What for an International Resource Panel (IRP)?

The International Resource Panel provides a science-policy interface on resource-efficiency to governments and other stakeholders in their endeavour to tackle persistent and emerging challenges to the use of natural resources and environmental sustainability.

The objectives are:

> To provide independent, coherent and authoritative scientific assessments of policy relevance on the sustainable use of natural resources and in particular their environmental impacts over the full life cycle;

> To contribute to a better understanding of how to decouple economic growth from environmental degradation.
International Resource Panel Structure

Steering Committee
Governments and civil Society Organizations
Strategic guidance, political support, regional synergies

Scientific Panel
Internationally recognized experts (29)
on sustainable resource management
Scientific assessments and advice through working groups

International network of experts

Steering Committee members (34)
- Government and IGOs: Australia, Belgium, Canada, China, Chile, Denmark, EC, Egypt, Finland, France, Germany, Hungary, Indonesia, India, Italy, Japan, Kazakhstan, Kenya, Mexico, Netherlands, Norway, The Philippines, Russian Federation, South Africa, Switzerland, Tanzania, USA, Vietnam, European Commission, OECD
- Civil Society Organisations: ICC, ICSU, IUCN, and WBCSD
- Observers: UK

Background

What are we talking about?
Understanding how to decouple environmental impacts and resource use from economic growth...

... while avoiding burden shifting between countries, generations, and trade-offs between impact categories and life cycle stages.
ACTIVITIES OF THE METALS GROUP

Metals related reports published by the International Resource Panel
www.unep.org/resourcepanel

All reports are downloadable for free
The metals WG work plan

- Promote the recycling of metals and the circular economy
- Production of assessment reports:
  - Rapport 1: Metal Stocks in Society
  - Rapport 2a: Recycling Rates
  - Rapport 2b: Recycling of metals: options, limits, infrastructure
  - Rapport 3: Environmental Impacts of Metals
  - Rapport 4: Geological Metal Stocks (suspended)
  - Rapport 5: Future Demand Scenarios of Metals
  - Rapport 6: Critical Metals and Metals Policy Options

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Objectives and conclusions

- Provide an understanding of the stock of metals already extracted at the global scale and policy-relevant facts for the sustainable management of minerals and metals and for the recycling of metals.
- Further to the compilation of data from 54 assessments, it provides an understanding of the extracted per capita stock of 5 metals (aluminium, copper, iron, lead and zinc) in relation with the wealth level (GDP per capita) of individual countries, as well as of their residence time in the economy before becoming possibly recyclable waste.
- It provides more limited data on 19 other metals.
- It highlights the scarcity, or even the absence of data about the metal stocks in mining industry waste, in household waste, in government and industry stockpiles.

**Estimate of the Al, Cu, Fe, Pb, stainless steel, Zn stock in society (in kg. per capita, 2005 values. In blue; data from the richer countries (860 M people) in red from low-income countries (560 M people).**

Data source: INP report on Metals stocks in society.
Objectives and conclusions

- Provide an assessment (2009) of the recycling status of 60 metals, either at the primary recycling stage (production waste), or from end-of-life products (secondary recycling);
- The report provides a synthesis of data available on the average content in recycled metal of metallic products in circulation, as well as on the ratio recycled elements / total end-of-life waste:
- Due to ever growing production of the various metals, and of their long residence time in many applications the recycling rate from end-of-life waste stagnates;
- The relatively inefficient collection of end-of-life products, the limitations of recycling processes and low metals prices contribute to the low recycling rate observed for many metals. Only 18 of them have recycling rates > 50% at end-of-life.
Average recycling rates of metals in end-of-life products
Source: International Panel Report « Recycling Rates of Metals » (Graedel T. et al.)

METALS RECYCLING: OPTIONS, LIMITS AND INFRASTRUCTURE
Objectives and conclusions

• Describe the obstacles limiting the recycling of metals from end-of-life products; identify available options and the infrastructure needed in order to increase their recycling rates.

• So far recycling policies are metal-centric. Their objectives are to enhance recycling in % of a collected waste stream (ex. Directive 2012-19 EU on waste electrical and electronic equipment). Well suited to the recycling of goods made of one metal, they are an obstacle to the recycling of the rarer metals contained in numerous products.

• The availability of rare metals and the mastery of their uses is a strategic asset for the competitiveness of enterprises and nations.

• Recycling policies ought to become materials centric, focusing on the recovery of rare resources from very complex assemblies.

Most man-made products are not conceived in view of their recycling

Geological
Copper Mineral
Chalcopryrite CuFeS2

More than
15 Minors e.g.
Au, As, Pd, Se, etc.

Designed
Copper Mineral

More than
40 Elements
Complexity Linked as Alloys, Compounds etc. for Product Functionality Reasons

Geological Linkages
Product Design and Material Combinations Create New “Minerals”
Material Connections
Joined Materials

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www.unep.fr/scp/rpanel
Infrastructures for recycling

A number of components need to be functional to see recycling rates advance:

- Pro-recycling product design;
- Inventory and description of Best Available Techniques (BAT);
- Policies aligning their objectives on the economic drivers of fully circular systems;
- Waste recycling in BAT based plants;
- Knowledge and command of the technologies related to waste characterisation and separation, concentration and metallurgical treatment of the phases to be recycled;
- Incentives, combining economic and regulatory obligations such as extended producer responsibility
- Process modelling, to anticipate phase behaviours during recycling.
- Conservation of a high-level non-ferrous metals EU metallurgy. This is an essential component of a policy that would aim at securing EU’s raw material supply and eco-efficiency.

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ENVIRONMENTAL RISKS AND CHALLENGES OF ANTHROPOGENIC METALS FLOWS AND CYCLES
Objectives and conclusions

- Describes the environmental impacts of 17 metals all along their life cycle;
- Metals are part of biological processes and are essential inputs to many economic processes owing to their specific physical and chemical properties, and in a number of cases to their atomic properties;
- Man-made metal emissions into the environment, if waste dumps are excluded, are of the same order of magnitude than natural weathering processes or volcanic eruptions;
- Metals produced in small amount have, per weight unit, a much higher environmental impact during their cradle to gate (integration into a manufactured product) than metals produced in large quantities. This does not apply for co- and by-products.
- The highest impacts occur during mining, processing and metallurgy. These are impacts on air, water and soils; chemicals, water and energy use (7 to 8% of the world energy use). Important impacts also occur at end-of-life in case of dispersion of metals into the environment.
- Renewable energies require more metals (by quantity and diversity) than conventional energy production technologies.

Material requirements for global electricity systems, to provide the 2007 world electricity production (18.8 E12 kWh), under various electricity mixes (Kleijn et al., 2011).
The distribution of elements in soil essentially reflects geology. 


Elements essential, beneficial and non-essential to plant and animal life 
Source: 
EPA, 2007
MY OWN CONCLUSIONS

Own conclusions

• Development of metal life-cycle databases should be considered as a public good and financed as such (EU Life-Cycle Database project of the European Commission)
• Metals Life-Cycle Analysis is needed to identify impacts and develop reduction/mitigation strategies
• An international effort is needed to enhance the industry’s transparency, from exploration to production and trade
Own conclusions

- The Global Reporting Initiative provides a very useful sustainability reporting framework specifically tailored to the minerals and metals industry. It needs to be further elaborated and generalised.
- The international trade rules need to be revised to integrate environmental and social externalities.
- What matters is not the amount of minerals and metals we use, but the impacts of that use.
- Governance, transparency, education and training as well as research are essential to the sustainable global use of mineral raw materials. The EU has realised this.
- Sustained efforts are needed to help developing countries.

Thank you for your invitation.