

Resource Efficiency in the Minerals and Metals Sector

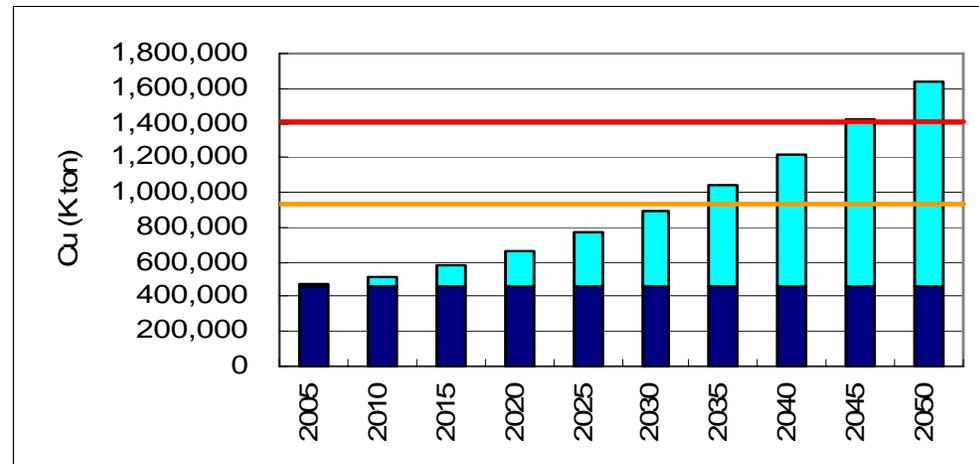
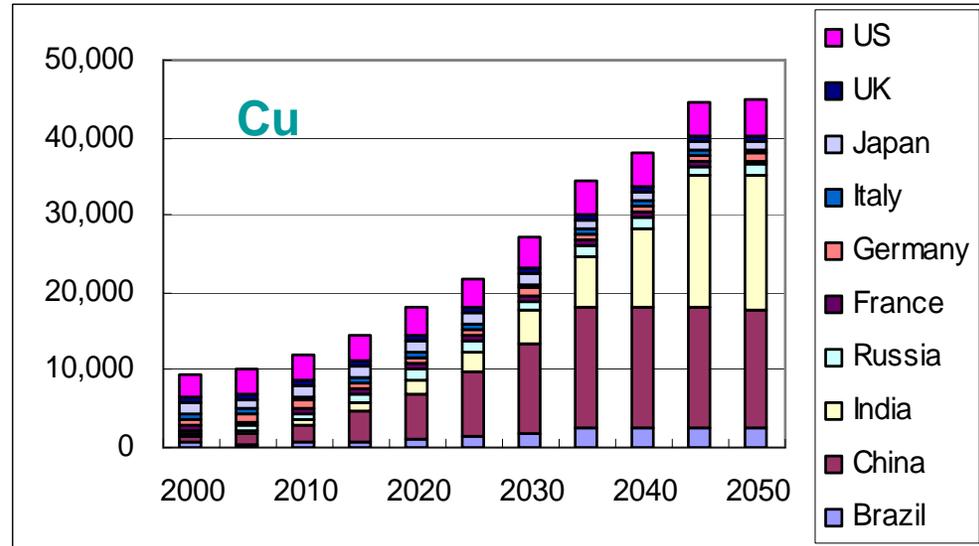
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- Understanding the Challenges
- A life cycle based response
 - Materials Stewardship
- Creating renewable materials
- Efficient metrics

Resource Challenges

- Demand for minerals and metals is increasing
- Prices high due to tight supply
- Mining is an environmentally invasive activity
- Major deposits in developing countries
- Contribution to sustainable development
- Security of nation state raw material supply



Data Source: Khomei Halada, National Institute for Materials Science, Japan (25.9.2007)

- Policy response to non-renewable resource depletion
 - reduce consumption
 - emissions control and waste management
 - emphasise non-renewability of the resource (ores and naturally occurring minerals)
 - paucity of consideration for social dimension

Maximising Value

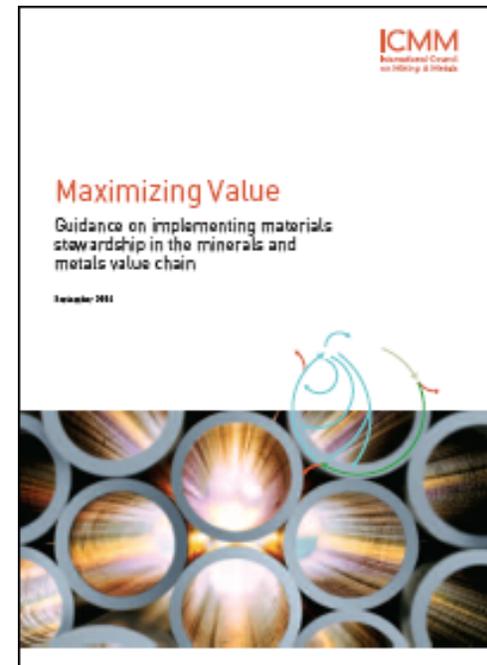
- A new policy perspective
 - a life cycle approach
 - conserve materials
 - emphasise durability and recyclability of metals
 - sustainable use

- Maximizing Value was created to help ICMM and its members understand materials stewardship and its application. It supports a number of ICMM's SD Principles in particular:

8 *“facilitate and encourage responsible product design, use, re-use and recycling and disposal of our products” and...*

5 *“seek continual improvement in our health and safety performance”*

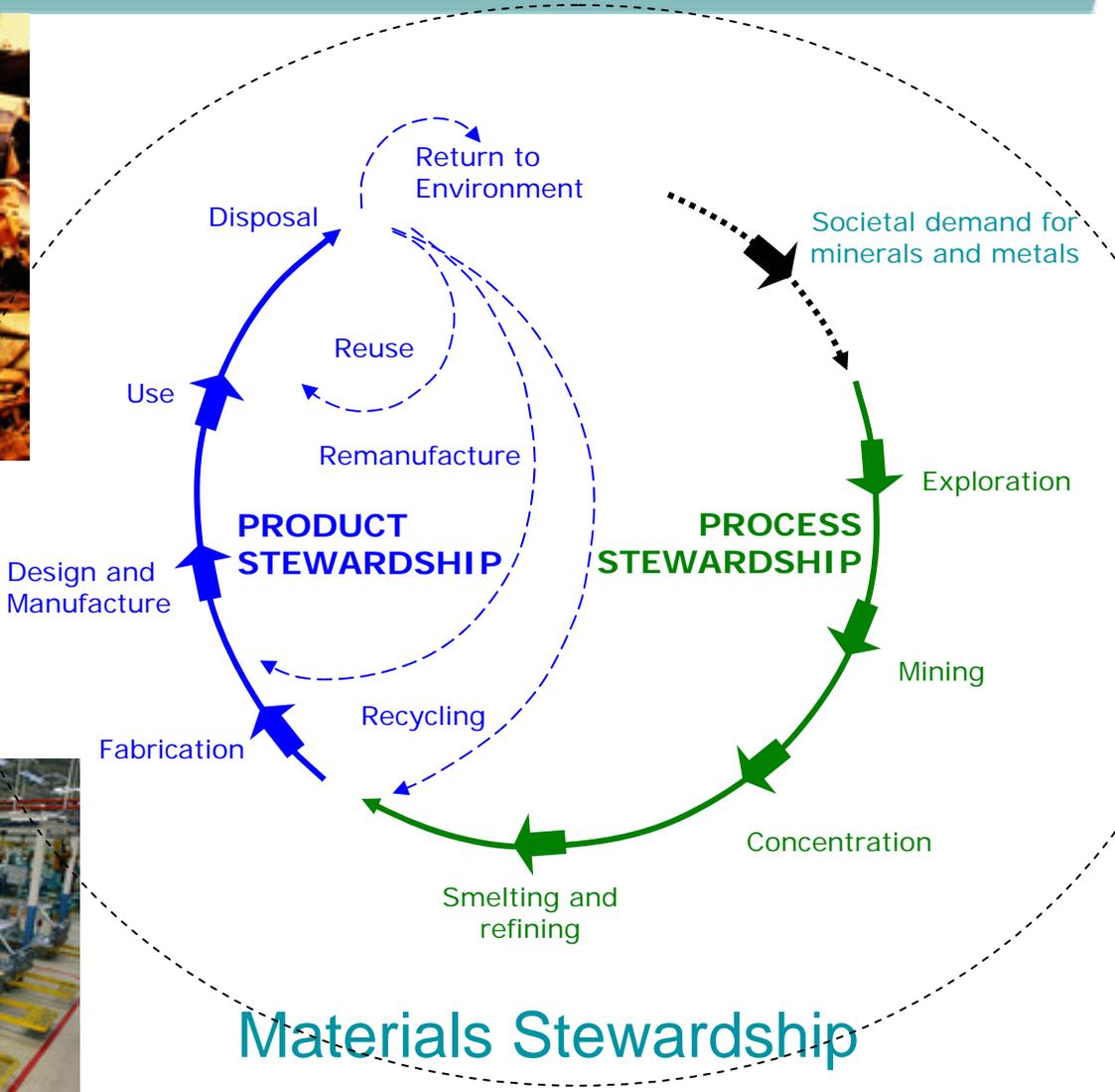
6 *“continually seek ways to improve environmental performance”*



- Materials stewardship means responsibly providing materials and supervising material flows to create maximum societal value and minimum impact on humans and the environment.
- 4 Key Themes »»

1. Take a Systems Perspective
 - Understanding material flows and life cycle benefits
2. Build new and strengthen existing relationships
 - Interacting with other players in the value chain
3. Optimize the production and application of minerals and metals
 - Implementing Eco-efficiency
4. Contribute to a robust, accessible base of information to support decision making
 - Transparent sharing and reporting of data and information

Process and Product Stewardship



Materials Stewardship

- **Resource endowment** - good governance in the management and investment of revenues
- **Community development** - building sustainable communities for the life time of the mine as well as post mining.
- **Reducing environmental impacts** – biodiversity policy
- **Reduced emissions and energy efficiency.**

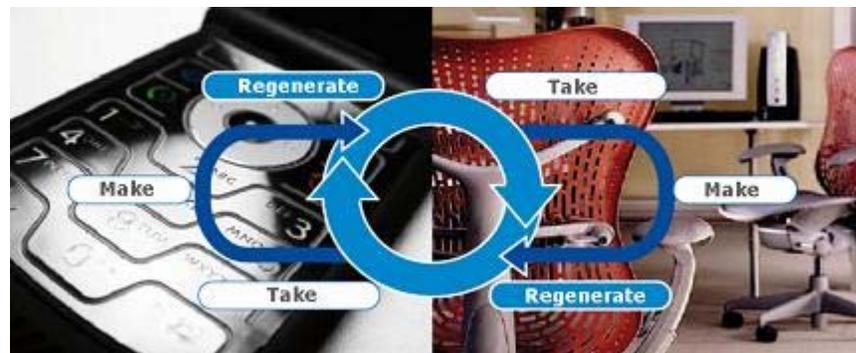


- Risk assessment and communication
- Design for environment
- Product policy
- Innovation
- Creating a “Renewable Materials” society



Maximizing Value through Materials Recycling

- Metals can be recycled repeatedly without loss of value
- Maximum efficiency through reuse / recycling
 - Reduced energy demand
 - Conservation of raw materials
 - Reduced environmental impacts
- Promoting a “Renewable Materials Society”



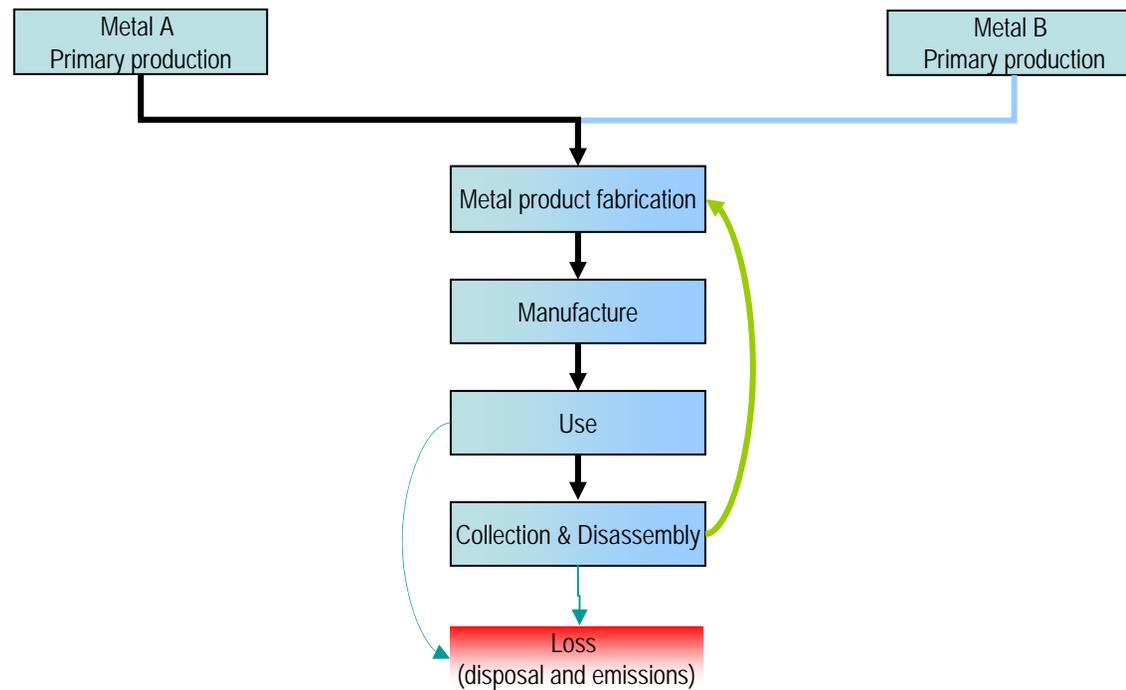
- Promoting a Renewable Materials Society requires
 - ✓ Appropriate metrics
 - ✓ Understanding of material flows
 - ✓ Determination of material pools – local, regional and global
 - ✓ Materials not waste orientated public policy
 - ✓ Public private partnerships
 - ✓ Design for recycling

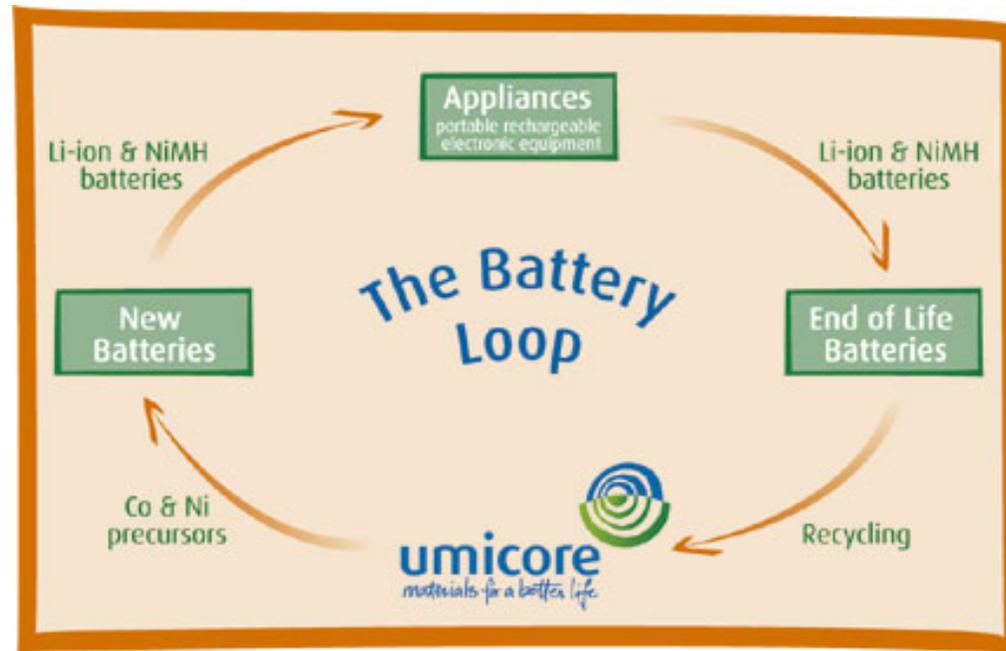
- Macro metrics do not account for metals recycling
- Ratio of primary / recycled metals production is flawed
- No account of
 - metal durability
 - metal life cycle
 - rate of collection
 - unprocessed stock

Overall Recycling Efficiency Rate

$$\mathbf{RER= \frac{\mathbf{Recycled\ metals}}{\mathbf{Metals\ possible\ to\ collect\ (old\ +\ new\ scrap)}}$$

Alloy loop Recycling retains metal A and B in alloy material loop





- **VAL'EAS™ battery recycling process** - sustainable and cost-efficient
- **Umicore** is the only company in the world proposing a real closed loop solution for Li-ion batteries combined with an environmentally sound management of these end-of-life batteries.

- Resource efficiency in the minerals and metals sector is realised through the implementation of sustainable development principles throughout the life cycle of minerals and metals.
- A life cycle management approach to minerals and metals is required where the fulcrum is the material and the principal objective is to capitalise on the renewability of metals.
- Materials Stewardship is a key framework condition, where all stakeholders have a shared responsibility to maximise the value of materials.

THANK YOU

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