Bridging the Distance Divide:
Reducing the Costs of Exploration and Mining in Remote Canada

Nunavut Mining Symposium 2016
Iqaluit, Nunavut

PDAC
PROSPECTORS & DEVELOPERS ASSOCIATION OF CANADA

PRESENTATION OVERVIEW

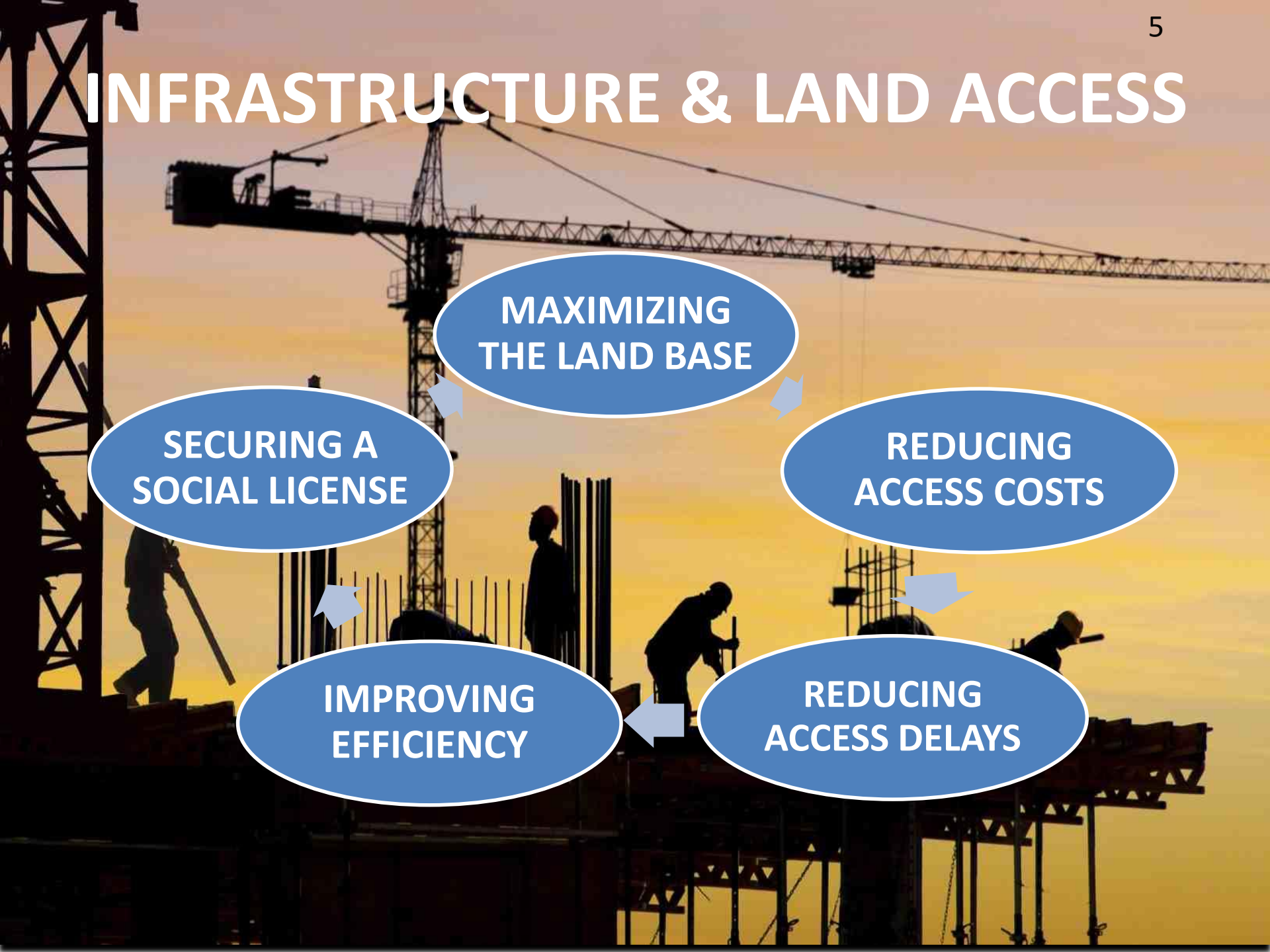
- About the PDAC
- Mining's contribution to the territories
- Northern cost premium
- Remoteness and mineral development
- Responding to the northern cost premium

The PDAC Convention has averaged 25,000+ attendees (2010-2016)

OUR VISION

A ***competitive*** Canadian exploration and development industry that ***operates responsibly*** around the world to find the minerals and metals that are essential to modern life.

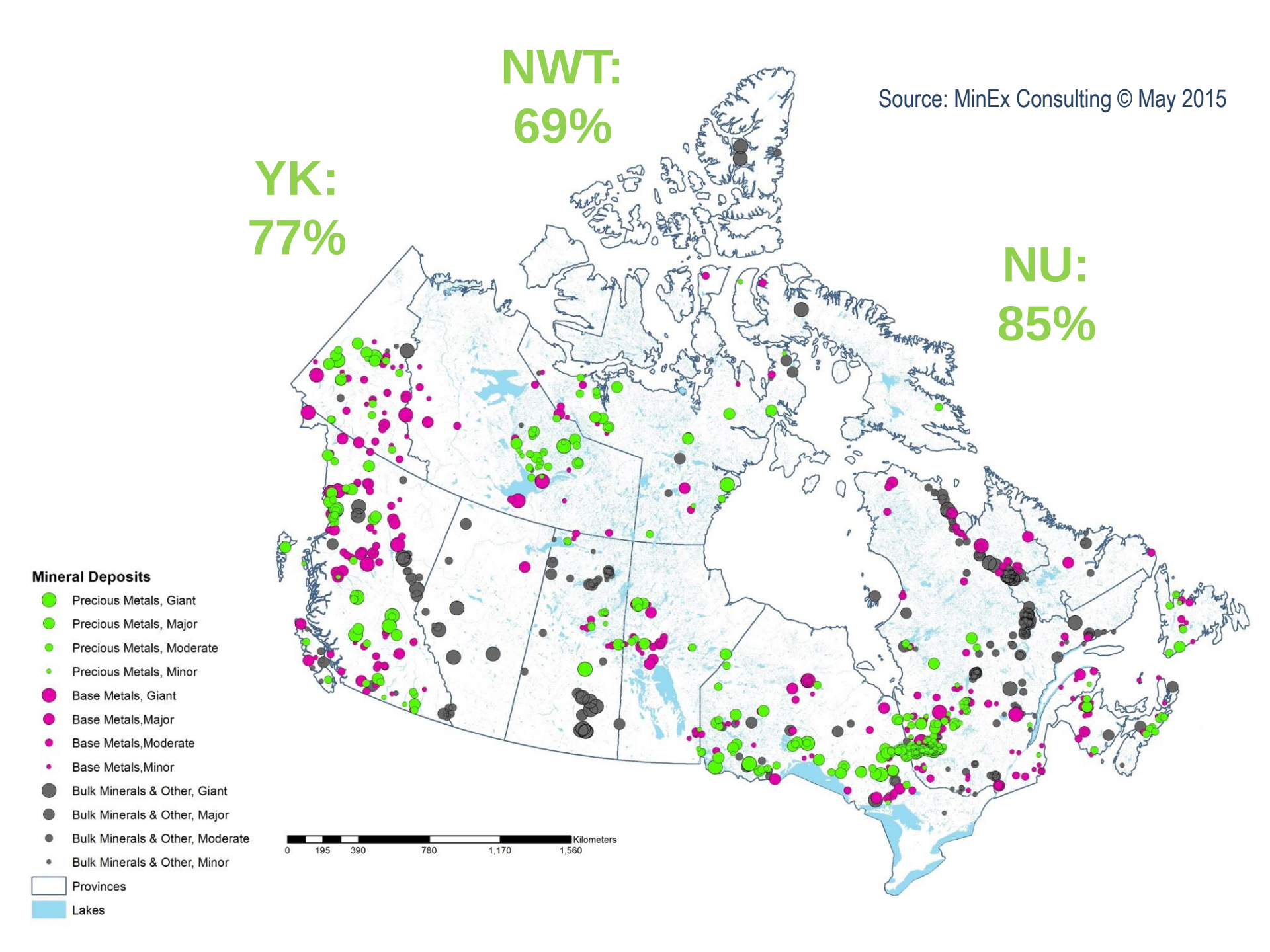
INFRASTRUCTURE & LAND ACCESS



THE NORTHERN COST PREMIUM

- Mineral exploration costs increase arithmetically with distance from infrastructure
  - Up to 50km away: **2.27 times more expensive** than the average costs of the non-remote projects (up to 50km away)
  - More than 500km away: **2.8 times higher**

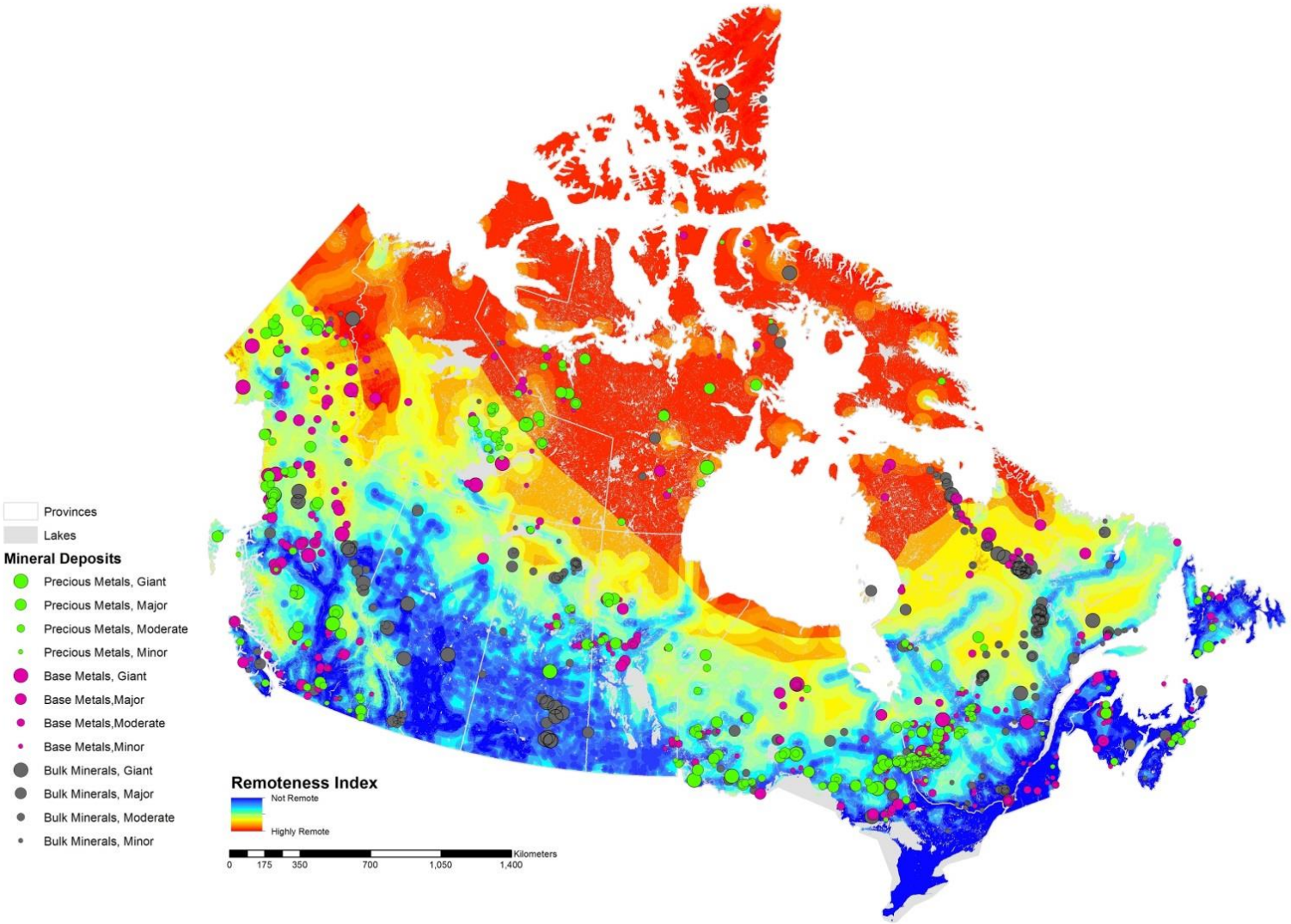
- Capital costs were higher for a range of commodities**:**
  - **2.5 times higher** for base metal mines
  - Approximately **double** for gold mines
  - **15-20% higher** for diamond mines in the territories


NWT:
69%
YK:
77%
NU:
85%
Source: MinEx Consulting © May 2015
Mineral Deposits
Precious Metals, Giant
Precious Metals, Major
Precious Metals, Moderate
Precious Metals, Minor
Base Metals, Giant
Base Metals,Major
Base Metals,Moderate
Base Metals,Minor
Bulk Minerals & Other, Giant
Bulk Minerals & Other, Major
Bulk Minerals & Other, Moderate
Bulk Minerals & Other, Minor
Provinces
Lakes
0 195 390 780 1,170 1,560
Kilometers

FACTORS AFFECTING THE MOVEMENT INTO PRODUCTION

- Small size
- Low grades
- Commodity Prices / Access to Capital
- Taxes and royalties
- Community and social issues
- High production costs
  - Depth of cover
  - Remoteness

REMOTENESS AND UNDEVELOPED DEPOSITS

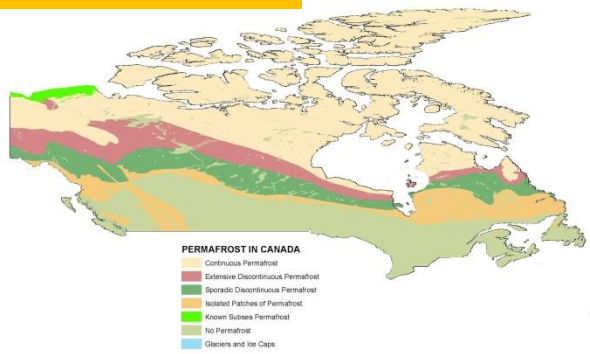


Note: Based on analysis of 1079 undeveloped projects >="Minor" in size, including 355 "precious metal" (ie Au, Ag, PGE and diamond), 402 "base metal" (ie Cu, Ni, Zn/Pb, Sn, W, Mo and REE) and 302 "Bulk Mineral" (ie iron ore and coal) undeveloped projects

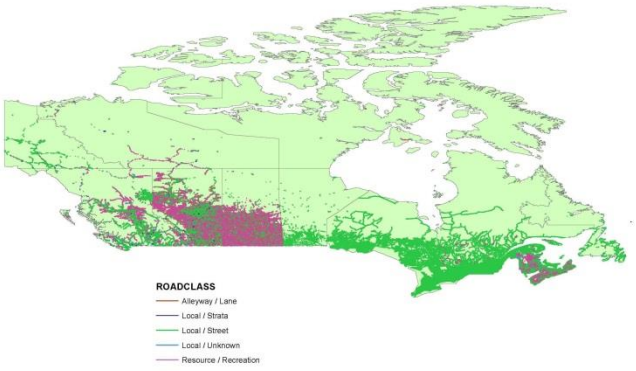
COST DRIVERS:
TERRAIN – CLIMATE - INFRASTRUCTURE

ELEVATION

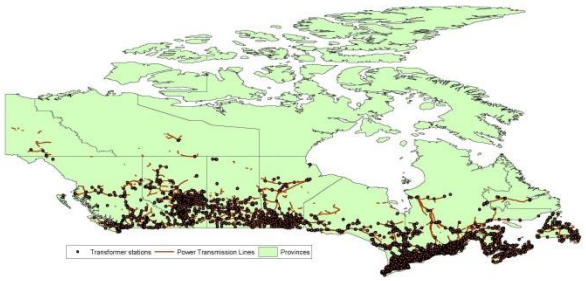
PERMAFROST



ROADS



POWER



Other geo-spatial layers used in the analysis include:

- *Towns and regional cities*
- *Rail*
- *Ports (and ship size)*
- *Airports (and their capabilities)*

Data Sources: Kenex compiled data from Geobase (roads), NASA (Digital Elevation Map), Canvec (Power, Rail and Airports), Statistics Canada (towns), WorldPortSource (Ports) and Geological Survey of Canada Geogratis (Permafrost) … date of acquisition Oct 2014

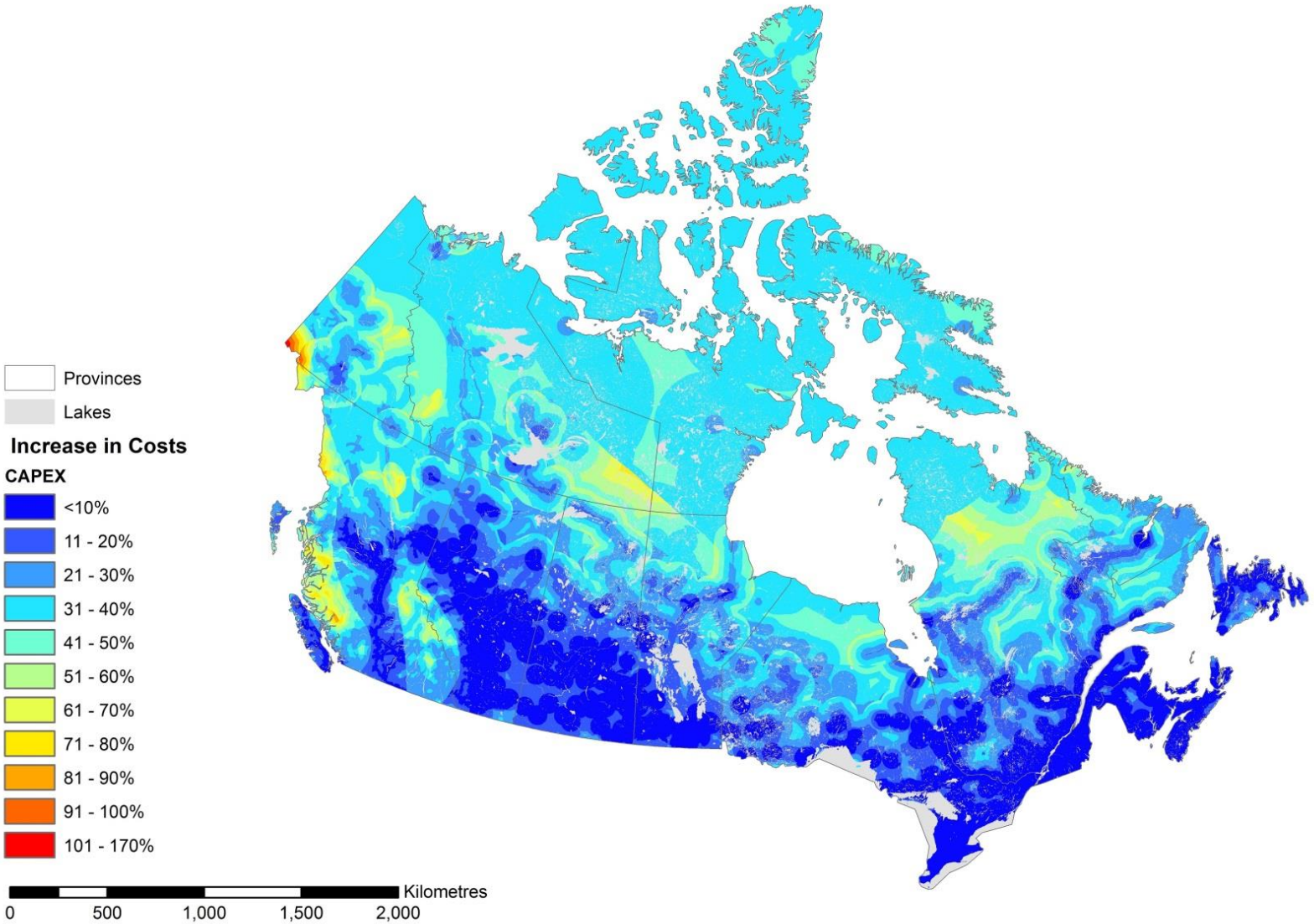
COST MODELLING

The impact of remoteness was modelled for gold, copper and iron ore mines at three different scales (small, medium, large)

		S	M	L
PRECIOUS METALS	Gold (U/Ground)	0.35 Mtpa	1.75 Mtpa	4.9 Mtpa
BASE METALS	Copper (Open Pit)	0.35 Mtpa	1.75 Mtpa	4.9 Mtpa

IMPACT OF REMOTENESS ON CAPEX (PRECIOUS METALS)

1.75 MTPA



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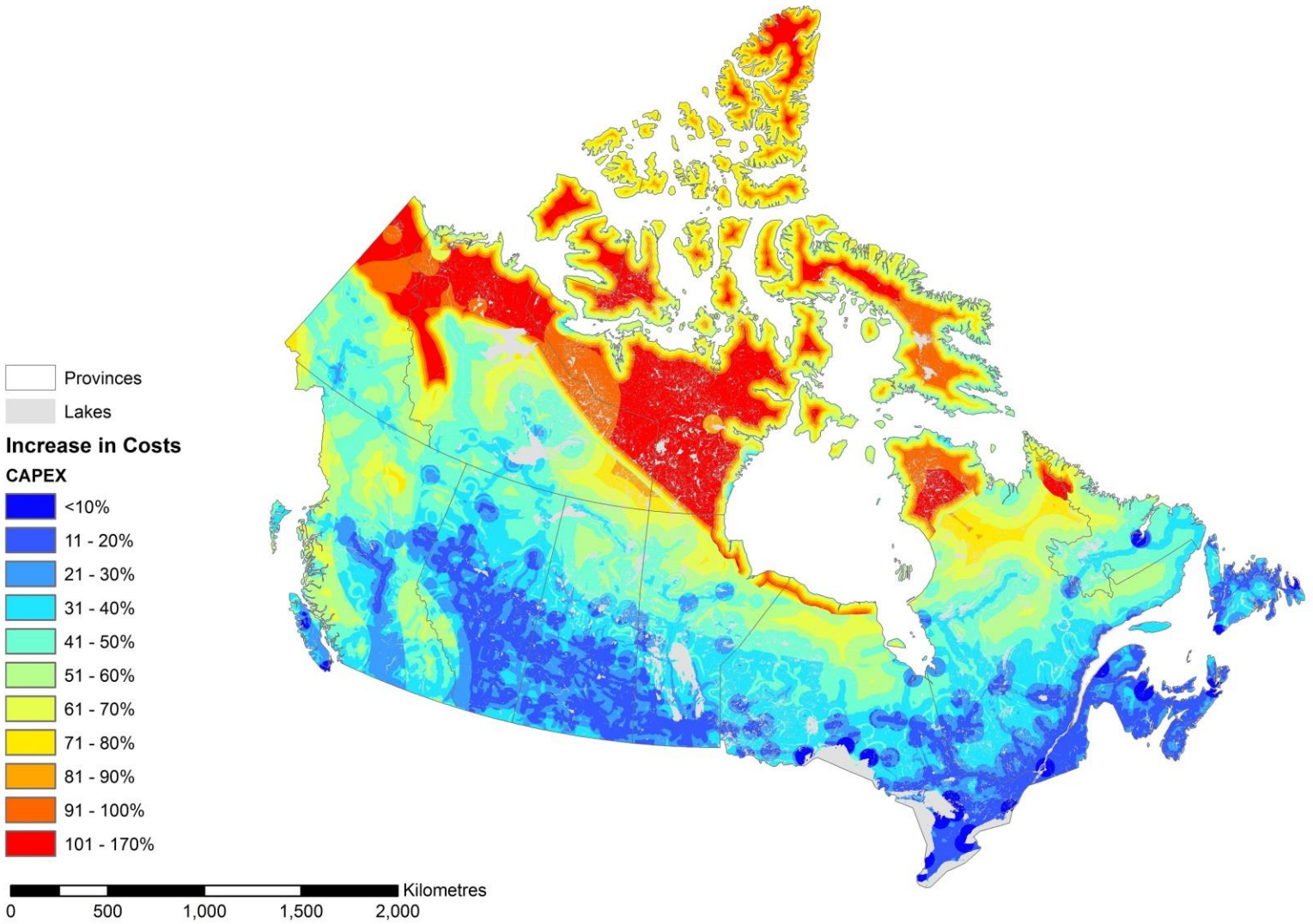
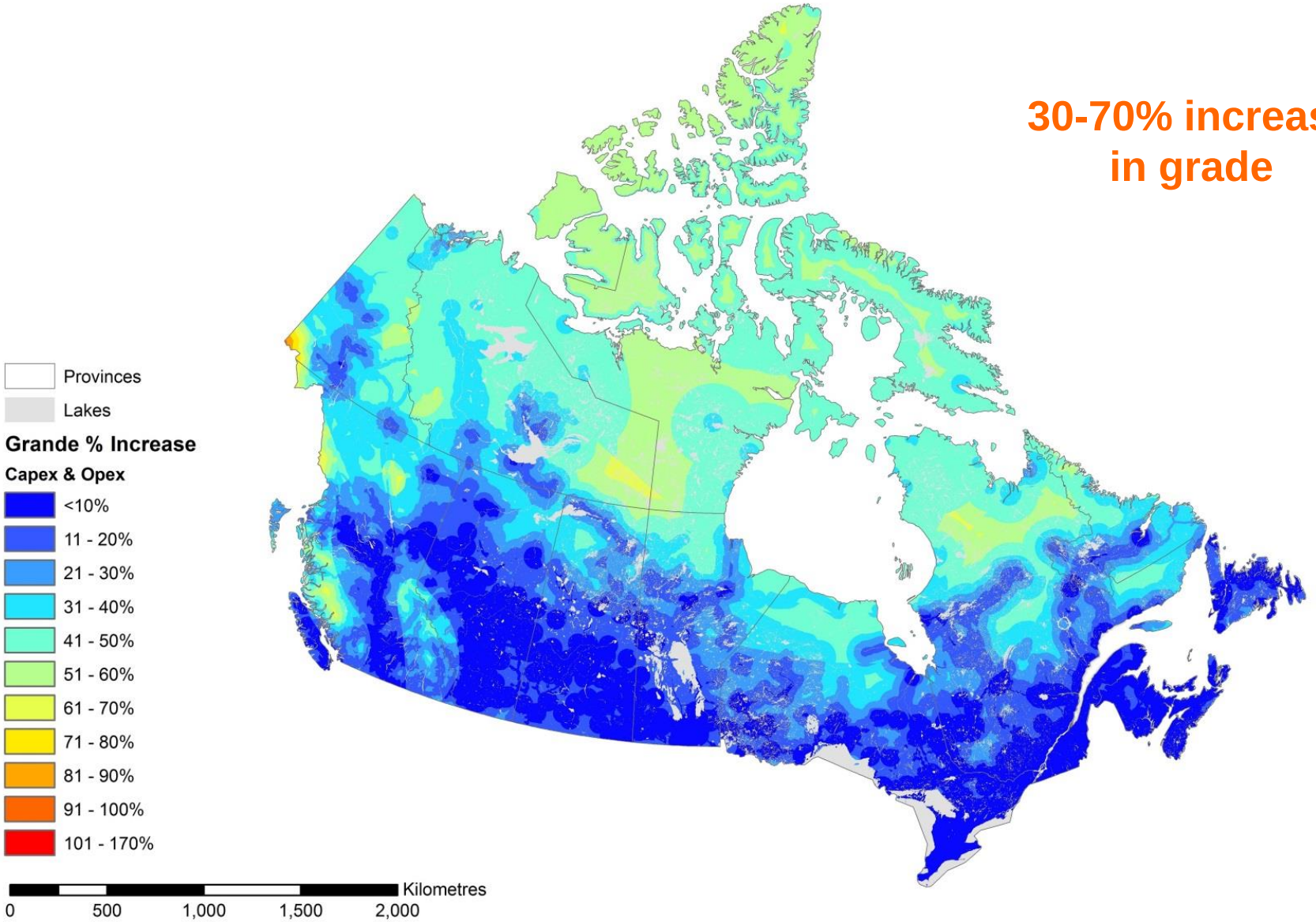


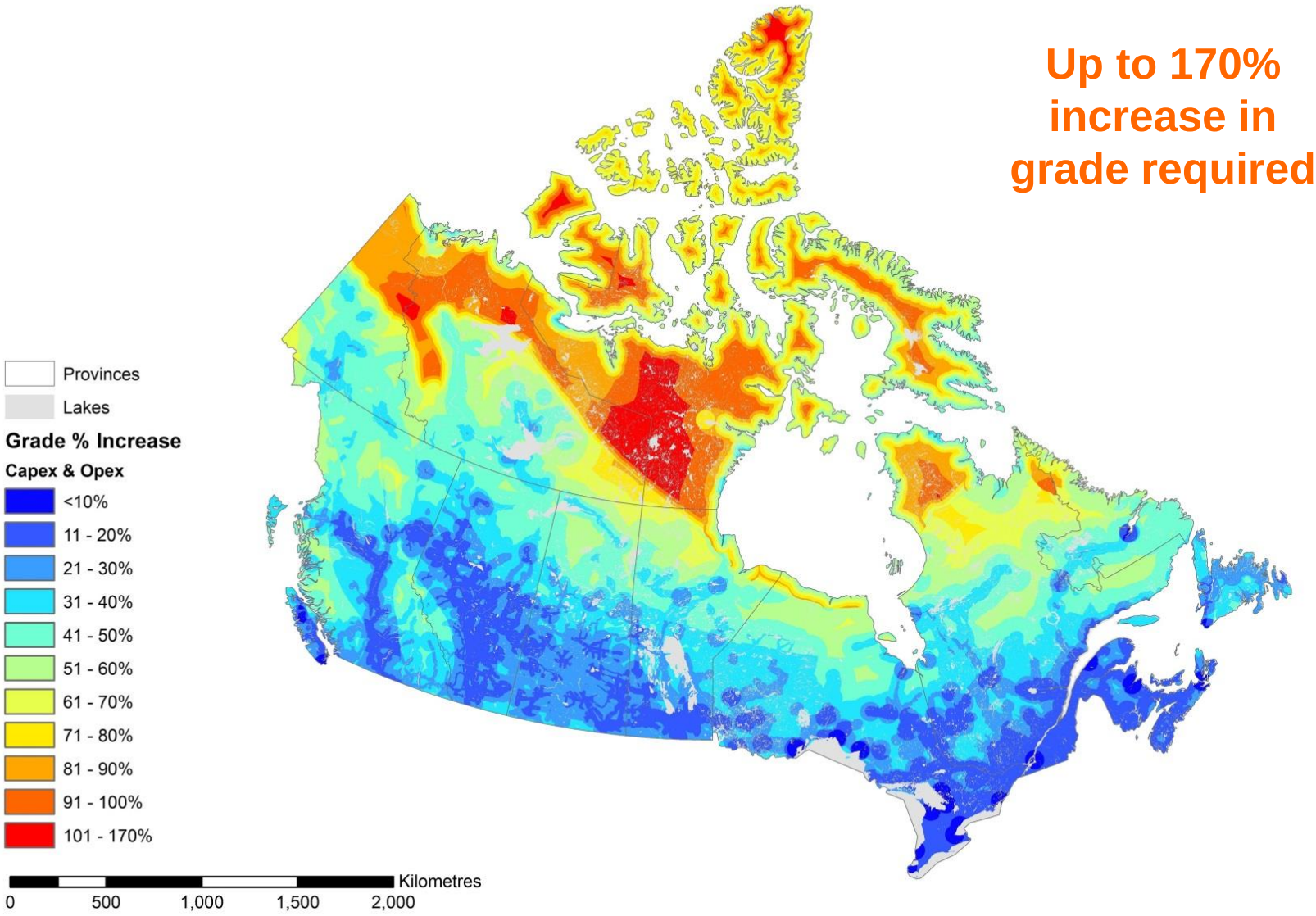
REMOTENESS AND GRADE (PRECIOUS METALS)

1.75 MTPA



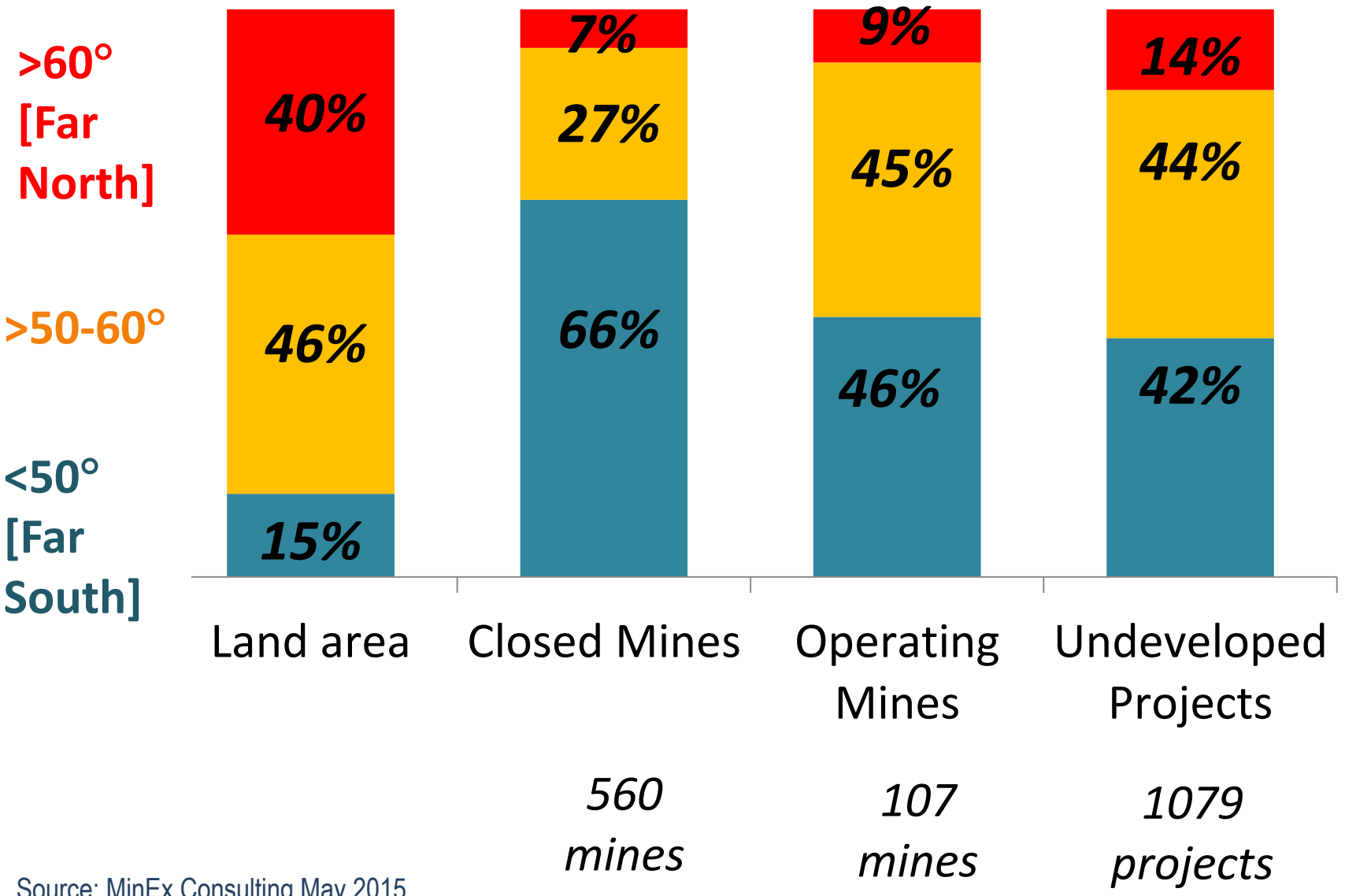
30-70% increase in grade

REMOTENESS AND GRADE (BASE METALS)
1.75 MTPA



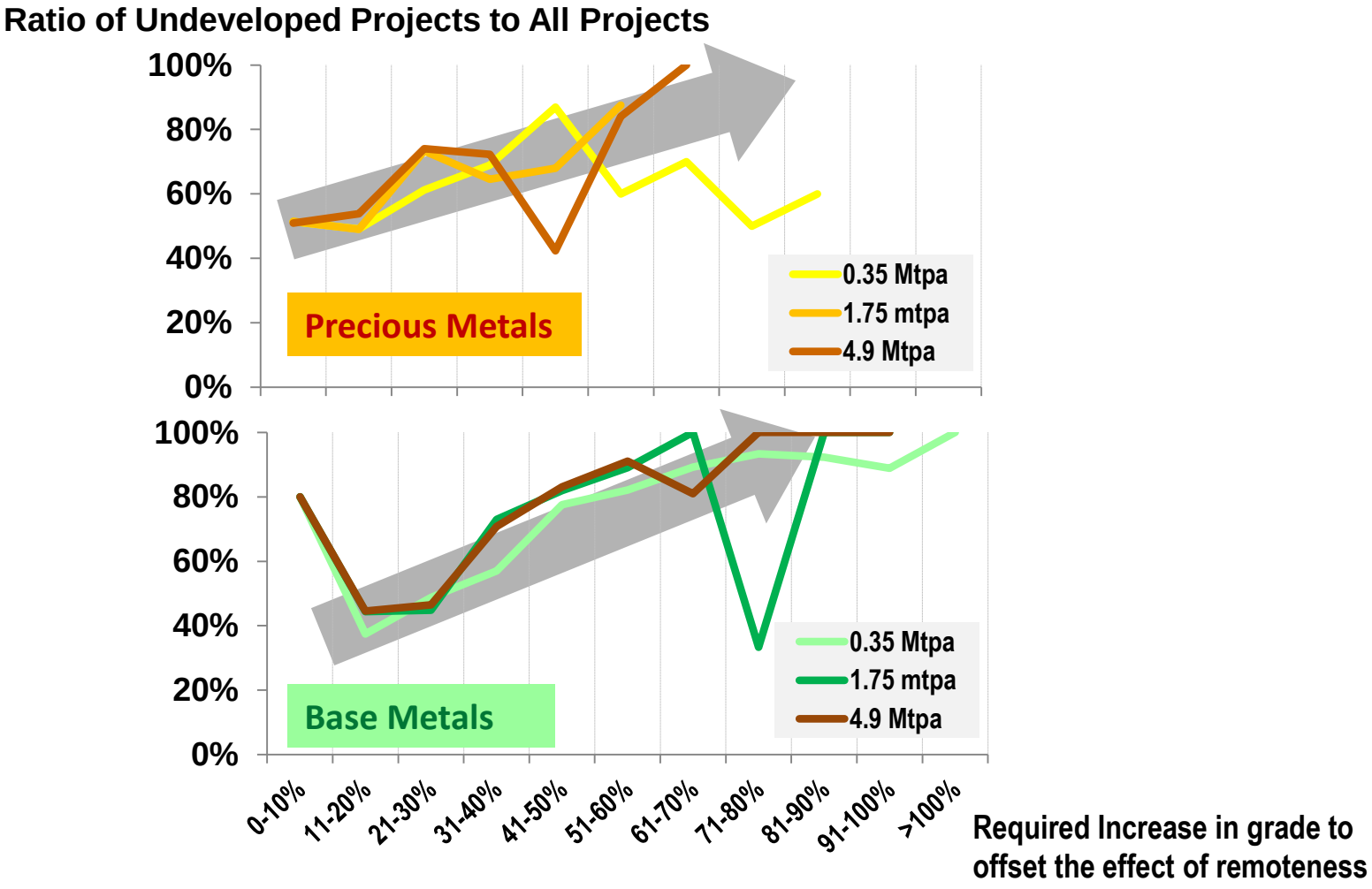
Up to 170% increase in grade required

CANADA'S NORTH: A TALE OF UNDERDEVELOPMENT



Source: MinEx Consulting May 2015

As you move to more remote areas the proportion of undeveloped projects increases



Note: Undeveloped Projects includes Advanceed Exploration and Feas/Pre-Feas Projects
All Projects includes Operating Mines, Closed Mines and Undeveloped Projects

Sources: PDAC 2015 (MinEx Consulting and Kenex Ltd)

RESPONDING TO THE NORTHERN COST PREMIUM

To support exploration in remote and northern areas, governments could:

- Create new, or enhance existing, tax credits for exploration projects in remote and northern areas
- Incentivize drilling on early-stage exploration projects in remote and northern areas, such as the incentive offered by the Government of Western Australia

RESPONDING TO THE NORTHERN COST PREMIUM

To facilitate the movement of remote discoveries into production, governments could:

- Create an investment tax credit (10%) on all capital expenditures associated with remote and northern mines
- Provide a supplementary 15% tax credit on specified infrastructure investments (e.g. roads, ports, docks)
- Assuming the 10% investment tax credit as a base, create a mechanism for conditionally repayable contributions related to infrastructure
- Establish a northern infrastructure investment bank

FINANCING INFRASTRUCTURE INVESTMENTS WITH THE CANADA INFRASTRUCTURE BANK

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