HOW COULD THE EU'S METHODOLOGY FOR DEFINING CRITICAL RAW MATERIALS BE ENHANCED?

Defining “critical” raw materials for the EU

Three reasons why some materials may be considered critical:

- “first, they have a significant economic importance for key sectors,
- second, the EU is faced with high supply risks [...]
- and third, there is currently a lack of substitutes.”

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Indicators from “Critical raw materials for the EU” (Ad-hoc working group on defining critical raw materials, 2010)
Critical raw materials (first EU exercise)

Data from “Critical raw materials for the EU” (Ad-hoc working group on defining critical raw materials, 2010)
EU methodology

What it does
- Provide transparent estimates for the relative ranking both in supply risk and economic importance
- Give relative ranking at one point in time (snapshot)
- Compare raw materials on the basis of their economic benefit to society
  - Considers all uses of a raw material
- Explicitly acknowledge contribution of secondary raw materials to supply
- Emphasizes the importance of substitution

What it doesn’t
- Provide a view into the future beyond the lifetime of the indicators used
- Consider the effect of market size (e.g. scale of problem and rate of change of indicators)
- Explicitly consider the interdependence between different metal markets (both on the supply and the demand side)

See also Buijs, Sievers and Tercero Espinoza: Limits to the critical raw materials approach, Waste and Resource Management 2012 (in press)
Some data limitations encountered during the 2010 EU exercise

- Production statistics differentiated by quality
  - Specially relevant for industrial minerals
- Life cycle data
  - Balancing environmental impacts in production with environmental benefits in use (e.g. platinum for catalytic converters)
  - Feasible to apply to raw materials with their myriad uses?
- Trade statistics
  - Detail, completeness and correctness of reported data
  - Relevant for import dependence and availability of secondary raw materials
- Recycling indicators
  - Quality of data and assumptions varies widely
  - Most complete current source: UNEP report (but heavy reliance on extrapolations and expert judgment)
Market size (tonnes, 2010) of EU CRM

Market size is a factor in:
- Magnitude of investment necessary to increase supply
- Rate of change of indicators, e.g.
  - Concentration of supply
  - Distribution of end uses
- Limitations to expanding supply of co- and by-products

Data from “Critical raw materials for the EU” (2010), World Mining Data (2012), USGS Mineral Commodity Summaries (2012)
Changing concentration of supply

Not considered in the quantitative methodology: Co- and by-products

Influence of technological change and market size: The example of electric vehicles

Modified after Tercero Espinoza (2011) / POLINARES Project results (http://www.polinares.eu/docs/events/polinares_events_tw2_minerals_supply_chain_bottlenecks.pdf)
Example: Cobalt

- EU completely dependent on imports (≈ 20% of world production)
- ≈ 2/3 of cobalt products produced in Europe are sold outside of Europe
- ≈ 20% of cobalt demand worldwide is for battery production (Li-ion for electronic devices)
  - but these are not produced in the EU!

Quantifying economic importance: Positioning Europe in global supply chains

Based on data from Eurometéaux for the report Critical Raw Materials for the EU (2010); see also Tercero Espinoza (2011) / POLINARES Project (http://www.polinares.eu/docs/events/polinares_events_tw2_minerals_supply_chain_bottlenecks.pdf)
Acknowledging the contribution and potential of recycling

Modeling raw material flows: Basis for recycling indicators & import dependence

Modeling work for the International Copper Association (publication in preparation by Glöser, Soulier and Tercero Espinoza)
Plurality of studies with
- Different foci and levels of analysis (countries, regions, companies)
- Different methodological emphases
- Different reliance on quantitative data vs. expert opinion
  - Different sets of indicators
- Different timeframes

Examples of indicators used:
- Apparent consumption (value, tonnage)
- Substitutability (availability, performance)
- Emerging uses (qualitative/quantitative) and competing technology demand
- Import dependence
- Static lifetime of reserves
- Country concentration of supply
- Political stability/Governance rating
- Environmental performance of producers
- Recycling rates
- Share of country in world demand
- …

My own personal assessment

- Considering its purpose (highlight current issues), the EU approach is generally adequate
- Nevertheless, there is a need to
  - Strengthen the data basis → increase confidence in results (accepting methodology)
    - Better flow modeling → recycling rates
    - More extensive survey of substitution options
  - More clearly define economic importance
    - Current approach generally overstates the impact of supply shortages
    - A supply chain approach may prove more appropriate, but it unfortunately difficult, data intensive and time consuming
- Enrich the list of options available for critical raw materials by
  - Considering prospective and qualitative aspects and their interactions (e.g. as done in Annex V of the 2010 report)
  - Must be done on a material by material basis, interconnecting where necessary
Trying to capture the dynamics of raw materials markets

Preliminary results from the project "Value from Waste" (part of the ERA-NET AERTOs)
Updating the EU list of critical raw materials

- Reassessment of old long list using the same methodology but with latest data
- Include qualitative assessment similar to previous report
- Expanding the long list
  - Metals and minerals: at least gold, hafnium, selenium, potash, phosphate rock and tin
  - Bio-based materials such as wood, cotton and natural rubber
- Differentiate individual PGMs and REEs where possible
- Analysis of production and trade flows for short-listed materials
- Ten-year supply and demand forecasts for short-listed materials
- Propose recommendations for further refinements to the methodology, e.g. regarding
  - Land use competition
  - By-products and their relation to base metals
- Project start Q4 2012
- Expected project duration: 1 year.

Call for tenders No 147/PP/ENT/CIP/12/F/S01C02 (DG ENTR)
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