

Hur säkrar Sverige tillgången av kritiska råmaterial?
SNS seminarium 2024 10 10

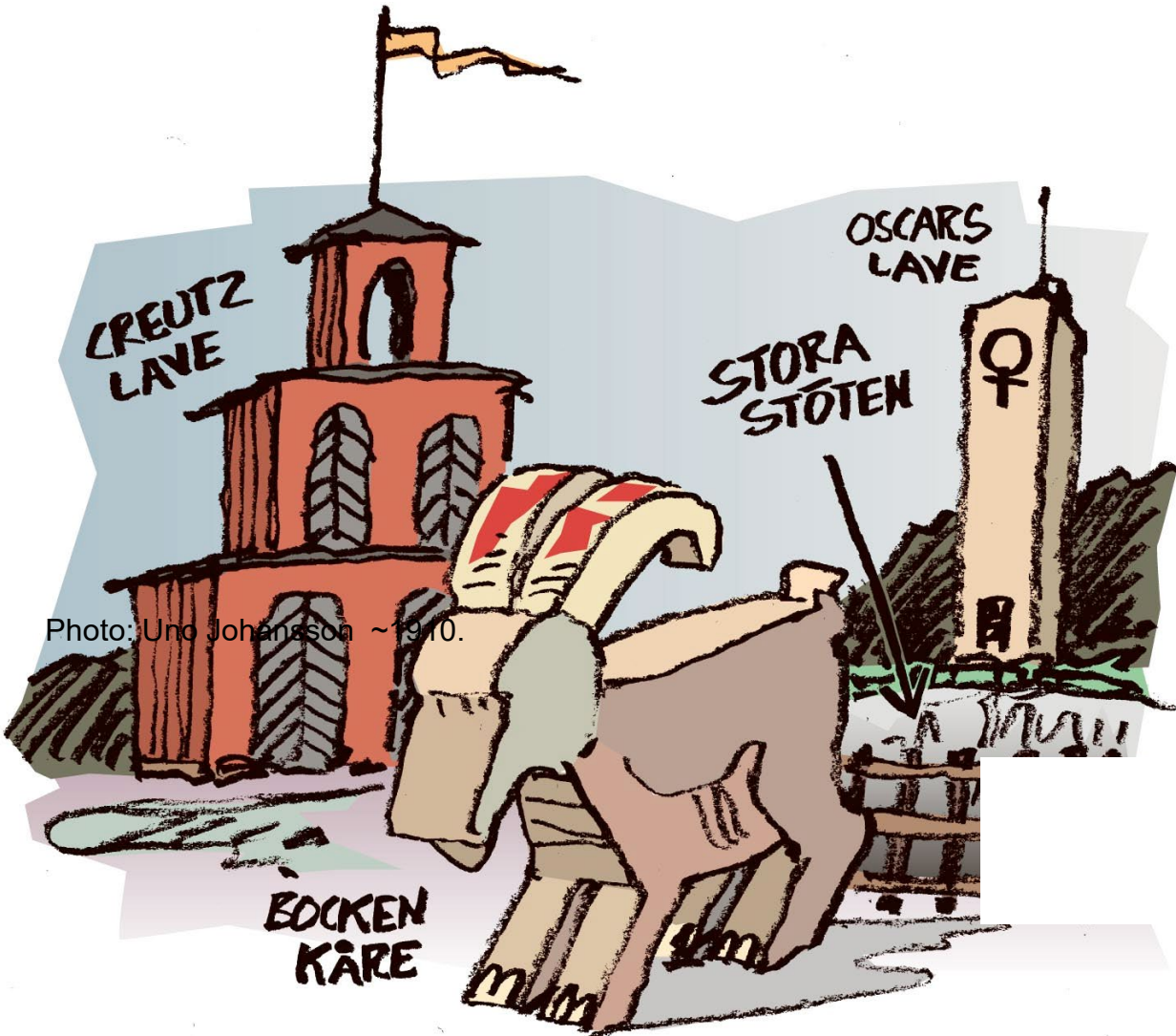


Photo: Uno Johansson ~1970.

Copper drawing: Kaianders Sempler.

Kritiska metaller- en möjlighet för det nordiska gruvklustret!

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- **Kritikalitet och efterfrågan**
- **Europeisk gruvproduktion**
- **Kina och kontrollen över metaller och mineral**
- **Nordiska gruvklustret**
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Kritikalitet och efterfrågan

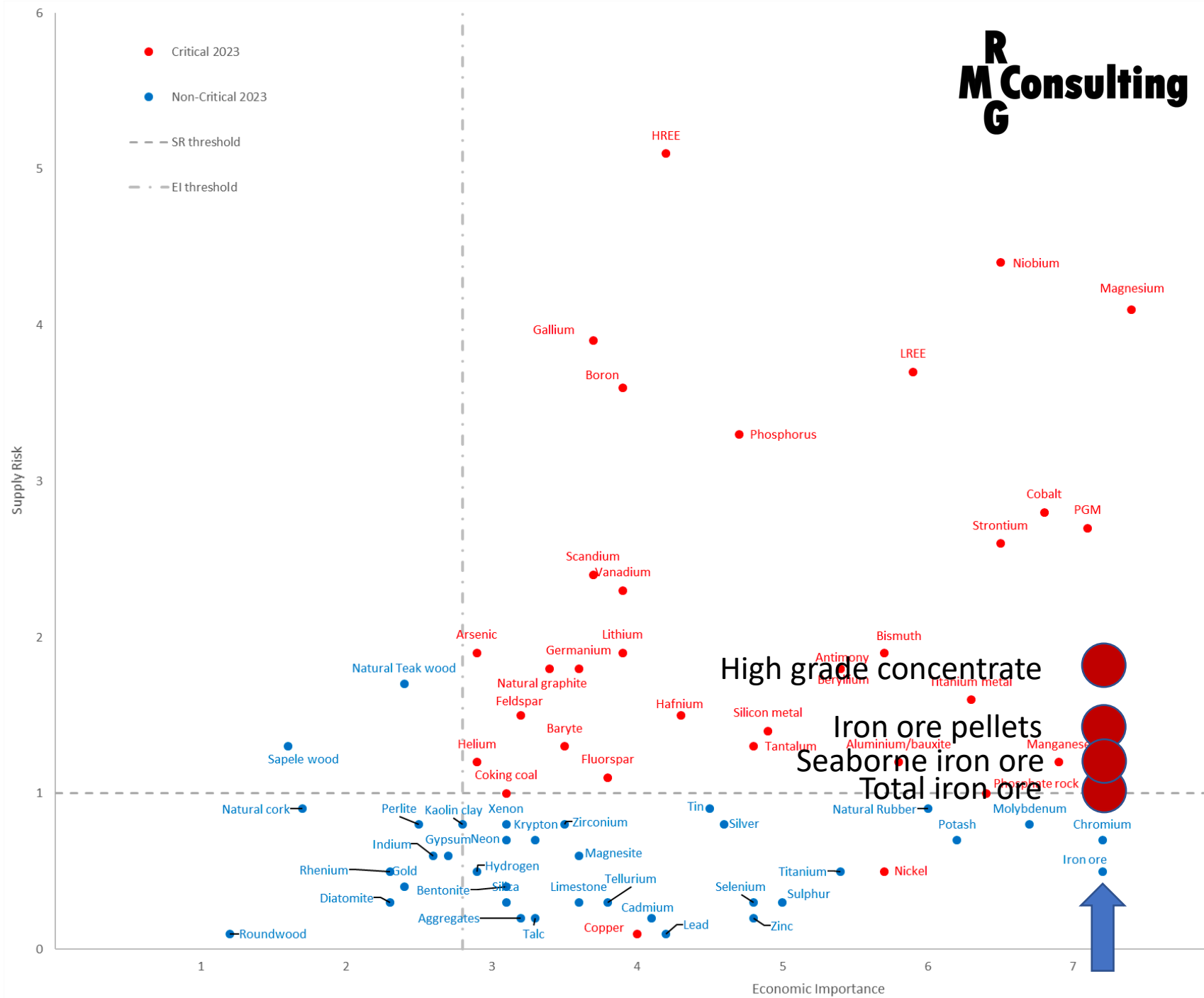
Strategy perspective



Source: Modified from Tercero et al. Fraunhofer Institute.

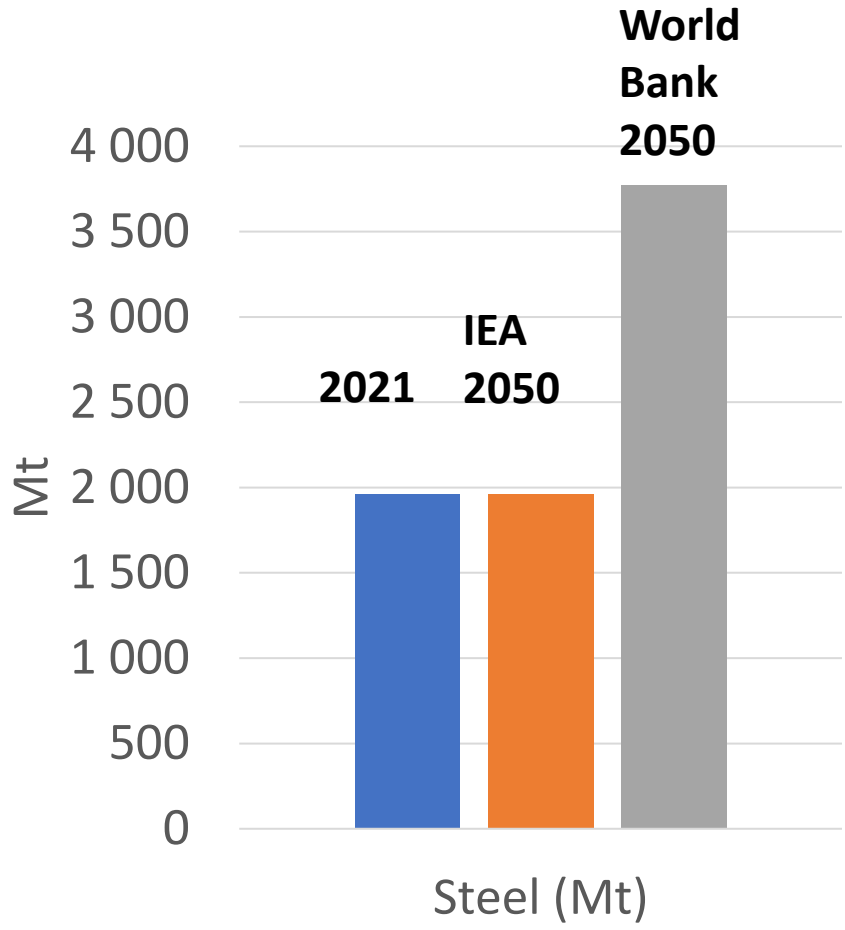
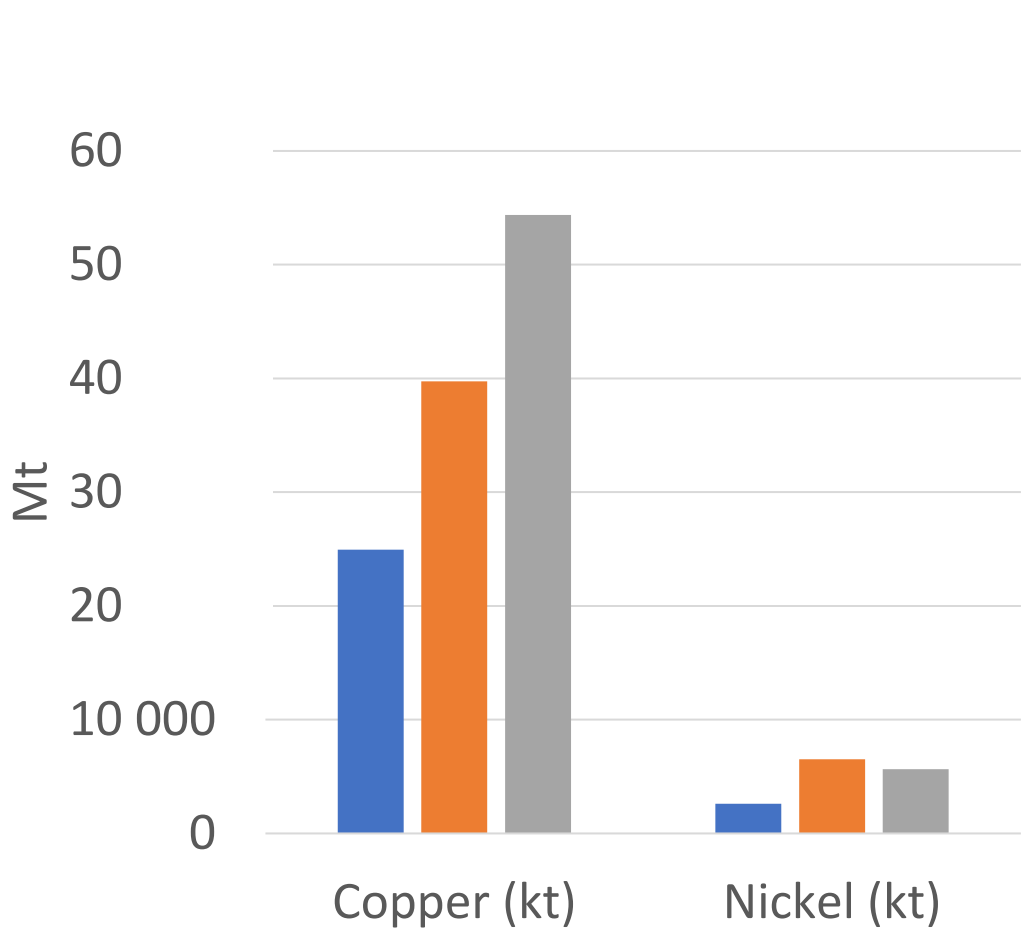
What is critical ? High quality iron ore !

- Total iron ore (our calculations)
 - 1.0
- Seaborne iron ore
 - 1.2
- Iron ore pellets
 - 1.4
- High grade iron ore concentrate
 - 1.8
- DR grade pellets
 - Most probably higher



Demand for copper, nickel and steel

2050 comparison with IEA projections

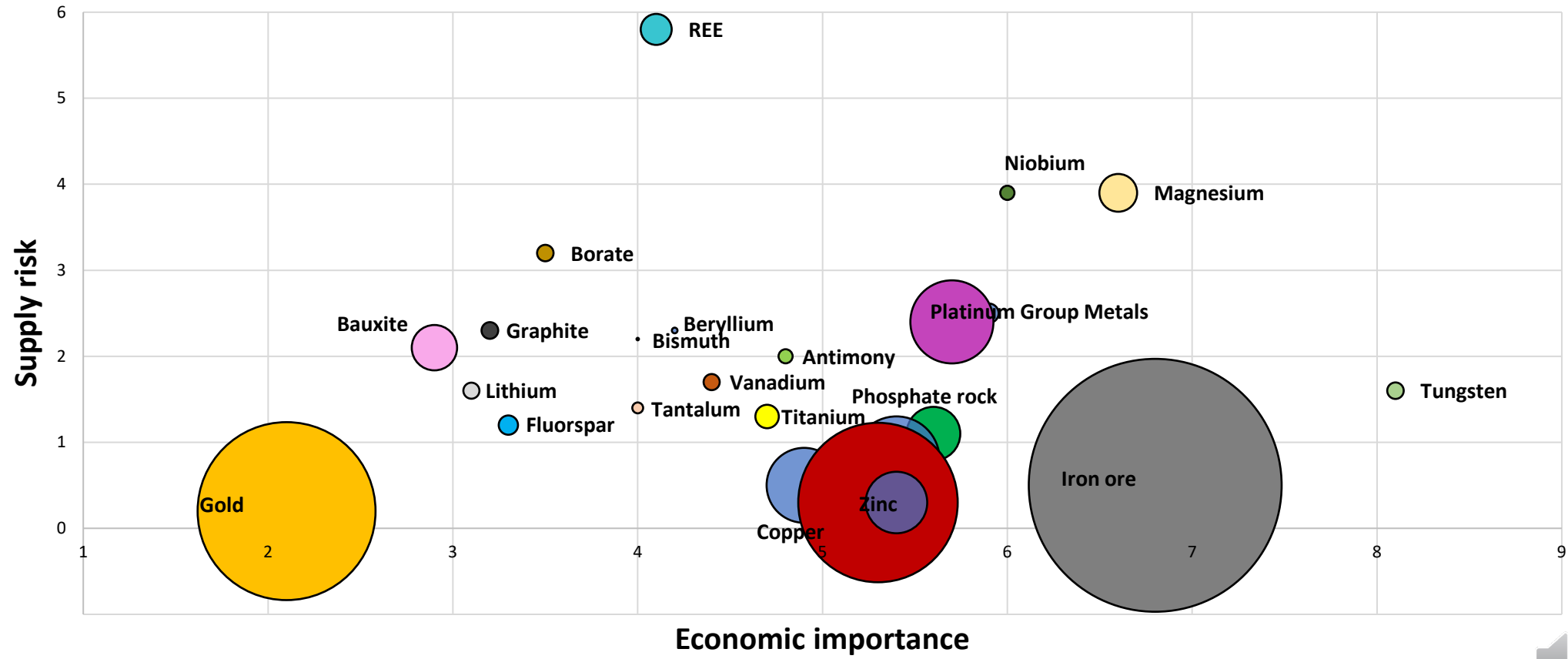


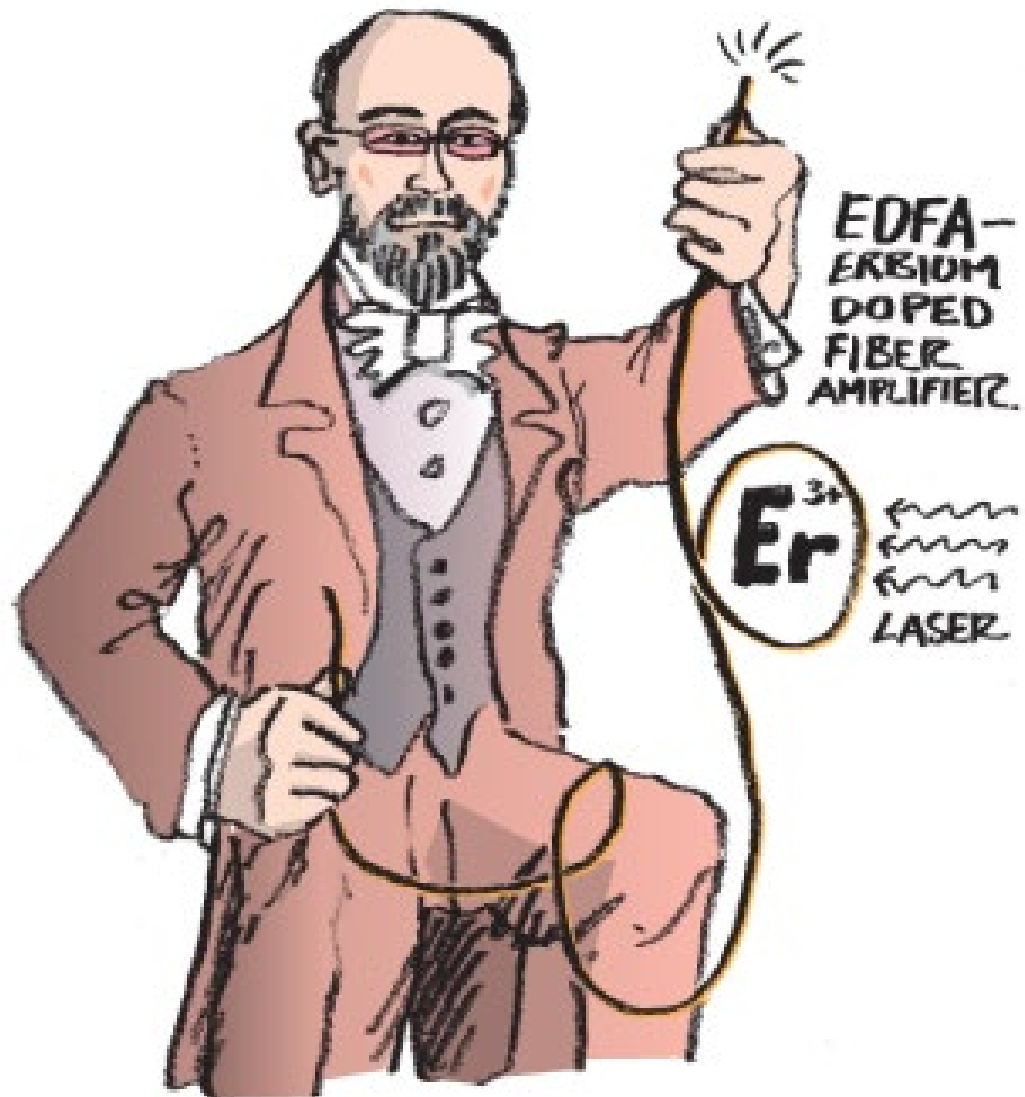
Source: World Bank

Global mine production volume

Metal	Volume (kilo tonne, kt)
Iron ore (steel)	2 000 000.00
Copper	20 000.00
Nickel	2 500.00
Lithium	345.00
Rare Earth Elements REE	225.00
Gold	2.50
Platinum Group Metals PGM	0.40

Metals criticality and mine values





Europeisk gruvproduktion

CARL GUSTAF MOSANDER

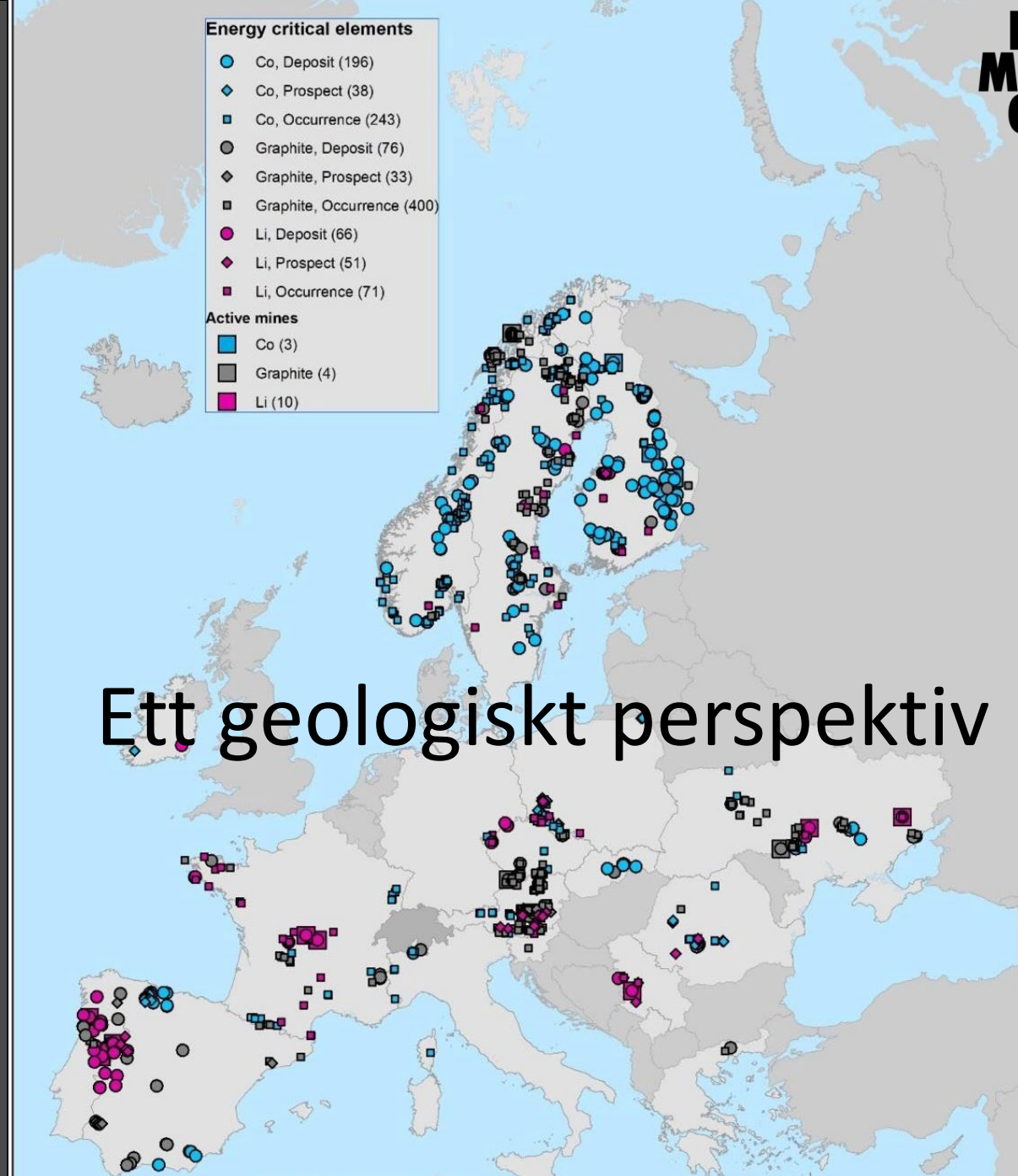
Erbium drawing: Kaianders Sempler.

Cobalt, Graphite, Lithium

- Deposits
- Prospects
- Occurrences

This map made under the FRAME project by the geological surveys in Europe, highlights: deposits, prospects and occurrences of lithium, cobalt and graphite.

There is minimum of 217 valid exploration licences for lithium. 83 licences in SW Finland (Länttä) and 28 in Sweden, 28 in Ireland (Leinster), German (11) - Czech Republic (8) boundary (Erzgebirge), North Portugal (23) - NW Spain (10) (Galicia), Serbia (12, Jadar). There are also a number of cobalt and graphite exploration licenses in Europe.



Operating mines and advanced projects: Cobalt, Graphite, Lithium

Graphite

- Operating mine
- Advanced project

Lithium

- Operating mine
- Advanced project

Cobalt*

- Operating mine
- Advanced project

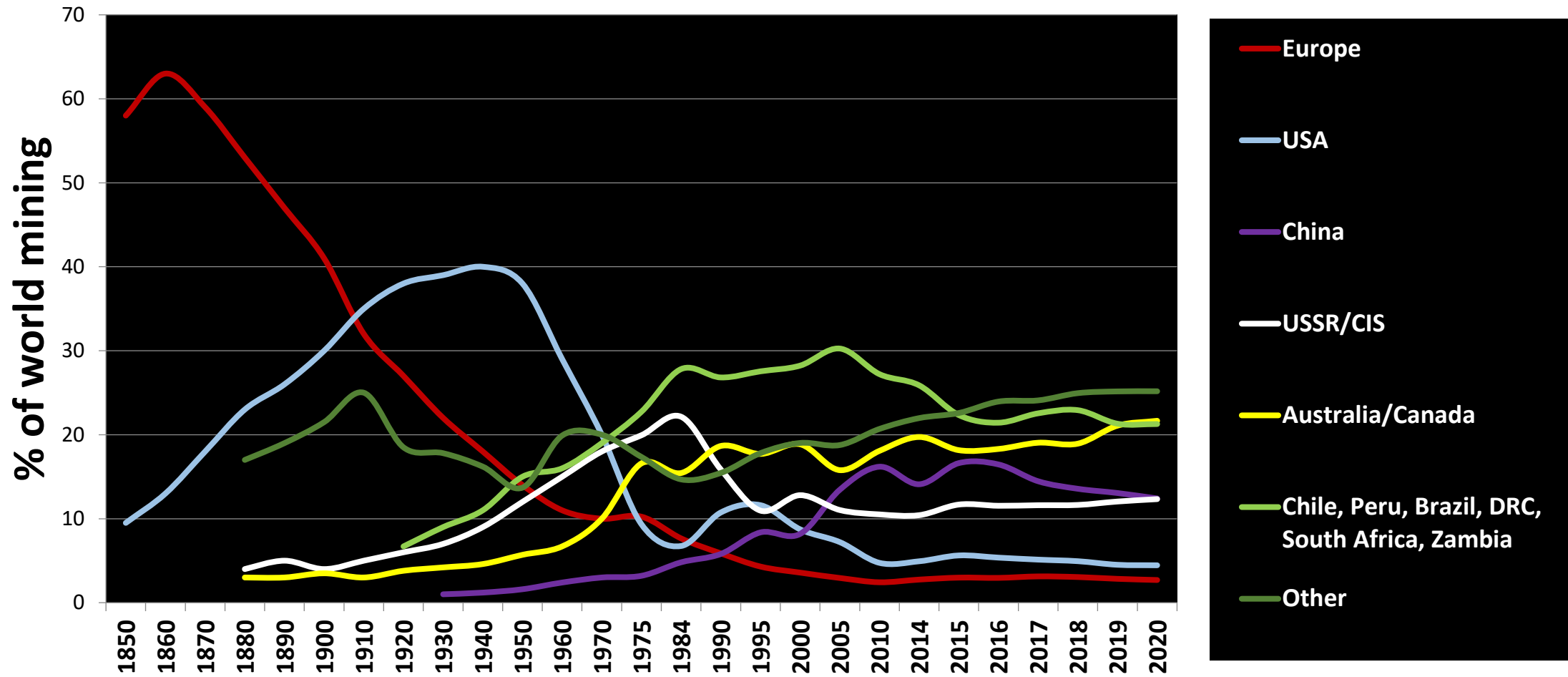
*only mined as a by-product

Source: RMG Consulting

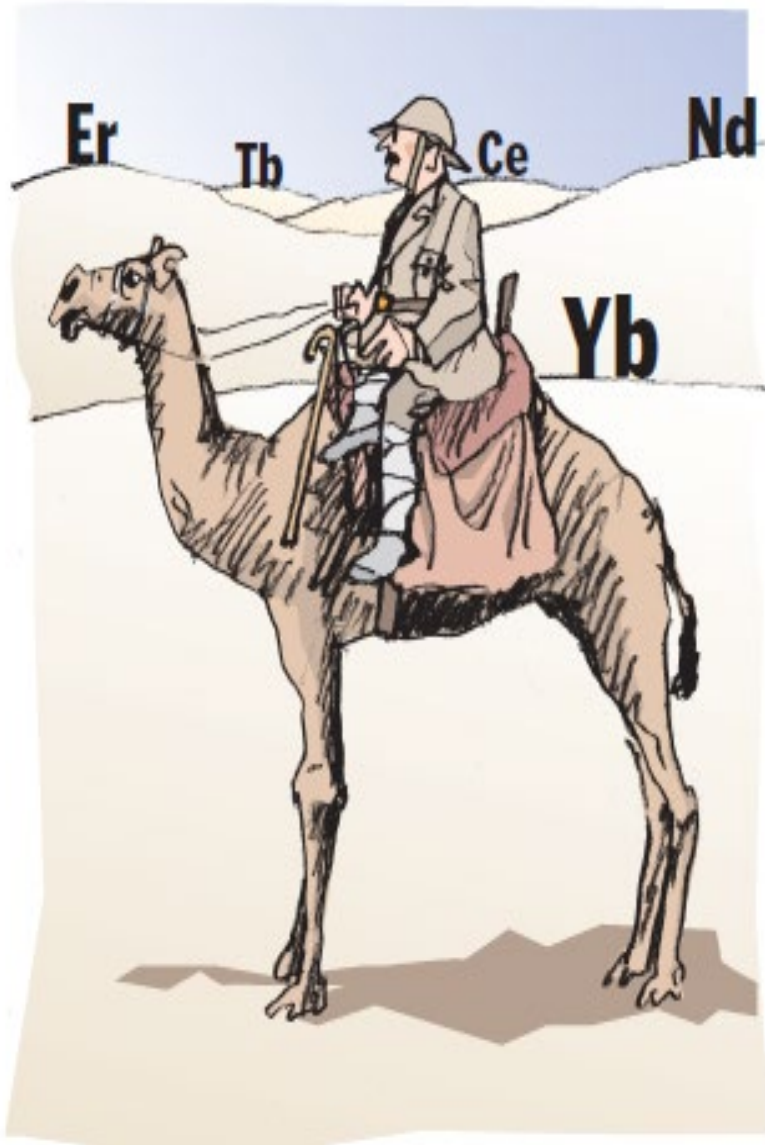


Industri- perspektivet

Locus of production 1850-2020



Source: RMG Consulting



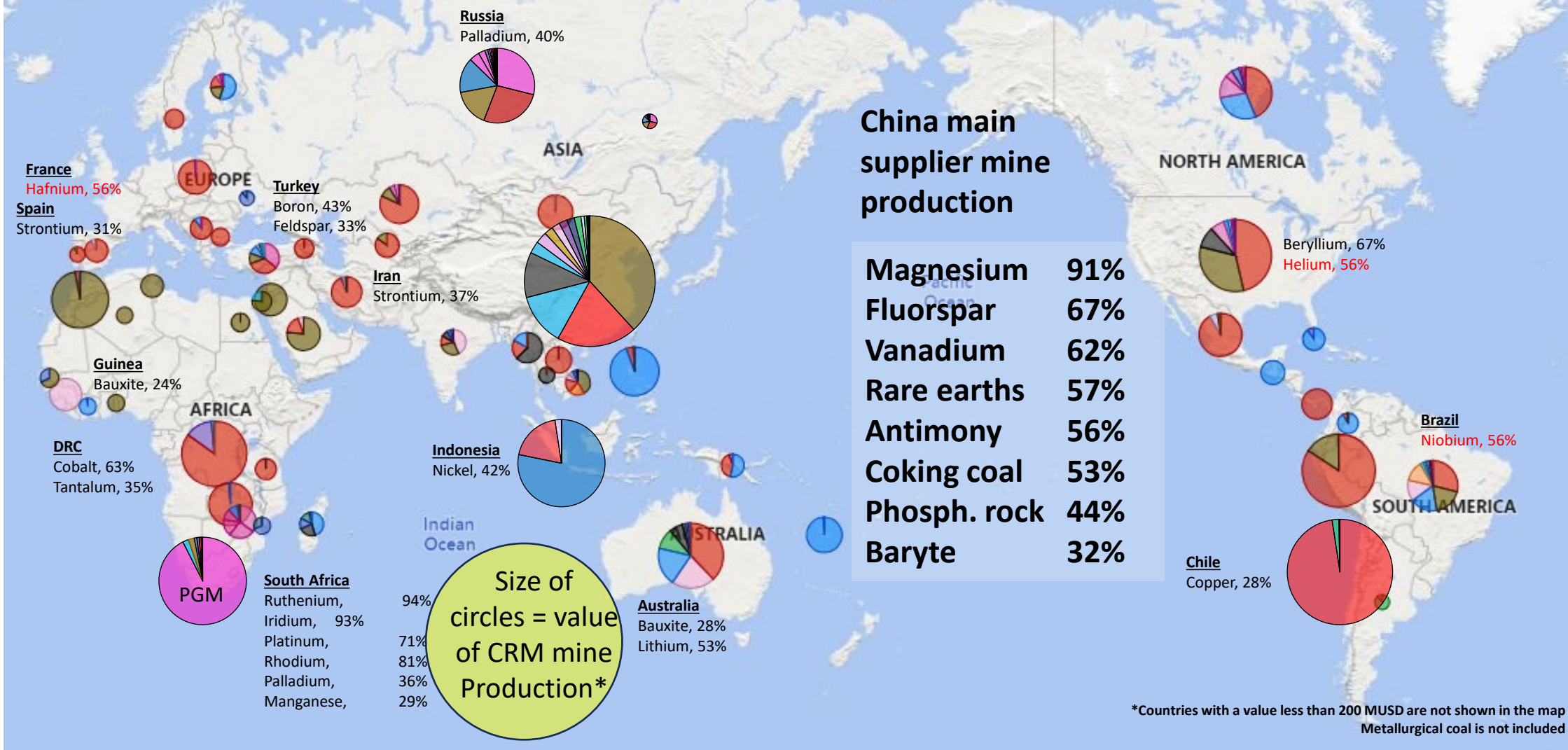
Kina och kontrollen över metaller och mineral

SVEN HEDIN'S 1927 EXPEDITION
DISCOVERED LARGE DEPOSITS
OF ORE CONTAINING RARE
EARTH ELEMENTS IN THE
GOBI DESERT.

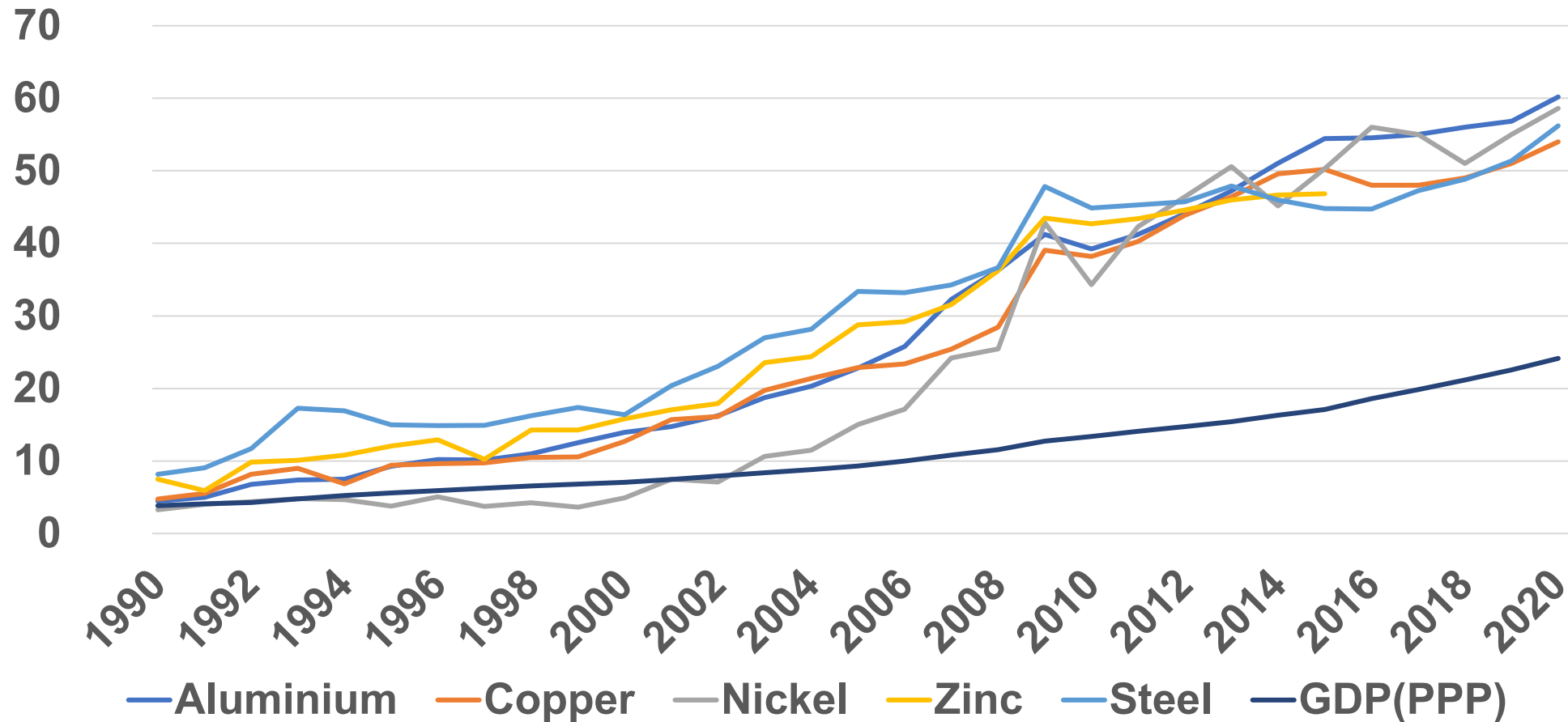
% = main global suppliers of individual CRMs

Mine Production
Refined Production

Mine production of critical materials



Chinese metal demand

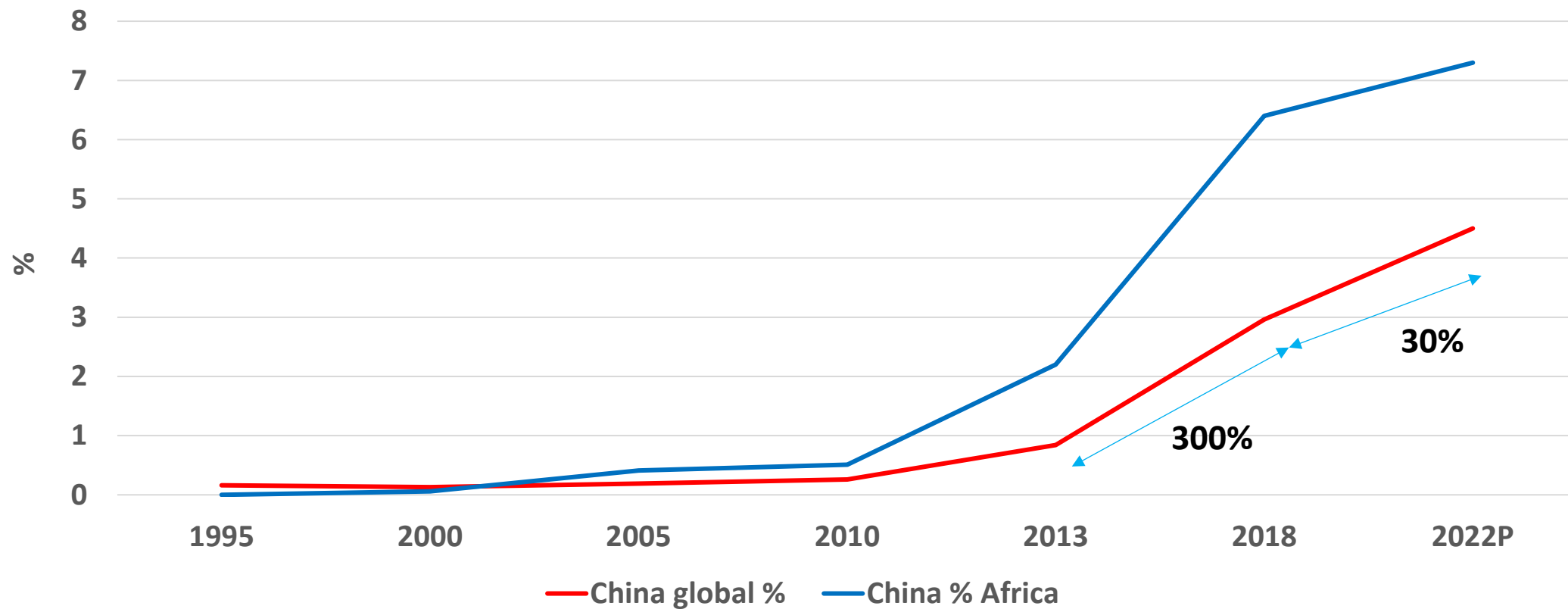


Chinese import dependency 2023

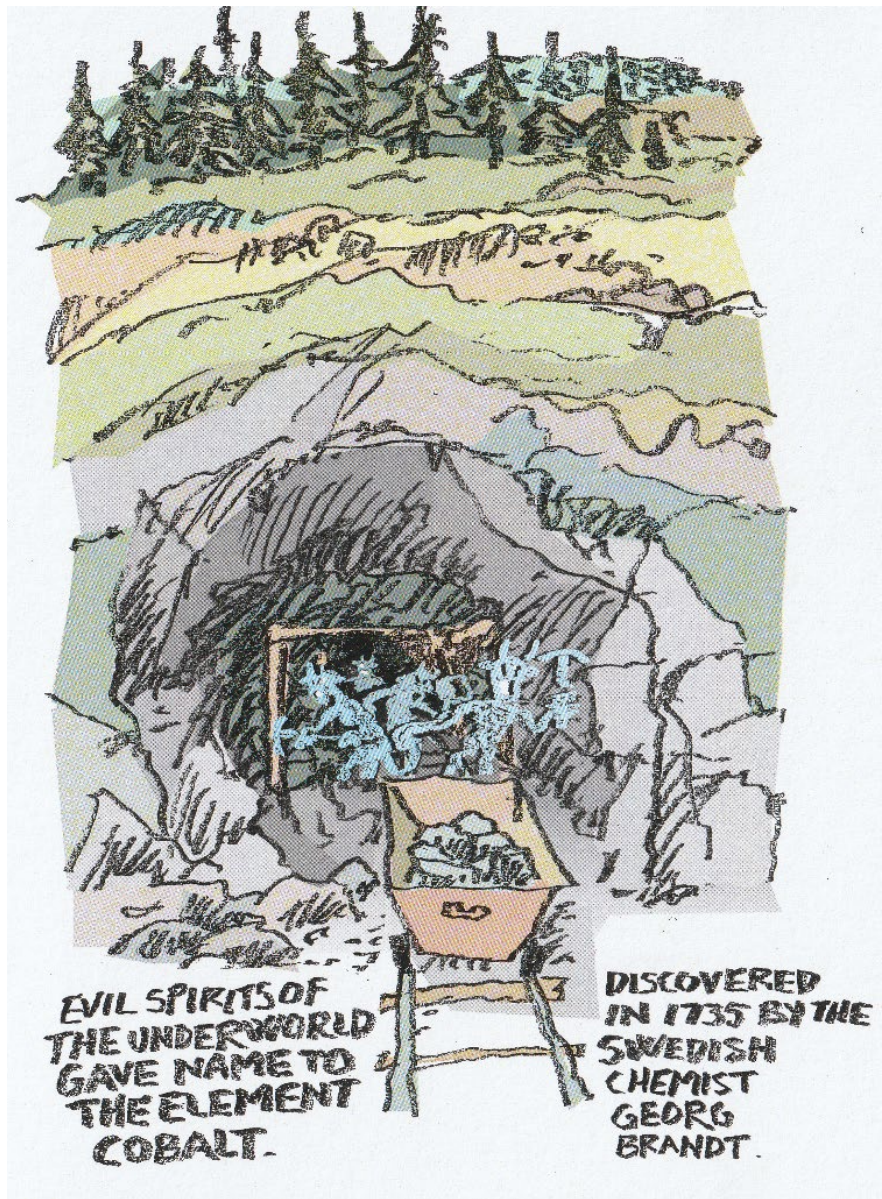
Metal	Import value ores & conc. (Billion USD)	Value of mine production China (Billion USD)	Chinese import dependency (%)
Copper	56.3	11.9	83%
Iron ore	128.1	31.6	80%
Nickel	4.5	1.8	72%
Zinc	4.8	10.4	31%

Source: Comtrade, BGS, RMG Consulting

Control of overseas mine production

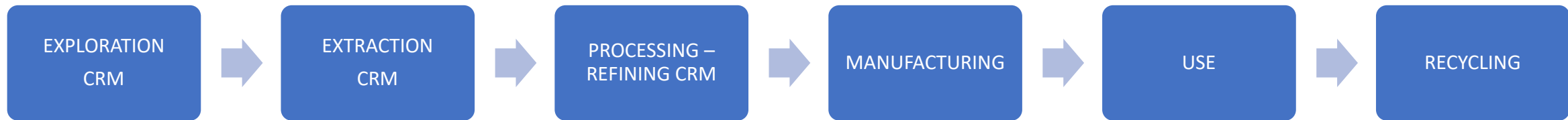


Source: RMG Consulting



Det nordiska gruvklustret

Cobalt drawing: Kaianders Sempler.



AngloAmerican

FINNISH MINERALS GROUP

LATITUDE COBALT

BOLIDEN

PROVINCE RESOURCES LIMITED

FINNCOBALT

KELIBER

Suhanko Arctic Platinum Oy

ARCTIC MINERALS

LEADING EDGE MATERIALS

MANTIN LABORATORIES

talga

GLOBAL ENERGY METALS CORP

LKAB

Primary Material
Ores and concentrates

BOLIDEN

Terrafame

MRC | SKALAND GRAPHITE AS

Elkem

TITANIA
- a KRONOS Company

FREEMET - McMoRAN

BASF
We create chemistry

umicore

JM eramet

BOLIDEN

NORNICKEL

GLENCORE

Elkem

Batteries, cells etc.

northvolt

FREYR

VALMET AUTOMOTIVE

MORYOW

BEYONDER

NanoPow

Applications
Electrical

Epiroc

VOLVO

SCANIA

SANDVIK

normet

BOLIDEN

hydrovolt

northvolt

Critical Metals

Nm Neometals

STENA RECYCLING

NORDIC MINING EQUIPMENT SUPPLIERS

SANDVIK

normet

ABB

VOLVO

Epiroc

outokumpu

Metso:Outotec

MOBILARIS Group

SCANIA

FLSMIDTH

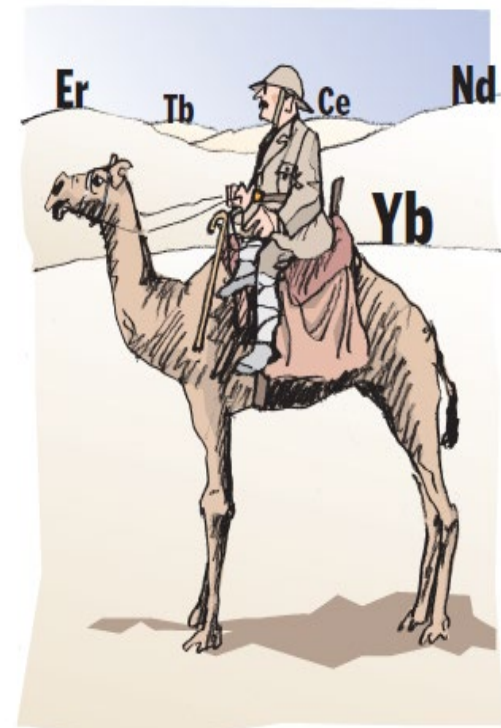
FLYGT
a xylem brand



Slutsatser

- **Framtiden är osäker** – vad kommer att vara kritiskt?
Inte bara de “kritiska/strategiska” metallerna - allt efterfrågas.
%-tal inte tillräckligt – absoluttal är viktiga – både ton och dollar.
- **Risk för suboptimeringar** – gruvor och smältverk i Europa måste vara lönsamma.
De rikaste fyndigheterna bör öppnas först.
Gruvor i u-länder kan kickstarta ländernas ekonomiska utveckling.
- **Gruvor kan ej flyttas** – smältverk, raffinaderier och vidareförädling kan.

- **Kina elefanten i rummet** – ökad kunskap behövs om landets utveckling och mål gällande metaller och mineral.
- **Nordiska gruvklustret = gruvföretagen + utrustningsbolagen + akademien.**
Klustret är världsledande och beroende av frihandel.
Spelar avgörande roll i Europas försörjning av metaller och mineral.
I Europa eller i andra delar av världen.



BECAUSE OF ITS TANTALIZING PROPERTIES, THE SWEDISH CHEMIST ANDERS EKEBERG NAMED HIS NEWFOUND METAL "TANTALUM".

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Elements first isolated from minerals found in the Ytterby mine outside Stockholm.
Illustrations by Kaianders Sempler.

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