

Industrial Minerals

Current Trends and Future Opportunities

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BRITISH
COLUMBIA

Ministry of Energy and Mines



Outline

- **Industrial Minerals and the Economy**
- **Trends**
- **British Columbia's Geological Potential**
- **Assessment of Mineral Projects**

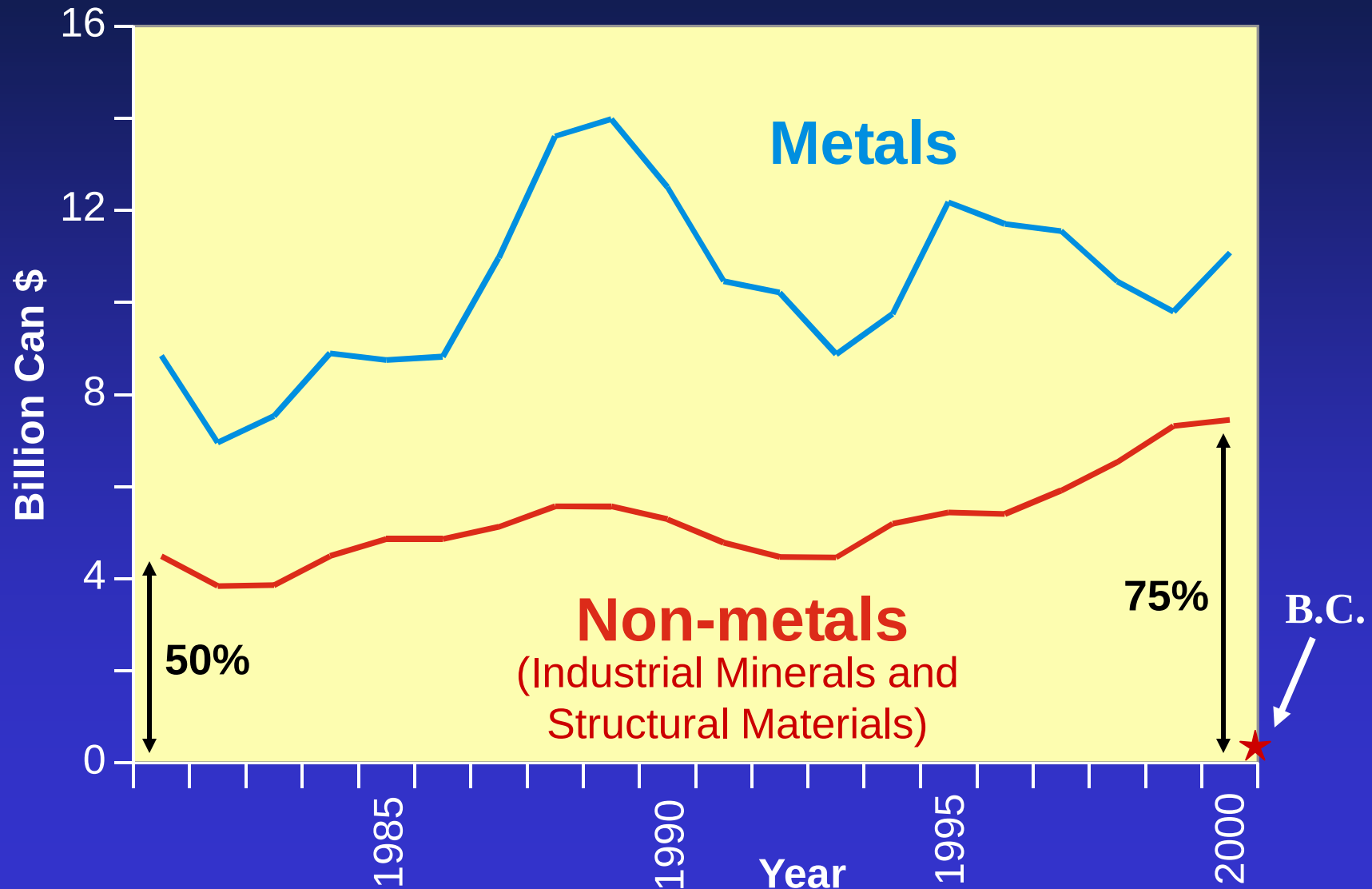
Definition of Industrial Minerals

Any rock, mineral, or other naturally occurring substance of *economic value*, exclusive of:

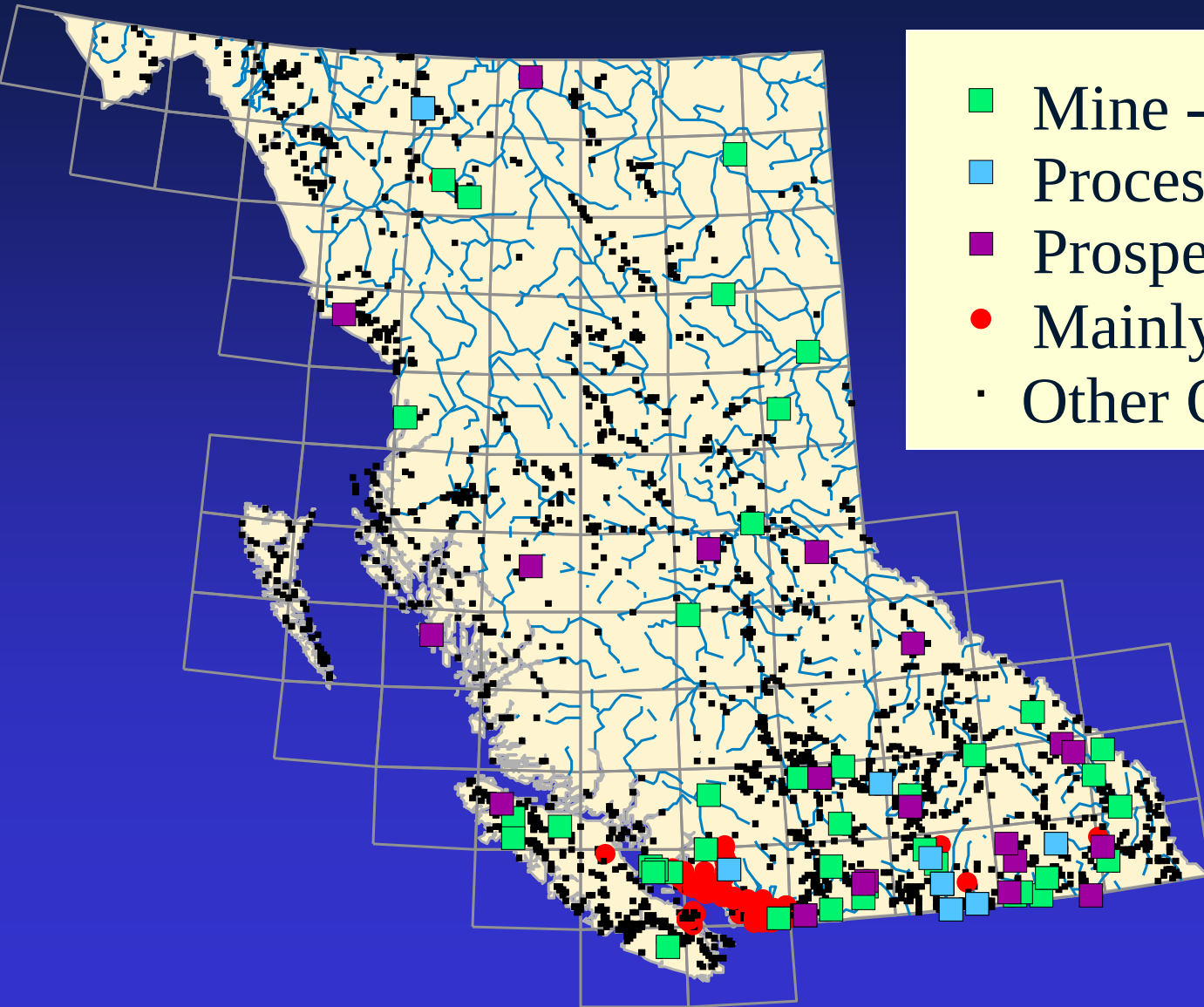
- metallic ores
- mineral fuels
- gemstones

Dual minerals

Industrial Minerals and Metal Production in Canada



Industrial Minerals in B. C.



- Mine - Quarry
- Processing Plant
- Prospect/Development
- Mainly Aggregates
- Other Occurrence

High-Low Principle

- High value:
world market

- Low value:
local market

<u>Mineral</u>	<u>US\$/tonne</u>
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Wollastonite	200 - 300
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Graphite	230 - 750
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Mica	210 - 1200
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<u>Mineral</u>	<u>US\$/tonne</u>
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Crushed stone	≤6
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Natural aggregate	≤4
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Gypsum	≤7
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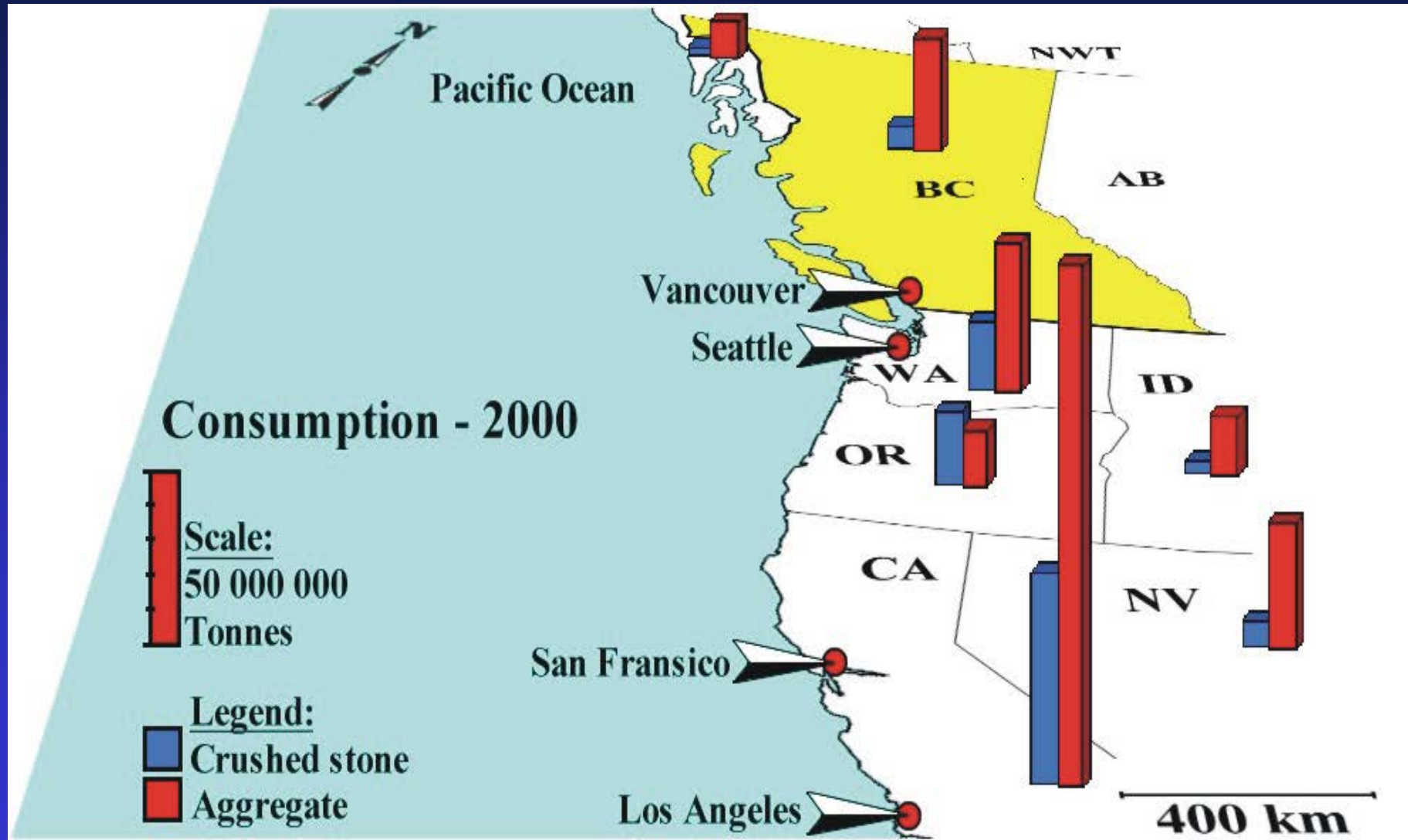
High-Low Principle

- **High value:**
world market

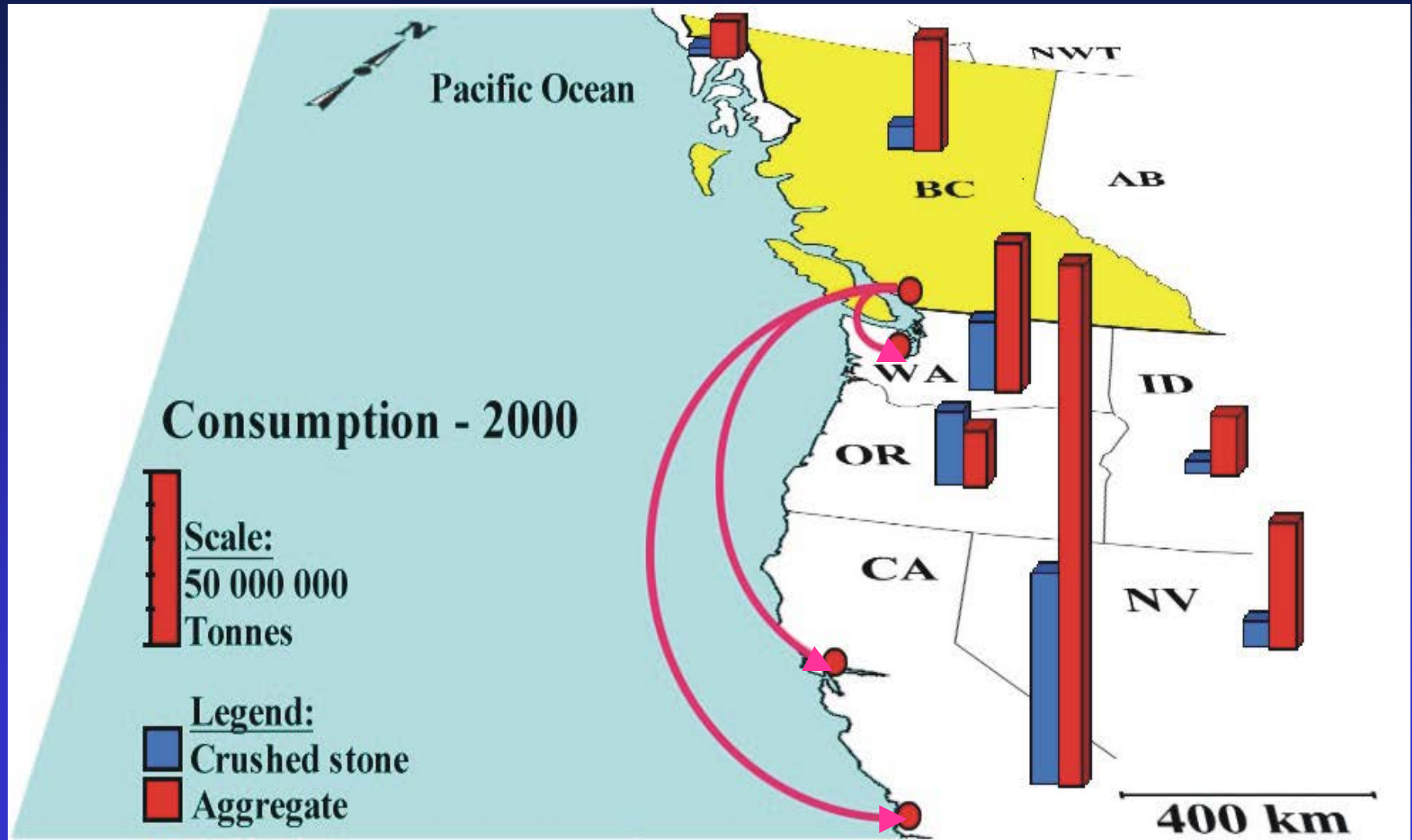
- **Low value:**
local market

- ▶ Developed / Developing countries
- ▶ Security of land tenure
- ▶ Trade barriers & government initiatives
- ▶ Land sterilization
- ▶ Value-added processing
- ▶ Energy cost differences

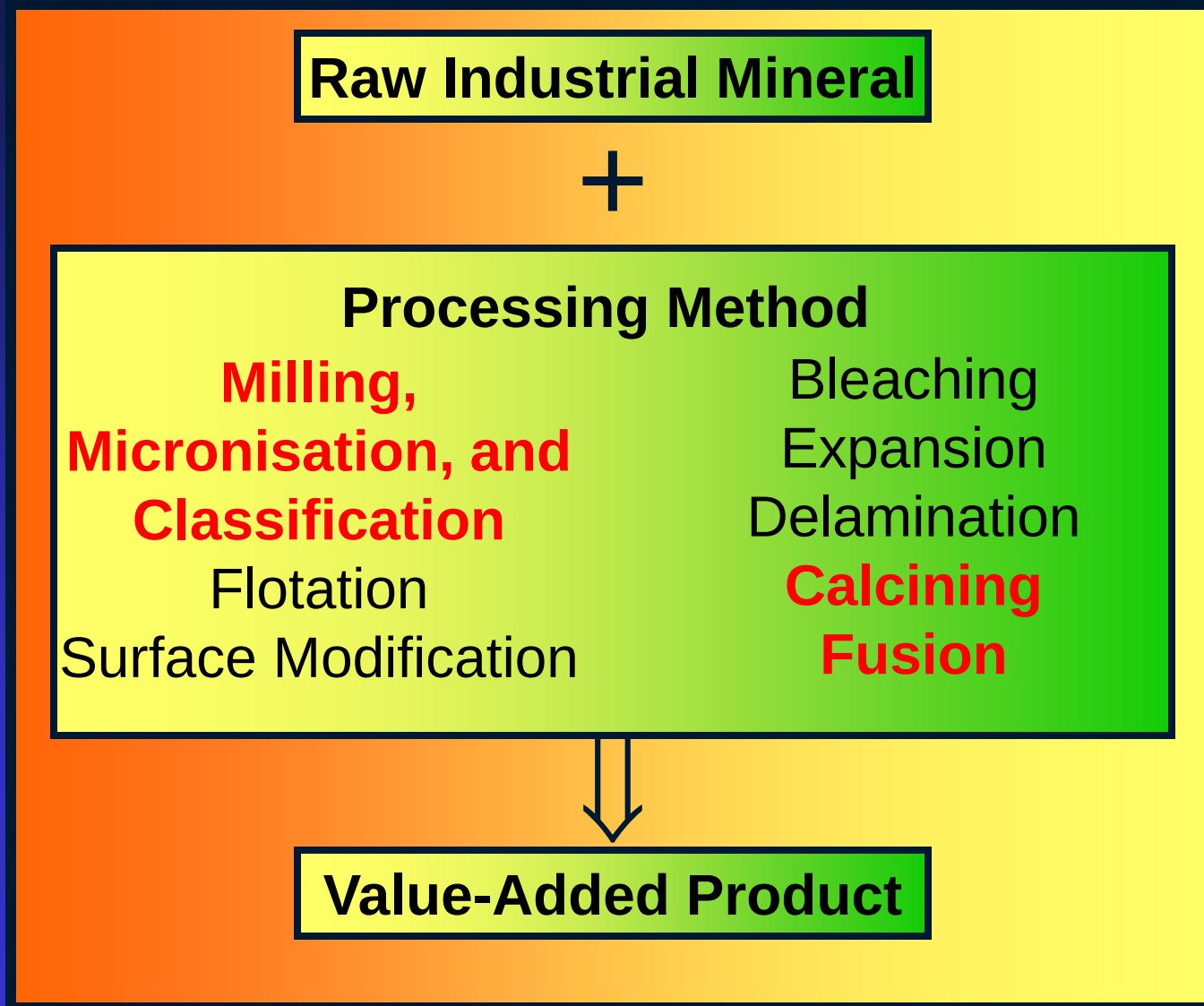
Land Sterilization / Urbanization



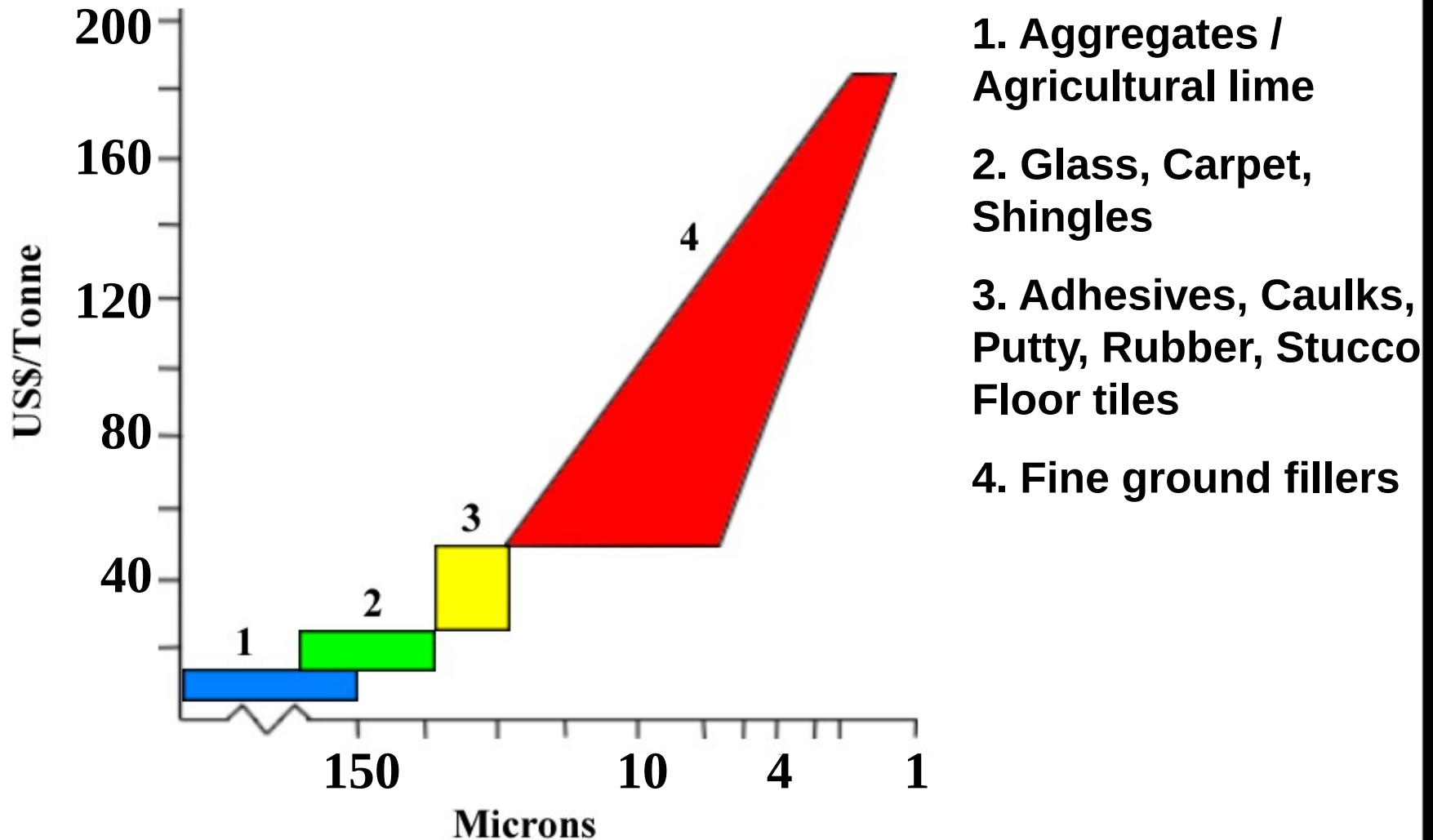
Land Sterilization / Urbanization



Value-added Processing



Value-added Processing of CaCO_3



Energy-intensive Value-added Products

<u>Mineral</u>	<u>Product</u>	<u>US\$/tonne</u>
Magnesite	Raw	≈50
	Caustic MgO	119 - 138
	Dead-burned MgO	105 - 135
	Fused MgO	>320
	Mg Metal	≈2430

Energy-intensive Value-added Products

Other Examples:

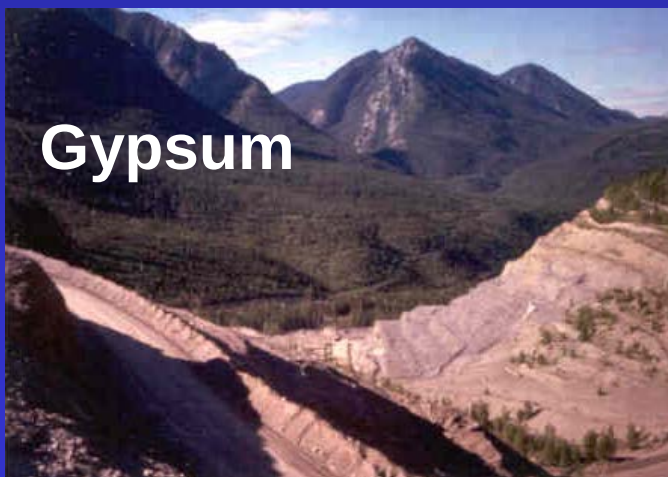
**Silicon
Ferrosilicon
Silicon carbide
Sintered or electrofused refractories
Traditional or advanced ceramics
Reinforcing or insulating fibres
Glass
Industrial intermediates**

Global Trends

- Environmental Regulations
- Health Regulations
- Recycling Efforts
- Technology

Environmental Regulations

Negative Impact

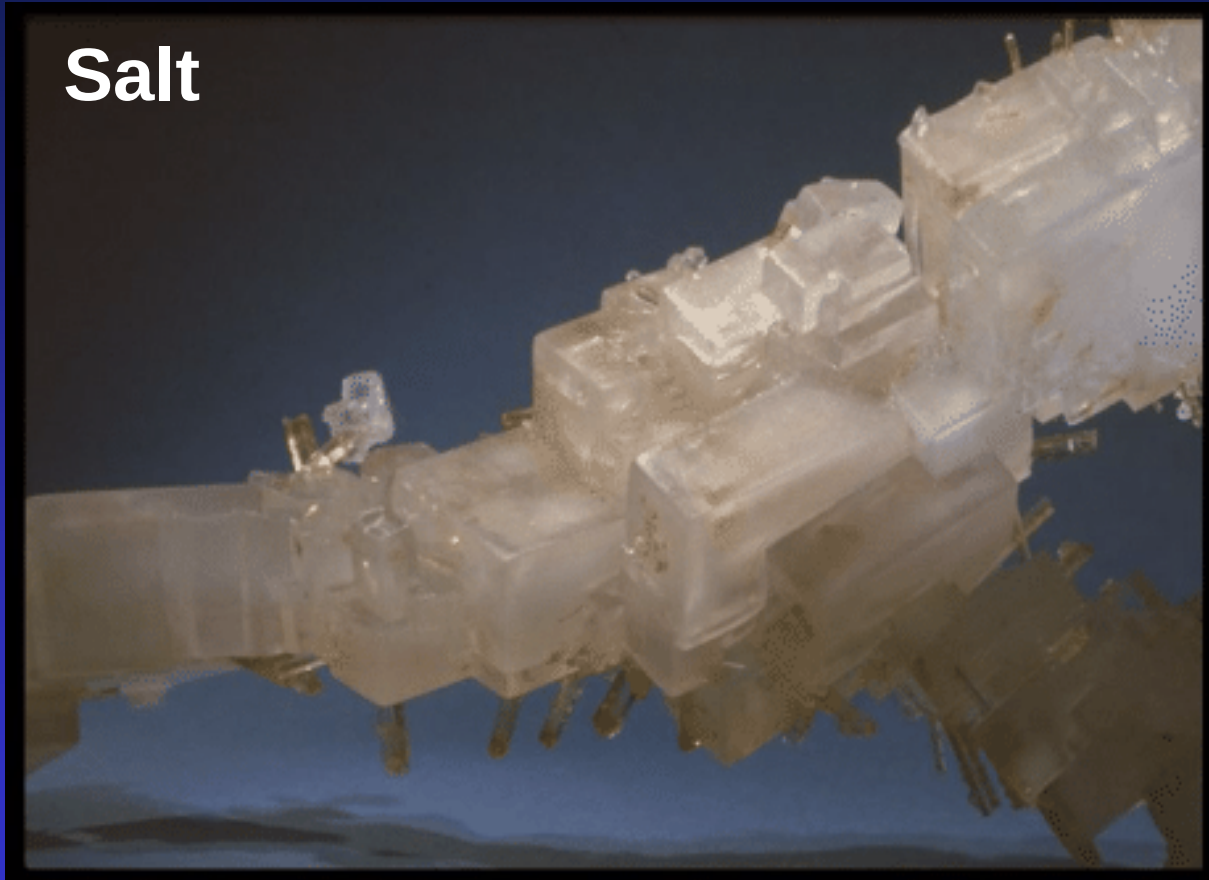


Positive Impact

Zeolites
Perlite
Dolomite
**Calcium
carbonate**
Lime
**Magnesia /
Magnesite**
Peat
Diatomite

Environmental Regulations

Salt



Source: Institute for Mineralogy and Mineral Resources, 2001

Health Regulations

Asbestos

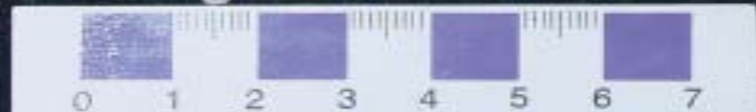
Fiberglass
Ceramic fibers
Carbon fibers
Aramid fibers

ATH
Wollastonite
Diatomite
 $\text{Mg}(\text{OH})_2$
Perlite
Vermiculite
Pumice
Pyrophyllite
Barite
Alumina/Emery

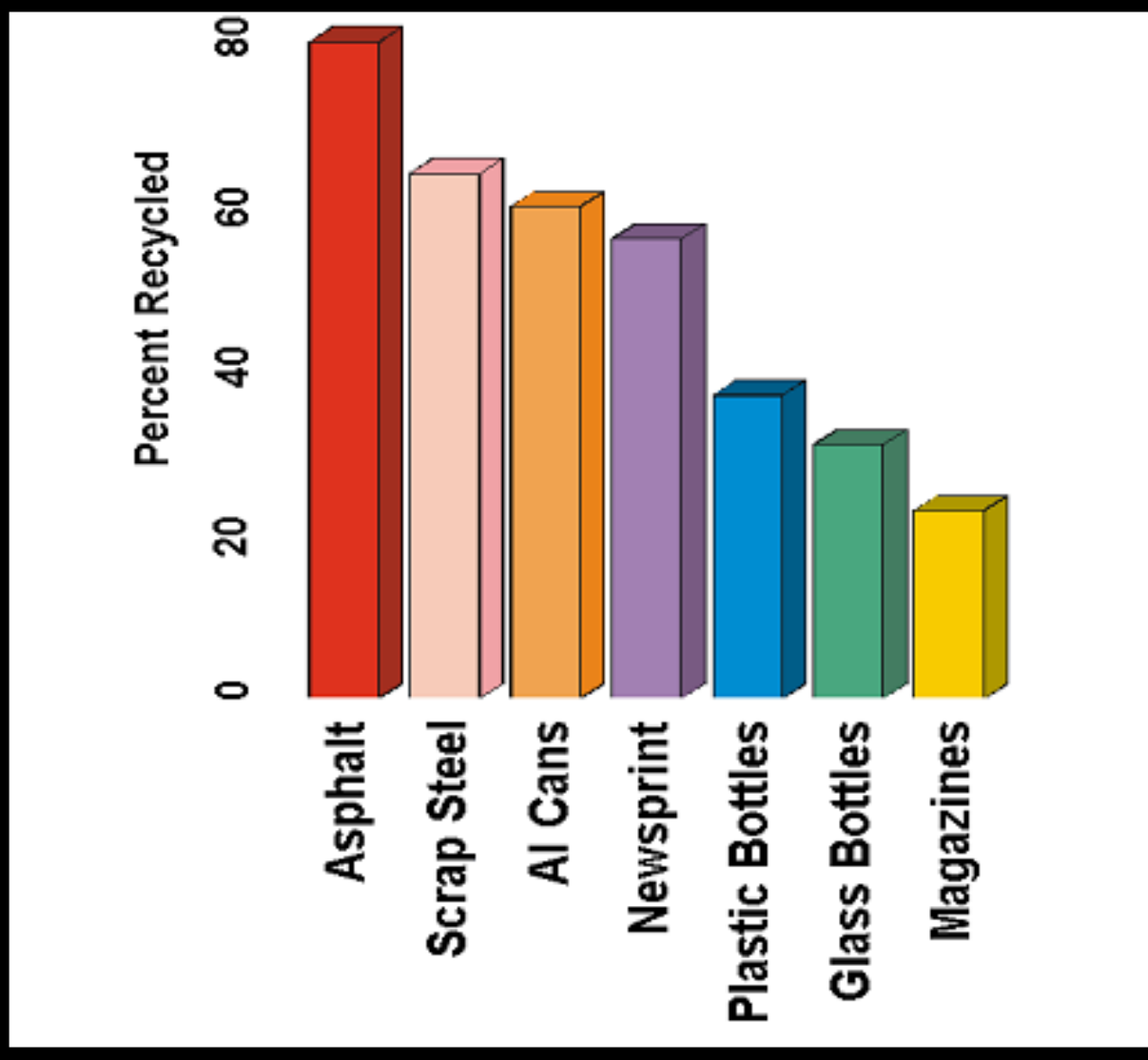
Source: Department of Occupational Health and Safety, Youngstown State University, 2001

Silica

Garnet
Olivine
Magnesite
Slag



Recycling



Source: National Asphalt Paving Association

Technology

Past

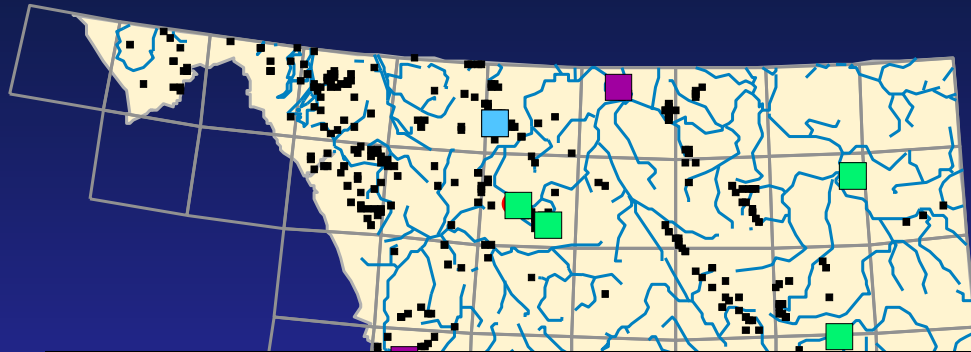
Glass → plastic containers
Acid → neutral paper

Present

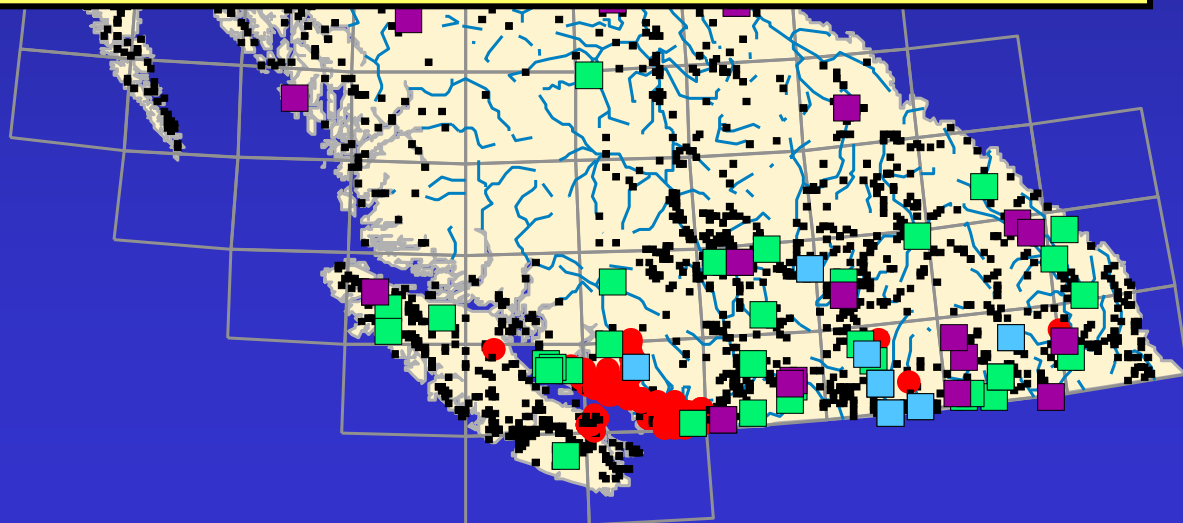
Wireless communications
Flame retardants
“Superpave”

Future ?

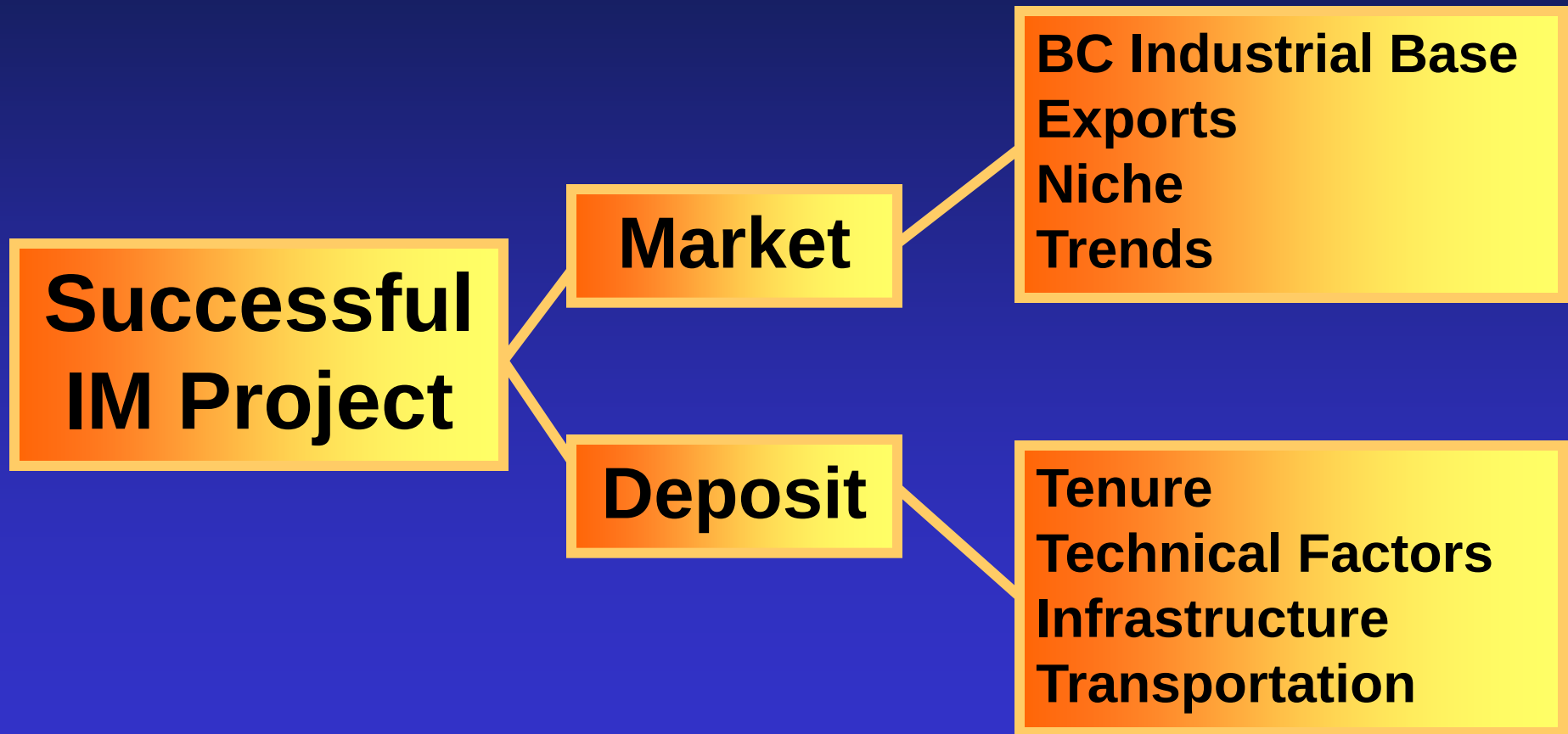
Internet marketing
Fuel cell
CO₂ sequestration



**What are the opportunities
in British Columbia?**



Project Selection



B.C. Successes & Conclusion

Rocky Mountain Tufa

Kettle Valley Stone Company



IKO



Margranite