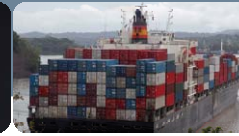


Welcome to the presentation recycling rates of metals



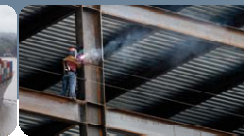
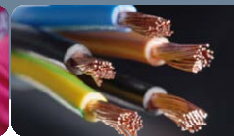
International Resource Panel

Brussels, May 26, Matthias Buchert, Öko-Institut e.V.



The metals challenge

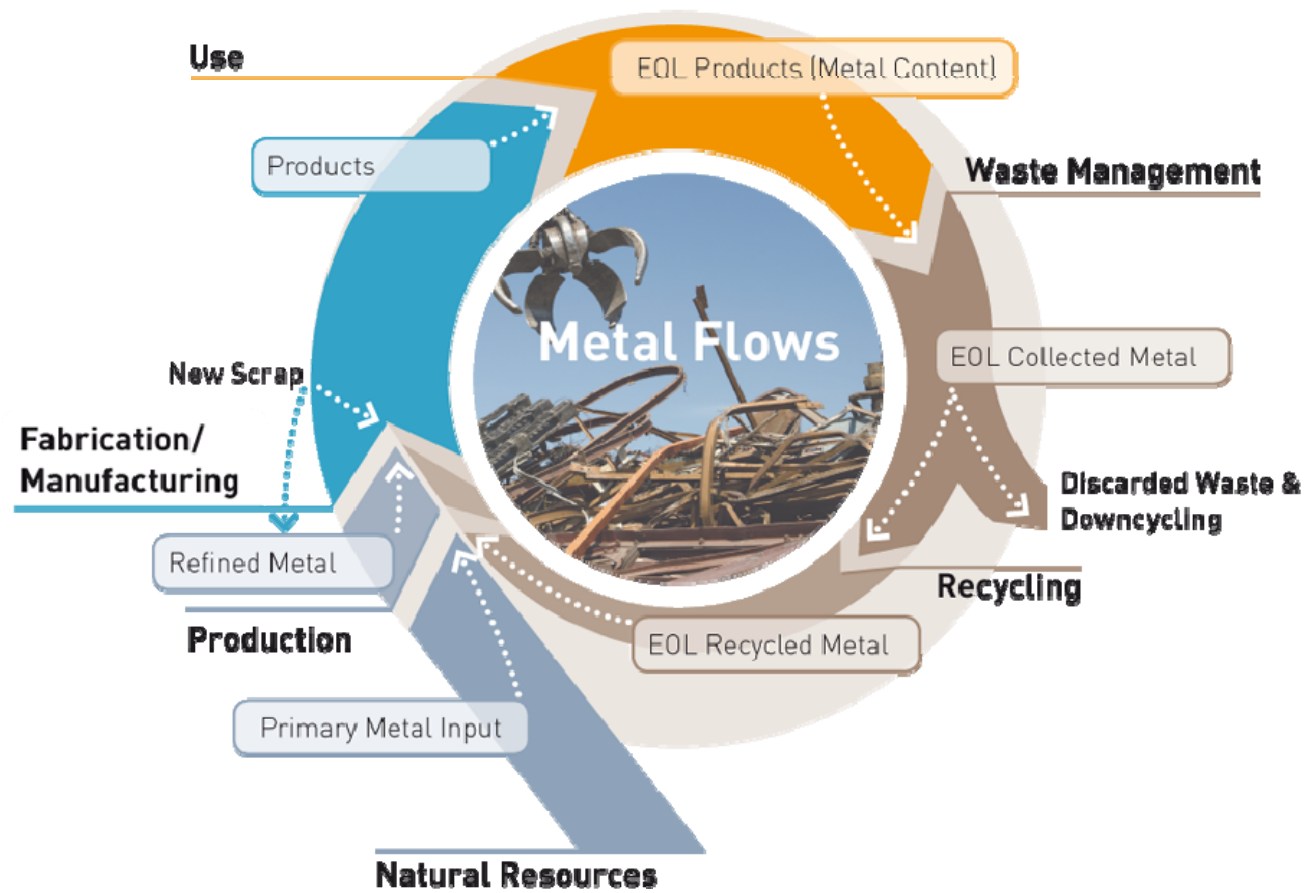
- Metals are essential for economic development
 - Base metals like steel and aluminum, mainly for buildings and infrastructure
 - Precious and specialty metals, like palladium and indium for modern/clean technologies
- Global demand for metals is increasing
 - E.g. copper and aluminum have doubled in the past 2 decades
 - Rising demand in emerging economies and developing countries
 - Very strong demand growth for many precious and specialty ('technology') metals
- The increasing global demand for metals causes many problems and challenges
 - Increasing environmental pressures from extraction and manufacturing of raw materials
 - Growing dependence on regional or economic concentrations of natural resources
 - Increasing risks of international crisis (e.g. war lord activities in parts of Africa)
 - Social tensions among local populations (land owner issues etc.)



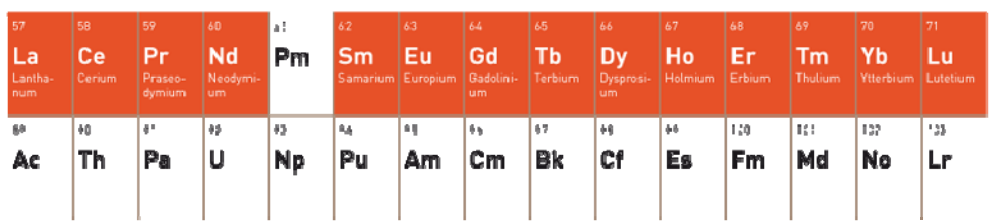
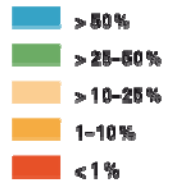
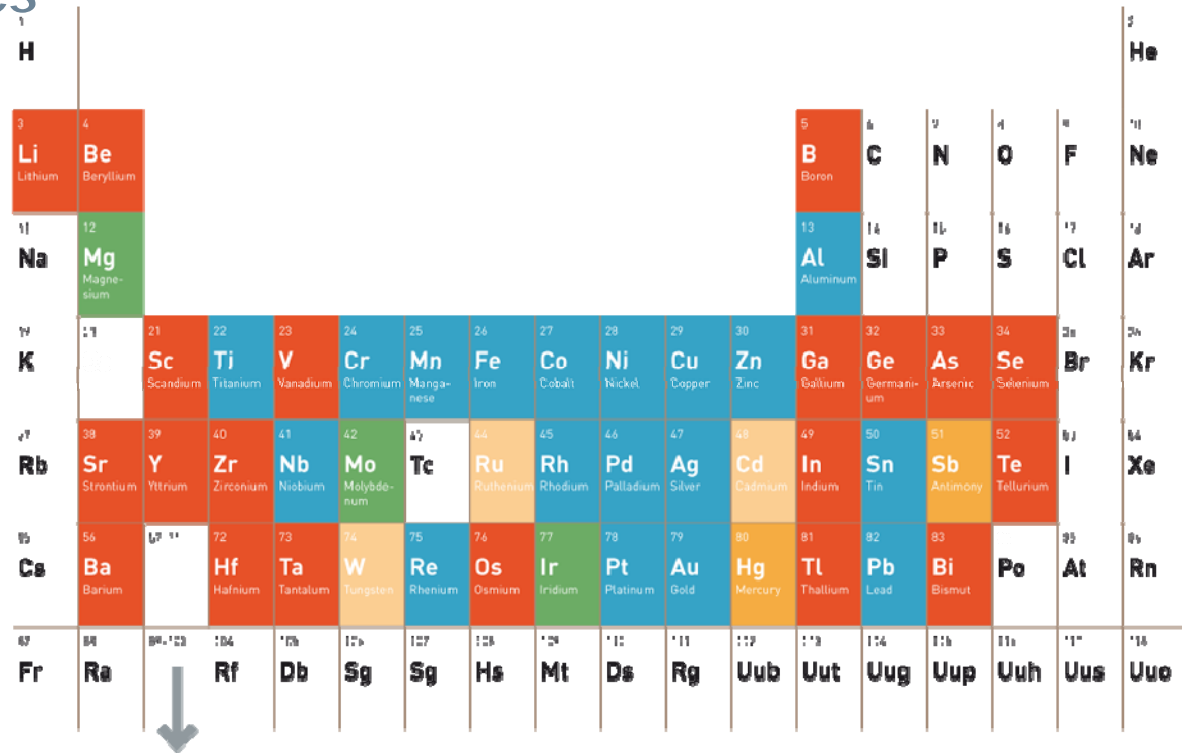
UNEP's Global Metal Flows Working Group

- Promoting the recycling of metals and a “circular economy”
- Work on a series of six assessment reports
 - Report 1: Metal Stocks in Society (published in 2010)
 - **Report 2: Recycling Rates of Metals (published now)**
 - Report 3: Environmental Impact of Metals
 - Report 4: Recycling: It's Opportunities, Limits and Infrastructure
 - Report 5: Future Demand Scenarios for Metals
 - Report 6: Critical Metals and Metal Policy Options

Defining recycling rates



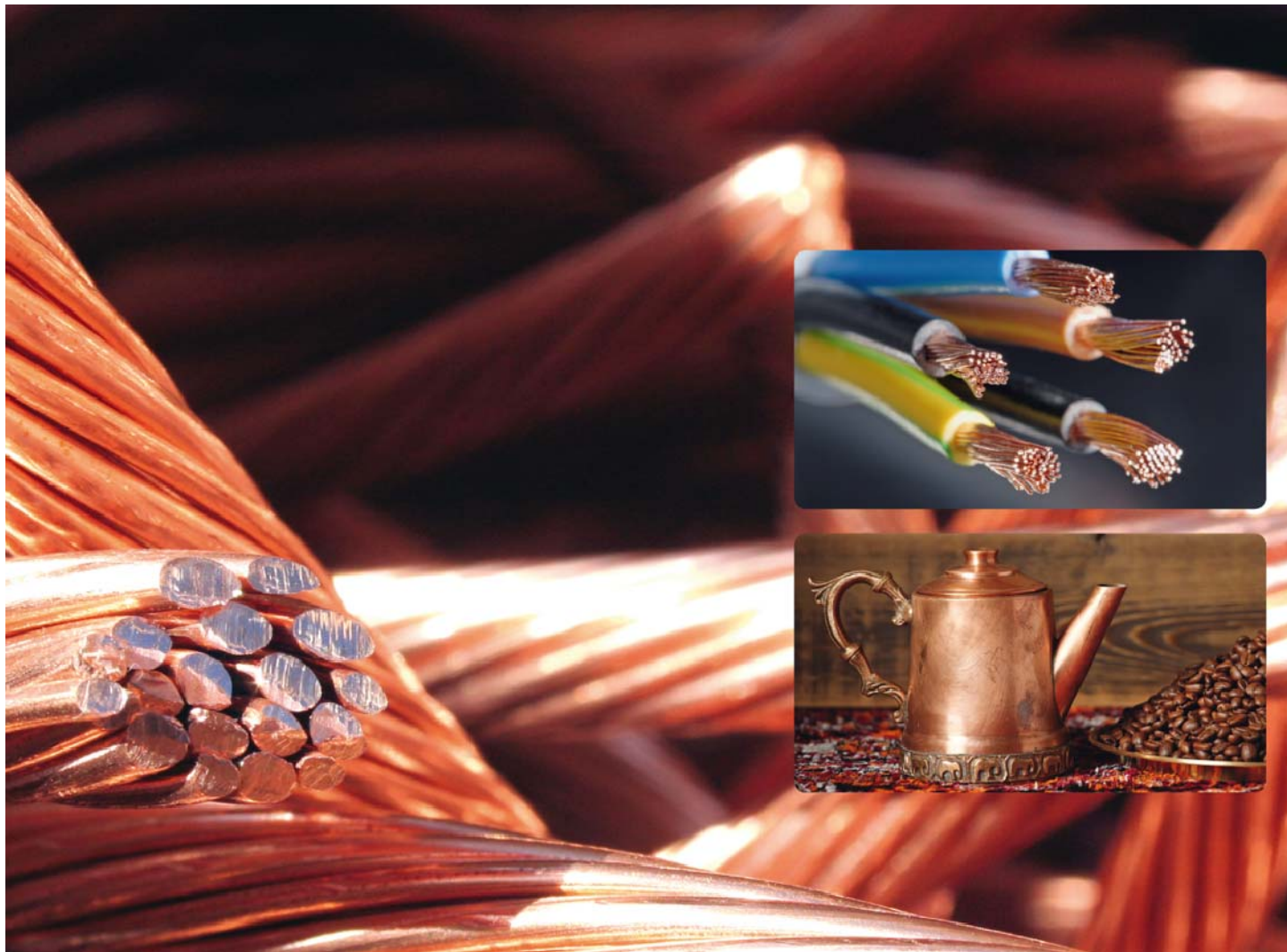
EOL-recycling rates





Recycling rates of steel

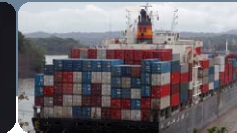
- The most widely-used metal – construction, infrastructure, vehicles, etc.
- Current global production counts on 1.3 billion tons steel per year, which causes 2.2 billion tons of greenhouse gas emissions (4-5% of total man-made emissions)
- Often used in very large pieces (steel beams, auto bodies), which makes recycling more probable
- Recycled iron requires only about 25% of the energy needed to produce virgin iron
- Estimated 2009 end-of-life recycling rate: >50% (varies among countries and iron-containing products)
- An additional substitution of just 100 million tons of primary steel by secondary steel has a GHG reduction potential of about 150 million tons CO₂





Recycling rates of copper

- Common uses: power distribution, electrical wiring, plumbing
- Usually used in pure form and in rather large pieces, which makes recycling more probable (exception: electric and electronic devices)
 - Increasing demand for infrastructure and innovative technologies , like electric vehicles
 - Increasing small-scale applications in which copper is embedded in a complex matrix: cell phones, DVD players, electronic toys etc.
- Estimated 2009 end-of-life recycling rate: >50% (varies among countries and copper-containing products)
 - Lack of adequate recycling infrastructure for WEEE (Waste Electrical and Electronic Equipment) in most parts of the world causes total losses of copper and other valuable metals like gold, silver, palladium, tin etc.



Recycling rates of palladium

- Current global mine production about 220 tons/year; high regional concentration
 - Main applications are automotive catalysts (> 60%) and electronics (> 16%); further applications industrial catalysts, dental, jewellery
- Current end-of-life recycling rate 60-70% (global average)
 - Excellent rates for industrial applications: 80-90%
 - Moderate rates for automotive applications: 50-55%
 - Poor rates for electronic applications: 5-10%
- Increasing problems due to lack of recycling infrastructure for consumer goods
 - Less than 10% of post-consumer cell phones are recycled in an appropriate way
 - The main problems are insufficient collection and pre-treatment schemes in the most countries of the world

Specialty metals: indium example

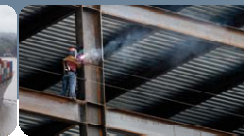
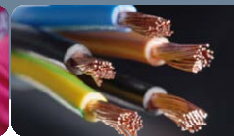


tellurium



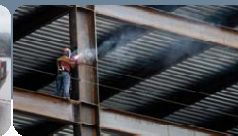
indium

Courtesy of Umicore Precious Metals Refining



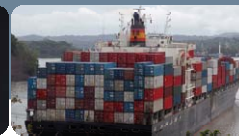
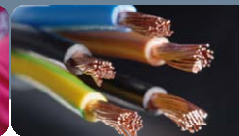
Recycling rates of indium

- Strategic metal used for LCD glass, lead-free solders, semiconductors/LED, photovoltaic etc.
- Strong growth in gross demand is predicted for indium: from ca. 1,200 tons (2010) to ca. 2,600 tons (2020)
- Specialty metals like indium are crucial for future sustainable technologies like PV, battery technologies, catalysts, efficient lighting systems etc.
- The supply of indium from natural resources is crucial: so-called minor metal, which occurs just as a by-product (mainly zinc ores) in low concentrations
- The current end-of -life recycling rate of indium is below 1% like for the most other specialty metals: urgent progress is necessary to enhance their recycling



Current hot spots for research & development (examples)

- Recycling of the new lithium-ion batteries from the automotive sector (lithium, cobalt, nickel, copper etc.)!
- Future recycling of rare earths elements (or their compounds) from magnets and luminescence!
- Future recycling of specialty metals like indium, gallium, tellurium etc. from photovoltaic applications!
- Improvement of the end-of-life recycling rates for many specialty and precious metals from WEEE (e.g. global collection systems for mobile phones)!
- Development of a global circular economy for the recycling of metals: e.g. create new partnerships and small businesses in the recycling sector in Africa!



Conclusions

- Metal stocks in society are increasing continuously
- These “mines above ground” could contribute to decoupling of resource use from economic growth by efficient recycling
- UNEP’s work on metals has shown just moderate or even poor end-of-life recycling rates for many metals
 - Only for a 18 metals, like iron/steel, palladium and platinum , could rates above 50% be stated
 - Many metals show rates below 25%, or even below 1% (for many specialty metals)
 - Serious data gaps on stocks in society and recycling rates have to be closed
- Enhanced recycling rates could help to reduce environmental pressures (GHG emissions, water and land consumption, waste, pressure on biodiversity), and it is crucial to secure sustainable supply of critical metals
- Improved recycling schemes will give many people new jobs and a living