



Non-ferrous raw materials and the economic value chain

Monique Jones, Eurometaux

Marko Gernuks, Volkswagen

with the contribution of the European Copper Institute

Critical raw materials at EU level

EC Workshop

Brussels, 10 September 2010



Outline

1. **EU non-ferrous metals industry in EU economy**
2. **Current and future products or technologies ... a few examples**
 - lithium and rare earths in the electrified vehicles
 - copper in sustainable energy applications
3. **The benefits and challenges of recycling for the EU economic value chain**



Non-ferrous raw materials and the economic value chain

Non-ferrous raw materials

EU non-ferrous metals industry

EU non-ferrous metals industry in EU economy

A value chain in itself

→ *contributing to EU GDP*

A supplier of essential inputs to the EU enterprises

→ *enabling EU manufacturing activity*

A supplier of essential inputs to enterprises outside the EU

→ *earning export revenue*



EU non-ferrous metals industry in EU economy

EU non-ferrous metals industry turnover (est. € 185 bio in 2008)

mining → 2%
refining/recycling → 23%
first processing → 75%

→ € 51.7 bio imports of raw materials in 2008

ores & conc.	21%
scrap & residue	14%
intermediates & unrefined	5%
unwrought metal	60%



EU non-ferrous metals industry in EU economy

EU non-ferrous metals industry's activity spreads over a widely diversified range of materials

- base metals (Cu, Ni, Al, Pb, Zn, Sn)
- precious metals (Ag, Au, Pt, Pd, other PGM)
- refractory metals (W, Mo, Ta, Nb, ...)
- other metals (Co, Ge, In, Te, Sb, Ga, ...)

➔ *a diversified range of industrial sectors can rely on EU production for securing their non-ferrous metal supplies*



EU non-ferrous metals industry in EU economy

- ❑ non-ferrous metals are used in 13 manufacturing sectors in the EU
 - ❑ these sectors account for >75% of the EU manufacturing added value
- non-ferrous metals directly contribute to the creation of more than € 1 300 bio added value in the EU (reference year 2006)**

(next slide illustrates this with reference to the EC criticality assessment and a selection of metals/sectors)



	Metals	Chemicals	Pharm	Mech. equipt	Electr. equipt	Electronics/IT	Transport	Plastic RubberGlass	Construction	Consumer goods
Al	x			x			x		x	x
Ag		x	x			x		x		x
Be	x			x	x	x	x	x		x
Co	x	x								
Cu				x	x	x	x		x	x
Ga						x				x
Ge		x				x				
In	x		x			x		x		x
Li	x	x	x			x	x	x	x	x
Mg	x						x		x	x
Mo	x	x	x			x				x
Ni	x	x				x				x
Nb	x								x	
PGM		x	x	x		x	x			x
RE	x	x			x	x		x	x	
Sb		x						x		
Ta				x		x	x			
Te		x	x			x				
Ti		x		x			x			
W	x			x	x					
Zn	x		x					x	x	7



EU non-ferrous metals industry in EU economy

The EU non-ferrous metals industry is ranking among worldwide leaders in respect of

- **recycling, refining, processing technology**
- **environmental performance and energy efficiency**
- **production scale**
- **product range and quality**
- **research and innovation**



Non-ferrous raw materials and the economic value chain

Non-ferrous metals are

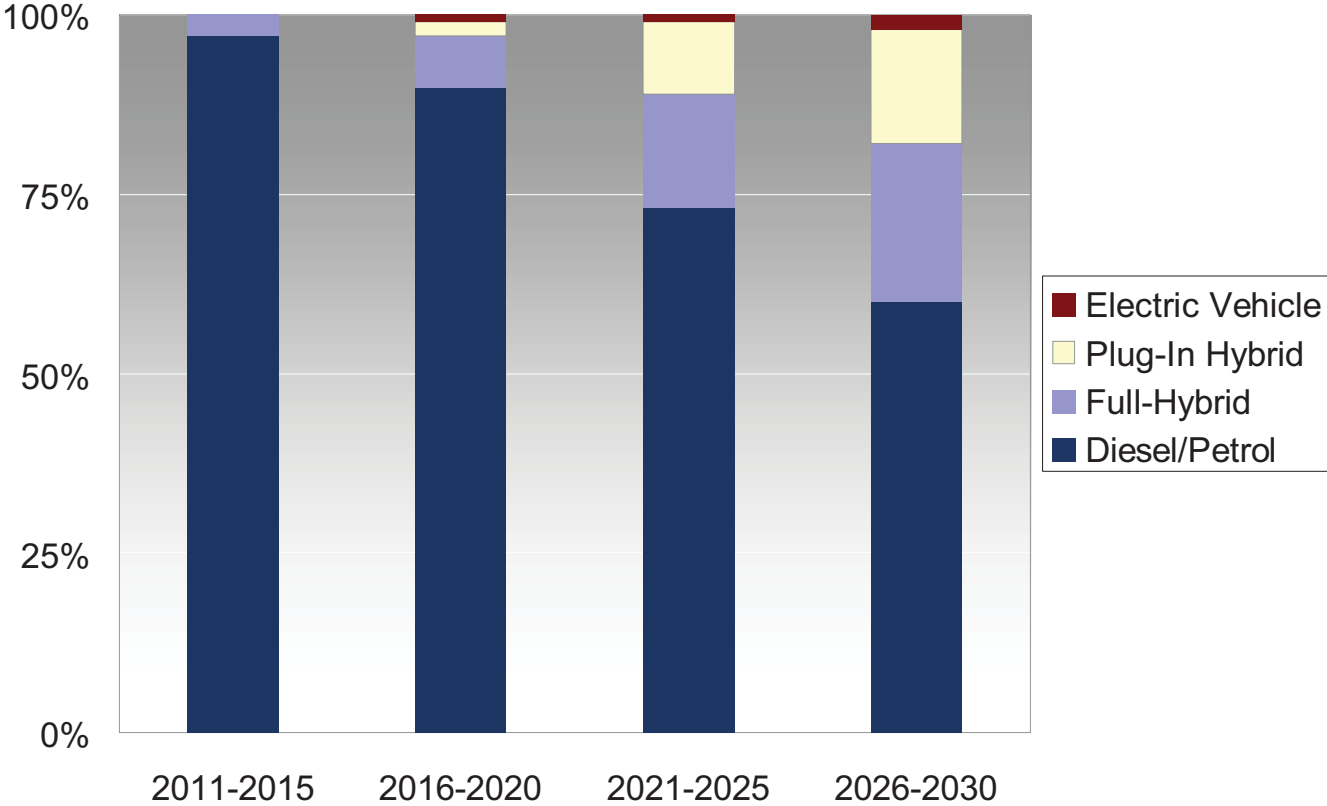
- **resource and energy saver** because they
 - enable miniaturization and nano-technologies
 - are infinitely recyclable without losing their intrinsic properties
 - enable improved functionality of applications
 - **problem solvers for new technologies and applications** aimed to meet the sustainable development objectives of a « green » society
- ➔ **the EU industry is in a position to mobilize these assets to support technological development of manufactured products and related industrial activity**



Outline

1. EU non-ferrous metals industry in EU economy
2. **Current and future products or technologies ... a few examples**
 - *lithium and rare earths in the electrified vehicles*
 - *copper in sustainable energy applications*
3. The benefits and challenges of recycling for the EU economic value chain

Market development of electrified cars



Source: McKinsey 2009, Mix technology world scenario

Key components of electric vehicles



Li-ion
battery

Electric
motor

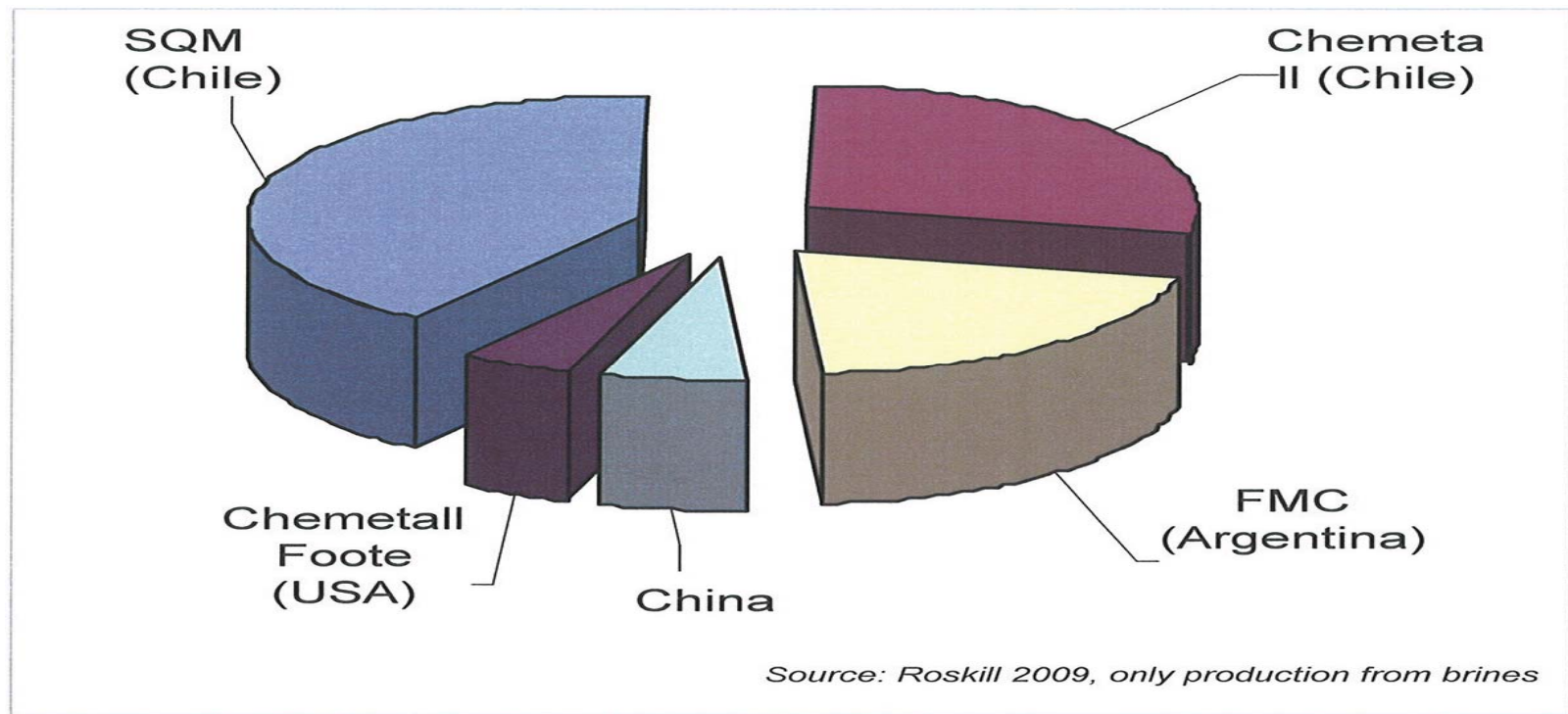


Rare earths for electric motors

- Neodymium (one of the rare earths) is an essential component of the powerful Nd-Fe-B permanent magnets without which the electric motor would not deliver the required performance
- 97% of rare earths production, i.e. world supply, is currently located in China
- in view of growth prospects of demand in particular, China's industrial policy on rare earths is a source of major concern as regards stability, predictability and availability of world market supply

Lithium for Li-ion batteries

- Li reserves are sufficient to cope with significant demand growth, notably for electric vehicles Li-ion batteries
- only 3 companies account for 90% of Li carbonate supply worldwide → source of potential problems

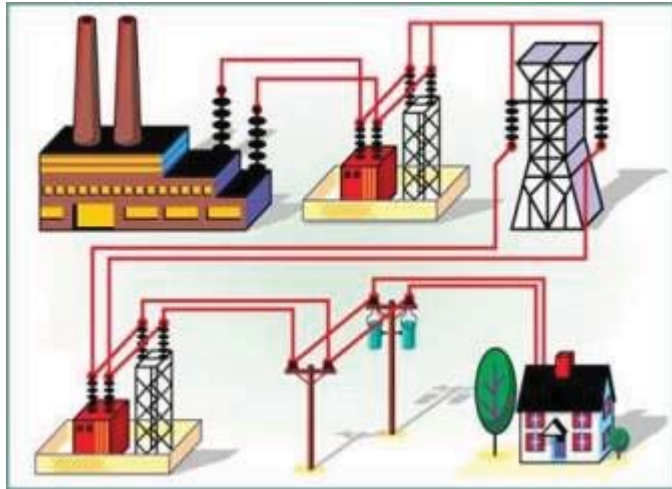




Outline

1. EU non-ferrous metals industry in EU economy
2. **Current and future products or technologies ... a few examples**
 - *lithium and rare earths in the electrified vehicles*
 - *copper in sustainable energy applications*
3. The benefits and challenges of recycling for the EU economic value chain

+1 kg of Cu in transformers can save 500 kg CO₂



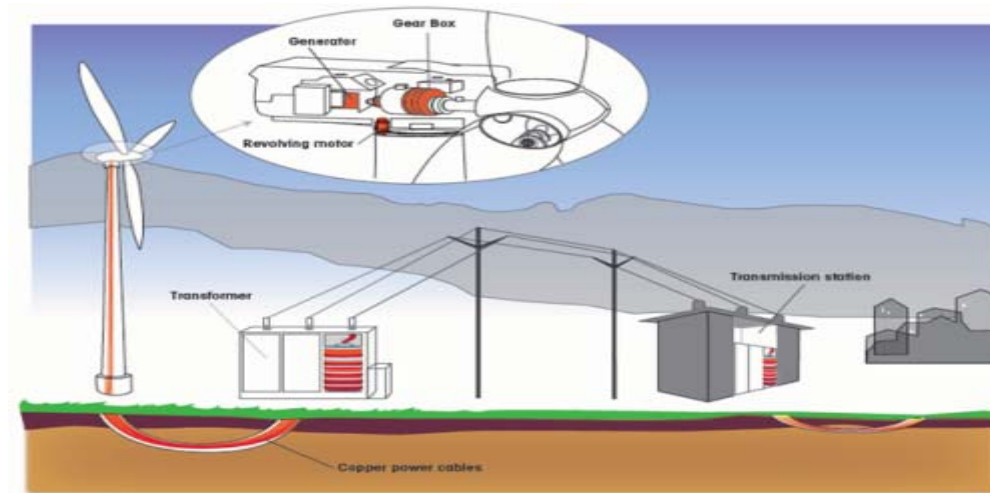
- 5 million point sources
- second largest “loss maker” in electricity grid
- existing technologies, using 30% more copper, improve efficiency by 30% and can save 4% of EU’s Kyoto CO₂ commitment
- minimum efficiency standards required

Europe's Largest Solar Platform - Sevilla



- Solar Thermal exploits copper's thermal conductivity in collector and fluid distribution network
- Photovoltaics exploit copper's electrical conductivity in connectors and distribution grid - 4,000 kg/MW capacity

250,000 tonne copper in European wind turbines by 2010



3,000 kg copper per MW increases efficiency of wind energy conversion

High Speed Train Velaro (ES)



**one train exploits 10 tonne of copper components
10 tonne of copper and alloy cables per km of track**



Outline

1. **EU non-ferrous metals industry in EU economy**
2. **Current and future products or technologies ... a few examples**
 - *lithium and rare earths in the electrified vehicles*
 - *copper in sustainable energy applications*
3. **The benefits and challenges of recycling for the EU economic value chain**



The benefits of recycling for the EU economic value chain

- valuable raw materials are not discarded
- the « urban » mine is exploited to the benefit of natural resources conservation
- trade deficit in respect of raw materials is reduced
- energy consumption is reduced (e.g. 95% for aluminium)
- CO₂ emissions are reduced (e.g. 650 000 tonnes CO₂/year for copper)

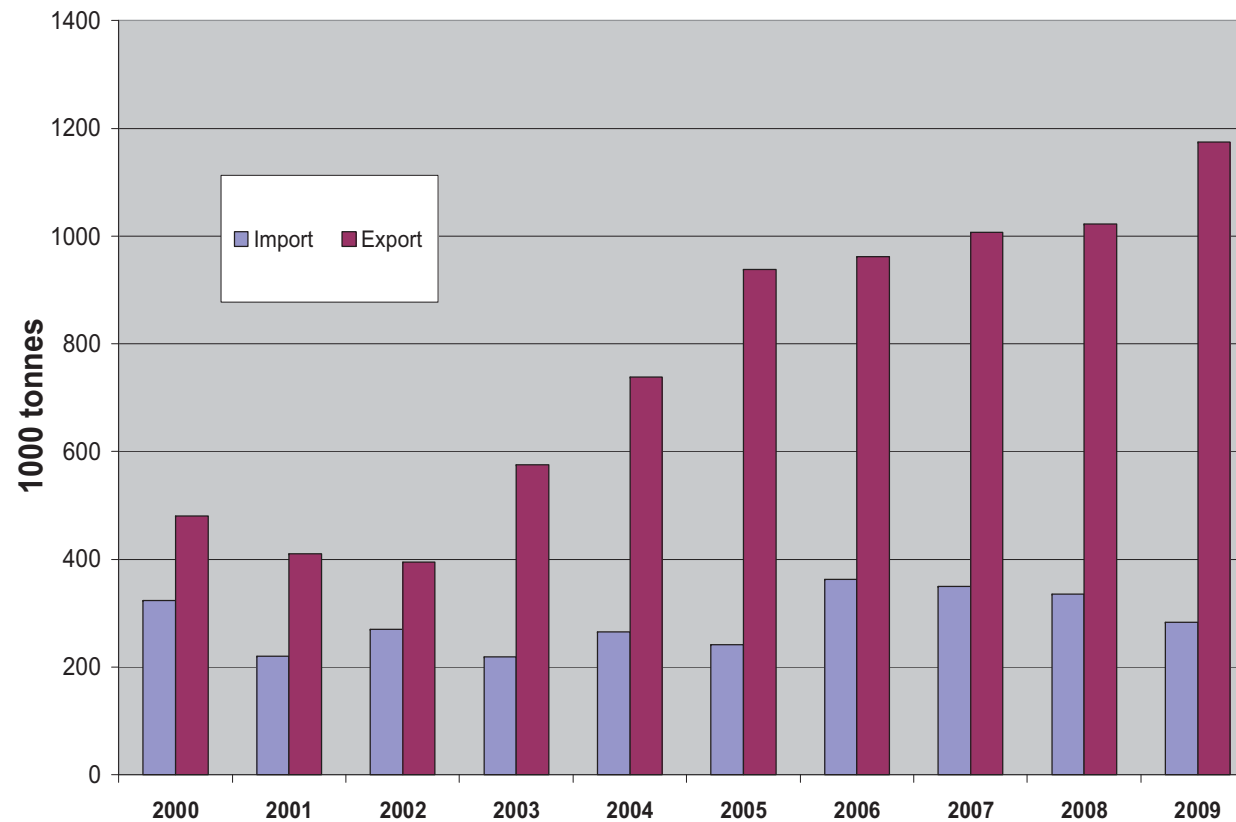


The challenges of recycling for the EU economic value chain

life-time of products...recycling technology...market conditions

- it will take a long time until a significant number of end-of-life electrified cars, high speed trains, wind turbines, solar platforms...will be back for recycling
- new technologies need to be developed in the meantime on a sustainable basis for recycling essential metals from new products
- scrap or end-of-life product leakage outside the EU, due to competitive trade distortions or fraud, is increasingly hampering our capacity to draw the benefits of recycling strategies

10 years of EU copper scrap imports and exports



Source: Eurostat Comext data under HS 7404