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MINING ROYALTIES IN QUEBEC

OVERVIEW OF AN ANALYTICAL FRAMEWORK

The strong demand for minerals and metals and its concomitant effect on prices have prompted debates in resource-rich countries concerning the share of economic rent the state should retain and the structure and appropriate level of mining royalties required to achieve its financial and economic objectives. Canada is no exception. In Quebec, a new mining royalty scheme was adopted in 2010. Although there is general support for the new scheme, its implementation has not quelled the public debate.

In an effort to refocus the debate on a rational examination of the factors that must inform an efficient mining royalty scheme, SECOR-KPMG and Fraser Milner Casgrain ("FMC") have, in a recently published report ("Report"), compared the royalty scheme presently in effect in Quebec to three other royalty schemes that have been proposed in order to determine their likely impact, taking into account the characteristics of the Quebec mining sector and its relative position globally^{1,2}. The Report provides an analytical framework to assess and compare various royalty schemes in order to gain a better understanding of their impact on profitability as well as on the potential revenues that the Government of Quebec can expect from mining activities. It also explains the investment decision-making process in the mining industry.

This overview of the Report summarizes the key considerations taken into account in the comparative analysis, the methodology used to derive the potential impact of proposed royalty schemes with respect to the risk/reward equation governing investment decisions in the mining industry and the salient points of the Report.

1. THE QUEBEC MINING INDUSTRY IN A GLOBAL CONTEXT

In 2011, Quebec shipments of minerals and metals amounted to \$7.7 billion, placing the Province in the fourth position behind Ontario, Saskatchewan and British Columbia with about 16.1% of total Canadian shipments³. With eleven large-scale mines currently in operation, the Quebec mining sector represents less than 1% of global mineral production and, therefore, it is relatively marginal on an international

¹ The full report « Les redevances minières au Québec », July 2012 is available at : http://www.fmc-law.com/Home/Publications/0812_FMC_Co_authors_Mining_Royalty_Regime_Study.aspx?setlanguagecookie=1. The analyses that underlie the Report were prepared by a team of SECOR-KPMG professionals led by Mr. Renault-François Lortie.

² Financial support was provided to SECOR team by ArcelorMittal Mines Canada Inc., Osisko Mining Corporation, Goldcorp Inc., Iamgold Inc., Agnico-Eagle Mines Limited, Aurizon Mines Ltd, Quebec Mineral Exploration Association, Minalliance.

³ Excludes oil and gas.

scale. Looking to the future, four of the world's 200 large-scale projects are located in Quebec, two of which being iron mines projects⁴.

Quebec is a good place for mining operations and a promising location for the development of new mines. There coexists in its large territory regions with known potential and several others with undetermined potential, such as the Plan Nord territory, where the likelihood of discovering various mineral deposits that would be competitive on a global scale is generally considered a distinct possibility. The development of large hydroelectric dams over the past 25 years has equipped the James Bay territory with road, electricity and airport infrastructures which now give year-round access to this vast region. But there is much more to it. The availability of professional and technical personnel, a trained workforce and the quality of its geological database and modern public geosciences infrastructure constitute major advantages. Moreover, Quebec offers a stable environment conducive to business. According to the Fraser Institute, Quebec ranked as the 5th most attractive mining jurisdiction worldwide in its 2011/2012 Survey of Mining Companies⁵.

TABLE 1
VALUE OF PRODUCTION OF METAL MINES IN QUEBEC

	Mine	Main mineral products	Value of production in 2011 (2011, \$CAN MILLION)	Estimation of mining profit (2011, \$CAN MILLION)
Substantial mines	MontWright	Iron	2,350	N/D
	Raglan	Nickel and copper	816*	N/D
	Lac Bloom	Iron	1,459*	N/D
	Fire Lake	Iron	604*	N/D
	Persévérance	Zinc and copper	321*	N/D
	Lac Tio	Iron	300*	N/D
	Canadian Malartic	Gold	263	130
	Casa Bérardi	Gold	260	171
	LaRonde	Gold, silver, copper and zinc	189	(21)
	Niobec	Niobium	178	67
	Goldex**	Gold	161	104
	Lapa	Gold	99	30
Small mines	Beaufor	Gold	42	16
	Kiena	Gold	35	(1)
	Doyon et Mouska	Gold	34	(4)
	Géant Dormant***	Gold	27	(5)
	Lac Herbin	Gold	16	(7)

* Estimates based on available data for production volumes and the average spot price of the relevant mineral in 2011

** Production was stopped in 2011 but partial resumption was recently announced

*** Production discontinued in January 2012

Source: SECOR-KPMG, « Les redevances minières au Québec », Table 1, July 2012

⁴ Lac Otelnuk (iron ore), KeMag (iron ore), Éléonore (gold) and Renard (diamonds).

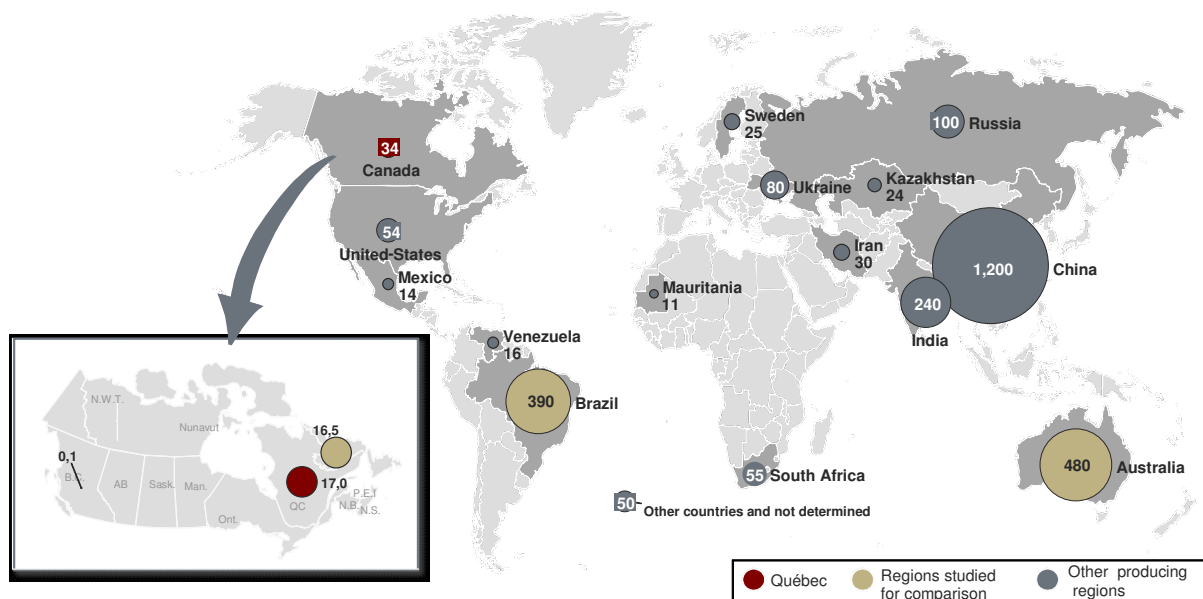
⁵ Fraser Institute Annual "Survey of Mining Companies", 2012.

The relatively small size of the Quebec mining sector at the global level is due to various factors, including the size and average low grade of the mineral deposits, the relatively harsh climate conditions that prevail, the infrastructure deficit to access remote deposits in the northern part of the Province and the greater distance from the large Asian markets relative to its main competitors. The combination of these factors drives most Quebec's mines into the third and fourth quartile in terms of production costs and, therefore, renders them more susceptible to the vagaries of world commodity markets. The iron ore and gold mining sectors provide a good illustration of the situation and the factors at play. These minerals represented 43% and 17%, respectively, of total Quebec mineral production in 2010 which is the reason the Report is focused on these two mining segments.

1.1 THE IRON ORE MINING SECTOR

Canadian shipments of iron ore accounted for about 1.3% of global production. China and India are large but very high cost iron ore producers. Consequently, their production levels tend to fluctuate in tandem with ore prices, their domestic mines playing the role of price sensitive swing producers. Hence, substitution of domestic iron ore for imports occurs rapidly as soon as seaborne iron ore or pellet prices decline below certain levels. Canada is in direct competition with Australia and Brazil that dominate the seaborne market (Figure 1).

FIGURE 1
GEOGRAPHICAL LOCATIONS OF WORLD IRON ORE PRODUCTION
(2011 million tons)



Canadian iron ore production is concentrated in the Labrador Trough and, in 2011, it was shared almost equally between Quebec (17 million tons) and Newfoundland and Labrador (16.5 million tons). There are presently four iron mines in production in Quebec (Table 2).

TABLE 2
QUEBEC IRON ORE MINES
(2012)

Mine	Company	Production value 2011 (M \$CAN)	Years of production	Annual production (Mt)	Fe content (%)
Mont Wright	Arcelor Mittal	2,350 ⁴	35	14 ³	33 - 39%
Lac Bloom	Cliffs Natural Resources	1,459 ⁴	1	8.7 ²	N/D
Fire Lake ¹	Arcelor Mittal	604 ⁴	N/D	3.6	N/D
Lac Tio	Rio Tinto	300 ⁵	61	2,84	28% Fe / 40% TiO ₂

¹ Temporary operations to satisfy demand.

² Production to increase to 16.6 Mt in 2013.

³ Planned increase to 24 Mt in 2013.

⁴ Estimates based on available data for production volumes and the average spot price CFT Tianjin 62% Fe in 2011.

⁵ SECOR estimates.

Source : SECOR-KPMG, « Les redevances minières au Québec », Table 6, July 2012..

While the total value of iron ore exports increased from \$CAN 143M in 2002 to \$CAN 1048M in 2010, their destination shifted from Europe (85% in 2002) to China (69% in 2011). This substitution of the main export market carries a significant bearing on the competitiveness of Canadian mines relative to Australian, African and Brazilian producers which are closer to the Chinese and Indian markets (Table 3).

TABLE 3
DISTANCE BETWEEN THE PORTS OF EXPORT
(nautical miles)

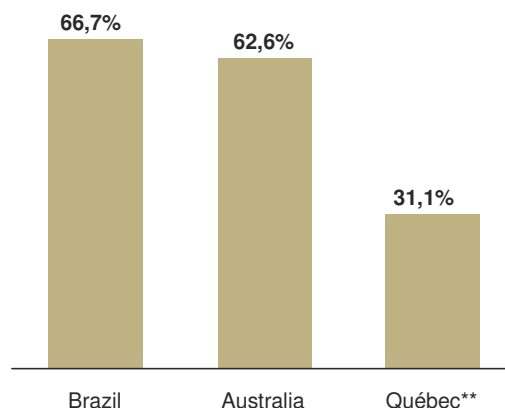
Country	Port	China (Qingdao)
Australia	Dampier, Hedlands	3,400
South Africa	Saldanha	9,700
West Africa	Ghana	12,600
Brazil	Turbarao	13,500
Canada	Sept-Îles	14,300

Source: Ports.com

This geographical disadvantage is compounded by the fact that the iron content of Canadian ore is about half of that of mines in Australia and Brazil which requires the ore to undergo a concentration process prior to shipping (Figure 2).

Despite these constraints, two of the current mines in production are engaged in expansion programs to double production in 2012. Moreover, there are currently six new iron ore mine projects at different stages of development (Table 4). While these Quebec-based projects have both higher capital intensity due to the greenfield nature of the projects and the new infrastructure required and higher cost structures due to lower grades and greater shipping distances, this is not stopping Asian steelmakers from acquiring interests in projects and companies to secure supply.

FIGURE 2
AVERAGE GRADE OF IRON ORE MINES
(2012, %Fe)



* Based on grade of the Northern System (main iron-producing region in Brazil).

** Based on average grade of mines in operation or estimate levels of current mining projects.

Source : SECOR-KPMG, « Les redevances minières au Québec », Figure 32, July 2012

TABLE 4
IRON MINES PROJECTS IN VARIOUS PHASES OF DEVELOPMENT
(2012)

Project	Company	Annual production value (M \$CAN)	Grade	Reserves (Mt)	Resources (Mt)	Capital investment (M \$CAN)	Production date	Estimated production time (years)
DSO	New Millenium Capital Corp./Tata Steel	549	60	64	74	N/D	2012	15
Lac Otelnuk	Adriana Res./Wisco	7,782	29.1	N/D	6,450	12,909	2016	N/D
KeMag	New Millenium Tata Steel	5,551	31.3	2141	1,000.3	N/D	2016	34
Hopes Advance Bay	Oceanic Iron Ore	2,922 ²	31.8	N/D	1,232	N/D	2016	24
Fire Lake North	Champion Minerals	1,294	35	N/D	1,037.4	1,367.9	2015	35
Blackrock	Métaux Blackrock	746 ³	29.1	152	73.4	670	2013	15

Sources: Secor-KPMG, « Les redevances minières au Québec », Table 7, 2012.

1.2 THE GOLD MINE SECTOR

Canada produced 110 tons of gold in 2011, about 4% of global production; Quebec produced approximately 28 tons. Hence, on a world basis, Quebec (and Canada) remains a relatively marginal producer, even though global production is much less concentrated than in the iron ore sector.

There are presently eight gold mines in production in Quebec, including one low grade high volume mine (i.e. Canadian Malartic) (Table 5). Development activities have been relatively buoyant in recent years. We count nine mining projects at various stages of development, including the world class Éléonore project with an estimated capital cost of \$1.4 billion (Table 6).

TABLE 5
GOLD MINES IN QUEBEC
(2012)

Mine	Type	Company	Annual production (kg Au)	Grade (g/t Au)
Canadian Malartic	Open pit	Osisko	6,225	0.97
Casa Bérardi	Underground	Aurizon	5,079	5.8
Goldex *	Underground	Agnico-Eagle	4,214	N/D
LaRonde **	Underground	Agnico-Eagle	3,862	4.3
Lapa	Underground	Agnico-Eagle	3,330	6.71
Beaufor	Underground	Mines Richmont	816	6.98
Doyon et Mouska	Underground	Iamgold	733	N/D
Kiena	Underground	Mines d'or Wesdome	607	2.91
Géant Dormant*	Underground	North American Palladium	452	8.4
Lac Herbin	Underground	Alexis	317	6.13

* Not in production in 2012.

** This mine also produces copper, zinc and silver..

Sources :. Secor-KPMG, « Les redevances minières au Québec », Table 10, 2012.

TABLE 6
GOLD MINES IN THE DEVELOPMENT STAGE IN QUEBEC
(2012)

Project	Company	Estimated annual production (M \$CAN)	Average grade	Type	Start of production	Life of mine
Éléonore	GoldCorp	1,000	7.6	Underground	2014	15
Extension Laronde	Agnico-Eagle	582	4.3	Underground	2013	15
Westwood	Iamgold-Québec	324	7.5	Underground	2013	16
Francoeur	Mines Richmont	78	6.9	Underground	2012	4
Belleterre	Ressources Conway	N/D	N/D	Underground	N/D	N/D
Lac Pelletier	Alexis/Thundermin	N/D	6.5	Underground	N/D	N/D
Rocmec 1	Roomec	N/D	7,0	Underground	N/D	N/D
Veza	North American Palladium	86	6.1	Underground	2012	N/D
Lac Bachelor	Ressources Métanor	96	7.4	Underground	2012	N/D
Joanna	Mines Aurizon	219	1.37	Open pit	Postponed	N/D

Sources : Secor-KPMG, « Les redevances minières au Québec », Tables 11 and 12, 2012.

2. MINING ROYALTY SCHEMES AND THEIR VARIANTS

The typology of mining royalty schemes put forward by the International Mining for Development Center comprises six categories of schemes:

- Royalties based on the volume of production
- *Ad valorem* royalties which are based on the value of production
- Royalties based on profits
- Royalties based on the economic rent of resources or “super profits”
- Hybrid regimes with both an *ad valorem* and a tax on profit component
- Shared production contracts

In its comprehensive study of mining royalty schemes, the World Bank has retained four types of schemes for mining operations, discarding the scheme based on volume of production which is appropriate only for low value minerals (i.e. quarries) and shared production contracts which are mainly

used in the petroleum industry⁶. The principal advantages and disadvantages of the different schemes are summarized in Table 7.

TABLE 7
ADVANTAGES AND DISADVANTAGES OF DIFFERENT ROYALTY SCHEMES

ROYALTY REGIME	MAIN ADVANTAGES	MAIN DISADVANTAGES
Ad valorem	Relative stability of fiscal revenues and ease of implementation	Does not take a company's "ability to pay" into account, magnifying the risks of projects and requiring higher hurdle rates.
On profits	Takes projects' "ability to pay" over the life of the mine into account and thus has a lesser impact on investment decisions	Less stable government revenues and high implementation and auditing costs for the government
On Resource Rent or "Super Profit"	To some extent, takes "ability to pay" into account and allows the capture by the State of a larger share of the economic rent when prices increase	Very difficult to forecast government revenues and very high implementation costs; generally negative on investment decisions
Hybrid	Ensures minimum level of fiscal revenues and, to some extent, takes companies' "ability to pay" into account	Difficult to forecast revenues for the government compared to <i>ad valorem</i> royalties and potentially higher implementation costs for the government

Sources : Secor-KPMG, « Les redevances minières au Québec », Table 4, 2012.

The conclusions of the analyzes concerning the impact of the major variants of mining royalty schemes can be enunciated as follows:

- The *ad valorem* royalty schemes facilitate the collection of royalties at a more constant level under various price variations. However, these schemes add a significant cost burden to the mining companies when the prices are low and the mining projects are less profitable since the payment of royalties is due even when profits are weak or inexistent. The effect is to accelerate the closure of mines when prices are depressed and threaten the continued viability of mining communities. Since these schemes add a significant amount of risks to the project, it reduces its estimated value relative to the same project subject to a royalty scheme based on profits and leads to the postponement or abandonment of several potential projects. This conclusion is particularly pertinent for Quebec where mines are characterized by relatively high production costs.

⁶ Otto, J. et al. (2006). *Mining Royalties : A Global Study on Their Impact on Investors, Government, and Civil Society*. World Bank : Washington D.C..

- Profit-based schemes adjust to variations in profitability over the life of the mine. Thus, when prices are low and mines become marginally or not profitable, this scheme does not compound the problem. This is particularly important in regions where production costs are higher. Avoiding a supplementary burden in such a situation can help mines pass through a depressed mining cycle without having to shut-down production, thus avoiding the painful socio-economic consequences that irremediably afflict local mining communities when such occurs. When prices are high and profits are up, a profit-based scheme gives governments a larger proportion of the value generated. However, the royalty amounts collected by the government will mirror the cyclability of the mining industry and there is a risk that they may be nil for some mines during certain years.
- The hybrid royalty schemes, including the “Super Profit” variant, combine the advantages and disadvantages of the other two categories. It is particularly important to monitor and adjust the royalty rates of the two components. Thus, if the *ad valorem* component is too high, the hybrid scheme will suffer the disadvantages associated with *ad valorem* scheme. It is also critical to determine the extent to which *ad valorem* royalties will be deductible from the profit-based royalties, as is the case in Australia and British-Columbia. In the absence of such a provision, the fiscal burden imposed on mining projects may well be too large, with the result that these projects will no longer be competitive and, therefore, may never be realized. Moreover, when prices adjust downwards or when the industry generally assumes that prices will decline, as are the current expectations, a hybrid royalty scheme takes on all the disadvantages of the *ad valorem* royalty scheme, disadvantages which are particularly significant for a jurisdiction characterized by relatively high costs of production.

It is generally observed that (i) *ad valorem* schemes are common in jurisdictions with weak tax administration organizations or low cost mining operations; (ii) profit-based schemes are preferred in jurisdictions with efficient tax collection agencies such as North American jurisdictions and, (iii) hybrid regimes are prevalent in jurisdictions which combine well developed fiscal authorities and abundant and low cost mining operations. This pattern is coherent with the above qualitative analysis. Notwithstanding the type of royalty scheme, the quantum of the royalty levies has considerable impact on the investment decision to develop a mine. This is accentuated by the fact that the selection of projects that will be financed is generally made on a competitive global scale. Table 8 summarized the main features of the mining royalty schemes and corporate tax levels in jurisdictions that are Quebec’s main competitors in the iron ore and gold sectors.

TABLE 8
ROYALTY SCHEMES AND RATES IN COMPETING REGIONS
(July 1st, 2012)

	Combined Tax Rate on Companies	Type of Mining royalties	Competent Authority	Mining Royalty Rate (Gold)	Mining Royalty Rates (Iron if Different from Gold)	Last Changed
Quebec	26.9%	Profits	Provincial	16%	-	2012
Newfoundland and Labrador	29%	Profits	Provincial	15% on company profits 20% on royalties to a third private party if any	-	1975
Ontario	25% ¹	Profits	Provincial	10%	-	1990
British Columbia	25%	Ad valorem + profits	Provincial	2% ad valorem²	-	1989
Alaska	44.4%	Profits	State	- Profits <\$40K US = 0 - Profits >\$40K US ~3.3% - Profits >\$50K US ~5.2 - Profits >\$100K US ~7.4%	-	1955
Nevada	35%	Profits	State	Varies from 2 to 5\$ (function of the ratio of profits over revenues)	-	1989
Peru	30%	Ad valorem (progressive)	National	1% - 7.14% (always > 1% revenues)	-	2011
Mexico	30% ³	None	None	0% (but are thinking about establishing one)	-	2008
Chile	20% ⁴	Ad valorem (progressive)	National	4% - 9% ⁴	-	2010
Brazil	15% Base 10% >240K R\$ 9% global revenues regime	Ad valorem	National	1%	2% ⁵	Ongoing
South Africa	28%	Ad valorem (progressive)	National	0.5% - 7% (depending on profitability) ⁶	-	2010
Western Australia	30% ⁷	Ad valorem + profits	National & State	2.5%	6.5%⁷ 22.5% applies to profits > \$125 M (iron and coal)	2012

¹Specific tax rate for agriculture, mining, forestry and fishery concerns. For other types of enterprise, the rate is 26%.

²Based on the actual net product (mining revenues less certain operating expenses); deductible from taxes on profits (including future taxation years with an interest rate of 125% of the federal rate.

³Will change to 29% in 2013, and then 20% in 2014.

⁴Will change to 5 – 14% for royalties and the tax rate will be at 18% in 2013, then 17% in 2014.

⁵Considering raising it to 4%.

⁶Precise formula not revealed.

⁷Rate will be set at 7.5% for royalties, and 29% for the combined tax rate in 2013.

2.1 THE QUEBEC MINING ROYALTY SCHEME

Canadian mining operations are subject to a three-tiered tax system:

- A federal income tax levied on a mining corporation's taxable income (as a rule, net of operating expenses, depreciation on capital assets and the deduction of exploration and pre-production development costs);
- Provincial income taxes generally based on the same (or similar) taxable income; and
- Provincial mining taxes, duties or royalties levied on a separate measure of production profits or revenues.

The Quebec mining royalty scheme which was introduced in 2010 has the following main features:

- It is based exclusively on profits, at a rate of 16%;
- The applicable profit is determined on a mine per mine basis;
- The rate of the depreciation allowance was reduced from 100% to 30% for property acquired after March 30, 2012;
- The parameters of the processing allowance were reduced to 7% and 13%, as the case may be;
- An additional allowance for a new mine located in Northern Quebec.

The current royalty rate of 16% in Quebec is amongst the highest levy for profit-based royalty schemes. It is estimated that this royalty scheme will yield a "tax intake" equivalent to about 4.4% of the total value of mineral shipments. The total tax burden on a typical mining operation in Quebec would amount to about 40.9% of profits. This compares to total tax burdens of 29.8% in Ontario, 37.3% in British Columbia and 41.2% in Newfoundland and Labrador⁷.

2.2 THE ALTERNATE ROYALTY SCHEMES PROPOSED IN QUEBEC

Several proposals have been put forward to change the current mining royalty scheme. All these proposals include an *ad valorem* component. For instance, the Parti Québécois proposes a scheme modeled on the Australian "Minerals Resource Rent Tax" ("MRRT") which would comprise a 5% *ad valorem* royalty and a 30% tax on the consolidated profits generated in Quebec which exceed a 8% return on capital. In an attempt to capture the gist of the proposals that fuel the public debate, the following four royalty schemes have been compared:

1. The current royalty scheme in Quebec: 16% royalty on the profits of each mine;
2. An *ad valorem* royalty scheme: 7% royalty on the value of the mineral extracted;
3. A scheme applied in Western Australia: a 6.5% *ad valorem* royalty combined with a 22.5% royalty on profits over \$125M applied on a company basis for iron ore and a 2.5% *ad valorem* royalty for gold;

⁷ PwC, "Digging Deeper, Canadian mining Taxation", 2011.

4. A hybrid model based on a 5% *ad valorem* royalty plus a 30% “super profits” royalty applied on all mining profits exceeding 8% of mining revenues.

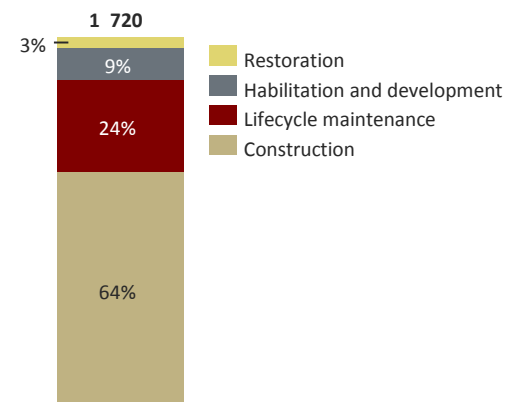
The defining characteristic of an efficient mining royalty scheme is that it takes into account the cumulative effects taxes have on the economics of mining projects and on the potential levels of future investments. In the words of the World Bank, “nations should carefully weigh the immediate fiscal rewards to be gained from high levels of tax, including royalty, against the long-term benefits to be gained from a sustainable mining industry that will contribute to long-term development, infrastructure, and economic diversification⁸.” The analytical framework used in the Report circumscribes the impact of the four schemes on these critical dimensions.

3. THE INVESTMENT DECISION MAKING PROCESS IN THE MINING INDUSTRY

The discounted cash flow modelling is the generally accepted valuation technique for mining projects. As for any capital investment decision, the driving factors are the cash flows related to the capital and operating costs, revenues expected to be generated by the project and the uncertainty (or risks) associated with each factor. The peculiarity of most mining projects is their long-term horizon and the very high level of uncertainty that surrounds each factor. In addition, the decisions must also consider the uncertainty as to regulatory obligations concerning environmental, labor, local communities and aboriginals and taxation requirements. Clearly, this latter source of uncertainty is much more acute in some jurisdictions than in others.

The net present value (“NPV”) of a project allows companies and investors to rank order potential projects and select those which should produce the best returns. More sophisticated models such as Dynamic DCF and Real Option modelling provide decision-makers with enhanced cash flow models that improve economic analysis, risk assessment and the management and financing of mining projects. In the final analysis, the investment decision making processes that use these sophisticated techniques which take better account of the uncertainty in capital and operating costs and the volatility in metal prices still rest on the expected NPV of a project.

FIGURE 3
DISTRIBUTION OF CAPITAL COST OVER THE
LIFE OF A MINING PROJECT
(2012, \$ CAN million)



Source : Secor-KPMG, « Les redevances minières au Québec », Table 6, 2012

⁸ Otto, J. et al. (2006). *Mining Royalties : A Global Study on Their Impact on Investors, Government, and Civil Society*. World Bank : Washington D.C..

3.1 CAPITAL AND OPERATING COSTS

The allocation of capital costs from inception to mine site closure is illustrated in Figure 3. The data is taken from the feasibility study of a major gold mine in Quebec. Total capital costs throughout the life of this project were estimated at \$CAN 1.7 billion. But this is not the whole story.

Capital project execution is fraught with considerable risks. For instance, between October 2010 and March 2011, the average reported project overrun by public mining companies was about 71% of the original project cost estimate. Rapidly escalating costs in recent years across the global mining industry are expected to intensify over the next several years due to a number of factors, including labor, energy, ore grades, supplier constraints and taxes. Furthermore, high crude oil prices, wage inflation and increasing complexity are driving operating costs⁹. Quebec is not immune to this cost escalation. Between 2003 and 2010, the unitary cost of drilling has increased 43%. From 1980 to 2005, the ratio of the value of shipments to mining investments has hovered around 3.5. Since 2006, this ratio has declined as low as 2.33 in 2010. Although the ratio is expected to improve in 2011, it does illustrate the rapid increase in capital and production costs relative to commodity prices¹⁰.

In addition to the cost inflation and usual cost overrun risks associated with major engineering and construction project execution, mining companies must take into account the fact that the very large investments during the construction phase are made before mineral extraction and cash generation begins which makes financing a critical dimension.

3.2 THE PRICE OF MINERALS AND METALS

The high volatility of prices for minerals over the life of the contemplated mine makes the investment decision process more complex at the preliminary production phase. The unprecedented level of commodity price volatility is driven in part by macroeconomic uncertainty and the lack of transparency of demand, particularly in China and India, over a reasonable horizon. This issue is compounded by the increased volatility in currency markets.

In recent years, the mining industry has seen a significant growth in the price of all metals. Today, strong doubts persist, both in the financial markets and within the industry, on the sustainability of these recent price levels. Indeed, for several minerals, notably iron ore, world prices have been declining in the last twelve months (Table 9). Capital cost inflation without a concurrent increase in underlying commodity prices calls for revisions of capital expenditure targets and puts in question several projects.

⁹ See, for instance, Ernst & Young "Business risks facing mining and metals 2012 -2013", 2012.

¹⁰ Institut de la statistique du Québec, « Mines et chiffres », Nov. 2011.

TABLE 9
AVERAGE SALE PRICES
(\$ US/metric ton)

	2 Q11	1 Q12	2 Q12
Iron Ore	145.3	109.26	103.29
Thermal Coal	95.29	87.58	70.97
Metallurgical Coal	256.53	209.53	171.13
Nickel	25,541.96	19,696.43	17,761.9
Copper	8,871.38	8,117.28	7,566

Source : Vale, S.A., "Performance of Vale in 2Q12", July 25, 2012.

3.3 PROJECT FINANCING CHALLENGES

The increased risks associated with mining projects coupled with the volatility seen on capital markets raise serious funding challenges for the mining industry. In several segments – gold being the primary example – there has been a decoupling between the price of the metal and the market value of the mining companies. Gold prices have increased 30% in 2010 followed by another 25% gain in 2011; yet, this surge has not been reflected in gold mining companies' equity valuations. Recently, it has been observed that access to financing for mining development projects has become increasingly restricted, except for the well-established producing companies.

The bottom line is that even when the profitability of a mining investment is estimated to be attractive under reasonable assumptions, there is no assurance whatsoever that the company will be able to raise the necessary capital in the market in competition with other investment alternatives.

4. FINANCIAL SIMULATIONS OF ROYALTY SCHEMES

The analytical framework used for the Report relies on a financial model built with information drawn from recently published feasibility analyses which conform to National Instrument 43-101 adopted by the Canadian Securities Administrators. The model takes into account variables such as price and production costs and is used to calculate the NPV of a mining project under the four royalty schemes mentioned above. The financial simulations take full account of all fiscal measures applicable to an active mine in Quebec¹¹.

¹¹ The analytical framework does not pertain to other mining policy dimensions such as (i) infrastructure expenditures by the Quebec government; (ii) costs incurred by mining companies related to environmental and social regulations; (iii) considerations related to mandated or voluntary beneficiation; and (iv) the impact on regional job creation and employment.

4.1 AN IRON MINE IN QUEBEC

For the purpose of the financial simulation, the analysis is based on a typical iron mine in the Labrador Trough with a projected lifespan of 20 years. Total capital cost for the acquisition of the deposit and construction of the mine is set at \$1,417 million. The main characteristics of the mining project are given in Annex A. The mineral price and operating costs assumptions are as follows:

— Price assumptions

The prices are the spot price 62% Fe FOB Sept-Iles. These prices are lower than the 62% Fe CFR Tianjin since they do not include transportation costs. The prices used for the simulations are:

- \$100 US/ton which corresponds to recent industry long-term forecast.
- \$75 US/ton, a 25% discount to current forecast. This price is, however, higher than the average price of \$60 US/ton that prevailed in 2009.
- \$140 US/ton, a price corresponding to 2011 spot prices in Sept-Iles.

— Cost assumptions

The operating cost assumptions are:

- \$53/ton of concentrate which corresponds to the costs estimated for the Fire Lake North project and is representative of the cost of operating mines in the Labrador Trough. This cost level is characteristic of 3rd quintile iron mines.
- \$32.5/ton of concentrate which is typical of first quintile mines.
- \$70/ton of concentrate which corresponds to the average of fourth and fifth quintile mines operating worldwide.

The results of the financial simulations are shown in Tables 10 and 11.

TABLE 10
NPV OF IRON ORE MINE PROJECT UNDER DIFFERENT ROYALTY SCHEMES
(NPV - \$US/thousand)*

ASSUMPTIONS									
Iron ore price (\$US/ton)		\$100			\$75			\$140	
Production cost (\$US/ton)	\$53	\$32.5	\$70	\$53	\$32.5	\$70	\$53	\$32.5	\$70
ROYALTY SCHEMES									
	NPV (\$)	NPV (\$)	NPV (\$)	NPV (\$)	NPV (\$)	NPV (\$)	NPV (\$)	NPV (\$)	NPV (\$)
Profits (16%)	1,240	2,058	432	15	-	(1,132)	3,085	3,887	2,310
Ad Valorem (7%)	1,078	2,044	124	(278)	(125)	(1,519)	3,106	4,460	2,191
Australian Model (ad valorem 2.5%)	1,169	2,089	162	(250)	(63)	(1,419)	3,102	3,828	2,372
Hybrid "Super Profits" (5% ad valorem +30% profits)**	937	1,650	195	(179)	(234)	(1,408)	2,408	3,107	1,827

* Cash flows after royalties, income taxes and interest are discounted at a rate of 8%

** On profits exceeding 8% of revenues

Sources : Secor-KPMG, « Les redevances minières au Québec », Tables 17, 19 and 21, 2012.

TABLE 11
NPV OF GOVERNMENT REVENUS FROM IRON MINES UNDER DIFFERENT ROYALTY SCHEMES*
(\$CAN/thousand)

ASSUMPTIONS									
Iron ore price (\$US/ton)		\$100			\$75			\$140	
Production cost (\$US/ton)	\$53	\$32.5	\$70	\$53	\$32.5	\$70	\$53	\$32.5	\$70
ROYALTY SCHEMES/GOVERNMENT REVENUES									
	NPV (\$)	NPV (\$)	NPV (\$)	NPV (\$)	NPV (\$)	NPV (\$)	NPV (\$)	NPV (\$)	NPV (\$)
Profits (16%)									
— Canada	225	383	82	22	161	-	588	750	434
— Quebec	485	806	195	73	355	-	1,221	1,556	910
Ad Valorem (7%)									
— Canada	198	384	38	-	142	-	595	787	413
— Quebec	673	820	546	387	499	387	1,194	1,346	1,049
Australian Model (ad valorem 2.5%)									
— Canada	168	316	38	-	123	-	482	633	340
— Quebec	612	842	509	359	456	359	1,311	1,731	941
Hybrid "Super Profits" (5% ad valorem +30% profits**)									
— Canada	167	302	46	3	117	0	466	604	337
— Quebec	846	1 296	467	285	632	276	1,949	2,419	1,490

* Royalties and income taxes are discounted at a rate of 8%.
** On profits exceeding 8% of revenues.
Sources : Secor-KPMG, « Les redevances minières au Québec », Tables 20, 22 and 24, 2012.

4.2 FINANCIAL SIMULATIONS FOR A GOLD MINE

The financial model for the simulation of the impact of the four royalty schemes for a gold mine are based on the representative characteristics of a low grade high volume mine in Quebec: grade of 1,00 g/t over a 14 years horizon. The capital cost for the acquisition of the deposit and construction of the mine amounts to \$1,250 million (see Annex B).

The production cost and price assumptions are as follows:

— Production cost

- \$600 US/once which corresponds to the average production cost of the majority of gold mines in operation in Quebec. This level is characteristic of mines in the third quartile.
- \$900 US/once which corresponds to mines in the fourth quartile. The Beaufort mine is in this category. New greenfield mines are likely to exhibit such a cost structure.

– **Gold prices**

- \$1,200 US/once which is equal to the median long-term price forecast of 50 banks covering the gold market.
- \$900 US/once, the lowest price forecast by those same banks. The average price in 2008 was \$871 US/once.
- \$1,600 US/once, the highest price forecast by these banks. This price is similar to the average price in 2011 of \$1,568 US/once.

The results of the financial simulations are summarized in Tables 12 and 13.

TABLE 12
NPV OF GOLD MINE PROJECTS UNDER ROYALTY SCHEME VARIANTS*
(\$US/thousand)

ASSUMPTIONS						
Gold price (\$/once)	\$1,200		\$900		\$1,600	
Production cost (\$/once)	\$600	\$900	\$600	\$900	\$600	\$900
ROYALTY SCHEMES						
	NPV (\$)	NPV (\$)	NPV (\$)	NPV (\$)	NPV (\$)	NPV (\$)
Profits (16%)	1,038	66	66	(1,331)	2,248	1,344
Ad Valorem (7%)	922	(288)	(187)	(1,636)	2,252	1,181
Australian Model (ad valorem 2.5%)	1 117	(27)	9	(1,440)	2,508	1,440
Hybrid "Super Profits" (5% ad valorem +30% profits**)	792	(173)	(133)	(1,549)	1,800	1,024

* Cash flows after royalties, income taxes and interest are discounted at a rate of 5%.

**On profits exceeding 8% of revenues.

Sources : Secor-KPMG, « Les redevances minières au Québec », Tables 24 and 26, 2012.

TABLE 13
NPV OF GOVERNMENT REVENUES FROM GOLD MINES PROJECTS
UNDER ROYALTY SCHEME VARIANTS*
(\$CAN/thousand)

ASSUMPTIONS						
Gold price (\$/once)	\$1,200		\$900		\$1,600	
Production cost (\$/once)	\$600	\$900	\$600	\$900	\$600	\$900
ROYALTY SCHEMES/GOVERNMENT REVENUES						
	NPV (\$)	NPV (\$)	NPV (\$)	NPV (\$)	NPV (\$)	NPV (\$)
Profits (16%)						
– Canada	153	-	-	-	392	212
– Quebec	377	52	52	-	860	494
Ad Valorem (7%)						
– Canada	134	-	-	-	394	183
– Quebec	512	406	305	305	854	686
Australian Model (ad valorem 2,5%)						
– Canada	170	-	-	-	445	233
– Quebec	280	145	109	109	547	378
Hybrid “Super Profits” (5% ad valorem +30% profits**)						
– Canada	106	-	-	-	301	150
– Quebec	669	291	231	218	1 399	877

* Royalties and income taxes are discounted at a rate of 5%.

** On profits exceeding 8% of revenues.

Sources : Secor-KPMG, « Les redevances minières au Québec », Tables 25 and 27, 2012.

4.3 OBSERVATIONS

The results shown in the tables 10 to 13 above provide a cogent explanation for the choice of royalty structures used in different mining regions. They also demonstrate the conundrum of mining fiscal policy: government revenues are optimized only if the structure and levels of the royalty scheme take into account the impact on investment decisions. Several observations are in order:

- Although the hybrid scenario proposed by the Parti Québécois would appear to generate the highest revenues for the Quebec government, the profitability of the investment would be negative in all but under very favourable cost and pricing conditions throughout the life of the mines. Such a scenario is very unlikely to be retained as the basis for a positive investment decision and, consequently, it would likely deter investment decisions for most, if not all, greenfield mining projects in Quebec.

- *Ad valorem* schemes significantly increase the risk of investments compared to royalty schemes based on profits. This negative impact is exacerbated in a low-price high-production cost environment. For example, we see that the NPV of the iron ore projects swings negative at the average production cost in Quebec of \$53 US/ton at prices of \$75 US/ton for all schemes with an *ad valorem* component whereas, under the same conditions, the investment remains profitable under the present Quebec royalty scheme. This effect is still more accentuated for gold mines.
- The simulations show that in regions characterized by low productions costs, *ad valorem* schemes have minimal impact on the profitability of the investments while generating additional government revenues compared to a scheme based solely on profits. Unfortunately, compared to many other mining regions, Quebec is not endowed with mineral deposits that can be mined at low cost.

The dynamic impact of a royalty scheme has far-reaching consequences. A well-designed mining royalty scheme will consider its likely impact on exploration activities. Exploration is a high risk activity of a highly speculative nature which is generally performed by junior exploration companies (58.4% of exploration expenditures in Quebec in 2010) financed with equity, mostly in public markets. Since the probability of success is low, expected returns need to be high in the event of the discovery of an economically viable mineral deposit. Recent history carries an important lesson.

In 1988, exploration expenditures in Quebec fell dramatically (from \$504M in 1987 to \$185M in 1989) and remained at an anaemic level until 2003. Between 1999 and 2008, Quebec's share of Canadian mineral production gradually declined from 19.8% to 11.5%. The recent increase in mining investments is directly linked to the gradual resurgence of exploration activities since 2003. Hence, the expectation that a change in the structure and rates of the royalty scheme in Quebec would seriously impinge on the expected profitability of mining investments will most likely curtail exploration activities and jeopardize future mine discoveries and investments.

The results of the financial simulations provide insights about the dynamic effect of different mining royalty schemes. Clearly, there is no scheme that is universally superior to the other: a good royalty scheme must be adapted to the economic and mining circumstances of the region where it applies. This conclusion should not be lost on heedful policy makers.

5. CONCLUSION

An informed debate on the subject of mining royalties in Quebec must rest on rigorous analyses which take into account the key factors that apply. Quebec is highly attractive for its mineral potential because 90% of its bedrock consists of Precambrian rock of the Canadian Shield, a geological assemblage well known for its gold, copper, zinc, nickel, iron and ilmenite deposits. The social, economic and political environment is also generally supportive of mining activities. However, the fact remains that Quebec mines are relatively low grade and high cost operations geographically distant from the important Asian markets.

The strong prices for metals and minerals that have prevailed in the last five to ten years have prompted governments, local communities and aboriginal groups worldwide to claim a larger share of the economic rent stemming from these favourable conditions. In numerous cases, these demands implicitly – and sometimes explicitly – assume that these high prices are the “new normal”. History shows that this is very unlikely to be the case, a lesson that has begun to unfold with the recent significant drop in commodity prices.

The results of the financial simulations which reflect the characteristics of iron ore and gold mines in Quebec corroborate the qualitative evaluation found in international studies of the four royalty scheme variants considered. The unequivocal conclusion that emerges from the comparative analysis is that a change to the structure of the present royalty scheme or an increase of the mining royalty rate will not necessarily lead to an increase in fiscal revenues in the medium and long terms since such a change in policy is likely to compromise future investments. An optimal royalty scheme must take full account of the unique characteristics of (i) the Quebec mining sector; (ii) the competitive position of the sector compared to other producing regions around the world; and, (iii) the evolution of mineral prices over various mining cycles, including periods of high and bearish prices. Quebecers will derive much larger benefits from their mineral endowment if the royalty scheme does not focus on short-term government revenues and gives appropriate weight to the impact of the royalty scheme on the risk/reward equation that is fundamental to investment decisions.

Quebecers would do well to recall the old common saying from their rural roots that “one should never attempt to milk the cow for more milk than it can give for fear of losing her”.

ANNEX A

MAIN ASSUMPTIONS CONCERNING THE IRON MINE PROJECT

MINE		
Deposit Characteristics		
Tons	(000's)	921,800
Fe Grade	%	35%
Strip ratio		3.8
Iron recovery rate		80%
Average annual productionn (65% Fe)	(000's)	8,372
Operating Costs		
Mining	(\$ per ton extracted)	2.30
Processing	(\$ per ton of ore)	2.70
Administration	(\$ per ton of ore)	0.90
Rail transportation & port operations	(\$ per ton of ore)	5.50
Construction time	(years)	1
Start-up	(year)	2014
Mine Life	(years)	20
CAPITAL COSTS		
Exploration	(M \$CAN)	\$50
Construction	(M \$CAN)	\$1,367
Maintenance and life cycle	(M \$CAN)	\$671
OTHER		
Income tax rate – CAN	(%)	15.0%
Income tax rate – QC	(%)	11.9%
Exchange rate CAD/USD		1.05
Discount rate	(%)	8%

ANNEX B

MAIN ASSUMPTIONS CONCERNING THE GOLD MINE PROJECT

MINE		
Deposit Characteristics		
Tons	(000's)	270,465
Au Grade	(g/t)	1.00
Au Contained	(thousand oz.)	8,696
Strip ratio		2
Au Recovery rate	(%)	90%
Operating Costs		
Mining	(\$ per ton extracted)	2.58
Processing	(\$ per ton of ore)	9.00
Administration	(\$ per ton of ore)	1.50
Construction time	(years)	2
Start-up	(year)	2016
Mine Life	(years)	14
CAPITAL COSTS		
Exploration	(M \$CAN)	\$150
Construction	(M \$CAN)	\$1,100
Maintenance and life cycle	(M \$CAN)	\$420
OTHER		
Income tax rate – CAN	(%)	15.0%
Income tax rate – QC	(%)	11.9%
Exchange rate CAD/USD		1.05
Discount rate	(%)	8%