Öko-Institut e.V.
Institut für angewandte Ökologie
Institute for Applied Ecology

Greenland and the EU Critical Materials

EU-Greenland workshop on raw materials

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Our Profile

Oeko-Institut is a leading European research and consultancy institute working for a sustainable future.

- A non-profit association founded in 1977
- Offices in Freiburg, Darmstadt and Berlin (Germany)
- Clients: European Union, national and state-level ministries, companies, foundations and non-governmental organizations
- Around 150 employees
- 300 – 400 projects per annum

Focuses of our research

Resource management (e.g. rare earth elements, urban mining, recycling)

Mobility (e.g. national transport data, e-mobility)

Energy and climate protection (e.g. energy scenarios, emissions trading, renewable energies, grid integration)

Sustainable consumption (product rating and development: Eco-design Directive, LCAs, carbon footprints, product sustainability assessments (PROSA), EcoTopTen)

Nuclear engineering and facility safety (assessment of nuclear power plants, concepts for repositories)

Focuses of our research

Companies (advice and organizational development for sustainability in management, production, technology development)

Chemical management and technology assessment (e.g. implementation of REACH, RoHS, evaluation of nanotechnologies)

Law, policy and governance (draft laws, IMPACT, CSR)

Environmental Statistics (Eurostat, indicator, waste and resource statistics)

Immission control and radiation protection

Oeko-Institut's tasks

- EU need for critical and base raw materials
  - Fact sheets
- EU industry cooperation with Greenland
  - Stakeholder workshop
- Environmental aspects
  - Visit to Greenland
    - mining and environmental regulators,
    - NGOs active in mining issues in Greenland,
    - TANBREEZ office in Nuuk.

Greenland's mining legislation

- is nevertheless well foreseeable for applicants as the regulation is oriented towards highest environmental standards of worldwide state-of-the-art in the respective fields,
- is among the most modern and advanced in the world; certain regulations such as
  - the waste management funding rule
  - the recently established opportunity for communities to apply for financial support of their necessary process-related activities, or
  - the Social Impact Analysis (SIA) requirement and the respective procedure ending in a consensus document, or
  - the continuous update of permits and necessary upgrades of technologies to the current state-of-the-art
- are well above current average standards

Greenland's mining legislation

- Framework very advanced
- Europe can learn from this comprehensive approach!
- ➢ We are interested to see how these instruments work in mid and long term in practice
- One controversial discussed point:
  - Deposit of the waste dumping into Lake Fostersø as planned in the TANBREEZ (and others projects ?) was seen by Greenland's regulators as a sustainable waste management option*
  - EU mining waste directive: disposal in mining location, not in lakes
  - Image problem of Greenland might arise from dispoal in lakes

*
- because the lake hosts no higher species (no fish or other animals),
- because the wastes to be dumped do not have a relevant sulfur content to produce any acid with the oxygen-rich lake water
- run-off from the lake will be largely diluted

Focus of stakeholder consultation

Greenland's critical materials and base metals with **high** / **moderate** potential:

Critical metals

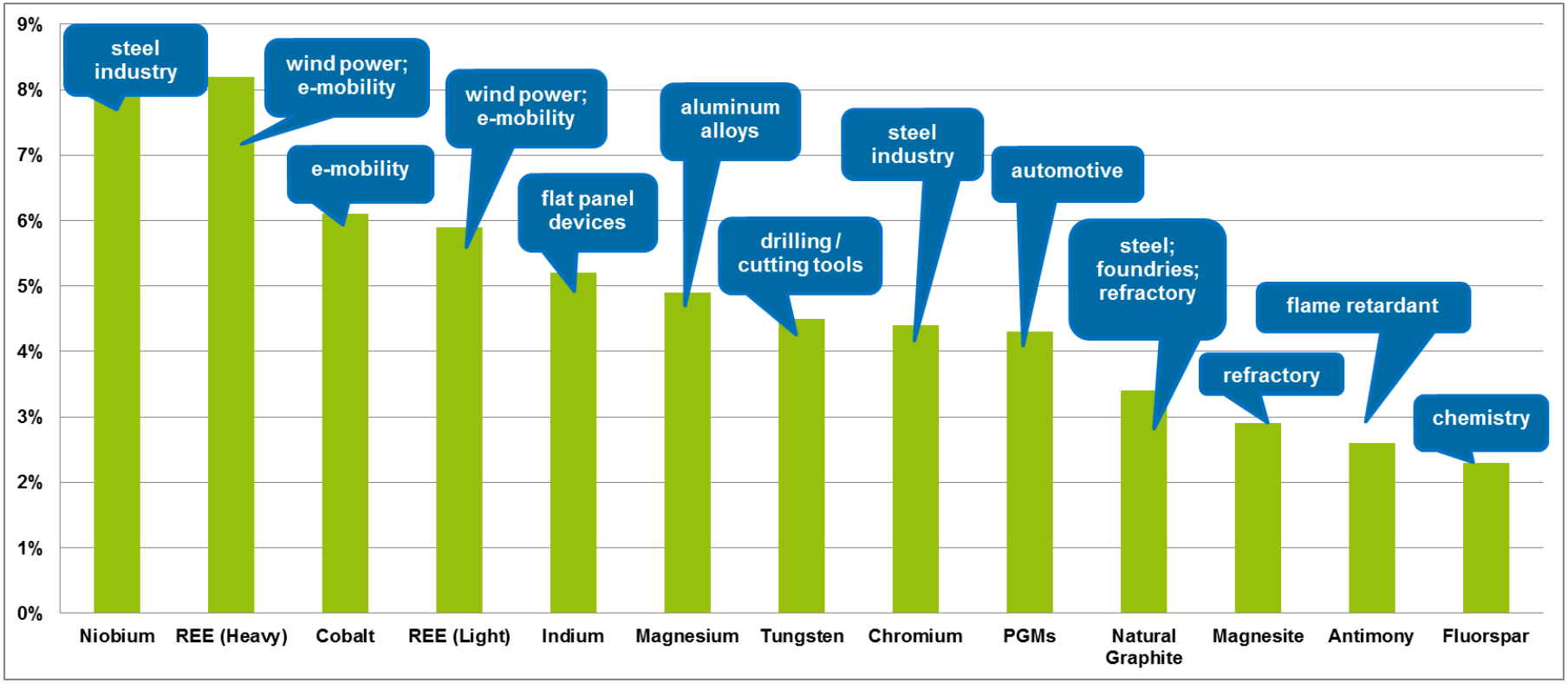
- **Rare earths**
- **Niobium**
- **Tantalum**
- **Platinum Group Metals (PGM)**
- **Graphite**
- **Fluorine**
- **Tungsten**
- **Antimony**

Base metals

- **Iron**
- **Copper**
- **Zinc**
- **Chromium**
- **Nickel**

Low potential: Cobalt

Forecasted average annual demand growth until 2020 for selected Critical Raw Materials and main drivers



➢ Demand arises from traditional and new high-tech sectors!

Source: Report on critical raw materials for the EU, 2014

Results from Stakeholder Consultation

Stakeholder workshop and bi-lateral talks to industry representatives

- European downstream industries focus strongly on their core businesses
- Current raw material supply does not provide sufficient incentives to establish new raw material initiatives
- Rare earths:
  - tight supply shortages have eased
  - European rare earth market is too small for a closed European value chain
  - global competition in mining; other mining project more advanced
  - difficult market conditions
  - Problem of “European” financing; MoU with China

German experience with raw material partnerships I

German‘s raw material partnerships:

- Kazakhstan, Mongolia on the way, though no concrete raw material projects have been agreed upon to date
- Peru, since 2014

Conclusions:

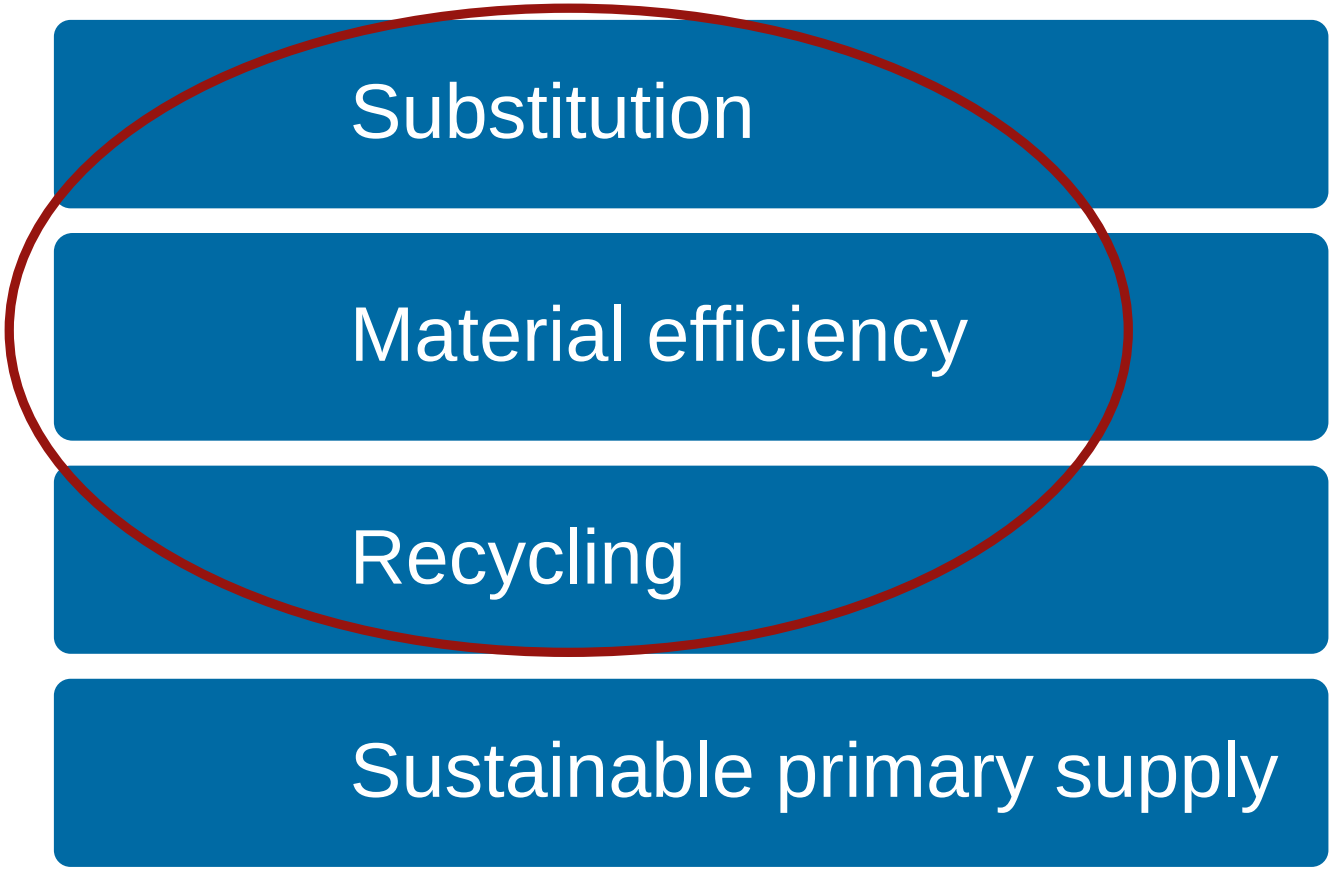
- long-term activities and require an intensive preparation process
- Deepening of existing partnerships in the foreground
- Main challenges are differences in the partners’ interests and needs
  - The raw material rich countries have a large interest in infrastructure development, financing of raw material projects and education
  - German downstream industries that need raw materials provision are not specialized in infrastructure businesses.

German experience with raw material partnerships II

In addition to the raw material partnerships, several German companies from different industrial sectors founded the Rohstoffallianz (Resource Alliance) with support from / in cooperation with the BDI in 2012.

The aim is the development of options for securing a long-term supply of raw materials ranging from mere supply agreements over collaborations with enterprises for the processing of raw materials to equity participation in mining projects.

European strategic options towards a secure raw materials supply



Success stories of substitution

- LED with very high resource efficiency
  - Expert statements in 2011: no substitution for Tb
  - Three years later: Tb-free LED are state of the art.
  - Very fast development!

- Wind turbines with Dy-free permanent magnets:
  - Dy is used to stabilize neodymium permanent magnets at high temperatures
  - High demand increase of Dy forecasted, e.g. from wind energy
  - Siemens has a patent for Dy-free permanent magnet in wind power ⇨ 2017

Conclusion

- European industry is strong in recycling, material efficiency and substitution ⇨ R&D, investment
- Most EU industries do not want to engage in mining and financing of mining
- In the long term, priorities might change if supply shortages happen again
- In the long term, industry might be more prepared to engage in sustainable mining
- Greenland provides a good approach with high environmental standards
- Focus of cooperation: critical and base metals

Thank you for your attention!

Do you have any questions?

Contact

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Further information

- www.oeko.de – our **website** with up-to-date information in both German and English
- www.twitter.com/oekoinstitut - follow Oeko-Institut on **Twitter**
- **eco@work** – our free e-paper with breaking news from the institute
- **Annual report** – provides the complete picture of Oeko-Institut

2014 report: Twenty Critical Raw Materials for the EU

EU Ad-Hoc-Working Group on Raw Materials:

Report on critical materials for the EU (2010)

Antimony	Beryllium	Cobalt	Fluorspar
Gallium	Germanium	Graphite	Indium
Magnesium	Niobium	PGMs	REEs
Tantalum	Tungsten		

Report on critical materials for the EU (2014)

Antimony	Beryllium	Borates	Chromium	Cobalt	Coking coal	Fluorspar
Gallium	Germanium	Indium	Magnesite	Magnesium	Natural Graphite	Niobium
PGMs	Phosphate Rock	REEs (Heavy)	REEs (Light)	Silicon Metal	Tungsten	