
LEVELLING THE PLAYING FIELD

Supporting Mineral Exploration and Mining in Remote and Northern Canada

APRIL 2015



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Prospectors & Developers Association of Canada
Yukon Chamber of Mines

PREFACE

The purpose of this report is to provide policy makers and the broader public with more information on the uneven playing field faced by mineral exploration and mining companies operating in northern and remote Canada, in order to catalyze smart and effective public investments that support responsible northern resource development. While the primary audience of the report is the federal government, provincial and territorial governments should also review the recommendations and explore to what extent they could adopt or adapt them for implementation at a regional level.

The report begins by assessing the mineral industry's value proposition for remote and northern regions, outlining past and current contributions as well as future opportunities. The report then identifies a "disconnect" between stated federal social and economic development policy objectives for remote and northern regions and federal fiscal policy, in light of several recent mineral industry tax policy reforms.

The body of the report quantitatively establishes the cost differential to undertake exploration and mine development and operation in remote and northern versus centrally located jurisdictions. It then determines the principal sources of those cost differentials, and assesses their impact on the economics of remote and northern exploration and mining projects. The report puts forward recommendations that, by enhancing the competitiveness of industry activities in remote and northern regions, will help federal, provincial and territorial governments deliver on publicly stated social and economic policy objectives for these regions.

The study only focuses on the cost differential between north and south and does not examine other issues that relate to the relative competitiveness of the northern operating environment.

Finally, a note on how the authors understand the scope of the report and its intended audience. There is an automatic tendency to think exclusively of the three territories when using the words "north" or "northern". For the purposes of this report, however, the terms "north" or "northern" (unless otherwise specifically indicated) are used in a more inclusive sense to include remote and northern regions of the provinces (as well as the territories).



EXECUTIVE SUMMARY

Canada is a resource nation, and its minerals industry has helped make it a global resource powerhouse. The minerals industry contributed over \$71 billion in taxes and royalties to Canadian governments between 2003 and 2012, and creates significant economic opportunities for residents of remote, rural and Aboriginal communities.¹ In addition, the mining industry sources many of its inputs from Canadian suppliers and its outputs are the source of significant value-added increases when used by Canadian manufacturers.

There are two indicators, however, of challenges to the long-term viability of the industry: reserves for several key base metals have experienced significant declines since the 1980s,² and production volumes of key commodities have also been declining.³ These indicators point to a twofold problem: the need to make more discoveries (to replace declining reserves) and the need to bring new and existing discoveries into production. The alternative is the slow contraction of the Canadian mining industry over time, and a gradual decline of the social and economic benefits that it generates.

Remote and northern parts of Canada hold the key to resolving both challenges. Exploring and mining in these areas come, however, with a hefty cost premium. This report provides much-needed empirical data on this cost premium, and presents an analysis of the primary drivers for it. For example, the report looks at how exploration costs rise as a function of the distance between the project and transportation infrastructure and compares the return on a typical mining project located in a northern part of Canada with an otherwise similar project located in the southern part of the country.

Companies operating in northern Canada face a unique set of challenges that more centrally located industries in Canada do not have to face. These challenges derive from and are inextricably linked to the characteristics that define the geographical regions themselves: remoteness, severe weather, undeveloped infrastructure, and (in many cases) sparse populations or no people for hundreds of kilometres. These challenges combine to make exploration and mining substantially more expensive than in most of southern Canada, and can make it difficult for northern parts of the country to attract the investment necessary to sustain the economic opportunities generated by the industry.

MAIN FINDINGS

The research undertaken for this report clearly demonstrates that the cost premium for both exploration and mining is directly linked to the transportation infrastructure deficit in remote and northern Canada.⁴

Exploration

Expenditure and cost information was obtained from fourteen different exploration projects owned by three senior companies and five junior companies, to empirically assess how costs varied. It became clear that the primary driver of cost variation was the distance of a project from the transportation infrastructure required to service the needs of the project. In other words, 'remoteness' (rather than degree of latitude) was the primary variable determining the costs faced by exploration companies.

As a working definition, a 'remote' project was defined as one that was more than 50km away from a transportation route, or supply centre (hereafter 'supply route') capable of supporting the needs of the project.

1 ENTRANS Policy Research Group Inc., "Payments to Governments by the Canadian Mineral Sector 2003-2012", 2013 http://mining.ca/sites/default/files/documents/Entrans_PaymentsstoGovernments_2013_0.pdf

2 Drake, Arleen, "Canadian Reserves of Selected Major Metals and Recent Production Decisions," 2012 <http://www.nrcan.gc.ca/mining-materials/exploration/8294>.

3 See Annex II of *Mining Sector Performance Report, 1998-2012*, produced by Natural Resources Canada with the Intergovernmental Working Group on Minerals and Metals, <http://www.nrcan.gc.ca/sites/www.nrcan.gc.ca/files/mineralsmetals/files/pdf/MSP-report-eng.pdf>.

4 While there is a direct linkage between infrastructure and the "northern cost premium," it must be acknowledged that there are other factors that contribute as well. For example, territorial projects needing to go through the Institutions of Public Governance (Board) process incur additional costs unique to those processes.

Projects were grouped into three categories: non-remote (50km or less from a supply route); remote (from 51km to 500km); and very remote (more than 500km).

Based on these groupings, an analysis of average costs (using all-in costs for diamond drilling) revealed the following:

- The average costs of the remote and very remote projects (more than 50 km from a supply route) were 2.27 times more expensive than the average costs of the non-remote projects (up to 50km away).
- The average costs of the very remote projects (more than 500km from a supply route) were, on average, 2.8 times higher than the non-remote projects.
- The highest cost project, obtained from a project in the Arctic, was almost six times that of the lowest cost project, which was in an established mining camp.

Production

The mine development cost premium is largely due to the need to invest in infrastructure that would not be required for an otherwise equivalent southern mine. This infrastructure includes power plants, accommodation facilities, aircraft and airstrips, winter and permanent roads and ports. These costs loom particularly large in the gold and base metal projects but less so for diamonds. Costs for northern mine development include:

- Capital costs, which can be particularly high compared to an equivalent mine in a centrally located jurisdiction:
 - About double for gold mines
 - 2.5 times higher for base metal mines
 - 15%-20% higher for diamond mines
- Operating costs, which are about 30%-60% higher

Assuming an approximate continuation of current mineral prices, the effect of the northern cost premium significantly reduces the internal rate of return on northern gold and base metal projects (by roughly three-quarters and two-thirds respectively) relative to their southern equivalents. For diamonds, a northern project remains profitable despite higher costs (returns are somewhat lower if the investor is tax limited). However, the before-tax returns to northern gold and base metal projects, while challenging, suggest that the projects still have social value.

The higher cost profile of exploration and mining in remote and northern Canada is reducing the competitiveness of those regions as a destination for mineral investment. Without creative action to address these challenges, the industry may not be able to sustain the same level of economic benefits for future generations of Canadians.

POLICY RECOMMENDATIONS

The five associations that partnered in the study make the following recommendations on how federal, provincial and territorial fiscal policy can help “level the playing field” for companies operating in remote and northern Canada.

To support exploration in remote and northern areas:

- Create a new and enhanced federal Mineral Exploration Tax Credit (METC) for projects in remote and northern parts of Canada (25% instead of the current 15%).
- Explore options to incentivize drilling on early-stage exploration projects in remote and northern areas, such as the incentive offered by the Government of Western Australia.⁵

⁵ Government of Western Australia, “Program 2 Innovative Drilling: Government Co-funded Exploration Drilling,” last modified February 27, 2015, <http://www.dmp.wa.gov.au/7748.aspx>.



In the absence of governments assuming full responsibility for construction of the infrastructure required to open up northern Canada, the following are recommended to support mining in remote and northern areas:

- Create an investment tax credit (10%) on all capital expenditures associated with remote and northern mines.
- Provide a supplementary 15% investment tax credit on specified infrastructure investments (e.g., roads, ports, docks, dams, rail lines, power plants).
- Assuming the 10% investment tax credit as a base, create a mechanism for conditionally repayable contributions related to infrastructure investments (in lieu of the supplementary 15% investment tax credit) that could cover up to 25% of specified infrastructure investments, with the option of pardoning the loan in exchange for public ownership of that infrastructure at mine closure.
- Establish a northern infrastructure investment bank to provide long-term financing (loans, bonds, equity) for resource-development-related infrastructure projects in the territories. Such an institution could serve as a mechanism to distribute and manage the repayable contributions recommended above.



MINING – REMOTE AND NORTHERN CANADA’S OPPORTUNITY

Mining is the economic advantage of remote and northern Canada. The discovery, development and production of mineral resources in these areas result in increased regional investment, business development, revenue generation and employment. This economic activity increases income, corporate and property taxes and royalty payments to governments, augments territorial, provincial and national GDP, and helps support one of the world’s largest mining supply sectors (which generates its own robust economic contributions to local, provincial and national economies).⁶

THE NORTHERN REGIONS OF PROVINCES

Exploration and mining activities have made significant contributions to the prosperity of numerous communities across the northern regions of provinces in recent years (see Figure 1). Mining employment across the northern regions of all provinces for 2011 neared 16,000 workers, with mining producing more than \$3.4 billion in mineral output (see Table 1).

FIGURE 1: TOP 100 EXPLORATION AND DEPOSIT APPRAISAL PROJECTS⁷

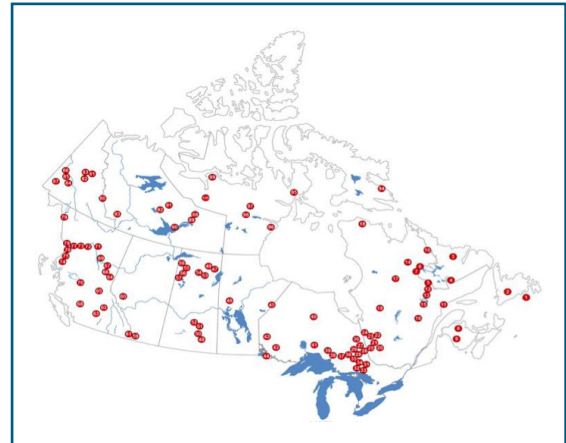


TABLE 1: MINING’S ECONOMIC CONTRIBUTIONS TO NORTHERN REGIONS OF PROVINCES – 2011

Province	Northern Primary Mineral Mining Output (\$2002 millions)	Employment of Northerners in Primary Mineral Mining
Newfoundland and Labrador	677	2,516
Quebec	411	158
Ontario	1,667	11,155
Manitoba	172	322
Saskatchewan	190	197
Alberta	131	175
British Columbia	155	1,368
Total	3,403	15,891

Source: Conference Board of Canada – The Future of Mining in Canada’s North⁸

THE TERRITORIES

At the time of writing (March 2015), eight mines were operating across the territories. These mines are making a significant contribution to local and regional economic development. Recent data indicate that mining accounts for approximately 15% of overall employment in the Yukon, NWT and Nunavut combined, with proportionally large

6 See the 2014 study about “the ‘hidden’ supply sector [that] nearly doubles mining contributions to Ontario’s economy.” Canadian Association for Mining Equipment and Services for Export, Pan-Ontario Mining Supply and Services Sector Economic Impact Study, October 22, 2014, http://www.camese.org/uploads/Pan-Ontario_mining_supply_and_services_sector_economic_impact_study_-_October_22nd_2014.pdf

7 Natural Resources Canada. “Map of Top 100 Exploration and Deposit Appraisal Projects of 2014 (Based on Expenditures).” Accessed from http://www.nrcan.gc.ca/mining-materials/exploration/17179?utm_medium=email&utm_source=map_top_100_march%202015&utm_campaign=mms_e_letter_&utm_content=link1

8 Margaret Caron-Vuotari and Gilles Rheaume, The Future of Mining in Canada’s North, The Conference Board of Canada, January 28, 2013, 9, <http://www.conferenceboard.ca/e-library/abstract.aspx?did=5306>.



percentage contributions to territorial GDP (see Table 2). Additionally, territorial mining projects have generated \$808 million⁹ in royalties to governments from 2003 to 2012.

TABLE 2: MINING'S ECONOMIC CONTRIBUTIONS TO THE TERRITORIES – 2013

Contributions	Nunavut	NWT	Yukon
Total employment in mining	2,215	3,689	2,589
Total employment in all sectors	12,500	22,500	19,300
Employment in territories as proportion of total employment	18%	16%	13%
Mining (and oil and gas) percentage contributions to GDP	18%	27%	12%

Sources: Mining Industry Human Resources Council, Statistics Canada

The diamond mining industry provides an excellent example of the positive impacts the mineral industry can have. Since diamond mining began (only 16 years ago), the three operating diamond mines have elevated Canada into third place in the value of global diamond production.¹⁰

This value has translated into benefits¹¹ that include:

- 44,000 person years of employment, of which 50% is northern and 25% Aboriginal
- Training and support for over 2,100 people
- Spending to construct and operate the mines totalled \$14.8 billion, of which \$10.6 billion is northern and of this northern spending \$4.8 billion is with a new Aboriginal business community
- Community contributions (social investments) in excess of \$100 million

Looking forward, under favourable market conditions and barring unforeseen delays, 15 potential mines could start, or restart, production over the next 10 years in the three territories (see Annex I). Aggregated into Table 3, these projects represent more than \$17 billion in initial capital investment potential and the potential creation of

TABLE 3: FIFTEEN ADVANCED MAJOR MINING PROJECTS IN THE TERRITORIES

NPMO Northern Project Tracker	Projected Capital Investment (\$ millions)	Estimated Jobs
EA	9,482	4,865
Permitting	7,747	2,265
Total	17,229	7,130

Sources: Mining Industry Human Resources Council, Statistics Canada Source: Canadian Northern Economic Development Agency, Northern Projects Management Office data

9 Of the \$808 million, all but \$3million (Yukon's revenues) went to the federal government. See Entrans Policy Research Group Payments to Governments by the Canadian Mineral Sector 2003-1012, Mining Association of Canada, November 19, 2013, http://mining.ca/sites/default/files/documents/Entrans_PaymentsToGovernments_2013_0.pdf.

10 Kimberley Process, Rough Diamond Statistics, https://kimberleyprocessstatistics.org/public_statistics; and Natural Resources Canada, "Mineral Production - Annual Statistics," <http://sead.nrcan.gc.ca/prod-prod/ann-ann-eng.aspx>.

11 NWT & Nunavut Chamber of Mines, Measuring Success 2014: NWT Diamond Mines Continue to Create Benefits, November 2014, http://www.miningnorth.com/_rsc/site-content/library/publications/Measuring_Success_NWT_Diamond_Mining.pdf.



more than 7,100 full-time jobs (nearly double 2013 employment levels), plus significant opportunities for local communities and businesses.¹²

ILLUMINATING THE POTENTIAL: IZOK CORRIDOR PROJECT

To further quantify what this means economically, examine MMG’s Izok Corridor Project – a single project from the list of 15 cited in Annex I – as a case study. While the projected capital investment is noted at \$1.8 billion, further extrapolation is required to assess the full extent of economic development that will follow this initial development cost.

MMG forecasts total project expenditures – initial capital and operating costs over the life of mine – of \$6.5 billion¹³ for Izok Corridor Project, the majority of which will go towards the purchase of goods, services and labour from within Nunavut, the Northwest Territories and the rest of Canada. Table 4 indicates that the project is projected to add a total of \$5.1 billion to the gross domestic product (GDP) of Nunavut and \$2.5 billion to the GDP of the rest of Canada, considering all direct, indirect and induced effects. During operations, the mine’s production will result in an average annual increase of \$391 million to Nunavut’s GDP, equal to 18% of the territory’s output in 2012.

TABLE 4: ESTIMATED CONTRIBUTIONS FROM THE IZOK CORRIDOR PROJECT

Location	Gross Domestic Product (CAD\$ billions)	Employment (person years)	Labour Income (CAD\$ billions)
Nunavut	5.1	12,900	1.5
Rest of Canada	2.5	20,400	1.4
Total (all of Canada)	7.6	33,300	2.9

Source: MMG

The Izok Corridor Project will employ hundreds of people directly, many from within the Kitikmeot region of Nunavut, for a total of 12,900 person years of employment in Nunavut and an additional 20,400 person years of employment in the rest of Canada, considering all direct, indirect, and induced effects. Initial estimates for mineral production have shown direct corporate taxes and resource royalties will total \$390 million over the life of the project, including more than \$100 million in royalties and Impact and Benefit Agreement payments. Government revenues from direct personal income tax will exceed \$150 million plus another \$90 million in other payroll deductions.

While every project is unique, with some requiring greater capital or operating costs over the life of mine, MMG’s estimated total cost for the Izok Corridor Project helps illustrate the scale of economic development that would result should each of the 15 projects move forward. MMG’s projected \$6.5 billion total capital and operating cost over the life of mine runs just over 3.5 times the projected initial capital cost of \$1.8 billion. As a conservative estimate, if the above project list were multiplied by a factor of 2, then total investment over the life of mine for the above 15 projects approaches \$35 billion – a sum that exceeds the 2013 total combined territorial GDP more than 3.5 times.

¹² The term “potential” is an important caveat given the dynamic nature of the industry, which can be affected by markets, financing, corporate decisions, land access, regulatory decisions, and other factors. In these times of economic volatility, it is also important to remember that even projects that have been approved might still have to seek investment or wait for better economics.

¹³ Canadian Northern Economic Development Agency, Northern Projects Management Office data.



SUSTAINING THE BENEFITS

As the preceding sections have shown, the mineral industry has generated, and continues to generate, significant economic opportunities in northern Canada. The ability of the industry to sustain these benefits, however, is not assured. Although it is difficult to break out exploration figures for the northern part of the provinces, NRCan provides a detailed breakdown of exploration and deposit appraisal expenditures in the three territories.¹⁴ Notwithstanding the fact that exploration expenditures have fallen across Canada, the three territories have lost ground relative to the southern provinces, attracting 20% less investment than they did in 2011. Without exploration, there are no discoveries; without discoveries, there are no mines; and without mines, there are no economic benefits for northerners.

Discovering deposits, however, is only part of the solution; the right enabling environment must be in place to facilitate the movement of discoveries into production. Addressing both imperatives will require decisive action by both industry and government, including the adoption of innovative practices by companies and the deployment of a range of policy tools by governments. The next section will highlight the importance, for governments, of taking a holistic approach to unlocking the resource potential of northern Canada, using federal policy in the territories as an illustrative example.

¹⁴ Natural Resources Canada, "Exploration plus deposit appraisal expenditures, by province and territory, 2010-2015," <http://sead.nrcan.gc.ca/expl-expl/27-eng.aspx>.

POLICY DISCONNECT – TOWARDS AN INTEGRATED AND HOLISTIC FEDERAL APPROACH TO RESPONSIBLE RESOURCE DEVELOPMENT IN THE NORTH

In the federal government's Northern Strategy¹⁵ the government outlines its vision for an autonomous, vibrant, prosperous, healthy Canadian North, including:

- **Exercising sovereignty** through the active presence of geoscientists, prospectors, exploration companies and mining companies, and through the shipping and transportation infrastructure to support them, in the most remote parts of Canada's North.
- **Promoting economic and social development** by creating economic opportunities, and increasing the participation of Aboriginal people and communities in those opportunities.
- **Protecting our environmental heritage** through the investments made by companies in baseline and project-specific environmental studies and in environmental performance improvements.
- **Improving and devolving northern governance** by diversifying territorial economies.¹⁶

While Chair of the Arctic Council, Canada made a commitment to support "development for the people of the North" across the Arctic Circle, a region inhabited by four million people in eight countries. A central pillar of Canada's vision for its chairmanship is supporting responsible Arctic resource development that contributes to improving the lives of northerners and supporting sustainable circumpolar communities.¹⁷

In a region with fewer private sector alternatives compared with southern Canada, the mineral industry has already demonstrated its capacity to support inclusive economic growth. As an example, the diamond mines of the Northwest Territories have generated significant employment and business development opportunities for northerners and Aboriginal communities. The opportunity that mineral development presents is most striking in Nunavut, where there are few economic alternatives to resource development, the population is booming, and human development outcomes on a range of measures are poor.¹⁸

In both words and action, the Government of Canada has acknowledged the importance of making it easier to explore and mine in the north, and has deployed a range of policy tools to unlock northern resource potential, including:

- **Geoscience policy:** Investments in geoscience to bring knowledge of the northern landmass up to modern standards. For example, the Geo-mapping for Energy and Minerals Program (GEM) provides modern, regional-scale, geological knowledge of Canada's north. Between 2008 and 2012, eight GEM mineral projects generated considerable staking activity and \$16.7 million in mineral exploration expenditures. Over the long run, the GEM program is expected to stimulate over \$500 million in exploration expenditures.¹⁹
- **Regulatory policy:** Improvements in the efficiency and effectiveness of northern regulatory regimes,²⁰ such as the creation of CanNor's Northern Projects Management Office (NPMO). The NPMO was established to improve the environmental review process for proposed major resource development and infrastructure projects in northern Canada. NPMO has a mandate to improve the timeliness, predictability and transparency of northern regulatory processes to foster a more stable and attractive investment climate in the territories.²¹

15 Government of Canada, "Canada's Northern Strategy," last modified December 21, 2012, <http://www.northernstrategy.gc.ca/index-eng.asp>.

16 The Government of Canada currently provides annual unconditional funding of almost \$2.5 billion to the territories through the Territorial Formula Financing.

17 Foreign Affairs, Trade and Development Canada, "Canada's Arctic Council Chairmanship," last modified July 3, 2014, <http://www.international.gc.ca/arctic-arctique/chairmanship-presidence.aspx?lang=eng>.

18 The Nunavut Roundtable for Poverty Reduction, Understanding Poverty in Nunavut, August 31, 2012, http://makiliqta.ca/sites/default/files/anti-poverty_content_april18.pdf.

19 Government of Canada. "GEM: Geo-Mapping for Energy and Minerals." Last modified January 23, 2015. <http://www.nrcan.gc.ca/earth-sciences/resources/federal-programs/geomapping-energy-minerals/10904>.

20 Government of Canada, "Action Plan to Improve Northern Regulatory Regimes," Economic Action Plan 2014, <http://actionplan.gc.ca/en/initiative/action-plan-improve-northern-regulatory-regimes>.

21 Government of Canada. "Northern Projects Management Office (NPMO)." Last modified February 2, 2015. <http://www.cannor.gc.ca/eng/1370267347392/1370267428255>.



- **Human resources policy:** Investments in skills training initiatives and institutions, such as the 25-month program delivered by the Northwest Territories Mine Training Society in 11 communities and on three mine sites across the Territories and the Kitikmeot region of Nunavut.²² This program, funded by Employment and Social Development Canada's Skills and Partnership Fund (SPF), is being used to train 400 Aboriginal participants in essential mining sector-skills.
- **Aboriginal policy:** Support for communities to prepare for the economic opportunities generated by the resource industry, such as CanNor's Community Readiness and Opportunities Planning initiative.²³

These efforts are helping to make the territories more competitive in terms of attracting investment by the mineral industry. Notwithstanding these efforts, recent changes to federal fiscal policy are moving in a different direction:

- The elimination of the Corporate Mineral Exploration and Development Tax Credit
- The elimination of the Atlantic Investment Tax Credit for resources
- The phasing-out of the Accelerated Capital Cost Allowance for mining
- The rendering of pre-production development expenses ineligible for Canadian Exploration Expense deductions

These fiscal policy changes have been enacted in pursuit of "tax neutrality," to avoid having the tax system distort capital allocation decisions. This policy assumes that it is only the tax system that creates distortions in how capital is allocated. Geography itself, however, and the costs of overcoming geography, also affect the economic viability of otherwise equivalent projects.

If there is a strong policy rationale for supporting economic development in remote parts of the country – and Government of Canada policy to date suggests there is – then fiscal tools must also be used to complement the other policy levers being deployed, for a "whole of government" approach to unlocking northern resource potential to the benefit of companies, northerners, Aboriginals and all Canadians.

More generally, tax neutrality is but one of 10 widely held and recognized guiding principles of good tax policy. Also on the list of 10 principles is "economic growth and efficiency."²⁴ Tax policy must also support economic growth and efficiency; the tax system should not impede or reduce the productive capacity of the economy, nor hinder national economic goals, such as economic growth, capital formation, and international competitiveness. Given the limited opportunities for social and economic development in remote and northern Canada, and with Arctic sovereignty a strategic national consideration, the principles of economic growth and efficiency should be prioritized when guiding fiscal and tax policy towards the mining industry, particularly for companies operating in remote and northern Canada.

This report aims to empirically demonstrate the uneven playing field faced by the mineral industry in northern Canada. Based on the data, recommendations have been formulated for how fiscal policy can truly help to level the playing field and sustain economic activity in remote and northern Canada to the benefit of northerners, Aboriginals and all Canadians. While the primary audience of the report is the federal government, provincial and territorial governments should also review the recommendations and explore to what extent they could adopt or adapt them for implementation at a regional level.

22 Government of Canada, Prime Minister's Office, "PM announces investment in skills training; supports local resource jobs in the Northwest Territories," August 20, 2013, <http://www.pm.gc.ca/eng/news/2013/08/20/pm-announces-investment-skills-training-supports-local-resource-jobs-northwest>.

23 Canadian Northern Economic Development Agency, "Community Readiness and Opportunities Planning (CROP)," last modified April 1, 2014, <http://www.cannor.gc.ca/eng/1396121900938/1396122167871#q2>.

24 American Institute of Chartered Professional Accountants, "Tax Policy Concept Statement No. 1 - Guiding Principles of Good Tax Policy: A Framework for Evaluating Tax Proposals, March 12, 2011, http://www.aicpa.org/_catalogs/masterpage/Search.aspx?S=The+Ten+Guiding+Principles+of+Good+Tax+Policy

DISCOVERY – THE COSTS OF NORTHERN EXPLORATION

Without mineral exploration, there can be no mines. Using empirical data from 14 projects, this section outlines the cost premium faced by companies exploring in northern Canada.

METHODOLOGY

Robert Clark, a former Associate Director General from NRCan, was contracted to gather actual exploration cost data from companies with projects in both remote and non-remote areas. As a working definition, a 'remote' project was defined as one that was more than 50km away from a transportation route, or supply centre (hereafter 'supply route') capable of supporting the needs of the project. Projects were grouped into three categories: non-remote (50km or less from a supply route); remote (from 51km to 500km); and very remote (more than 500km).

Expenditure/cost information was obtained from 14 different exploration projects owned by three senior companies and five junior companies (see Annex II). The projects were organized into five different clusters of remote versus non-remote projects, each involving a minimum of two (and a maximum of four) different projects. Each project cluster contained similar projects at different distances from a transportation route or supply centre. The selection of project clusters was based on similarities in project ownership, commodities being explored for, stage of the project, and so on.

While a range of cost data was gathered, the one activity that is undertaken at virtually all exploration sites is diamond drilling, which provides the most precise information on the location, extent and quality of the mineralization below the surface (as well as unweathered samples of the mineralization present for analysis and testing). As a result, the final analysis focused on comparing all-in costs for diamond drilling.²⁵

FINDINGS

It became clear that the primary driver of cost variation was the distance of a project from the transportation infrastructure required to service the needs of the project.²⁶ In other words, 'remoteness' (rather than degree of latitude) was the primary variable determining the costs faced by exploration companies. Defining remote²⁷ as more than 50 km from an all-weather road or service/supply centre provides a useful metric for separating remote projects from non-remote projects and comparing their average costs (see Table 5). When applied to the projects studied for this report:

- The four non-remote projects (≤ 50 km) had an average cost of \$202.69 per metre.
- The five remote projects (> 50 km, ≤ 500 km) had an average cost of \$343.53 per metre (1.7 times more expensive than costs for non-remote projects).
- The five very remote projects (> 500 km) had an average cost of \$575.71 per metre (2.8 times more expensive than for non-remote projects).
- All remote projects together (projects farther than 50 km from supply route) had an average cost of \$459.62 per metre (2.3 times more expensive).

²⁵ Drill testing on geophysical or geochemical anomalies or surface mineralization is carried out at an early stage to determine the location, extent and quality of the mineralization below the surface and continues through all phases of exploration. The ways that costs are categorized/classified by one company sometimes differ from the way they are classified by another company. The "all-in" costs of both the company and the drilling contractor for a diamond-drilling program are the most comparable and reliable costs to use when making inter-project comparison, as the company often provides the transportation and accommodation for the drilling company in remote locations. However, different companies may include slightly different costs in the drilling category and not all companies could provide a detailed account of the costs included.

²⁶ At the exploration stage, unlike the production stage, the commodity being sought makes little difference to the cost comparison.

²⁷ Although the exploration project is 30km away (by air) from a mine that is technically 'very remote' (by the definition used in this report), its remoteness is mitigated by the mine's access via road to sea-lift, which reduces some of its costs. That is why this project is placed in the 'remote' category instead of 'very remote'. See 'Project Cluster 3' notes in Annex II for more information.



The highest costs, which were obtained from a project within the Arctic Circle, were six times higher than that of the lowest cost project, which was in an established mining camp.

TABLE 5: EXPLORATION PROJECTS ORGANIZED BY ALL-IN DRILLING COSTS AND REMOTENESS

Project	Location (a.w.r = all-weather road)	All-in Diamond Drilling Costs (\$/metre)
NON-REMOTE PROJECTS (<50 km)		
3B	20 km from town on a.w.r.	167.22
4A	10 km from town on a.w.r.	197.85
1A	50 km from a.w.r.	211.69
5B	50 km from a.w.r.	234.00
Average cost, non-remote projects		202.69
REMOTE PROJECTS (51 km–500 km)		
2C	120 km by winter road from a.w.r.	267.00
5C	207 km from a.w.r.	331.16
3A	30 km by helicopter from a very remote mine	339.97
1B	400 km by secondary road and 40km by air from a.w.r.	378.52
2A	300 km by air from supply centre (shared costs with 2B)	401.00
Average cost, remote projects		343.53
Ratio of average costs (remote/non-remote)		1.7
VERY REMOTE PROJECTS (>500 km)		
1C	630 km from a.w.r. by secondary road	381.88
2B	550 km by air from supply centre (shared costs with 2A)	401.00
1D	550 km by secondary road and 75 km by air from a.w.r.	486.90
4B	520 km by air from supply centre	608.78
5A	970 km from main supply centre	1000.00
Average cost, very remote projects		575.71
Ratio of average costs (very remote/non-remote)		2.8

These findings provide quantitative evidence for something that most people have assumed intuitively – the farther a company is from infrastructure, the more expensive it is to operate. For most industries, the distance away from infrastructure means they choose not to operate in remote parts of Canada. For the mineral industry, it means that any company operating in remote and northern Canada has a much harder job attracting investors who are well aware of the challenges associated with operating in these areas. It also means that exploration dollars simply don't go as far as they would for a company operating in a lower cost part of Canada (or the world), contributing to the perception of Canada as a high cost jurisdiction.

EXTRACTION – THE COSTS OF NORTHERN MINING

DEVELOPING THE NORTHERN FACTORS AND COST SOURCES

To quantify the acknowledged cost differential between developing and operating a mine in a centrally located jurisdiction versus a remote and northern jurisdiction, the additional capital and operating costs specifically associated with northern mining development needed to be identified. Several MAC members with existing or proposed projects in the north were canvassed by ENTRANS and reasonably complete estimates for gold, zinc-copper and diamond mining costs were obtained.

The capital cost component information from the survey for a gold mine, a zinc-copper mine²⁸ and a diamond mine are provided in Table 6. Except for the northern factor (shown in the last row), all the numbers are percentages of the total capital cost of the project specifically due to its remote and northern location. For example, 6.1% of the

TABLE 6: THE COSTS OF NORTHERN MINING – CAPITAL COSTS

Mines	Gold	Zinc-Copper	Diamond
	<i>Percentage of Total Capital Costs (%)</i>		
Total Capital Costs Due to Remote and Northern Location	51.2	61.0	14.0
of which:			
Power plant	6.1	x	4.9
Accommodation/subsistence	14.9	6.0	2.1
Plane transport	8.1	2.0	x
Permanent road/other infrastructure	7.1	18.0	x
Winter road	x	x	1.2
Transport ¹	x	x	2.6
Concentrate and other storage	x	7.0	x
Other infrastructure ²	0.9	5.0	3.2
Sub-total: infrastructure	37.1	38.0	14.0
Transportation	9.0	2.0	x
Contingencies	x	8.0	x
Other/not specified	5.1	13.0	x
Northern factor³	2.05	2.56	1.16

1 For the diamond mine, this reflects transportation and storage plus freight estimate (excess trucking costs during construction).

2 For the gold mine, this includes a sewage system and communications. For the zinc-copper mine, this equals additional indirect costs. For the diamond mine, this equals crushing infrastructure and other infrastructure (airport, boilers, water treatment, sewage system).

3 The northern factor is the ratio of the capital costs of the remote and northern mine to the capital costs of an equivalent southern mine. It is equal to 100 divided by 100 minus the percentage of the total capital costs of the mine due to its northern/remote location. In the gold mine case, for example, the northern factor of 2.05 is equal to $100/(100-51.2)$.

28 The zinc-copper mine also produces smaller quantities of lead and silver.



total capital costs of the gold mine are accounted for by the construction of a power plant, an investment which would not be required in an equivalent centrally located gold mining project because of access to the electrical grid.

Overall, the northern location accounts for 51% of the total capital cost for a gold mine, 61% for the copper-zinc mine and 14% for a diamond mine. Put differently, the northern factors – the ratios of capital costs in the northern mines to otherwise similar southern mines – suggest that the capital costs are slightly more than double for a gold mine, 2.5 times higher for a zinc-copper development and 16% greater for a diamond mine.

Certain cost items loom large in accounting for higher capital costs in remote and northern regions. Without access to an electrical grid, these projects require construction of a power generation plant. Such an expenditure accounts for 5%-10% of total capital costs (the power plant estimate for the zinc-copper mine is combined in the permanent road and other infrastructure category). Also important are accommodation and subsistence expenditures – the building of living quarters, kitchens and recreational facilities – for the workforce. Additionally, personnel transport is required because the employees and contractors working on these projects live temporarily on site, flying in and out on regular work rotations. The data provided for the analyses suggested that companies either lease or charter dedicated aircraft, which operate between urban locations and the sites on a scheduled basis.

In the case of the zinc-copper mine, concentrate storage is a particularly large component – 7% of total costs. The concentrate is shipped by sea. As the port can only operate for two to three months of the year due to ice, while the mining operation is continuous, storage facilities to accommodate almost a year's worth of concentrate are required. As product in storage is not yet sold, there are no revenues being generated for much of the year, which adds to operating capital costs. Similarly, there is no "just in time" delivery for fuel and for spare parts and equipment in the event of unplanned maintenance. This means that significant additional inventory must be purchased and stored on site for use throughout the year.

A number of the cost items – power plant, accommodation/subsistence, aircraft, roads, and so on – have been combined in a category designated as infrastructure. While the division between infrastructure and the other categories is rough, the idea is to distinguish between the higher capital costs related to standard mining activities – drilling, overburden removal, constructing shafts, purchasing on-site vehicles, mining and processing equipment – and capital expenditures that have to be undertaken in order for the northern project to be developed at all. Defined in this way, infrastructure expenditures are those on capital assets that would not be required in an equivalent southern project.

The data suggest that infrastructure accounts for 37% of total capital costs for the northern gold mine and 38% for the northern zinc-copper mine. These reflect, respectively, about three-quarters and 60% of the incremental capital costs associated with the remote and northern geographic location of the mine. For the diamond mine, the entire 14% of capital costs associated with a remote and northern location can be categorized as infrastructure. Table 7 provides the equivalent estimates for operating costs. Similar to the format of Table 6, all numbers in the table with the exception of the northern factors in the last row are expressed as percentages of the annual operating cost for the northern mine.

The northern factors are responsible for approximately 37% of the operating costs for the gold mine, 23% for the zinc-copper mine and 31% for the diamond mine. In northern factor terms, operating costs for the northern gold mine are about 60% higher than for the southern equivalent. The corresponding differences for the zinc-copper and diamond mines are 30% and 46%, respectively.

Higher logistical and transportation costs appear to be the main driver of higher overall operating costs for the northern projects, followed in importance by power and fuel costs. Higher wage bills are a surprisingly small component. Some caution, however, is in order when assigning relative importance to these components. The cost accounting systems of participating companies are different. Some companies identify discrete wage costs while others focus on activities – transportation, mine maintenance, G&A and so on – subsuming the wage costs within

TABLE 7: THE COSTS OF NORTHERN MINING – OPERATING COSTS

Mines	Gold	Zinc-Copper	Diamond
	<i>Percentage of Annual Operating Costs (%)</i>		
Total Capital Costs Due to Remote and Northern Location	51.2	61.0	14.0
of which:			
Logistics and transport ¹	13.8	10.1	13.4
Power/fuel	8.8	x	7.9
Additional wage bill	2.9	x	6.1
General and administration	3.6	6.4	x
Maintenance/mining operations	3.4	6.4	x
Other/unspecified ²	4.6	x	4.0
Northern factor	1.59	1.30 ³	1.46

1 For the zinc-copper mine, this includes flight operations, road maintenance, shipping and trucking. For the diamond mine includes personnel transport and logistics and transportation.

2 For the gold mine, this includes environmental, procurement and IT expenses. For the diamond mine, this includes subsistence supplies, municipal services and Aboriginal community relations.

3 The estimate for the zinc-copper mine is based upon a feasibility study, whereas the data from the diamond and gold mines are based on actual experience in the north.

these categories. For operating costs, therefore, the more solid numbers are those reflecting total costs. This focus on transportation and logistics costs provides context for why the specifically northern-related capital and operating costs associated with the diamond mine are less than the gold and copper-zinc mines. While diamond processing does occur on site, grinding rock is not required to process diamonds as it is at most metal mines, reducing the expense required to operate a grinding mill.

Furthermore, diamonds can be transported by air, reducing the capital investment and operational reliance on certain infrastructure associated with a larger scale shipping operation (additional roads, a port and related shipping costs). Finally, with respect to diamonds, it is important to note that there are no centrally located diamond mines in Canada against which to make a more accurate cost comparison, whereas there are for both gold and base metal mines. This should be taken into account when reviewing the diamond mine case study results.

The study results demonstrate that the mining premium associated with operating in a remote and northern region is directly linked to the infrastructure deficit in these regions. Much of the higher costs are due to the need to invest in infrastructure that would not be required in an otherwise equivalent southern mine. This infrastructure includes power plants, accommodation facilities, aircraft and airstrips, winter and permanent roads, ports, and storage facilities for mining consumables and fuel, and in the case of base metal mines, for product. These costs loom particularly large in the gold and base metal projects, and to a lesser degree in the case of diamonds.

IMPACT OF THE NORTHERN FACTORS ON PROJECT ECONOMICS

The study used a number of publicly available sources to develop data to assess the impact of the northern-related costs on mining project economics, for representative northern gold, zinc-copper and diamond mines. The study then applied the inverse of the northern factors to create representative southern mines, which were equivalent



in every aspect except for lower capital and operating costs as a result of the mines non-remote location. These representative northern and southern mining projects were then examined using NRCan's financial model to generate measures of project profitability, such as internal rates of return (IRRs) and cash flow.

While modelling specifics, assumptions and a more detailed methodology can be found in Annex III, Table 8 details the results. These include the pre- and post-tax IRRs for northern and southern gold, zinc-copper and diamond mines. The mines are assumed to be located in different jurisdictions - British Columbia, Ontario and Quebec for the southern projects - and in each of these provinces plus the three territories for the northern projects. The internal rates of return are those that would be seen by investors and proponents in each project given the price, cost and production assumptions and the fiscal regime in the particular jurisdiction. The analysis assumes a fully mature corporate income tax system; that is, all the recent changes (such as the elimination of the accelerated capital cost allowance for new mines and other definitional changes) are fully phased in. The post-tax results are shown from two investor perspectives:

1. Fully taxable: in which the investor has other Canadian income (e.g., from an operating mine) and can fully utilize the available tax deductions or credits against this income while the project is still in the construction phase.
2. Tax limited: in which the investor does not have other Canadian income and is therefore unable to use the available tax deductions or credits until the project generates taxable income.

TABLE 8: THE ECONOMICS OF REPRESENTATIVE NORTHERN AND SOUTHERN MINING DEVELOPMENTS – BASE CASE RESULTS

Mines %	Gold		Zinc-Copper		Diamond	
	Northern	Southern	Northern	Southern	Northern	Southern
Pre-Tax (Social Return)	9.5	39.6	14.1	37.6	31.2	40.8
Post-Tax – Tax Limited						
Nunavut	6.2	n/a	10.6	n/a	24.6	n/a
NWT	6.2	n/a	10.7	n/a	24.7	n/a
Yukon	6.0	n/a	10.3	n/a	23.6	n/a
Quebec	6.1	28.9	11.2	30.4	25.1	31.5
Ontario	6.8	32.2	11.2	31.2	25.9	34.0
British Columbia	6.7	30.7	10.9	30.5	26.0	33.7
Average	6.3	30.6	10.8	30.7	25.0	33.1
Post-Tax – Fully Taxable						
Nunavut	6.4	n/a	11.0	n/a	25.8	n/a
NWT	6.4	n/a	11.1	n/a	25.8	n/a
Yukon	6.2	n/a	10.8	n/a	24.8	n/a
Quebec	6.3	29.7	11.7	31.9	26.5	33.1
Ontario	7.3	32.9	11.8	32.8	27.6	35.7
British Columbia	6.9	31.3	11.3	31.6	27.1	35.0
Average	6.6	31.3	11.3	32.1	26.3	34.6

The above findings provide a number of useful insights into the economics of mine development in the north versus the south. First, the differentially higher capital and operating costs translate into much lower rates of return for the northern gold and zinc-copper mines. The return on the diamond mine, however, is less affected by location because transportation and certain operating costs are relatively less important compared to those for the other northern projects.

Second, on a pre-tax basis – essentially a rough proxy for a social return²⁹ – all three northern projects could be justified as proceeding, although the IRR for the gold mine – 9.5% – is marginal. On a post-tax basis – the return relevant to the investor – this is less the case. The after-tax return for the northern gold project falls to the 6%-7% range while that for the northern zinc-copper mine is around 11%. The northern diamond mine, however, remains quite attractive on a post-tax basis with IRRs in the mid-20s.

Third, there is relatively little variation in rates of return across provinces and territories suggesting that, despite considerable differences in detail, the tax and royalty systems in the various jurisdictions generate “government takes,” which are broadly similar.

Fourth, the percentage differences from the tax limited to the fully taxable position of the gold and base metal mines are quite small. These results suggest that the advantages of being in a taxable position – and, therefore, being able to use the available deductions and credits during the construction phase – are not large. One possible explanation for these results is that the incentives available to mining investments in the current mature tax system (with no tax credits or accelerated deductions) are too small to have much effect. A second possibility is that the three-year construction time frame for each of these projects is not long enough for the advantage of immediate utilization of deductions to be significant. If some northern projects are likely to require longer construction periods, then being tax limited – that is, not being able to use earned deductions until production and the generation of taxable income begin – would be more of a disadvantage.

²⁹ The “social” rate of return is what the project investors could earn if there were no income taxes or royalties paid by the project. The “social” rate of return as defined and calculated in this table is only a proxy indicator that governments might use in ranking projects. This return does not include all of the other social and economic benefits for the region that might arise from the project being developed. These benefits would need to be quantified in impact studies.



RECOMMENDATIONS

Levelling the playing field will require the deployment of a suite of policy tools that address the significant cost premium faced by exploration and mining companies operating in northern Canada. Acknowledging the historical precedent for sector- and regional-specific tax measures, which is explored more fully in Annex III, the authors recommend that federal, provincial and territorial governments consider the following recommendations to unlock northern resource potential:³⁰

SUPPORTING EXPLORATION

Note: the recommendations in this section were modelled to assess their impact; results can be found in Annex II.

1. Explore options to incentivize drilling on early-stage exploration projects in remote and northern areas

Diamond drilling generally accounts for between 50% and 80% of all early-stage (or “grassroots”) exploration expenses. A program that targeted drilling costs in remote parts of Canada would drastically improve the economics of early-stage exploration, bringing the costs more in line with exploration in less remote areas.

A new program could be modelled on a successful initiative in the state of Western Australia, which has an Exploration Incentive Scheme (EIS) for “underexplored greenfields regions”, providing \$20.5 million over four fiscal years.³¹ The Australian incentive provides a 50% grant for drilling costs (80% of funds paid upon completion of drilling, 20% upon receipt of the final report). The grant is limited to \$150,000 for a multi-drill-hole program and \$200,000 for a single deep hole. To qualify for the grant:

- Drilling must address significant knowledge gaps and/or critical uncertainties in under explored areas (i.e., general geoscientific concepts).
- Drilling methods and analysis methods must meet high technical standards.

The Department of Mines and Petroleum, in the state of Western Australia, administers the program.

2. Increase the Mineral Exploration Tax Credit (METC) to 25% for projects in remote and northern Canada

Mineral exploration is undertaken by a diverse range of entities, ranging from individual prospectors to so-called “junior” exploration companies and “senior” mining companies (companies with producing mines who also invest in exploration activities).

Over the last five years, more than 80% of the discoveries made in Canada have been made by juniors, highlighting the important role they play in finding the mines of the future.³² Juniors, however, generate no revenue of their own; instead, they must raise money either by signing agreements with the seniors (who may outsource some or all of their exploration programs) or by raising money from investors. Canada is the global leader in raising equity capital for the mineral industry, raising almost half of all funds raised worldwide between 2009 and 2013.

The industry is currently experiencing a significant downturn in exploration financing, however, which means it is important for companies to communicate (to potential investors) how they propose to spend the scarce resources that are made available. Companies operating in remote and northern Canada have a more challenging story to tell because their costs (all other things being equal) will be substantially higher than those of companies with similar deposits in southern Canada, or other lower cost jurisdictions.

30 Most of these measures were initially outlined in MAC’s and PDAC’s submissions to the House of Commons Standing Committee on Finance during its 2015 Pre-Budget Consultation. MAC’s submission to the Standing Committee, August 6, 2014, can be accessed at http://www.parl.gc.ca/Content/HOC/Committee/412/FINA/WebDoc/WD6615327/412_FINA_PBC2014_Briefs%5CMiningAssociationOfCanada-e.pdf. PDAC’s Budget 2015 proposals can be accessed at <http://www.pdac.ca/policy/budget-2015>.

31 Government of Western Australia, “Program 2 Innovative Drilling: Government Co-funded Exploration Drilling,” <http://www.dmp.wa.gov.au/7748.aspx>.

32 Schodde, Richard, “The rising importance of junior explorers ... and the key challenges they face going forward,” presented at the Quebec Mineral Exploration Association Conference, (slide 17), November 12-14, 2013, <http://www.minexconsulting.com/publications/R%20Schodde%20Quebec%20Conf%20Nov%202013%20FINAL.pdf>.

This recommendation would make investments in remote and northern projects more attractive to investors and help attract investment to northern Canada.

PROMOTING MINE DEVELOPMENT

Note: the recommendations in this section were modelled to assess their impact on project economics. Specific results can be found in Annex III.

Mineral deposits far from infrastructure can require substantial capital investments to develop, particularly for base metals and bulk commodities. This makes many mineral deposits uneconomic (particularly at current commodity prices), stranding vast quantities of Canada's resource wealth. These recommendations reflect how federal fiscal policy could help facilitate investments in the infrastructure necessary to unlock northern resource potential.

3a. Create a remote and northern capital expenditures investment tax credit

All companies should be eligible to earn a basic 10% investment tax credit on all capital expenditures associated with a northern mine. This 10% credit would acknowledge the higher costs associated with mine development in all remote areas, including those that already have at least some rudimentary forms of public infrastructure such as rail, road and/or power. A 10% credit rate is consistent with the rate currently provided to encourage regional development under the Atlantic Investment Tax Credit (AITC).

3b. Create a supplementary 15% infrastructure investment tax credit

Companies eligible to earn the capital expenditures investment tax credit should also be able to earn a further 15% investment tax credit on specified infrastructure investments (an IITC). Eligible "infrastructure" for purposes of the analysis includes assets such as roads, bridges, ports, dams, docks, rail lines, power plants, airstrips, inventory storage and other assets that would normally be available in the surrounding public infrastructure for mines in the southern part of Canada but which are absent in the north. This is essentially the definition developed in the analysis for Table 6 previously discussed.

The precise definition of infrastructure costs eligible for the additional 15% tax credit would be laid out in the Income Tax Regulations and administered by the CRA for taxable companies.

3c. Create a conditionally repayable infrastructure contribution mechanism

Companies should be able to earn the 10% investment tax credit on their non-infrastructure investments detailed above in 3a. Additionally, companies should have the option to choose between the supplementary 15% infrastructure investment tax credit (3b above), or choose to apply for a conditionally repayable contribution (CRC) to cover 25% of the infrastructure investment. While this option would be most attractive to companies in a tax-limited position, it should be made available to all companies that face the additional costs of overcoming northern geography regardless of tax position. It is expected the CRC coverage would generally be based on the definitions developed in the Income Tax Regulations for the IITC to simplify the approval processes. CRCs would be approved by a designated agency responsible for resource or regional development.

In recognition of the future public value inherent in a company's infrastructure investments, there should be an option whereby the ownership of any qualifying infrastructure receiving the CRC reverts to the Crown(s) after a pre-specified period of time in exchange for a full pardoning of the CRC.

4. Create a northern infrastructure investment bank

The current infrastructure deficit in the territories cannot be met through the use of existing federal infrastructure programs (e.g., through the Building Canada Fund and the P3 Canada Fund). In both cases, a key requirement is that proposed infrastructure projects have a "public use" component, not just a "public benefit" component. With Canada's three northern territories comprising over 40% of Canada's land mass and with only 113,000 residents living in remote communities, it is rare that mining development would occur adjacent to a northern community.



Although mining-specific infrastructure development in the north generates numerous public benefits (GDP contribution, employment, business development, tax and royalty revenues), it rarely meets the “public use” test of existing federal programs.³³

Accordingly, the current infrastructure financing gap could be addressed through the establishment of a federal Crown corporation, similar to the Alaska Industrial Development and Export Authority.³⁴ The work of this entity would be aimed at providing long-term financing (loans, bonds, equity investment) to resource-related infrastructure projects in the territories that generate public benefits but do not meet the “public use” criterion of existing federal programs.

This model is consistent with existing federal institutions, such as the Business Development Bank of Canada and Export Development Canada, aimed at providing financing support to private sector entities to promote economic growth. Such an institution could serve as a mechanism through which to distribute and manage the repayable contributions recommended above.

³³ While not meeting the current “public use” test for new builds, it is important to remember the positive infrastructure legacy of the mining industry in the north, which created roads, power generation and transmission, and railway capacity that are now used, in certain instances, by the broader public.

³⁴ Alaska Industrial Development and Export Authority, 2011, <http://www.aidea.org/>.

CONCLUSION

The objectives of this report have been, first, to establish the capital and operating cost differentials between exploration and mining developments in remote and northern Canada versus similar activity in more southerly, less remote parts of the country. By assessing the principle source of those cost differentials – a lack of infrastructure – the above set of recommendations are designed to provide public policy makers with options for enhancing the viability of exploration and mining in these regions. The report further demonstrates the strong synergy between exploration and mining activity and development – and the social and economic benefits that accompany it – as well as broader public policy objectives for remote and northern Canada.

While mining development is likely to continue into the future, seizing the opportunity for northern Canada requires action. Yet, this nation-building opportunity faces real barriers to becoming a reality that must be overcome. Doing so will benefit generations of northerners, Aboriginals and all Canadians.



ANNEX I – ADVANCED STAGE TERRITORIAL PROJECTS

Table 9 identifies mining projects in various stages of development across the three territories and was sourced from the Northern Projects Management Office.

TABLE 9: CURRENT TERRITORIAL MINING PROJECTS

Territory	Project	Company	Stage	\$ (millions) ¹	Operating Jobs
Yukon	Casino Mine	Western Copper and Gold Corp	EA	2,500	855
	Eagle Gold Mine	Victoria Gold Corp.	Permitting	400	150
	Mactung Tungsten Mine	North American Tungsten Corporation Ltd.	EA	250	190
NWT	Gahcho Kue Diamond Mine	De Beers Canada	Construction	859	380
	Nechalacho Rare-Earth Elements Mine	Avalon Rare Earth Metals Inc.	Permitting	1,049	350
	NICO Cobalt-Gold-Bismuth Mine	Fortune Minerals Limited	Permitting	589	225
	Prairie Creek Silver-Zinc-Lead Mine and All Weather Road	Canadian Zinc Corporation	Mine permitted and seeking construction financing; road not yet approved	193	220
Nunavut	Back River Gold Mine	Sabina Gold and Silvercorp	EA	839	900
	Bathurst Inlet Port and Road Joint Venture	Glencore, Sabina Gold and Silvercorp	EA	not specified	150
	Hope Bay Gold Mine	TMAC Resources	EA	400	540
	Izok Corridor Zinc-Copper-Lead Mine	MMG Ltd.	EA	1,800	710
	Kiggavik Uranium Mine	AREVA Resources Canada	EA	2,100	600
	Mary River Iron Mine railway & port	Baffinland Iron Mines Corporation	Permitting	4,100	950
	Mary River Iron Mine (Early Revenue Phase)	Baffinland Iron Mines Corporation	Mine producing, but production modification in review	750	210
	Meliadine Gold Mine	Agnico Eagle Mines Limited	Permitting	1,400	700
Total				17,229	7,130

Source: Northern Projects Management Office Project Tracker (August 2014) with updates from the NWT and Nunavut Chamber of Mines.

¹ These figures reflect project development costs.

ANNEX II – THE IMPACT OF NORTHERN FACTORS ON EXPLORATION COSTS

While the higher costs of exploration in northern Canada are acknowledged both intuitively and anecdotally, this annex clearly reveals the cost premium faced by companies exploring in northern Canada using quantitative data gathered from 14 exploration projects.

METHODOLOGY

Robert Clark, a former Associate Director General from NRCan, was contracted to gather actual exploration cost data from companies with projects in both remote and non-remote areas. A remote project was defined as one that was more than 50km away from a transportation route or supply centre capable of supporting the needs of the project. Expenditure/cost information was obtained from 14 different exploration projects owned by three senior companies and five junior companies. The projects were organized into five different clusters of remote versus non-remote projects, each involving a minimum of two (and a maximum of four) different projects. Each project cluster contained similar projects at different distances from a transportation route or supply centre. The selection of project clusters was based on similarities in project ownership, commodities being explored for, stage of the project, and so on.

While a range of cost data was gathered, the one activity that is undertaken at virtually all exploration sites is diamond drilling, which provides the most precise information on the location, extent and quality of the mineralization below the surface (as well as unweathered samples of the mineralization present for analysis and testing). Drill testing on geophysical or geochemical anomalies or surface mineralization is carried out at an early stage to determine the nature and extent of the mineralization below the surface and continues through all phases of exploration. Diamond drilling generally accounts for between 50% and 80% of all early-stage (or “grassroots”) exploration expenses, and is therefore a good activity by which to compare costs between remote and northern projects with more centrally located projects. As a result, notwithstanding the range of exploration cost data gathered during the research phase of this report, the final analysis focused on comparing all-in costs for diamond drilling.³⁵

EXPLORATION COST DATA

Project Cluster #1

The first project cluster compares costs faced by four remote gold projects situated at distances of between 50 km and 630 km from an all-weather road in the far north of Quebec. Two projects are accessible only by air, or by air and winter road. All four projects are operated by the same junior company. The projects are arranged below in order of remoteness or difficulty of access.

- Project 1A is about 50 km by secondary road from an all-weather road.
- Project 1B is about 400 km by secondary road and then another 40 km by float plane or helicopter from an all-weather road.
- Project 1C is about 630 km by secondary road from an all-weather road.
- Project 1D is about 550 km by secondary road, and then another 75 km by winter road or helicopter, from an all-weather road.

³⁵ It should be noted that different companies may include slightly different costs, in their accounting systems, under the category of ‘drilling’; not all companies could provide a detailed account of the costs included.



TABLE 10: COMPARISON OF EXPLORATION COSTS FOR PROJECT CLUSTER #1

Territory	1A (non-remote)	1B (remote)	1C (very remote)	1D (very remote)
Description of Costs	\$ Cost per Unit	\$ Cost per Unit	\$ Cost per Unit	\$ Cost per Unit
DRILLING PROGRAM				
Contractor costs	106.06/m	156.17/m	154.06/m	138.01/m
Labour – geologist, technician, cook, etc.	26.03/m	29.63/m	68.88/m	61.94/m
Transport, accommodation and supply	29.24/m	162.25/m	64.70/m	234.90/m
Sampling/analysis	24.54/m	17.04/m	39.72/m	17.92/m
Communication/materials	25.82/m	13.43/m	54.52/m	34.13/m
Drilling Program (all-in costs)	211.69/m	378.52/m	381.88/m	486.90/m
LINE CUTTING				
All-in costs	645.33/km	769.95/km	x	x
I.P. SURVEY				
All-in costs	2293.50/km	2913.48/km	x	x

By comparing the different exploration activities in Table 10, the following observations can be made:

- The all-in costs for diamond drilling show a relatively logical progression with costs of \$211.68, \$378.52, \$381.88 and \$486.90 per metre at Projects 1A, 1B, 1C and 1D, respectively. Although Project 1C is farther away from an all-weather road than Project 1D, air access is far more expensive than road access. As a result, the costs associated with Project 1D are higher.
- The costs for the diamond-drilling contractor do not track, however. This is due to the fact that some companies provide in-kind support to drilling companies (e.g., helicopter support, accommodation). All-in diamond-drilling costs are thus the most reliable measure for comparing costs across companies.
- Although the projects are all in northern Quebec, costs double with distance from infrastructure.

Project Cluster #2

The second project cluster compares costs at three base metal projects all north of 60 degrees latitude. Projects 2A and 2B are operated by the same “senior” company and are between 300 km and 550 km, respectively, from the supply centre supporting both projects. Project 2C is owned by a separate “junior” company and is connected to an all-weather road by a 120-km winter road. Project 2C also has a significant amount of infrastructure developed on site.

By comparing the different exploration activities in Table 11, the following observations can be made:

- Company 1 has contracted diamond drilling and geophysical surveys for both projects on a single contract at the same rate; the additional transportation costs and accommodation costs have been charged at the same rate for both projects. As a result, there is no difference between the drilling contractor costs for the two projects.
- The all-in diamond-drilling costs at the less remote Company 2 site (Project 2C) come in at \$267/m, which is significantly lower than the \$401/m associated with the two projects being managed by Company 1 (Projects 2A and 2B).
- The costs of running a camp per/person/day are very different, with Project 2C (closer to infrastructure) costing \$195 compared to \$500 and \$650 at the more remote sites (Project 2A and Project 2B, respectively). The costs are 2.5 times more at the remote site and 3.5 times at the very remote site, compared to the costs of the site with a winter road.

- The labour costs for a junior geologist are, as with most of the other projects studied, little changed with location. Company 2's costs at the winter road site (Project 2C) are \$325/day compared to \$330/day at the more remote sites of Company 1 (Projects 2A and 2B).
- The costs for the helicopter and fixed-wing planes are based on a rate per kilometre flown and do not vary much from a given supply centre. An earlier Prospectors & Developers Association of Canada (PDAC) study of cost norms for different supply centres has shown the costs of charter aircraft from Yellowknife are 25%-30% higher than the rates charged in established mining areas in the provinces.

TABLE 11: COMPARISON OF EXPLORATION COSTS FOR PROJECT CLUSTER #2

Territory	Company 1		Company 2
	2A (remote)	2B (very remote)	2C (remote)
Description of Costs	\$ Cost per Unit	\$ Cost per Unit	\$ Cost per Unit
Colour aerial photography and elevation mapping	x	x	536/square km
Camp costs	500/person/day	650/person/day	195/person/day
Geological mapping			109/line km
Geophysical surveys HLEM	3,571/line km	3,571/line km	x
Geophysical survey gravity			3438 /line km
Diamond drilling (contractor costs)	273/m	273/m	191/m
Diamond Drilling (all-in costs)	401/m	401/m	267/m
Labour cost - junior geologist contract	330/day	330/day	325/day
Labour cost - unskilled	280/day	280/day	x
Assaying/sample analysis	65/sample	x	36.8/sample
(B2) helicopter cost - dry	1,563/hr	1,563/hr	x
(B2) helicopter cost - with fuel	2,321/hr	2,321/hr	x
Supply flight (Twin Otter)	18.8/km	17.63/km	x
Supply flight (Grand Caravan)	14.05/km	11.8/km	x

Project Cluster #3

The third project cluster compares costs at a remote territorial project north of 60 degrees to those at a centrally located Quebec project. Both are gold projects operated by the same major company. The northern Project 3A is 30 km from an established mine (but uses a helicopter for some transportation). The mine itself, although connected to a local community by road, relies on supplies by sea (in the summer), or air, from supply centres several hundred kilometres away. By comparison, the southern Project 3B is 20 km from a town and is accessible by road.

By comparing the different exploration activities in Table 12, the following observations can be made:

- The contractor drilling cost of \$83.31 for Project 3B is the lowest obtained in the study and reflects the fact that the project is located near an existing mining camp. As well, the client is a major mining company that can achieve economies of scale by negotiating contracts for several projects with the same drilling company.
- The contractor cost for the northern project is still low by comparison with other projects in the territories at \$129.60, but it is 1.56 times the contractor costs for the southern project.
- The cost in the territories is double the cost in Quebec.

The main reasons for the cost differential are the additional requirements of the northern location. The personnel and equipment for the drilling program need to be flown into the mine site from the supply centre by fixed-wing



TABLE 12: COMPARISON OF EXPLORATION COSTS FOR PROJECT CLUSTER #3

Territory	3A – Territories (remote)	3B – Quebec (non-remote)
Description of Costs	\$ Cost per Metre	\$ Cost per Metre
Labour - contractors	32.43	17.28
Helicopter - contractor	112.28	x
Drilling - contractor	129.60	83.31
Materials - general	2.87	5.06
Assay fees	10.84	14.62
Fuel	x	1.35
Charter	4.8	x
Camp cost	10.63	x
Drill permitting	x	0.34
Salary - company	35.7	41.56
Communication, travelling, hotel, meals expenses	0.82	3.7
All-in Drilling Costs	339.97	167.22

aircraft. A helicopter is also needed to ferry personnel and equipment from the mine site to the project. Finally, people live at the bunkhouse at the mine and are charged a daily rate that is higher than living in a hotel in a small town in Quebec.

It should be noted that the cost of assaying per metre is meaningless as the number of assays depends on the amount of mineralization present and the number of samples that the geologist takes (as opposed to the degree of remoteness of the project). This would explain why this item is higher in the south than in the north.

Project Cluster #4

The fourth project cluster compares costs at two different gold projects, one in a more centrally established mining camp in Ontario and one in the territories. Both projects are operated by the same junior company.

Project 4A is in an established mining camp in Ontario, accessible by an all-weather road. It is operated by the same junior company that operates Project 4B, which is located in a remote area of the territories, some 520 km by air from its main supply centre.

TABLE 13: COMPARISON OF EXPLORATION COSTS FOR PROJECT CLUSTER #4

Projects and Costs	4A (non-remote)	4B (very remote)
	\$ Cost per Unit	\$ Cost per Unit
Camp costs	x	448.50/person/day
I.P. survey	3,750 /line km	x
Senior geologist	400/day	400/day
Geologist	325/day	325/day
Technician	310/day	310/day
Health and safety	x	13.75/person/day
Diamond drilling (contractor cost)	160.31/m	404.61/m
Diamond Drilling (all-in costs)	197.85/m	608.78/m



By comparing the different exploration activities in Table 13, the following observations can be made:

- The non-remote Project 4A does not require a camp, as staff can live in the nearest town. The usual practice when staying in town is to rent one or more houses and hire a cook for a cost of approximately \$100/person/day, which is far less than the camp costs per person/day at the remote Project 4B.
- The labour costs for staff do not vary between the remote and non-remote sites as the same staff members may work at either location depending on the requirements of the exploration programs.
- The all-in drilling costs are \$197.85 per metre at the non-remote Project 4A compared to \$608.78 per metre at the remote Project 4B in the territories. Stated another way, the all-in drilling costs in the remote project in the territories are triple the costs for the non-remote project in Ontario.

Project Cluster #5

The fifth project cluster compares costs at a very remote base metal project and at two Ontario projects that both have base and precious metals. One Ontario project is remote and the other is close to infrastructure. All three projects are operated by different companies. The non-remote Project 5B is operated by a senior company; the others are operated by juniors.

Project 5A is within 65 km of a community with a scheduled air service and can obtain some supplies there, but it obtains most of its supplies from Yellowknife around 1,000 km away. The non-remote Project 5B is 50 km by road from a major supply centre. Project 5C is in a remote area of northern Ontario, with no road access to the site. It is situated some 207 km from the nearest all-weather road and 300 km from the nearest airfield.

TABLE 14: COMPARISON OF EXPLORATION COSTS FOR PROJECT CLUSTER #5

Projects and Costs	5A (very remote)	5B (non-remote)	5C (remote)
Camp costs	162/person/day	75/person /day	323.12/person/day
Airborne terrain survey	x	3.9/line km	83.56/sq.km
Geological mapping/ prospecting	x	630/line km	348.18/person/day
Airborne geophysics (Mag., Gravity, EM)	x	51/line km	x
Ground geophysics (Mag., I.P., EM)	x	2,547/line km	2,440.27/line km
Labour geologist (junior)	350 /day	x	x
(B2) helicopter cost - dry	1,339/hr.	x	x
Fuel cost	630/drum	x	x
Diamond drilling (contractor costs)	drilling only 270/m	115/m	x
Diamond Drilling (all-in costs)	1,000/m	234/m	331.16/m

By comparing the different exploration activities in Table 14, the following observations can be made:

- In Project 5A, the camp costs of \$162/person/day are more than double the costs of \$75/person/day at the non-remote Project 5B because of the ability of local staff to drive to the site. However, these costs are modest compared to other projects in the territories that can be as high as \$650 per day. This is because food and other limited camp supplies can be brought in from a relatively close community. The camp costs at the remote Project 5C are \$323.12/person/day, which are high but in line with other remote projects.
- The contractor drilling costs are 2.35 times higher in Project 5A than the non-remote Project 5B, but are lower than the remote Project 5C. However, most of the transportation and camp costs are borne by the company in the remote location. Consequently, the all-in drilling costs for Project 5A are three times higher than remote Project 5C and 4.27 times higher than non-remote Project 5B.



- Project 5A is the farthest northern project studied, with nearly 1,000 km of air flight required to bring in equipment, resulting in the extreme cost of \$1,000 to drill a metre of core.
- It is interesting to note that for non-remote Project 5B the airborne geophysics is a fraction of the cost per line kilometre of doing a similar series of measurements on the ground. This is because ground surveys often have to be done separately for each survey, whereas the aircraft can collect data for several surveys at the same time, at a much quicker rate.

FISCAL INCENTIVES FOR EXPLORATION, ACROSS CANADA

PDAC regularly compiles and updates a list of the fiscal tools used to support exploration in each province or territory.³⁶ For the most part provincial and territorial initiatives fall into one of the following categories:

Provincial Exploration Incentives

Tax credits and rebates (BC, MB, NB, NU, ON, QC)

These incentives range from income tax deductions for companies and/or their investors to rebates for fuel taxes paid while using vehicles to explore. BC, MB, ON and SK have tax incentives that complement the federal flow-through share system. Manitoba already has geographically disaggregated incentives, offering higher incentives for exploration in remote areas.

Grants (MB, NB, NL, NS, YK)

More than half of Canada's provinces and territories offer grants to help offset the costs of exploration. These non-repayable grants reimburse a certain percentage of the cost (e.g. up to 50%) up to a maximum amount (e.g. \$100,000). NL and MB both offer larger amounts for exploration in remote areas.

Programs for prospectors (MB, NB, NL, NS, NT, NU, ON, YK)

Most jurisdictions offer grants to prospectors, usually up to about \$15,000 per year. MB and NL both offer additional incentives to support prospecting in remote regions.

Venture capital (QC)

Unique amongst the jurisdictions, Quebec provides venture capital for exploration and development through a range of institutions. SIDEX in particular has a mandate to support greenfields exploration, often in remote areas, to help diversify Quebec's mineral base.

Federal Exploration Incentives

The federal government also deploys a number of fiscal policy tools to support the financing of mineral exploration. Each of these incentives is available across Canada; none are regionally targeted to help compensate for the greater costs associated with operating in northern Canada.

Canadian Exploration Expenses (CEE)³⁷

This provision of the federal Income Tax Act provides a deduction of 100% of eligible exploration expenses against taxable income. Eligible CEE expenses include grassroots exploration expenses, as defined in subsection 66.1(6)(f) of the Income Tax Act and pre-production development expenses, as defined in subsection 66.1(6)(g) of the Income Tax Act.

The 2013 federal budget proposed the phase-out of the CEE treatment for pre-production development expenses. Instead, these expenses will be gradually changed to receive Canadian Development Expense (CDE) treatment,

³⁶ Prospectors & Developers Association of Canada. "Exploration Incentives in Canada." Accessible from <http://www.pdac.ca/policy/finance-taxation/policy/2014/07/14/exploration-incentives-in-canada>. Current as of May 9, 2014.

³⁷ Shortly after this document was finalized, the federal government announced its proposal to make certain consultation and environmental study expenses eligible as Canadian Exploration Expenses. This change, which PDAC had been advocating for, was a significant fiscal policy intervention in support of responsible resource development across Canada. See Department of Finance Canada, "Backgrounder - Canadian Exploration Expense Treatment of Environmental Studies and Community Consultations," last modified March 19, 2015, http://www.fin.gc.ca/n15/data/15-021_2-eng.asp.

which is a deduction of 30% of expenses on a declining balance basis. The change will be made according to the following chart:

	2013 and 2014	2015	2016	2017	After 2017
CEE	100%	80%	60%	30%	0%
CDE	0%	20%	40%	70%	100%

Initial PDAC analysis suggested that these changes might undermine the ability of junior exploration companies to raise flow-through funds to finance the development of their projects, which would create an incentive for them to sell off their properties instead of growing them into the production stage.

To test this hypothesis, PDAC contracted out Gamah International Limited to look at publicly available information for 66 Canadian junior exploration companies that used substantial amounts of flow-through funding over the last five years. Of the almost \$2 billion of flow-through used by these companies, Gamah was able to clearly ascertain that the vast majority of the CEE funds used (85%) were for surface exploration of a type that would still be classified as CEE even after Budget 2013 changes take effect.

For 7.5% of the funds raised (approximately \$140 million, by eight companies), the publicly available information suggested that the funds were used for a combination of surface exploration and mine development work. The information was not detailed enough to assess whether the expenditures would have qualified as CEE under the new definitions.

Interviews were conducted with the CFOs of four of the eight companies to clarify whether flow-through funds were used for pre-production mine development. As a result of these discussions, Gamah was able to ascertain that \$78 million of the \$140 million were used for expenses that would still be considered CEE under the new definitions. This left uncertainty on only \$62 million of the nearly \$2 billion of flow-through raised by the 66 companies. Even if that entire amount was used for pre-production mine development expenses, it would mean that 97% of flow-through funds were being used for expenditures that would still qualify as CEE even after Budget 2013 changes come into effect.

Flow-through Shares (FTS)

The FTS provision is outlined in subsection 66(15) of the Income Tax Act and allows an investor to claim a CEE or CDE (or a Canadian Renewable Energy and Conservation expense) deduction earned by a publicly listed company against its taxable income. However, the expenses must be reduced by any provincial or federal assistance received and, in that flow-through shares have a zero-adjusted cost base, when the share is sold, the entire income from the sale is subject to capital gains tax.

The Mineral Exploration Tax Credit (METC)

METC is a temporary 15% tax credit, linked to flow-through shares, that can be claimed on a more limited part of grassroots expenses for exploration conducted "from or above the surface of the earth," which is defined in subsection 127(9) of the Income Tax Act as "flow-through mining expenditures." This tax credit can be claimed in addition to the CEE deduction, but the expenses for CEE must be reduced by any provincial or federal assistance and the tax credit applied to the reduced amount. In addition, the tax credit must be taken into income in the following year. Under current legislation, this tax credit will terminate for new investment on March 31, 2016 (according to the proposed extension announced by the Minister of Finance on March 1, 2015).

Prospector's and Grubstaker's Shares Deduction

This provision, as defined in subsection 110(1) (d.2) of the Income Tax Act, allows a deduction from income of 50% of the value of shares, received and included as income, for that year.

The 10% Corporate Mineral Exploration and Development Tax Credit

This tax credit is being phased out at different times for the exploration and development components; the tax credit for exploration expenses was phased out in 2013. The tax credit for pre-production development expenses



will apply at a rate of 10% for expenses incurred before 2014, at a rate of 7% for such expenses incurred in 2014, and at a rate of 4% for such expenses incurred in 2015. The credit will not be available for pre-production development expenses incurred after 2015. Additional transitional relief will be provided in recognition of the long timelines involved in developing mines. For grandfathered projects, the credit will apply at a rate of 10% for pre-production development expenses incurred by a taxpayer before 2016.

PROPOSED NEW NORTHERN EXPLORATION INCENTIVES: DESCRIPTION AND ANALYSIS OF IMPACTS ON PROJECT ECONOMICS

Based on the study of all-in costs of diamond drilling, at varying distances from an all-weather transportation route, three categories of projects have been developed based on the average cost of one metre of diamond drilling. These categories are non-remote (less than 50 km), remote (50 km to 500 km) and very remote (greater than 500 km).

PROPOSAL #1: Explore options to incentivize drilling on early-stage exploration projects in remote and northern areas

Diamond drilling generally accounts for between 50% and 80% of all early-stage (or “grassroots”) exploration expenses. A program that targeted drilling costs in remote parts of Canada would drastically improve the economics of early-stage exploration, bringing the costs more in line with exploration in less remote areas.

A new program could be modelled on a successful initiative in the state of Western Australia, which has an Exploration Incentive Scheme (EIS) for “underexplored greenfields regions”, providing \$20.5 million over four fiscal years.³⁸ The Australian incentive provides a 50% grant for drilling costs (80% of funds paid upon completion of drilling, 20% upon receipt of the final report). The grant is limited to \$150,000 for a multi-drill-hole program and \$200,000 for a single deep hole. To qualify for the grant:

- Drilling must address significant knowledge gaps and/or critical uncertainties in under-explored areas (i.e., general geoscientific concepts).
- Drilling methods and analysis methods must meet high technical standards.

In partnership with the Intergovernmental Working Group on Minerals and Metals, the partners in this report would be interested in researching the feasibility of introducing a similar incentive at the regional or national level in Canada, to support early stage exploration in remote and northern areas.

For illustrative purposes, Table 15 documents the impact of implementing a one-third co-funded drilling incentive modelled along the lines of the Western Australia incentive. It illustrates the profound impact of the co-funded drilling incentive; for remote projects (between 50 and 500km from a supply route), it would immediately equalize the playing field, making per metre drilling costs roughly equivalent to non-remote projects.³⁹

TABLE 15: IMPACT OF IMPLEMENTING A ONE-THIRD CO-FUNDED DRILLING INCENTIVE FOR REMOTE/VERY REMOTE PROJECTS

Projects and Locations	Non-Remote	Remote	Very Remote
Distance from all-weather road (km)	≤50	51 - 500	>500
Average actual costs incurred by a company for diamond drilling (\$/metre)	203	343	576
Average costs following creation of one-third co-funded drilling incentive for remote/very remote projects (\$/metre)	203	229	384

38 Government of Western Australia, “Program 2 Innovative Drilling: Government Co-funded Exploration Drilling,” <http://www.dmp.wa.gov.au/7748.aspx>.

39 The overall cost to Treasury could be limited by various caps and restrictions, e.g. in terms of the total amount any one company could receive (per project) and/or the percentage of total costs that could be put forward.



PROPOSAL #2: Increase the Mineral Exploration Tax Credit (METC) to 25% for projects in remote and northern areas

The current flow-through/METC regime is applicable to projects throughout the country. Using the three “average cost” categories noted above, Table 16 shows the after-tax costs to finance one metre of diamond drilling for a flow-through share investor⁴⁰ as calculated for an investor in Ontario investing in Ontario projects, and for a BC investor investing in BC projects.⁴¹ These provinces were chosen because a large number of flow-through investors reside there and because both provinces offer flow-through tax credits over and above the federal credit.

The costs were calculated for the current tax regime (with a 15% METC) and also for the proposed 25% METC for projects that would fall within the remote and very remote categories (more than 50 km from an all-weather transportation route). These costs are shown in Table 16, which shows that from the perspective of an investor in British Columbia or Ontario, the enhanced METC would reduce the costs of financing one metre of drilling (in remote/very remote regions) by approximately 12%.

TABLE 16: AFTER-TAX COST TO A FLOW-THROUGH SHARE INVESTOR TO FINANCE ONE METRE OF DIAMOND DRILLING

Projects and Locations and Costs	Non-Remote	Remote	Very Remote
Distance from all-weather road (km)	≤50	51 - 500	>500
Average actual costs incurred by a company for diamond drilling (\$/metre)	203	343	576
After-Tax Costs to Investor (\$/metre)			
Current Regime:			
British Columbia	75	127	213
Ontario	82	140	235
With 25% Northern METC:			
British Columbia	n/a	112 (12% less)	187 (12% less)
Ontario	n/a	123 (12% less)	207 (12% less)

While the two proposals above are stand-alone recommendations, Table 17 shows the combined effect of adopting both the drilling incentive and the enhanced METC.⁴²

If both incentives are adopted, the costs of financing one metre of drilling for a remote project come to \$75/m for British Columbia and \$83/m for Ontario. These costs are on par with the costs of \$75 and \$82 for British Columbia and Ontario for a non-remote project, when financed under the current flow-through regime (as outlined in Table 16, column 2). Table 17 illustrates how much effort would be required to truly level the playing field for projects operating in northern Canada.

40 The average costs of investing in one metre of diamond drilling are objective and based on company data. References to the “cost to the investor” reflect the fact that the provision of (for example) \$550 to a company to conduct one metre of drilling in remote areas does not cost the investor \$550 if the investor uses flow-through financing. Taking the investor perspective allows for modelling of the impact of an enhanced METC on investor behaviour when faced with the opportunity to finance a drilling program in a remote or non-remote area.

41 The differences to the BC investor who receives a 20% provincial tax credit and the Ontario investor who receives a 5% provincial tax credit are minimal, because the METC received from the federal government is reduced by the provincial assistance received. Thus, a BC investor would receive METC for 80% of an investment while an Ontario investor would receive METC for 95% of an investment.

42 Each incentive would be targeted at different actors: the co-funded drilling incentive would be targeted at all companies operating in northern Canada, not just those that use flow-through funding, whereas the enhanced tax credit would be targeted at investors interested in financing northern projects using flow-through shares.



TABLE 17: COMBINED INCENTIVES TO COMPANY AND FLOW-THROUGH INVESTOR

Projects and Locations and Costs	Non-Remote Project	Remote Project	Very Remote Project
Impact of drilling incentive on costs to company (\$/metre)	n/a	229	384
	Non-Remote	Remote	Very Remote
Cost to investor of financing 1m of drilling, combining drilling incentive to company with 25% enhanced northern METC for investor (\$/metre)			
British Columbia	n/a	75	125
Ontario	n/a	83	138



ANNEX III – THE IMPACT OF NORTHERN FACTORS ON MINING PROJECT ECONOMICS

THE IMPACT OF NORTHERN FACTORS ON PROJECT ECONOMICS

Given current forecasts of mineral prices, what are the impacts of the northern factors – the considerably higher capital and operating costs presented above – on the economics of northern mining projects? Do they reduce the return on what would be an attractive prospect in the south to a marginal one for an otherwise equivalent northern project? Is there a significant difference in the spread between pre- and post-tax returns on otherwise equivalent northern and southern projects?

To answer these and related questions, ENTRANS used a number of publicly-available sources to develop data for representative northern gold, zinc-copper and diamond mines. The authors then applied the inverse of the northern factors to create representative southern mines that are equivalent except for the lower capital and operating costs due to their non-remote location. These representative northern and southern mining projects were then examined using the NRCan project financial model to generate measures of project profitability, such as internal rates of return (IRRs) and cash flow.

There are two main elements to this methodology: the representative northern projects and the project financial model. Each is described briefly below.

The Representative Northern Projects

For this study, the sponsors wanted, as far as possible, to avoid modelling specific projects. This would maintain both commercial confidentiality and broaden the applicability of the recommendations. For the zinc-copper and diamond mine analyses, examples of representative northern projects already exist. They are contained in the June 2008 report *Comparative Review of the Rate of Royalty in the Canada Mining Regulation, as Relates to National and International Competitiveness*,⁴³ which was commissioned by MAC and the then Department of Indian Affairs and Northern Development. The study, undertaken by the consulting firm Two Ducks Resources, focused on an empirical comparison of the mineral fiscal regime in the NWT at the time (essentially, the federal income tax system and the Canadian Mining Regulation royalty) and the fiscal regimes in a large number of other domestic and international jurisdictions. To do the comparison, Two Ducks created two hypothetical northern mines: a medium-sized base metal mine and a larger diamond mine.

As the report noted, “The mine types were chosen to reflect the spectrum of typical mine developments for the north, and the spectrum of mine cost structures – base metal mines having relatively complicated processing requirements and costs, including post-mine costs for smelting and refining, while diamond mines have relatively simpler processing requirements and costs but more complex and costly site development requirements.”

The authors of this report have taken the Two Ducks representative base metal and diamond mine examples and updated the capital and operating cost estimates using Statistics Canada’s GDP price deflator series to reflect a construction period starting in 2014 (versus 2004 in the Two Ducks analysis). Given that these are representative mining developments, some modest amounts of spending on initial exploration and property acquisition were added that were not in the original Two Ducks specifications.⁴⁴

For the gold mine analysis, there are, unfortunately, no publicly-available representative mine data. There is, however, a considerable amount of publicly-available information on Agnico Eagle’s Meadowbank operations.⁴⁵

43 Two Ducks Resources, *Comparative Review of the Rate of Royalty in the Canada Mining Regulation, as Relates to National and International Competitiveness*, a study undertaken for the Mining Association of Canada and the Department of Indian Affairs and Northern Development, June 2008. The Two Ducks report was extensively peer reviewed by both government and industry analysts and is available on MAC’s website at <http://mining.ca/sites/default/files/documents/ComparativeReviewoftheRateofRoyalty.pdf>.

44 The issue here is that pre-discovery exploration and acquisition costs are unique to each prospect. Years of exploration may (or may not) have been necessary to identify and firm up a discovery. The acquisition cost often reflects not only mineral price expectations at the time but also the consequences of corporate arrangements. The relatively modest amounts for acquisition costs and pre-discovery exploration are included primarily as markers and do not materially affect the results.

45 See for example, Agnico Eagle’s presentation *The Meadowbank and Meliadine Experience – Mining Exploration North of 60*, at the RBC Capital Markets North of 60 Conference, April 30, 2013, and Agnico Eagle’s Annual Form 20-F submissions available on the Agnico Eagle Mines website, <http://ir.agnicoeagle.com/English/investor-relations/default.aspx>.



From this information and with NRCan's and Agnico Eagle's assistance, a "representative" northern gold mine was developed, which has many attributes of Meadowbank but is not precisely that project.

For the southern projects, the initial approach was to collect cost profiles on actual mine developments. It became increasingly clear, however, that it was not possible to find southern matches that were sufficiently close in terms of major parameters other than location so as to permit a direct comparison. Instead, hypothetical southern projects were created that differed from their northern counterparts only in terms of the capital and operating costs associated with the northern location. This was achieved by scaling back the capital and operating costs of the representative northern mines using the northern cost factors shown in Tables 6 and 7 previously discussed. So, like the model of the northern mines, the southern projects are also not real projects. Rather, they are hypothetical representations of what the northern project would look like if, all other things are equal, they were located in southern Canada.

The Project Financial Model

For a project financial model, the authors turned to the Minerals and Metals Sector of Natural Resources Canada. NRCan has acknowledged expertise in this area and a well-deserved reputation for solid empirical research. Its project financial model can accept a variety of mine types and configurations. The model includes specifications for the federal mineral fiscal regime and the regimes for each of the provinces and territories. This allows an evaluation of project economics under different fiscal systems via a virtual placement of a project in various jurisdictions. In addition, the model can accommodate a range of financing arrangements. The major inputs and assumptions for the analysis are summarized in Table 18.

While recognizing that volatility in mineral prices is inevitable, this analysis is not intended to be a speculation on prices. Thus, the mineral price assumptions are either flat line extensions of recent prices or averages of available forecasts. In the case of gold, the US\$1,280 price is an average of 12 forecasts from around early summer 2014. The base metal prices are largely extensions of current prices. In the case of diamonds, the starting point is an assay report by Dominion Diamond Corporation (formerly Harry Winston) on the remaining pipes at Diavik.⁴⁶ The average price suggested by the report is US\$150 per carat. The only publicly available forecast of diamond prices – from BMO Capital Markets⁴⁷ – has diamond prices rising by 6% per year until 2017, which translates into US\$175 per carat that this analysis holds constant for the remaining life of the project. The exchange rate is from Budget 2013 and reflects the average, at the time, of major Canadian forecasting organizations.⁴⁸

The zinc-copper and diamond mines each have a life of 18 years of which 15 are production. The gold mine's life is shorter at 14 years of which only nine are production. Annual production ramps up for the gold mine but is constant for the zinc-copper and diamond mines. For the former, the mix of production reflects that of the Izok Corridor Project.

The capital and operating cost estimates for the northern projects reflect representative gold, zinc-copper and diamond mines described earlier. The estimates for the southern mines are essentially those for northern representative projects scaled back using the northern factors. For tangible capital, the capital northern factor is applied. Intangible capital – pre- and post-production exploration and development – is, however, more akin to operating costs and thus the operating cost operating factor is applied to such expenditures. Overall, the capital costs for northern gold and zinc-copper mines are about 90% higher than for their southern counterparts. For the diamond mine, overall capital costs are about 30% higher. Interestingly, the intangible component of capital costs is relatively much larger for the diamond mine. This may be related to the complex dam structure required to divert the

46 Dominion Diamond Corporation, "Dominion Diamond Corporation reports Diavik Diamond Mine First Calendar Quarter Production," April 15, 2014, <http://www.ddcorp.ca/investors/news-single?id=1918576>.

47 For the BMO forecast, see "Diamond Prices to Increase 6% a Year to 2020 on Supply, BMO Says," BloombergBusiness, May 17, 2013, <http://www.bloomberg.com/news/2013-05-17/diamond-prices-to-increase-6-a-year-to-2020-on-supply-bmo-says.html>.

48 One additional issue had to be addressed in the construction of the representative zinc-copper and diamond mine projects. The Two Ducks analysis does not require ore production and revenue estimates. The Two Ducks focus was on comparing fiscal regimes. It merely adjusted the model to achieve a target after-tax IRR under the Northwest Territories and Nunavut Mining Regulations (10%, 15% or 20%), then compared the results for other jurisdictions to that benchmark. In this approach, there was no need for price or mineral production estimates. The objective of this analysis is different. It aims to examine project returns for a given price and production combination. Therefore, ore production volume estimates had to be developed. The authors started with the total volumes of material removed as in the Two Ducks analysis, then developed estimates of the ratios of waste to total tonnes removed and ore percentages that reflected the recent northern mining experience, using publicly available information from, for example, Izok Lake for the zinc-copper mine and from Diavik for the diamond mine.

lake water in order to access the pipes – earth moving, dredging and site development are considered to be intangible expenditures.

Table 8 (re-presented below for convenience) integrates the various parts of the analysis by providing the pre- and post-tax internal rates of return (IRRs) for northern and southern gold, zinc-copper and diamond mines. The mines are assumed to be located in different jurisdictions – British Columbia, Ontario and Quebec for the southern projects and these provinces plus each of the three territories for the northern projects. The rates of return are those which would be seen by investors/proponents in each project given the price, cost and production assumptions and the fiscal regime in the particular jurisdiction. The analysis assumes a fully mature corporate income tax system; that is, all the recent changes are fully phased in (such as the elimination of the accelerated capital cost allowance for new mines and other definitional changes). As indicated, the post-tax results are shown from both a fully taxable and tax-limited investor perspectives.

TABLE 18: THE ECONOMICS OF REPRESENTATIVE NORTHERN AND SOUTHERN MINING DEVELOPMENTS – ASSUMPTIONS

Mines	Gold		Zinc-Copper		Diamond	
Mineral Prices \$US/unit	1280/oz. flat		Zinc – 1.10/lb flat Copper – 3.00/lb flat Lead – 2,100/tonne Silver – 19.70/oz.		150/carat in 2014 to 175/carat in 2017, then flat	
Exchange rate	0.94		0.94		0.94	
Project life – years	14		18		18	
construction	3		3		3	
production	9		15		15	
reclamation	2		x		x	
Northern factors¹						
capital	2.05		2.46		1.16	
operating	1.59		1.30		1.46	
Capital expenditures (\$ millions)	Northern	Southern	Northern	Southern	Northern	Southern
Intangible ²	262	183	192	160	1,232	864
Tangible ³	950	415	437	177	935	805
Total	1,112	598	629	337	2,167	1,633
Operating costs (\$ millions/year)	Northern	Southern	Northern	Southern	Northern	Southern
Total	294	184	265	204	174	119
	GOLD		ZINC-COPPER		DIAMOND	
Annual production	354 x 10 ³ oz. in year 4, rising to 375 x 10 ³ by year 7 and remaining at that level until year 12		Zinc – 147 x 10 ³ tonnes Copper – 28 x 10 ³ tonnes Lead – 15 x 10 ³ tonnes Silver – 2.8 x 10 ⁶ oz.		4.97 million carats	

1 The Northern factor is the ratio of capital (or operating) costs in a representative northern mine to the capital (or operating costs) in an otherwise equivalent representative southern mine. In the gold case, for example, the capital costs for the northern mine are 2.05 times those in the southern mine. Operating costs in the northern gold mine are 1.59 times higher than in an equivalent southern mine.

2 Intangible capital expenditures include mineral rights acquisition costs, pre-production development expenditures and post-production and off-site exploration expenditures.

3 Tangible capital expenditures include depreciable construction capital and sustaining capital.



EXISTING FEDERAL AND PROVINCIAL TAX INCENTIVE INSTRUMENTS AND POLICIES

After seeing how the northern factors reduced the after tax profitability of the northern mining projects, the next step was to determine what mechanisms could be applied, and to what degree, to enhance the viability of northern mining projects. The following is an overview of the options available, and the broader basis for understanding why the project partners support the authors' recommendations.

Historically, the federal government has used income tax incentives to encourage incremental investment within targeted industry sectors or regions of Canada. The two generic categories of such tax-based support are faster rates of deduction for capital assets and investment tax credits. Examples exist at both the federal and provincial level:

- The current 50% capital cost allowance (CCA) rate for both renewable energy equipment and for manufacturing and processing assets
- Tax credits for research and development under the federal Scientific Research and Experimental Development (SR&ED) Program and its provincial counterparts, the Atlantic Investment Tax Credit (AITC) and the Mineral Exploration Tax Credit (METC) and similar provincial credits

The main alternatives to tax-based options are various forms of direct government assistance to business. Although varying considerably in detail, federal direct assistance to business takes three main forms:

- **Non-repayable contributions** are essentially payments to companies to support identified capital or other investment. The amount can be determined via a formula ("x" percent of total spending) or on a case-by-case basis.
- **Unconditionally repayable contributions** are essentially loans from the government at preferential and sometimes zero interest rates with the requirement that the principal be repaid.
- **Conditionally repayable contributions**, as the name implies, are "loans" provided by the government with some flexibility within the context of a negotiated agreement regarding the circumstances under which the government would eventually forgive the loan.

The partners have reviewed all of these tax-based and direct assistance support options. In their view, a combination of investment tax credits and a conditionally repayable contribution would provide roughly equivalent support to fully taxable and tax-limited investors in northern mining developments. This option was initially outlined in MAC's submission to the House of Commons Standing Committee on Finance.⁴⁹

The following discussion provides a more detailed summary of the alternatives than was permitted in the submission.

Accelerated Capital Cost Allowance (CCA) Rates for Capital Equipment

Most of the current income tax incentives for new investments are embedded in the capital cost allowances for capital equipment. The CCA system provides an incentive whenever the rate of deduction for tax purposes exceeds the normal depreciation of a capital asset. An accelerated CCA provision does offer an investment incentive but only by advancing the timing of the tax deduction. It does not lower the total taxes payable over the full project life. There are currently two main categories of assets in the Income Tax Regulations with an explicit acceleration element. Under Class 43.2, many types of renewable energy and energy conservation investments receive a 50% CCA rate. Some form of accelerated deduction for these types of equipment has been in place for a number of years. While originally designed primarily to encourage energy efficiency and energy conservation, more recently the justification has been broadened to the benefits from reductions in GHG emissions. The entire manufacturing and processing sector also benefits currently - under Class 29 - from a 50% CCA rate for all assets. The provision was initially put in place in 2007 to support manufacturing employment during a high exchange rate period. In Budget 2015, however, the 50% rate for manufacturing was extended for 10 years

⁴⁹ MAC's submission to the House of Commons Standing Committee on Finance, August 6, 2014, can be accessed at http://www.parl.gc.ca/Content/HOC/Committee/412/FINA/WebDoc/WD6615327/412_FINA_PBC2014_Briefs%5CMiningAssociationOfCanada-e.pdf

TABLE 8: THE ECONOMICS OF REPRESENTATIVE NORTHERN AND SOUTHERN MINING DEVELOPMENTS – BASE CASE RESULTS

Mines	Gold		Zinc-Copper		Diamond	
	Northern	Southern	Northern	Southern	Northern	Southern
Pre-Tax (Social Return)	9.5	39.6	14.1	37.6	31.2	40.8
Post-Tax – Tax Limited						
Nunavut	6.2	n/a	10.6	n/a	24.6	n/a
NWT	6.2	n/a	10.7	n/a	24.7	n/a
Yukon	6.0	n/a	10.3	n/a	23.6	n/a
Quebec	6.1	28.9	11.2	30.4	25.1	31.5
Ontario	6.8	32.2	11.2	31.2	25.9	34.0
British Columbia	6.7	30.7	10.9	30.5	26.0	33.7
Average	6.3	30.6	10.8	30.7	25.0	33.1
Post-Tax – Fully Taxable						
Nunavut	6.4	n/a	11.0	n/a	25.8	n/a
NWT	6.4	n/a	11.1	n/a	25.8	n/a
Yukon	6.2	n/a	10.8	n/a	24.8	n/a
Quebec	6.3	29.7	11.7	31.9	26.5	33.1
Ontario	7.3	32.9	11.8	32.8	27.6	35.7
British Columbia	6.9	31.3	11.3	31.6	27.1	35.0
Average	6.6	31.3	11.3	32.1	26.3	34.6

ASSESSMENT OF ACCELERATED CCA INCENTIVES

There is a generic policy objective at Finance to keep the majority of CCA rates at or reasonably close to the estimate of economic life of the items in each class. Each class of assets can be very broadly described and includes a wide range of different types of equipment used in different sectors of the economy. ENTRANS believes that providing a very high rate of deduction to northern mining assets would be inconsistent with this tax policy objective.

Finally, higher CCA rates are of almost no immediate value to a company that is tax limited. Methods of “monetizing” the value of CCA deductions via some form of refundability or transferability to other investors are cumbersome and not particularly cost effective.

Investment Tax Credits

An investment tax credit is a reduction in income tax otherwise payable that is based on the costs of a new capital investment. There are currently relatively few investment tax credits in the federal corporate income tax system. At various times in the past, however, investment tax credits were used much more extensively to promote policy objectives such as regional economic development.

The SR&ED tax credit is by far the largest current example of an ITC in the federal income tax system. It is the largest single corporate income tax expenditure. The primary policy rationale for such a generous credit is that R&D is essential for economic growth, but the performer of the successful R&D is often unable to fully capture the economic rewards of the investment. Tax credits for film and video production have a similar rationale.



The 15% Mining Exploration Tax Credit (METC) applies to exploration activity financed via a flow-through share issue. The only current federal investment tax credit with an explicit regional dimension is the 10% Atlantic Investment Tax Credit (AITC). Budget 2012 phased out resource sector investment eligibility for AITC in that region.

Most provinces offer additional provincial tax credits for research and development, films and mineral exploration, and often use the same or very similar definitions and refundability rules as the federal incentive. In addition, Ontario, Quebec and Manitoba provide ITCs for various regions and sub-regions within the province. Quebec also differentiates tax credits by industry sectors.

ASSESSMENT OF INVESTMENT TAX CREDITS

Rather than just a deferral of tax that occurs with accelerated CCAs, tax credits provide an immediate and permanent reduction in tax otherwise payable. They are a well-understood feature of the Income Tax Act and can be delivered by both the federal and provincial governments through existing tax collection agreements. The rates can be different for each level of government and there is even considerable flexibility possible in designating qualifying activities and regions.

Tax credits are, by themselves, of direct and immediate benefit only to currently taxable companies. They can, however, be monetized fairly straightforwardly by being made refundable and thus of use to tax-limited corporations as a source of financing. The issue with refundability is not the mechanics but the rationale. This point is illustrated by the SR&ED example. In the SR&ED case, the refundability is limited to the credits earned by Canadian-controlled private corporations (CCPCs) largely on the grounds that such small companies have limited recourse to other sources of financing. To date, the federal government has been unwilling to significantly broaden the current SR&ED credit refundability provisions to all corporations. This reluctance has been due primarily to fiscal cost considerations and the view that the larger R&D performers have access to other forms of financing. In summary, ENTRANS believes that a new investment tax credit would be a relatively clean and efficient mechanism for delivering incentives directly to taxpaying mining companies. Its impact is also earlier in the project's life than the highest accelerated CCA (50%) available to other equipment. To be of benefit, however, to tax-limited mining companies, a tax credit would have to be made refundable or otherwise monetized. In the authors' view, however, the government would be reluctant to provide refundability to large international mining companies with access to financing.

Direct Incentives

As noted earlier, after reviewing the three generic forms of direct assistance, the authors focused their attention on conditionally repayable contribution (CRC) programs.⁵⁰ Under a CRC agreement, financing is advanced by the government with provisions for repayment that are dependent on the outcome of the investment. Typically, interest is not charged but there may be some administrative fee. The repayments can be waived in all or in part.

The logic of CRCs is to reduce business risk in investments that have a higher social than private return by increasing access to capital on very favourable terms. From an investor perspective, the advantage of a CRC is that it leverages an investment contribution, thereby increasing the investor's return. And, unlike ITCs or grants/non-repayable contributions, CRCs (and unconditionally repayable contributions) are not considered as assistance. Therefore, the investor receives the full tax deductions from the investment.

The federal government has been very active over the years in using unconditional and conditional repayable contributions to support investment in a number of industries. Current programs include the Strategic Aerospace and Defence Initiative (SADI), the Investing in Business Innovation Fund, the Canada Small Business Financing

⁵⁰ The distinction between a conditional and an unconditional repayable contribution is similar to whether a loan is secured by the project or by the company undertaking the project. In the former, loan repayment is conditional on the success of the project. In the latter, the company is responsible for repaying the loan even if the project is unsuccessful.

Program and the Automotive Innovation Fund (AIF).⁵¹ These funds are managed by Industry Canada. Sustainable Development Technology Canada (SDTC) reports to the Minister of Natural Resources Canada. The amounts involved are large. As of the end of 2013, SADI had about \$900 million in contributions outstanding of which \$560 million were CRCs.⁵² In February 2014, Industry Canada announced a further \$250 million repayable contribution to CAE Industries latest project to develop new simulation technology for its next-generation civilian and military aircraft flight simulators.⁵³ The SDTC program is also sizeable having, at last report, provided \$598 million to 246 projects since its founding in 2001. The AIF was recently increased and the cumulative contributions will soon reach the \$1 billion level.⁵⁴

PROPOSED NEW NORTHERN MINING INCENTIVES: DESCRIPTION AND ANALYSIS OF PROJECT IMPACTS

The proposed approach to encourage northern mining development is a hybrid, with support being delivered both within the tax system as well as through programs. The approach recognizes that not all mining companies will have sufficient taxable income to be able to immediately benefit from any new investment tax credits. These tax-limited companies will be allowed to negotiate access to repayable contributions for their infrastructure components.

Details of Tax Credit/CRC Option

In general, all companies would be eligible to earn a basic 10% investment tax credit on all capital expenditures associated with a northern mine. This 10% credit acknowledges the higher costs associated with mine development in remote areas. The 10% credit rate is consistent with that currently provided to encourage regional development under the Atlantic Investment Tax Credit (AITC).

In addition, it is proposed that fully taxable companies will be eligible to earn a further 15% investment tax credit on specified infrastructure investments (IITC). Eligible infrastructure includes roads, bridges, dams, docks, rail lines, power plants, airstrips, inventory storage and other assets that would normally be available in the surrounding public infrastructure for mines in southern Canada, but which are absent in the north. This is essentially the definition developed in Table 6 discussed earlier in this report. The precise definition of infrastructure costs eligible for the additional 15% tax credit would be laid out in the Income Tax Regulations and administered by CRA.

For a tax-limited company, the proposal is that it would be eligible to earn the 10% investment tax credit on its non-infrastructure investments. However, instead of earning the supplementary 15% IITC, the company could choose to apply for a CRC to cover 25% of its infrastructure investments. It is expected that, to simplify the approval process, the CRC coverage would generally be based on the infrastructure definitions developed in the Income Tax Regulations for the IITC. CRCs would be negotiated on a case-by-case basis with a designated agency responsible for resource or regional development. These negotiations would include, very importantly, the terms and conditions under which the CRC would be repaid.

Table 19 examines the impacts of various policy options on the post-tax internal rates of return (IRR) for northern gold, zinc-copper and diamond mines from the perspective of fully taxable and tax limited corporations. The latter assumes that the mine is the only activity of the corporation and any tax incentives such as investment tax credit are unusable until the mine itself becomes taxable. With a fully taxable company the assumption is that all deductions and credits earned can be fully accessed to reduce income tax otherwise payable on other income as soon as they are earned.

51 Budget 2008 introduced the AIF, providing \$250 million over five years to support automotive firms' strategic, large-scale research and development (R&D) projects to build innovative, greener, more fuel-efficient vehicles. On January 4, 2013, the Prime Minister announced the renewal of the AIF, with an additional \$250 million over the next five years. On February 11, 2014, the Government of Canada announced an additional \$500 million over two years (2014-2016) to the AIF to support significant new strategic research and development projects and long-term investments in the Canadian automotive sector.

52 Industry Canada, Industrial Technologies Office, Project Portfolio, last modified, July 7, 2014, http://www.ic.gc.ca/eic/site/ito-oti.nsf/eng/h_00025.html.

53 Industry Canada, "Harper Government Invests in Aircraft Flight Simulator Technology," media release, February 27, 2014, <http://news.gc.ca/web/article-en.do?mthd=tp&ctr.page=1&nid=819329&ctr.tpID=1>.

54 Industry Canada - Automotive Innovation Fund Program Summary, last modified February 20, 2013, <https://www.ic.gc.ca/eic/site/auto-auto.nsf/eng/am02257.html>.



For fully taxable companies, the comparison is between the IRRs under the 10% ITC plus 15% IITC proposal and those under the current regime. For the tax-limited companies, the options menu is longer. It includes examinations of the 10% ITC plus 15% IITC option with and without refundability and the 10% ITC plus 25% CRC for infrastructure option under the assumptions that the contribution is or is not repayable.

The two versions of the CRC option require some explanation. They are not designed to examine whether the project succeeds or fails to discharge the obligation. Rather, the logic of the non-repayable option is that infrastructure being supported may have an inherent public value that continues after the mining operations have concluded. Cumulative infrastructure development is an important factor in regional development in the North. A concern has been expressed that current government policy requires all infrastructure be removed after mining is completed.

Examples might include a power plant that continues to provide electricity to local communities or a port facility that could continue to be a base for commercial, scientific and naval vessels. In such cases, there could be an option whereby the ownership of any qualifying infrastructure receiving the CRC reverts to the Crown after a pre-specified period in exchange for pardoning the loan. Obviously, the types of infrastructure that may have a post-project value and thus what proportion of the CRC can be pardoned are matters for negotiation. The repayable and non-repayable versions of the option are designed only as “bookends” to examine the range of possibilities. In reviewing the results in Table 19, it is useful to compare not only the post-tax IRRs for the policy proposals themselves but also to relate them to the pre-tax return. Given the external benefits not captured by the project investor, it is entirely appropriate for governments to reduce the tax burden so that the after-tax return approaches the pre-tax IRR. As argued in the main report, there are a number of external social, environmental and policy facilitation benefits of northern mining development not captured in the straightforward project economics. The pre-tax IRR does provide a useful goalpost for policy discussion.

For the fully taxable investor, the combination of the 10% ITC and the 15% IITC distinctly improves project economics. The effect is most noticeable for the gold mine (from 6.6% to 9.0%) and least so for the diamond mine (from 26.3% to 27.7%), with the zinc-copper mine in the middle. These results highlight that the more profitable the project, other things being equal, the less consequential the support. Also, for the diamond mine, the northern factor component of capital costs is considerably lower than the other projects, so the size of the credits is proportionally smaller.

For the gold and zinc-copper projects, the effect of the two tax credits, assuming the investor is fully taxable, comes close to eliminating the tax burden (i.e., the after-tax IRRs are just slightly lower than the pre-tax returns). The effect is less pronounced for the more profitable diamond mine. It can be argued that the proposed ITCs provide greater relative benefit to less profitable projects. Highly profitable northern projects such as the diamond mine receive relatively less support. By contrast, the less profitable project (the gold mine) receives relatively more support.

It is probably worth noting that these effects are due only to assumed federal action. Adjustments to their royalty/mining tax and corporate income tax regimes by the provinces and territories could virtually eliminate the fiscal burden on marginal projects.

The task of improving the return on northern mining projects for tax-limited investors is somewhat more challenging. From Table 19, it is clear that if the 10% ITC and the 15% tax credit on infrastructure are not refundable, the improvement in the tax-limited investor's return – by about a percentage point for gold and 0.7 points for zinc-copper – while helpful, is not particularly significant.

The 25% CRC option in which the contribution is repayable increases the return for the tax-limited investor but, somewhat surprisingly, not by much. For the gold project, the improvement, relative to the non-refundable ITC option is only 7.4%–7.6%. For the zinc-copper project, the increase is a bit larger –10.8%–11.5% – while for the diamond project, the improvement is similar. The results, particularly for gold and zinc-copper, suggest that the negative effect of the repayment on returns offsets much of the positive benefit of the initial loan.

TABLE 19: IMPACTS OF PROPOSALS ON NORTHERN MINING PROJECTS

Mines	Gold	Zinc-Copper	Diamond
<i>Average IRRs across six jurisdictions¹ (%)</i>			
Pre-Tax	9.5	14.1	31.2
Post-Tax – Fully Taxable			
Current:	6.6	11.3	26.3
with 10% ITC and 15% IITC	9.0	13.0	27.7
Post-Tax – Tax-Limited			
Current:	6.3	10.8	25.0
with 10% ITC and 15% IITC, not refundable	7.4	11.5	25.6
with 10% ITC not refundable and 25% CRC on infrastructure repayable ²	7.6	11.9	25.8
with 10% ITC not refundable and 25% CRC on infrastructure not repayable	8.2	12.2	25.8
with 10% ITC and 15% IITC, both refundable	8.4	12.3	26.2

¹ Rates of return have been averaged across relevant provincial (Ontario, Quebec, British Columbia) and territorial (Yukon, NWT, Nunavut) jurisdictions. Different provincial corporate income tax rates as well as royalty/mining tax rates result in different IRRs in different jurisdictions.

² Repayments are assumed to begin in the year in which cumulative net cash flow from the project becomes positive. The payments are in equal annual tranches of the CRC amount over the remaining production life of the project subject a maximum of 50% of net annual cash flow.

If the CRC is not repayable (because, for example, the infrastructure assets are eventually to be assigned to the Crown), the returns to the tax-limited investor – 8.2% for gold, 12.2% for zinc-copper and 25.8% for diamonds – start to approach those for a fully taxable counterpart. These rates are just slightly lower than those that would obtain for the tax-limited investor were the 10% ITC and the 15% IITC to be fully refundable. For either of these options, the gap between pre- and post-tax returns is somewhat larger than that shown by the fully taxable results (principally because in the tax-limited case, the CCA deductions cannot be immediately claimed), which suggests some further room for provincial/territorial governments to also provide support.

