



# Non-ferrous raw materials and the economic value chain

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Critical raw materials at EU level

EC Workshop

Brussels, 10 September 2010

# Outline

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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

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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

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## 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

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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

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- ❑ 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. equip	Electr. equip	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

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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

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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

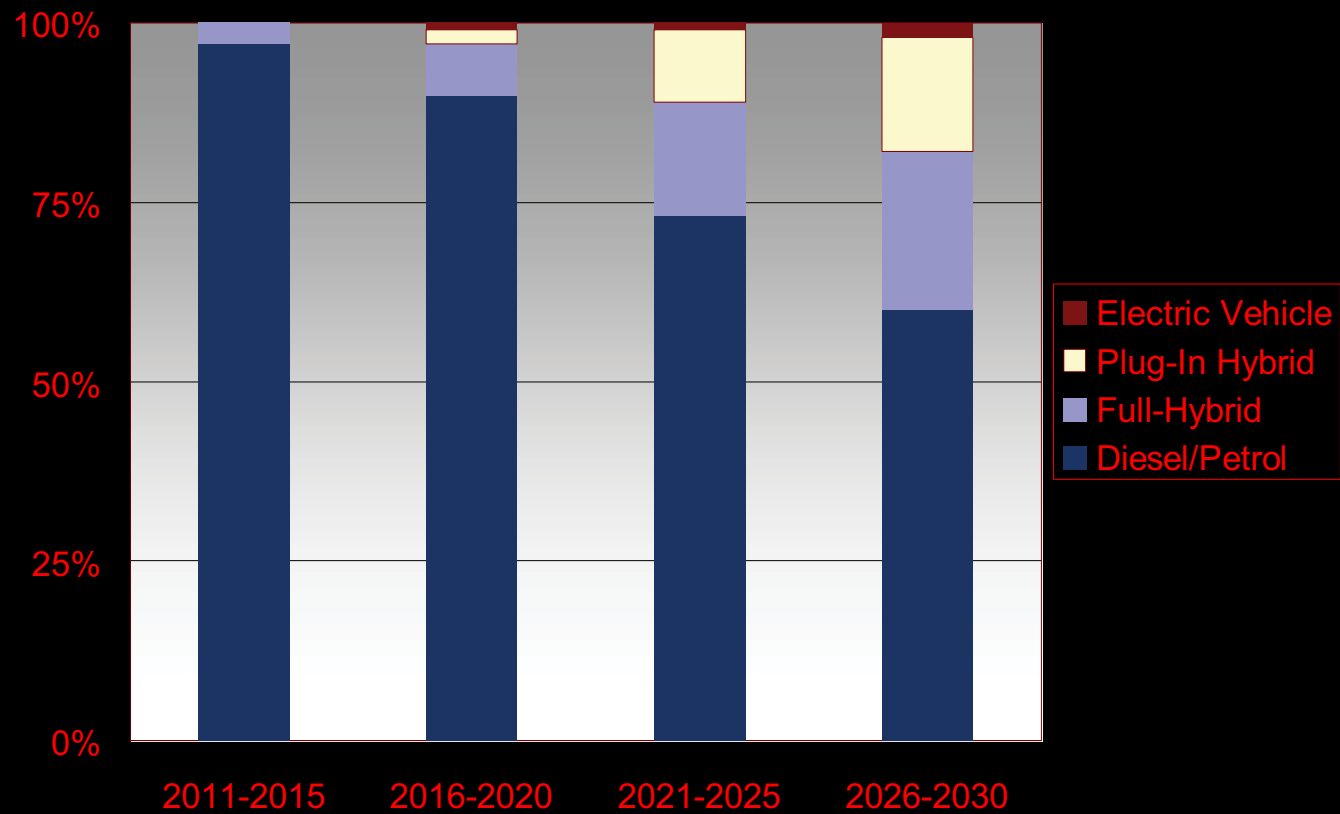
➔ **the EU industry is in a position to mobilize these assets to support technological development of manufactured products and related industrial activity**

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## Market development of electrified cars



Source: McKinsey 2009, Mix technology world scenario

# Key components of electric vehicles

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Li-ion  
battery

Electric  
motor

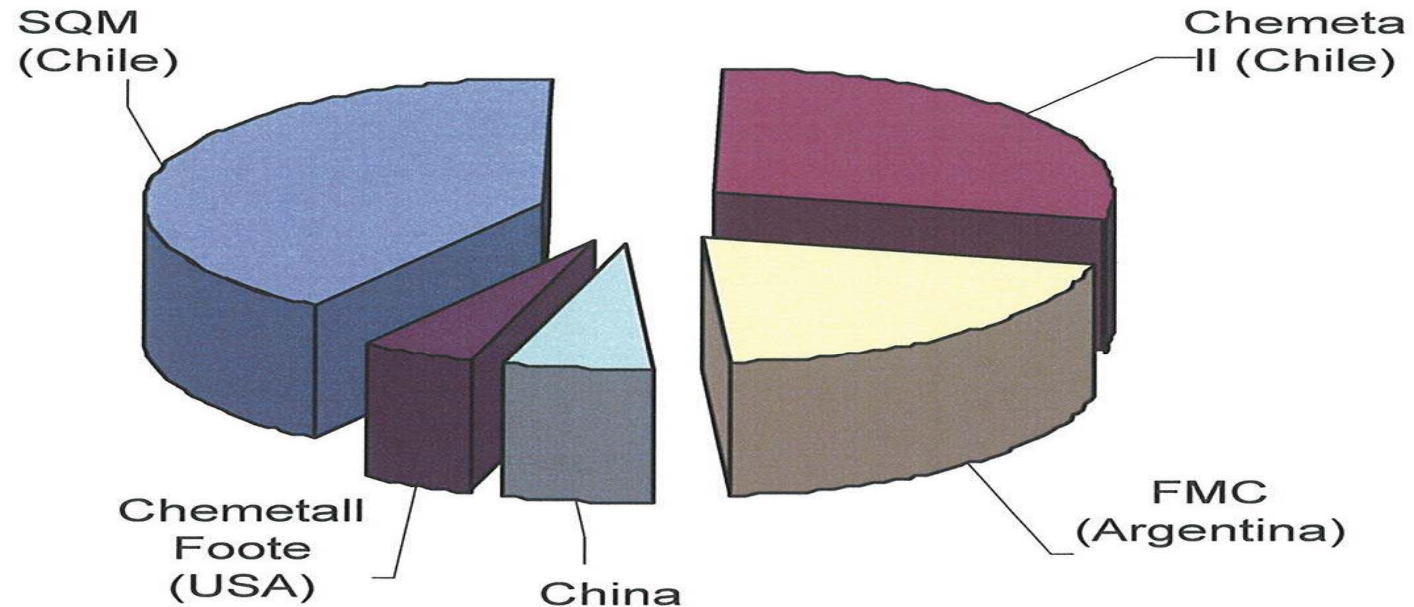
## Rare earths for electric motors

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- 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



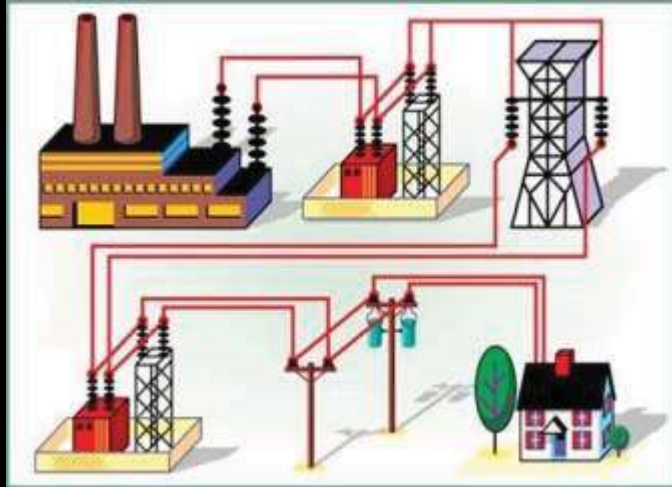
Source: Roskill 2009, only production from brines

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+1 kg of Cu in transformers can save 500 kg CO<sub>2</sub>



- 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 CO<sub>2</sub> commitment
- minimum efficiency standards required



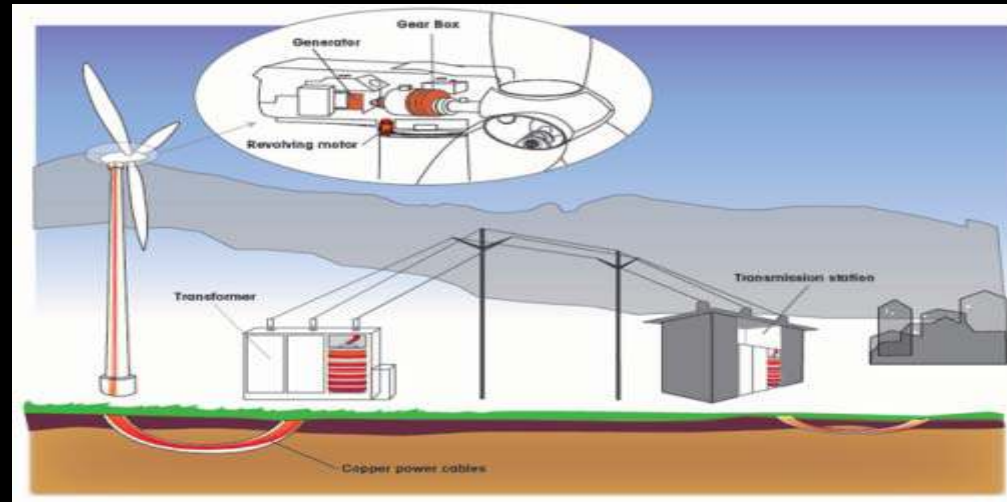
# Europe's Largest Solar Platform - Sevilla



- 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

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

## High Speed Train Velaro (ES)

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

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# The benefits of recycling for the EU economic value chain

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- 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)
- CO<sub>2</sub> emissions are reduced (e.g. 650 000 tonnes CO<sub>2</sub>/year for copper)

# The challenges of recycling for the EU economic value chain

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**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