Defining Critical Raw Materials in the EU: Information Gaps and Available Solutions

Security of Supply and Scarcity of Raw Materials:
A Methodological Framework for Supply Chain Sustainability Assessment
Joint Research Centre
Ranco, Italy, 13 September 2012

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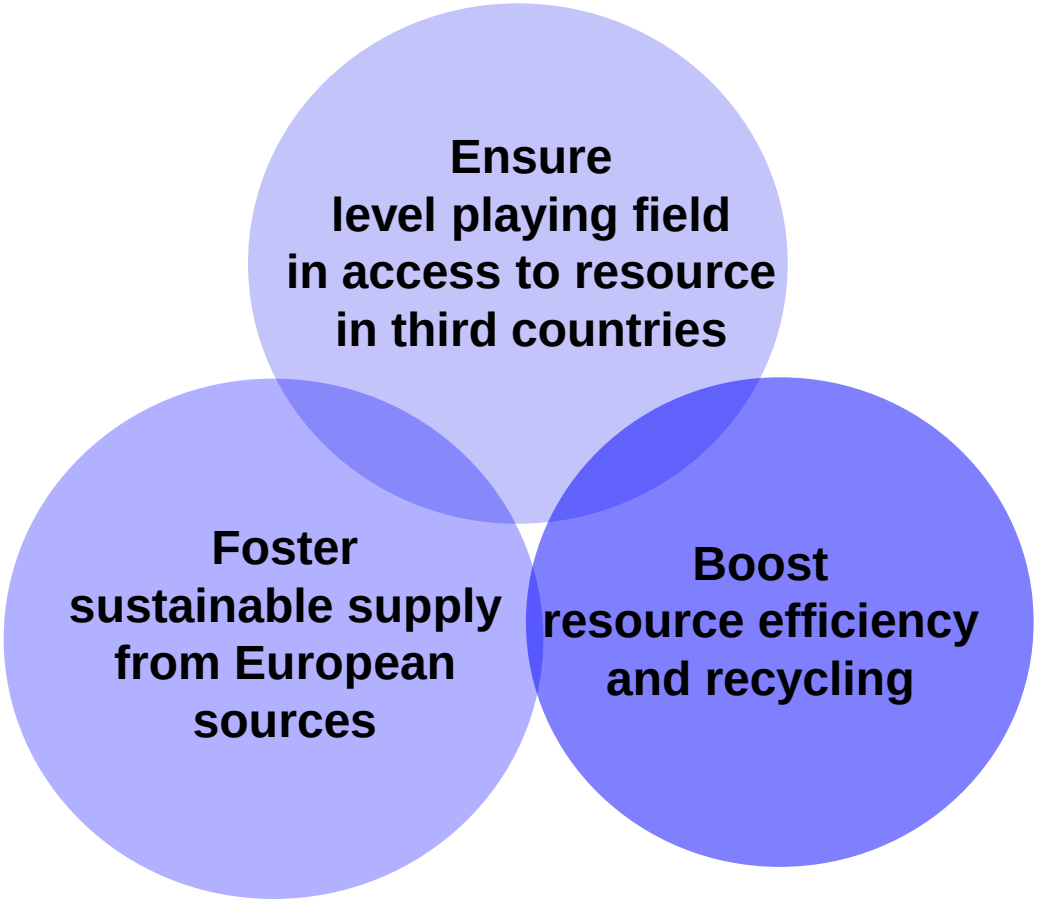
European Commission, DG Enterprise and Industry

EU Raw Materials Initiative

Integrated strategy

- Three pillars approach
- Area of non-energy, non-agricultural raw materials
- Launched Nov. 2008
- Reinforced Feb. 2011
- Primary and secondary raw materials
- Connecting EU external and internal policies



Criticality assessment

Critical raw materials list as a policy tool:

- Monitor issues of critical raw materials to identify priority actions
- Policy actions not limited to critical raw materials exclusively

Scope

Materials covered: **41 raw materials selected**

Time horizon: **10 years window**

Aluminium	Lithium
Antimony	Magnesite
Barytes	Magnesium
Bauxite	Manganese
Bentonite	Molybdenum
Beryllium	Nickel
Borates	Niobium
Chromium	Perlite
Clays (and kaolin)	Platinum Group Metals[11]
Cobalt	Rare earths[12]
Copper	Rhenium
Diatomite	Silica sand
Feldspar	Silver
Fluorspar	Talc
Gallium	Tantalum
Germanium	Tellurium
Graphite	Titanium
Gypsum	Tungsten
Indium	Vanadium
Iron ore	Zinc
Limestone (high grade)	

Approach

Relative concept of criticality:

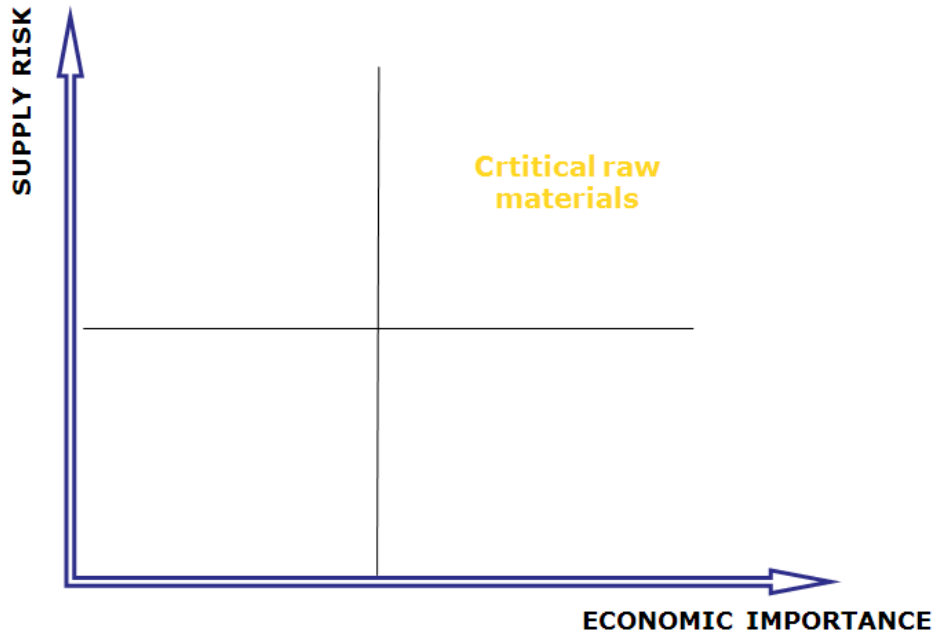
«Critical» when risks of supply shortage and their impacts on the economy are higher compared with most of the other raw materials

Assessment components:

- Economic importance
- Supply risk (and environmental country risk)

Features:

- Pragmatic approach
- Indicators-based
- Dynamic concept
- Primary and secondary RM



Assessment components

Economic importance

- Importance of a raw material per economic sector & importance of the sector in the EU economy

Supply risk

- Political and economic stability
- Level of production concentration
- Potential for substitution
- Recycling rate

Environmental country risk

- Risk of environmental protection measures by supplier countries

Assessment components

European Commission

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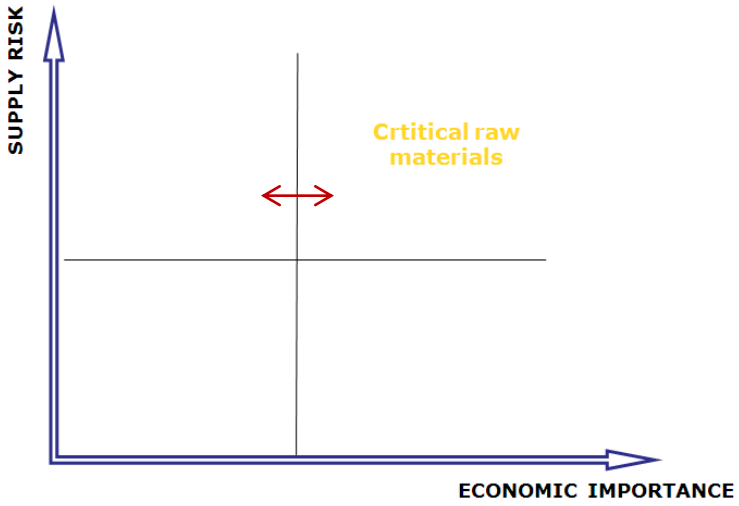
Economic importance

Measuring economic importance

- Breakdown into two dimensions: material & sector
- Based on use of each material per sector weighted by the value added of the sector that uses this materials as production input
- "Megasectors" to approximate value added

Towards a dynamic view:

- Technological advances and new uses taken into account
  -> towards a dynamic view



Emerging technologies

European Commission

Raw material	Production 2006 (t)	Demand emerging tech. 2006 (t)	Demand emerging tech. 2030 (t)	Demand/prod 2006	Demand/prod 2030
Gallium	**152**	**28**	**603**	**0.18**	**3.97**
Indium	**581**	**234**	**1.911**	**0.40**	**3.29**
Germanium	**100**	**28**	**220**	**0.28**	**2.20**
Neodymium	**16.800**	**4.000**	**27.900**	**0.23**	**1.66**
Platinum	**255**	**very small**	**345**	**0**	**1.35**
Tantalum	**1.384**	**551**	**1.410**	**0.40**	**1.02**
Silver	**19.051**	**5.342**	**15.823**	**0.28**	**0.83**
Cobalt	**62.279**	**12.820**	**26.860**	**0.21**	**0.43**
Palladium	**267**	**23**	**77**	**0.09**	**0.29**
Titanium	**7.211.000**	**15.397**	**58.148**	**0.08**	**0.29**
Copper	**15.093.000**	**1.410.000**	**3.696.070**	**0.09**	**0.24**

Assessment components

European Commission

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Supply risk

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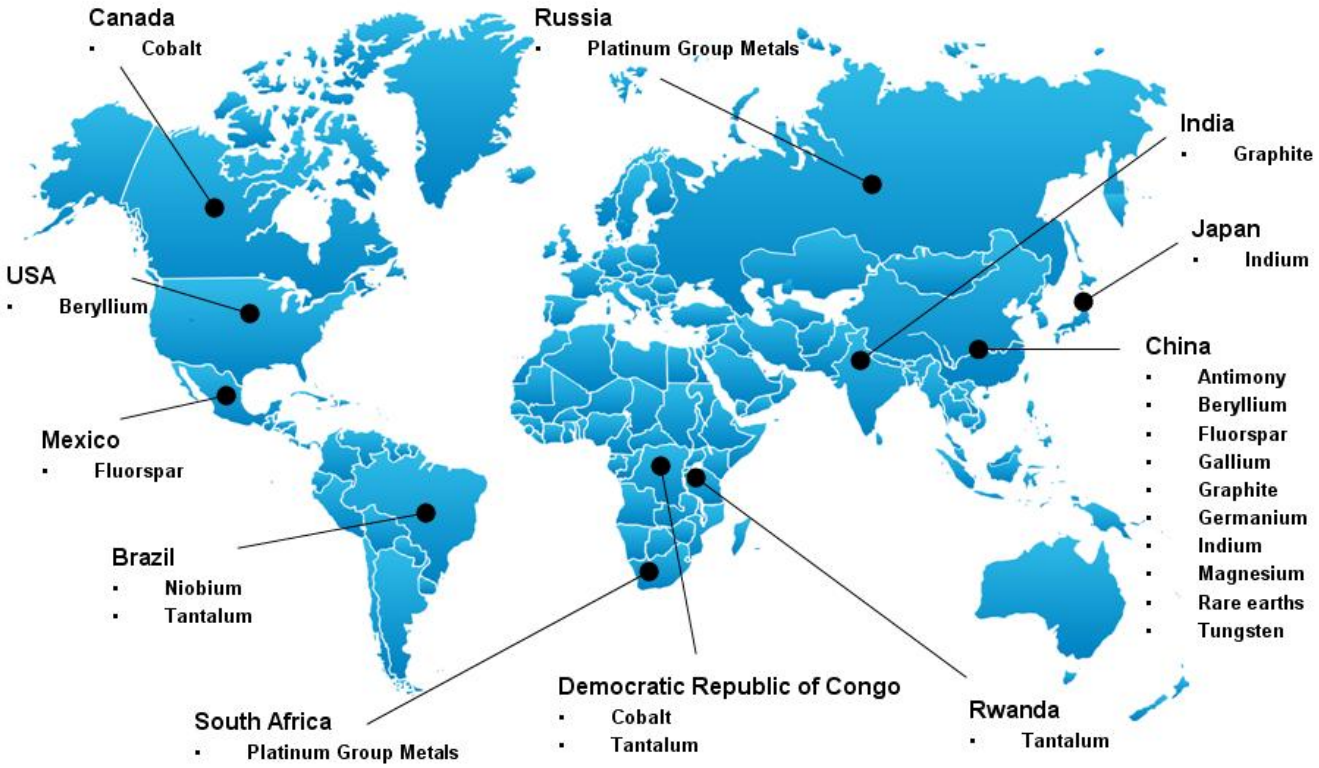
Environmental country risk

- Risk of environmental protection measures by supplier countries

Supply risk

Production concentration of critical raw mineral materials



Supply risk

Political and economic stability and production concentration

- Estimation with use of Worldwide Governance Indicators "weighted" by share of production coming from each of the countries (concentration)
- High index decreases supply risk

Substitution

- Qualitative assessment of substitution potential in each sector weighted by the share of EU's use of this raw material by this sector
- High substitution potential decreases the supply risk

Recycling potential

- Measured by the recycling rate
- High recycling rate decreases supply risk

Assessment components

European Commission

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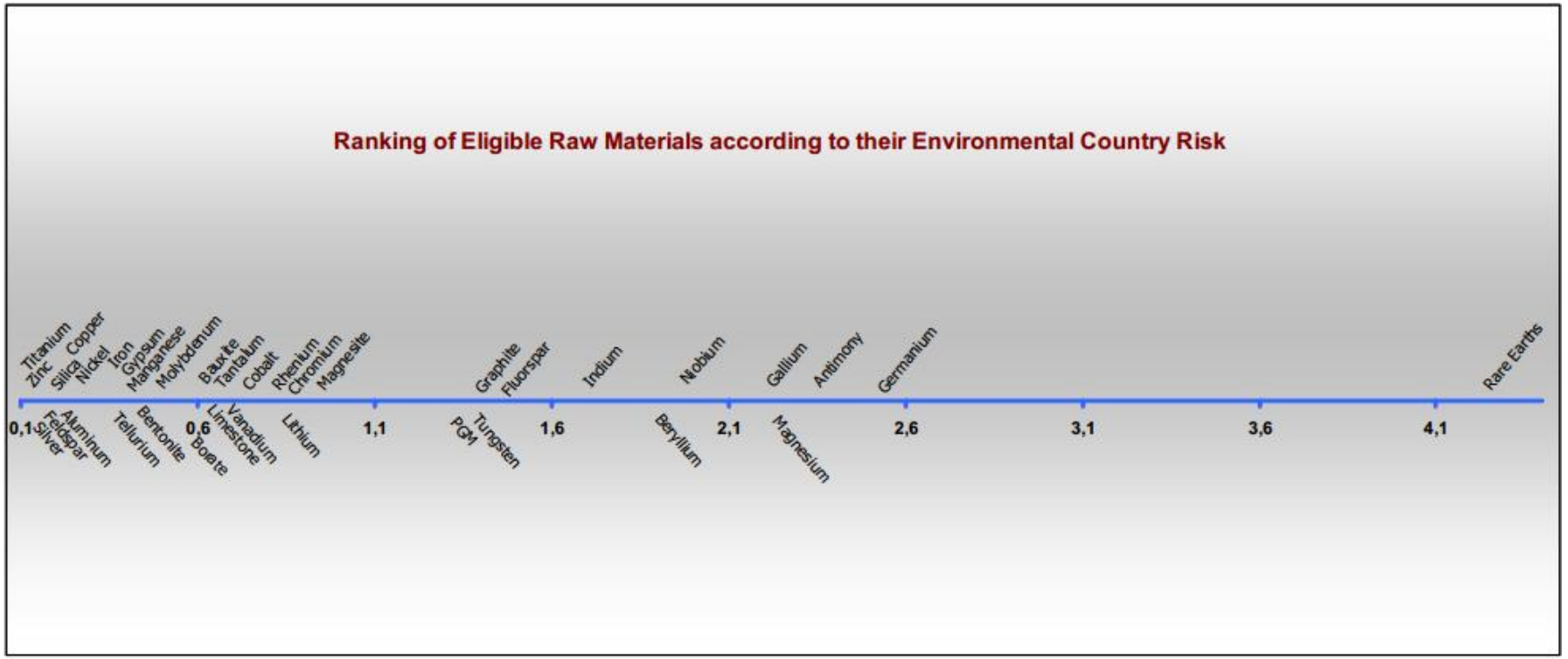
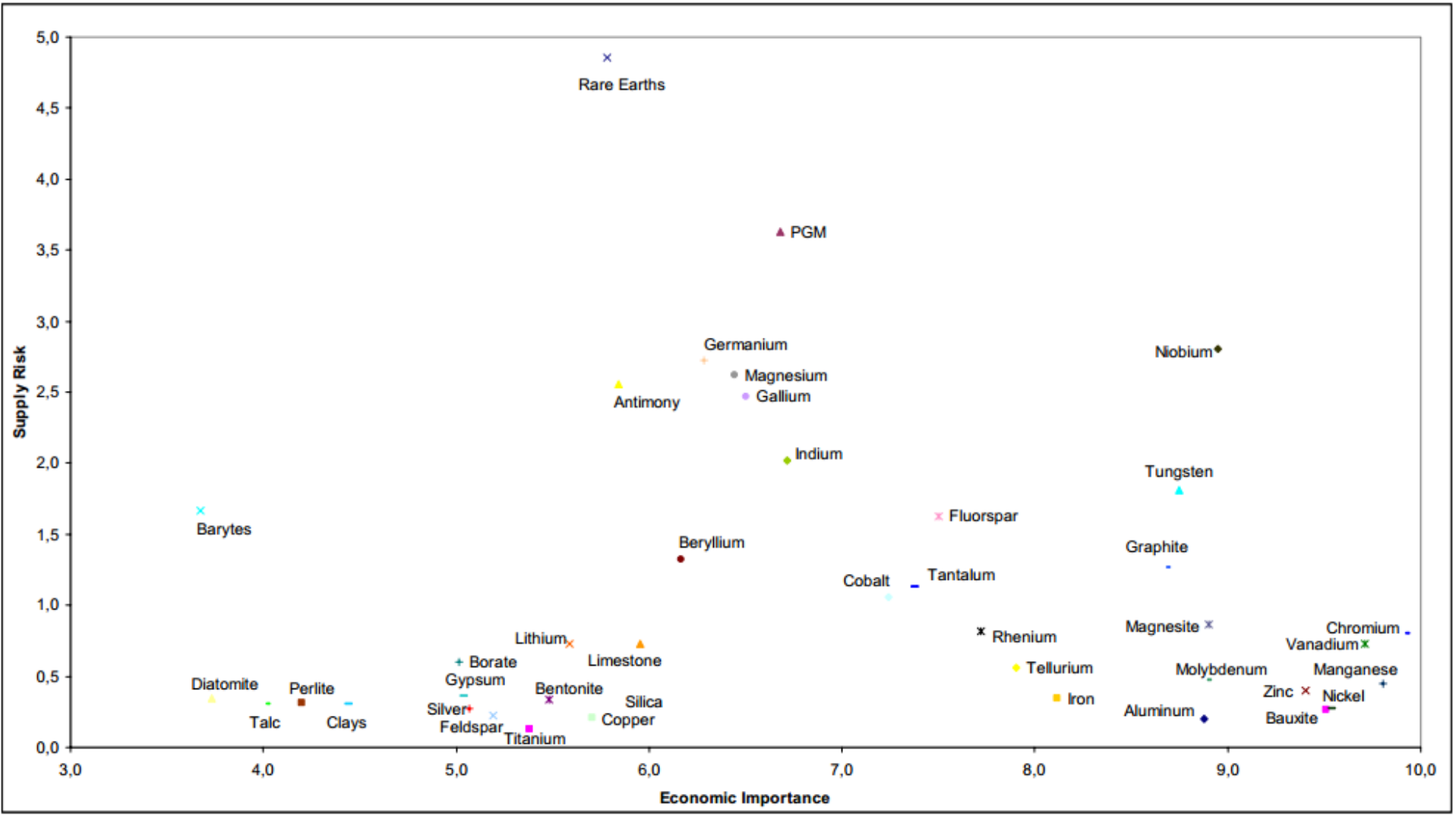


Outcome


Supply Risk
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10,0
Rare Earths
PGM
Germanium
Magnesium
Gallium
Antimony
Indium
Niobium
Tungsten
Barytes
Fluorspar
Beryllium
Graphite
Cobalt
Tantalum
Rhenium
Magnesite
Chromium
Vanadium
Lithium
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Perlite
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Bentonite
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Iron
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Aluminum
Talc
Clays
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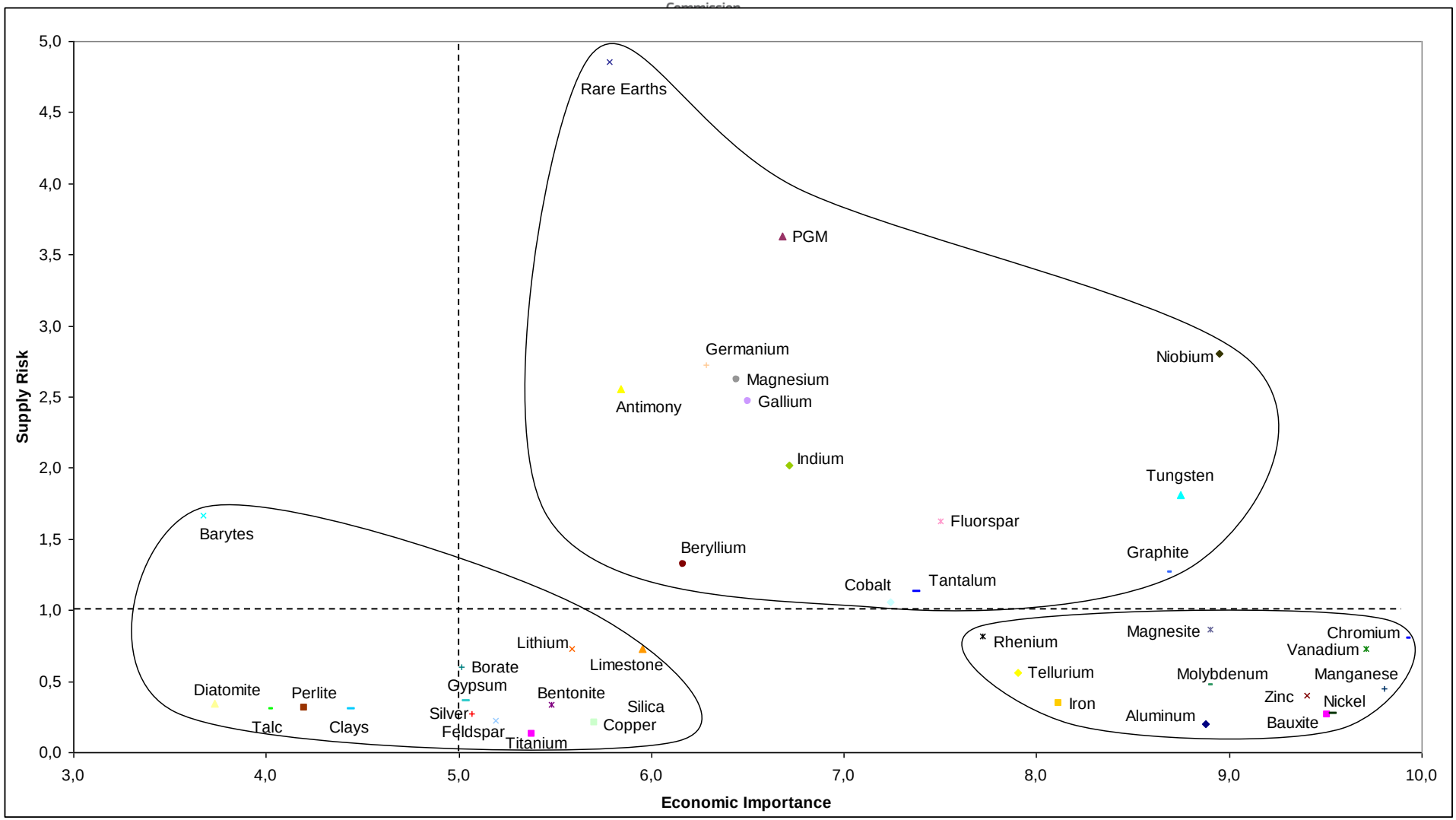
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Bentonite
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Copper
Feldspar
Titanium
Diatomite
Perlite
Talc
Clays
Rhenium
Magnesite
Chromium
Vanadium
Tellurium
Molybdenum
Manganese
Zinc
Nickel
Iron
Aluminum
Bauxite

Critical raw materials list

- Antimony
- Beryllium
- Cobalt
- Fluorspar
- Gallium
- Germanium
- Graphite
- Indium
- Magnesium
- Niobium
- PGMs (Platinum Group Metals)
- Rare earths
- Tantalum
- Tungsten

Input to different policy areas

- Keep raising **attention to policy-makers**
- Promote **coordination of national policies** regarding mineral supply and critical materials
- **Challenge trade distortive measures** regarding critical raw materials
- Analyse the functioning of the **markets**
- Promote **research** (exploration, substitution, recycling)
  In the context of the European Innovation Partnership:
  substitutes for at least 3 applications of critical raw materials
- Promote access to **deposits in EU**
- Address problem of **illegal exports** end-of-life products containing critical materials
- Measures for specific materials

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EIP – novel concept

European Innovation Partnership on Raw Materials
COM(2012) 82 final - 29 February 2012

Objectives:

- Reduce **import dependency**
- Provide **alternatives in supply**
- Push **Europe to the forefront** in raw materials sectors
- Mitigate negative **environmental impacts**

2020 targets

- EU standardised instruments for the survey of resources/reserves and 3-D geological map
- Dynamic modeling of trends: link demand and supply with reserves and complete LCA
- Up to 10 innovative pilot actions, e.g. demonstration pilot plants → exploration, mining, processing, collecting and recycling
- Substitutes for at least 3 applications of critical raw materials
- Network of Research, Education and Training Centres on sustainable raw materials management
- Pro-active strategy of EU at bilateral and multilateral level

Revising the list of critical raw materials

- ✓ **Update list of critical raw materials at least every 3 years**

- ✓ **Expand scope to other materials**
  - ✓ Nearly critical raw materials: rhenium, tellurium
  - ✓ Selected additional materials (e.g. hafnium, selenium, tin – JRC study on critical metals in energy technologies)

- ✓ **Progress regarding statistics**
  - ✓ General data & information on minerals and metals (input geological surveys)
  - ✓ Statistics on value-added manufacturing chain
  - ✓ Analytical progress in the area of land-use planning

- ✓ **Technical work to start in September 2012**
  - ✓ Expanded scope
  - ✓ Fine-tuning methodology
  - ✓ Expert group

- ✓ **Adoption of new list by Commission end 2013**
- ✓ **Possible discussion at Trilateral US-Japan-EU meeting in May 2013**

References

•EU raw materials webpage:
http://ec.europa.eu/enterprise/policies/raw-materials

•EU 2010 Report on critical raw materials:
http://ec.europa.eu/enterprise/policies/raw-materials/critical/index_en.htm

•European Innovation Partnership on raw materials
http://ec.europa.eu/enterprise/policies/raw-materials/innovation-partnership/index_en.htm

•2011 JRC report on critical metals and energy technologies:
http://setis.ec.europa.eu/newsroom/library/setis-presentations/jrc-report-on-critical-metals-in-strategic-energy-technologies

Thank you.

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