Critical minerals: the EU perspective

Critical minerals for the clean energy and high technology industries
2012 and beyond – the EU perspective
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Structure

- 2010 EC report on critical raw materials
- Awareness raising
- Policy tool
  - Research projects
  - International co-operation
  - Innovation Partnership
- Follow up analysis and revision
  - JRC report on critical metals
  - Revision of list of critical raw materials
**Integrated strategy**

- based on three pillars
- area of non-energy, non-agricultural raw materials
- connecting EU external and internal policies
- launched Nov. 2008
- reinforced Feb. 2011

Ensure **level playing field in access to resource in third countries**

Foster **sustainable supply from European sources**

Boost **resource efficiency and recycling**
Approach

- 41 raw materials analysed
- Time horizon: 10 years
- Pragmatic, transparent approach
- Key indicators
  - economic importance
  - supply risks
  - environmental country risks
Production concentration of critical raw mineral materials

- Canada: Cobalt
- Russia: Platinum Group Metals
- USA: Beryllium
- Mexico: Fluorspar
- Brazil: Niobium, Tantalum
- South Africa: Platinum Group Metals
- Democratic Republic of Congo: Cobalt, Tantalum
- Rwanda: Tantalum
- India: Graphite
- Japan: Indium
- China: Antimony, Beryllium, Fluorspar, Gallium, Graphite, Germanium, Indium, Magnesium, Rare earths, Tungsten
# Emerging technologies

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

With courtesy by Mr Schulz (Renault)
Policy tool

- Monitor issues of critical raw materials to identify priority actions
- Policy actions not limited to critical raw materials exclusively
Promote RTD and innovation

One Geology Europe

ProMine

ExPerl

ImpactMin

EO-MINERS

EuroGeoSource

I²Mine

ERA-MIN

“Horizon 2020”

Exploration, extraction, processing, recycling and substitution

Data capture and analysis for Exploration.
Case #1: ProMine

- 2009-2013
- Budget: € 17 million
- 27 partners from 11 Member States
- Aims to improve the EU’s knowledge base for actual and future deposits
- Develop first ever pan-European GIS-based mineral resources database and detailed 4D computer modelling system

Assessments and homogenising multi-layer information system within the ProMine-Project building a basis for 3D and 4D modelling.
## Case #2: substitution

### Projects under FP7

<table>
<thead>
<tr>
<th>Project</th>
<th>Title</th>
<th>Total budget</th>
<th>Max EC contribution</th>
</tr>
</thead>
<tbody>
<tr>
<td>REFREEPER MAG</td>
<td>RARE EARTH FREE PERMANENT MAGNETS</td>
<td>5,207,885</td>
<td>3,841,400</td>
</tr>
<tr>
<td>FREECATS</td>
<td>Doped carbon nanostructures as metal-free catalysts</td>
<td>5,068,694</td>
<td>3,955,619</td>
</tr>
<tr>
<td>Next-Gen-Cat</td>
<td>Development of NEXT GENeration cost efficient automotive CATalysts</td>
<td>5,615,292</td>
<td>3,938,298</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td></td>
<td><strong>15,918,538</strong></td>
<td><strong>11,735,316</strong></td>
</tr>
</tbody>
</table>
• In December 2010 in the context of the Transatlantic Economic Council (TEC), the US and EU agreed to work together in the area of innovation and access to critical raw materials.

• In November 2011 the TEC launched a joint work plan around various topics:
  ✓ Trade co-operation
  ✓ Raw Materials Data, Flows and Information Sharing
  ✓ Resource Efficiency and Recycling
  ✓ Research and Development on Raw Material Substitution and Reduction
  ✓ Waste Shipment
Objectives:

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

- **Technology-focused policy areas**
  - WP1 - Exploration, extraction, processing, recycling ...
  - WP2 - Substitution, alternative functionalities and materials

- **Non Technology policy areas**
  - WP3 - Improving Europe's *raw materials* regulatory framework conditions, knowledge base and infrastructure
    - e.g. data interoperability and availability
  - WP4 - Improving Europe's *recycling* regulatory framework conditions and excellence
    - e.g. public procurement, private initiatives

- **WP5 - International cooperation**
  - Promoting appropriate international cooperation
    - various policy issues possible e.g. geology, research, trade, competitiveness and investment conditions
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
Way forward EIP

**NB**: If Council conclusions in December 2012

- **First steps foreseen**: setting HLSG, Sherpa group and operational groups
  
  => call for expression of interest

- **HLSG to prepare Strategic Implementation Plan (SIP)**, for adoption ~ Sept. 2013

- **Communication on SIP**, late 2013
  
  => SIP implementation to start
Follow up analysis

THE JRC-IET STUDY (2010-11)

• Identify rare metal requirements for the high-priority low-carbon technologies of SET-Plan, namely: wind, solar, bio-energy, CCS, nuclear and electricity grids

• Examine the impact of rare metal supply and its disruption on the deployment of these technologies based on technology penetration scenarios

• Explore possible strategies to prevent or mitigate the negative impacts of rare metal supply and its restrictions on the SET-Plan goals
Average annual demand over the decade 2020-2030 compared to the known supply figures for 2010, expressed as a percentage.
Due to market and geo-political factors, five metals represent a high risk: neodymium, dysprosium, indium, tellurium and gallium.
PV uses three bottleneck metals: tellurium, indium and gallium, at 45, 30 and 2% maximum resp. of 2010 supply.

Wind uses two bottleneck metals: neodymium and dysprosium at around 4% maximum of 2010 world supply.
Conclusions of JRC report

- There are five metals (Dy, Nd, Te, Ga and In) for which the screening finds high risks for supply-chain bottlenecks.

- Existence of technology options implies that there are no unavoidable bottlenecks that could affect the implementation of the SET-Plan as a whole.

- Mitigation – EU-mine production; re-use, re-cycling, waste reduction and substitution

- Strong (EU) policy support – being addressed, for example, by the EU’s Raw Materials Initiative and the EIP

- Recommend that similar study be carried out to identify metal requirements and bottlenecks in other green technologies (e.g. electric vehicles, fuels cells, hydrogen etc)
Revising the list of critical raw materials

- Update list of critical raw materials at least every 3 years
- Technical work to start in September 2012
  - Expanded scope
  - Fine-tuning methodology
- Work to be completed by September 2013
- Adoption of new list by Commission end 2013
• EU raw materials webpage: 
  http://ec.europa.eu/enterprise/policies/raw-materials

• EU 2010 Report on critical raw materials: 

• European Innovation Partnership on raw materials 

• 2011 JRC report on critical metals and energy technologies: 