>Gold (\$8.2 billion – 70% of the gold produced in Australia)</li> </ul>	<ul style="list-style-type: none"> <li>Nickel (\$4.6 billion)</li> <li>Alumina (\$3.9 billion) (2010-2011 data)</li> </ul>
<ul style="list-style-type: none"> <li>Over half the 340 active mines in Australia are located in Western Australia.</li> </ul>		
Main exploration and extraction projects		
<ul style="list-style-type: none"> <li>North West Shelf Venture offshore oil and gas development: \$27 billion investment, representing 40% of the country's oil and gas production; partnership among Woodside, Shell, BP, BHP Billiton Petroleum, Chevron and Mitsubishi/Mitsui.</li> <li>Gorgon liquefied natural gas (LNG) project: joint venture among Chevron, Shell and Exxon Mobil; investments estimated at \$43 billion for a project of 15 Mt of LNG.</li> </ul>		
Economic development strategy		
<ul style="list-style-type: none"> <li>Presence of industrial clusters in mining and oil and gas (one of the rare locations where the two industries are present).</li> <li>Creation of consulting, engineering, legal and geological service firms in relation to the extraction industries.</li> <li>Establishment of the Exploration Incentive Scheme (EIS) by the Government of Western Australia, administered by the Department of Mines and Petroleum.</li> <li>Initiative of \$80 million over 5 years to stimulate private sector mineral and gas exploration in the least explored regions of the State.</li> </ul>		
Natural resources sector		
<b>Contribution to the country's GDP</b>	<ul style="list-style-type: none"> <li>The mining industry accounts for 8% of the Australian GDP.</li> <li>Mineral and energy production generates \$178 billion in Australia. Western Australia alone generates \$101.2 billion, 56.8% of the country's production.</li> <li>Mineral and energy exports account for 95% of the State's exports.</li> </ul>	
<b>Direct jobs in the industry</b>	<ul style="list-style-type: none"> <li>46,500 in the mining industry</li> </ul>	
<b>Main companies having their head office in the city/metropolitan area</b>	<p><b>Wesfarmers</b> (energy, industrial, retail, insurance)</p> <ul style="list-style-type: none"> <li>Revenue = \$46.6 billion (2010)</li> <li>200,000 employees</li> </ul> <p><b>Woodside Petroleum</b> (oil and gas)</p> <ul style="list-style-type: none"> <li>Revenue = \$4.2 billion (2010)</li> <li>3,650 employees</li> </ul> <p><b>Fortescue Metals Group</b> (mining)</p> <ul style="list-style-type: none"> <li>Revenue = \$3.2 billion (2010)</li> <li>2,225 employees</li> </ul>	<p><b>Macmahon Holdings</b> (mining and construction)</p> <ul style="list-style-type: none"> <li>Revenue = \$1.1 billion (2011)</li> <li>4,000 employees</li> </ul> <p><b>Iluka Resources</b> (mining)</p> <ul style="list-style-type: none"> <li>Revenue = \$887 million (2010)</li> <li>900 employees</li> </ul>
Results of the strategy		
<ul style="list-style-type: none"> <li>The State of Western Australia has become a major target for investors in the mining industry.</li> <li>Projected increase in the number of short-term mining and energy projects.</li> </ul>		

Sources:

- U.S. Department of State, Bureau of European and Eurasian Affairs, 2011;
- Government of Western Australia, Department of Mines and Petroleum, Quick Resource Facts, 2011;
- Parliament of Australia, *The Australian Resources Sector – Its contribution to the nation, and a brief review of issues and impacts*, September 2010;
- Australian Bureau of Statistics, *Regional Population Growth, Australia*, March 2011;
- ABS Labour Force, Australia, August 2011;

- Government of Western Australia, Department of Mines and Petroleum, Quick Resource Facts, 2011;
- Parliament of Australia, *The Australian Resources Sector – Its contribution to the nation, and a brief review of issues and impacts*, September 2010;
- Australian Bureau of Statistics, *Regional Population Growth, Australia*, March 2011;
- ABS Labour Force, Australia, August 2011;

- Australian Aluminium Council;
- Corporate websites.

## SYDNEY (NEW SOUTH WALES), AUSTRALIA

General Profile		
<b>Population</b>	<b>City</b>	357,500 (2010)
	<b>Metropolitan area</b>	4,575,532 (2010)
<b>GDP</b>	<b>Metropolitan area</b>	\$213 billion (2008) Montréal: \$148 billion (2008)
	<b>Country</b>	\$1,300 billion (2011)
<b>Main resources extracted</b>	<ul style="list-style-type: none"> <li>Coal (85% of the State's mineral production = 138 Mt / 19.5 billion Australian dollars in 2008-2009 – reserves estimated at 11 Bt)</li> <li>Steel (75% of national production)</li> </ul>	<ul style="list-style-type: none"> <li>Primary aluminum production (35% of national production)</li> <li>Copper</li> <li>Gold</li> </ul>
<ul style="list-style-type: none"> <li>Sydney is Australia's financial and economic centre, and accounts for about 25% of the country's GDP. The main exports of New South Wales are coal, copper, aluminum and steel. The mining industry accounts for 45% of this region's total exports.</li> </ul>		
Examples of exploration and extraction projects		
<ul style="list-style-type: none"> <li>\$500-million investment by Gujarat NRE in its coal mining operations in Illawarra in 2010.</li> <li>Major lead, zinc and silver deposits at Broken Hill (mined for the past 120 years).</li> </ul>		
Economic development strategy		
<ul style="list-style-type: none"> <li>Financial support of 70 million Australian dollars over the past 12 years, and addition of 16.5 million Australian dollars in support for 2010 to 2012 under the New Frontiers Initiative to stimulate exploration of mineral and oil resources.</li> <li>Performance of very precise geophysical mapping of over 80% of the State's territory.</li> <li>"One stop shop" approach developed by Sydney to make startup of mining and oil drilling projects easier.</li> </ul>		
Natural resources sector		
<b>Contribution to the country's GDP</b>	<ul style="list-style-type: none"> <li>The mining industry accounts for 8% of the Australian GDP.</li> </ul>	
<b>Direct jobs in the industry</b>	<ul style="list-style-type: none"> <li>29,000 in New South Wales (2011)</li> <li>81,000 indirect jobs (2011)</li> </ul>	
<b>Main companies having their head office in the city/metropolitan area</b>	<p><b>Origin Energy Limited</b> (oil and gas)</p> <ul style="list-style-type: none"> <li>Revenue = \$7.5 billion (2010)</li> <li>4,400 employees</li> </ul> <p><b>OneSteel</b> (mining, manufacturing, distribution)</p> <ul style="list-style-type: none"> <li>Revenue = \$5.4 billion (2010)</li> <li>10,600 employees</li> </ul>	<p><b>Zimplats Holdings</b> (mining)</p> <ul style="list-style-type: none"> <li>Revenue = \$527 million (2011)</li> <li>2,800 employees</li> </ul> <p><b>Whitehaven Coal</b> (coal production)</p> <ul style="list-style-type: none"> <li>Revenue = \$360 million (2010)</li> <li>250 employees</li> </ul>
Results of the strategy		
<ul style="list-style-type: none"> <li>The New South Wales mining and oil industries are growing rapidly.</li> <li>Over 30 projects for new mines and expansion of existing mines are scheduled over the next 10 years.</li> <li>250 million Australian dollars in private investments in exploration in the mining and oil industries in 2008-2009.</li> <li>28% increase in mineral exploration permits (724 to 937), and 40% increase in oil exploration permits (45 to 63) between 2005 and 2010.</li> </ul>		

Sources:

- PwC, UK Economic Outlook, November 2009;
- U.S. Department of State, Bureau of European and Eurasian Affairs, 2011;
- Government of Australia, Department of Foreign Affairs and Trade, 2011;
- New South Wales Government, Trade & Investment, *Mining and heavy industries*, 2011;
- Australian Bureau of Statistics, *Regional Population Growth, Australia*, March 2011;
- Corporate websites.

## BRISBANE (QUEENSLAND), AUSTRALIA

General Profile				
<b>Population</b>	<b>City</b>	95,863 (2010)		
	<b>Metropolitan area</b>	2,043,185 (2010)		
<b>GDP</b>	<b>Metropolitan area</b>	\$40 billion (2008) Montréal: \$148 billion (2008)		
	<b>Country</b>	\$479 billion (2011)		
<b>Main resources extracted</b>	<ul style="list-style-type: none"> <li>· Coal</li> <li>· Gold</li> <li>· Lead</li> <li>· Copper</li> <li>· Zinc</li> <li>· Silver</li> <li>· Bauxite</li> <li>· Nickel</li> <li>· Oil</li> <li>· Liquefied natural gas (LNG)</li> <li>· Primary aluminum production</li> </ul>			
<ul style="list-style-type: none"> <li>· The State of Queensland accounts for about one quarter of Australia's mining companies, and the City of Brisbane alone accounts for more than 600, or about 8%.</li> </ul>				
Examples of exploration and extraction projects				
<ul style="list-style-type: none"> <li>· \$16-billion natural gas project developed in partnership by Santos (Australia), Petronas (Malaysia), Total (France) and KOGAS (South Korea) at Gladstone.</li> <li>· \$15-billion natural gas project for QGC at Curtis.</li> </ul>				
Economic development strategy				
<p><b>The government strategy is to make Brisbane a major centre in the field of mining technology and services.</b></p> <p><b>Brisbane's main competitive advantages are:</b></p> <ul style="list-style-type: none"> <li>· Growth of the presence of head offices of national and international mining companies.</li> <li>· Regional and international gateway to access natural resources and the high-growth Asian export markets.</li> <li>· Presence of mining technology and service companies.</li> <li>· Diversified natural resources.</li> <li>· Reliable quality Infrastructures, such as the Port of Brisbane, which will receive development investments of over \$950 million for the next five years.</li> <li>· Presence of several research and development entities and many universities.</li> <li>· 10 Queensland universities offering programs related to the mining industry and research centres.</li> </ul>				
Natural resources sector				
<b>Contribution to the country's GDP</b>	<ul style="list-style-type: none"> <li>· Queensland mineral exports represent 62% of Australia's total mineral exports.</li> <li>· The mining industry accounts for 8% of the Australian GDP.</li> </ul>			
<b>Direct jobs in the industry</b>	<ul style="list-style-type: none"> <li>· 42,500 jobs in Queensland in the mining industry (2009)</li> </ul>			
<b>Main companies having their head office in the city/metropolitan area</b>	<p><b>Queensland Gas Company</b> (BG Group – energy)</p> <ul style="list-style-type: none"> <li>· BG Group market capitalization = 75 billion Australian dollars</li> <li>· 4,300 employees</li> </ul> <p><b>Coal &amp; Allied Industries</b> (mining)</p> <ul style="list-style-type: none"> <li>· Revenue = \$1.9 billion (2010)</li> <li>· 1,500 employees</li> </ul> <p><b>Macarthur Coal</b> (mining)</p> <ul style="list-style-type: none"> <li>· Revenue = \$592 million (2010)</li> <li>· 345 employees</li> </ul> <p><b>Ausenco</b> (engineering services in the mining, energy and natural resources industries)</p> <ul style="list-style-type: none"> <li>· Revenue = \$472.3 million (2010)</li> <li>· 2,500 employees (2010)</li> </ul> <p><b>Pan Aust</b> (mining)</p> <ul style="list-style-type: none"> <li>· Revenue = \$574 million (2010)</li> <li>· 2,330 employees</li> </ul> <p><b>Mincom</b> (software for extraction industries)</p> <ul style="list-style-type: none"> <li>· Revenue = \$230.2 million (2007)</li> <li>· 1,250 employees</li> </ul>			
Results of the strategy				
<ul style="list-style-type: none"> <li>· The mining and natural resources extraction companies have indicated that the projected investments in 2011-2012 to improve their Australian operations will reach about \$50 billion.</li> </ul>				

Sources: · Asia Pacific Cities Summit, *Mining and resources*, 2011;  
 · Australian Bureau of Statistics, *Regional Population Growth, Australia*, March 2011;  
 · Corporate websites.

## Notes

### Note:

