



Securing Critical Raw Materials for Europe

ICCM, Istanbul 29.9 – 1.10.2016

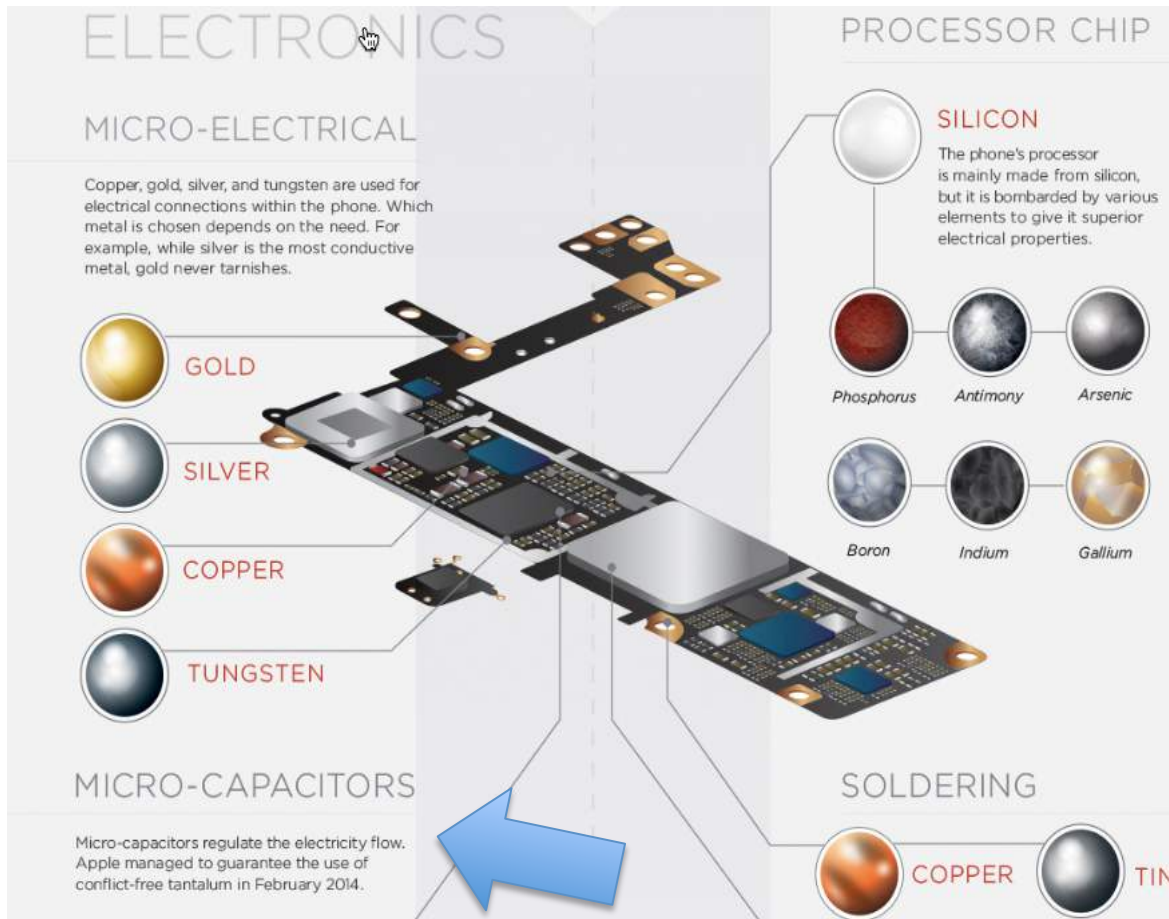
by

Dr. Ing. Martin Tauber
President CRM Alliance



Raw Materials are essential

“Of the 83 elements in the periodic table, a total of 62 different types of metals go into the average mobile handset.”



What are critical raw materials?

EU critical raw materials are those raw materials, which are economically and strategically important for the European economy but have a higher risk of supply interruption.

Candidate (investigated) materials

These materials represent a diverse group, including materials that are mined or cultivated as well as some refined materials that are considered highly important to downstream sectors.

Conflict Minerals

EU political aims for EU companies to source tin, tantalum, tungsten and gold responsibly. These minerals are typically used in everyday products such as mobile phones, cars and jewellery.



EU Definition of Critical Raw Materials

Critical Raw Materials are these raw materials, which

- Are economically and strategically important for European economy,
- but have a higher risk of supply interruption.
- Are immediately important to Europe's economy,
- and essential to drive future innovations in maintaining Europe's technological leadership in a highly competitive world economy.



What are critical raw materials?

The (20) 2014 EU listed CRMs out of (89) different substances (investigated)

Aluminium (Bauxite)	Aluminium (Metal)	Antimony	Baryte	Bentonite	Beryllium	Bismuth	Boron (Borates)	Chromium
Kaolin clay	Cobalt	Coking coal	Copper	Diatomite	Feldspar	Flourspar	Gallium	Germanium
Hafnium	Helium	Indium	Iron	Limestone	Gold	Gypsum	Lithium	Magnesium (Magnesia)
Magnesium (Magnesite)	Magnesium (Metal)	Manganese	Molybdenum	Neutral Graphite	Nickel	Niobium	Perlite	Phosphorus (Phos. rock)
Rhenium	Scandium	Selenium	Sulphur	Potash	Silica Sand	Silicon Metal	Silver	Talc
Tantalum	Tellurium	Tin	Titanium	Tungsten	Vanadium	Zinc		
Iridium	Osmium	Palladium	Platinum	Rhodium	Ruthenium			
Cerium	Dysprosium	Erbium	Europium	Gadolinium	Holmium	Lanthanum	Lutetium	Neodymium
Praseodymium	Samarium	Terbium	Thulium	Ytterbium	Yttrium			
Natural Rubber	Natural cork	Sapele wood	Natural Teak wood					
Aggregate	Lead							



What are conflict minerals?

The (4) conflict minerals; Tungsten also being a CRM

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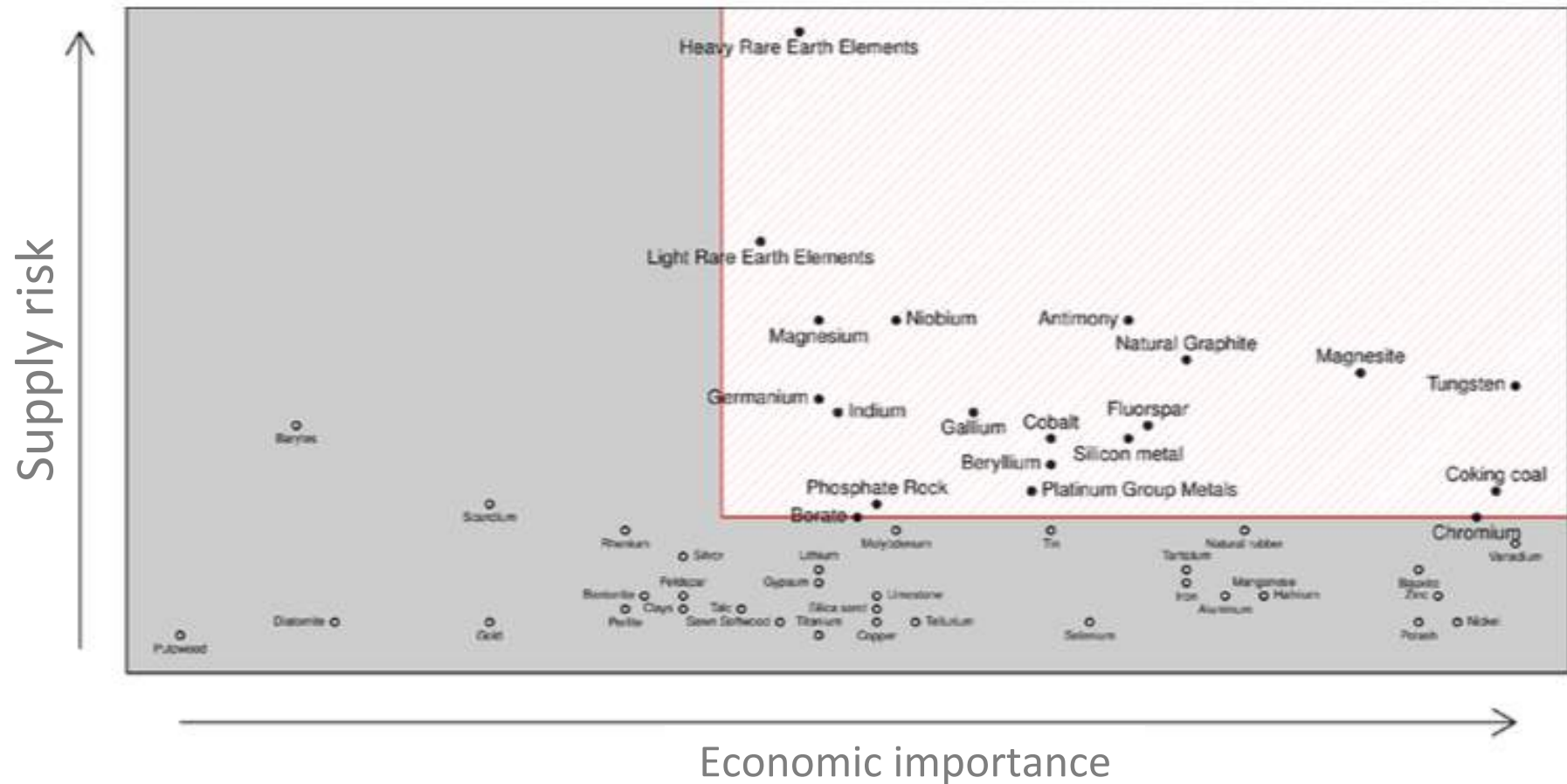
EU Critical Raw Material Policy

Report on Critical Raw Materials for the EU (2014)

- Raw materials are fundamental to Europe's economy, growth and jobs and they are essential for maintaining and improving our quality of life.
- Securing reliable, sustainable and undistorted access of certain raw materials is of growing concern within the EU and across the globe.
- These CRMs have a high economic importance to the EU combined with a high risk associated with their supply.

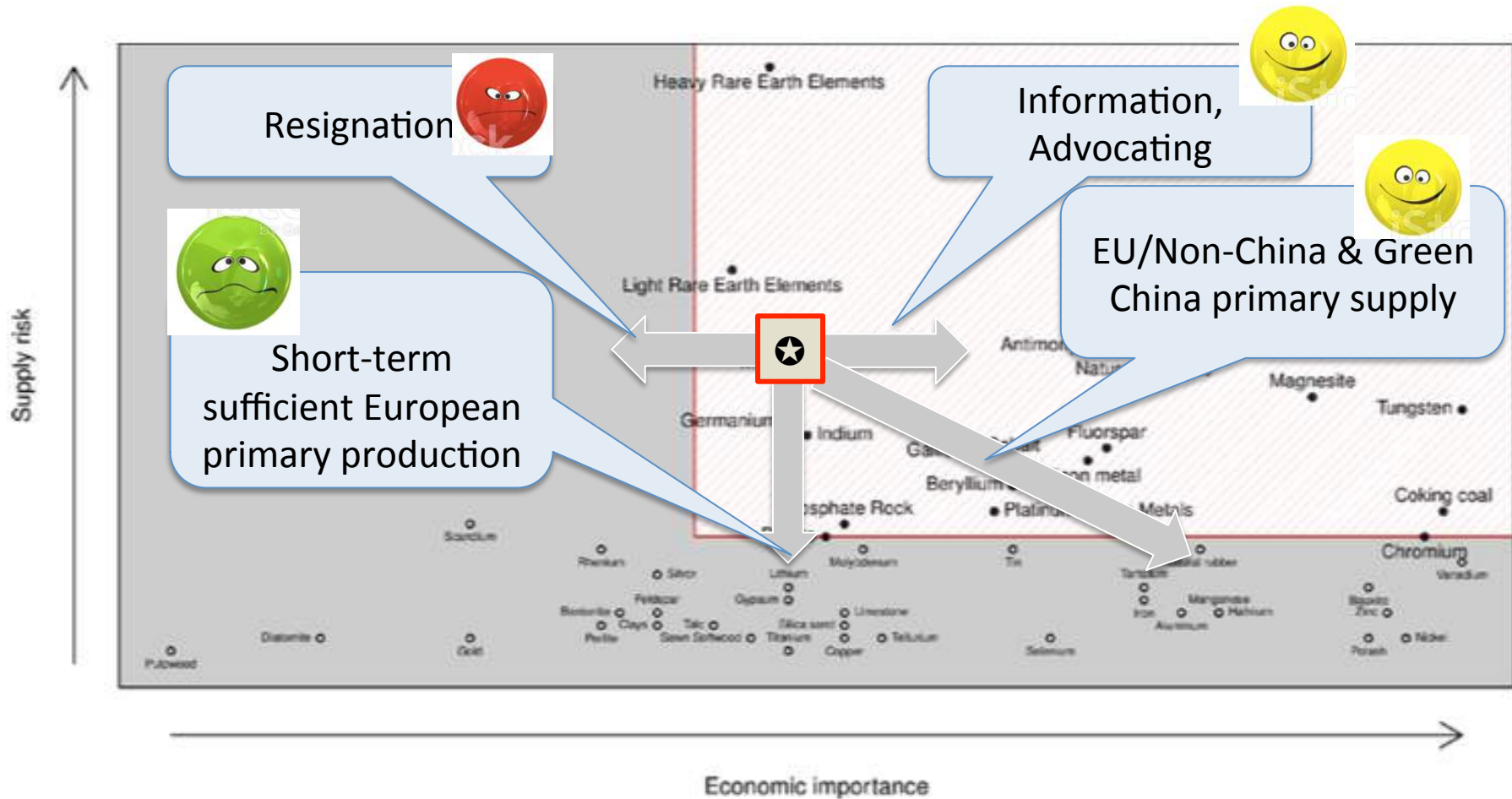
The EU Commission CRM list 2014

“The listing of CRMs is also meant to encourage political action to help secure reliable and unhindered access to them.”



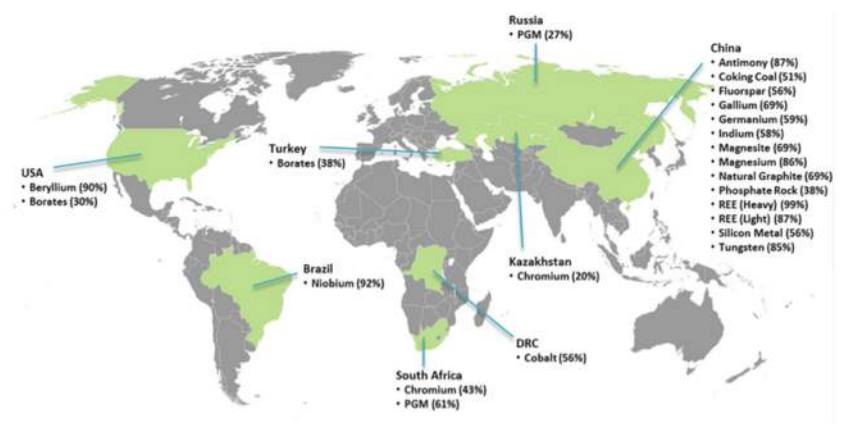
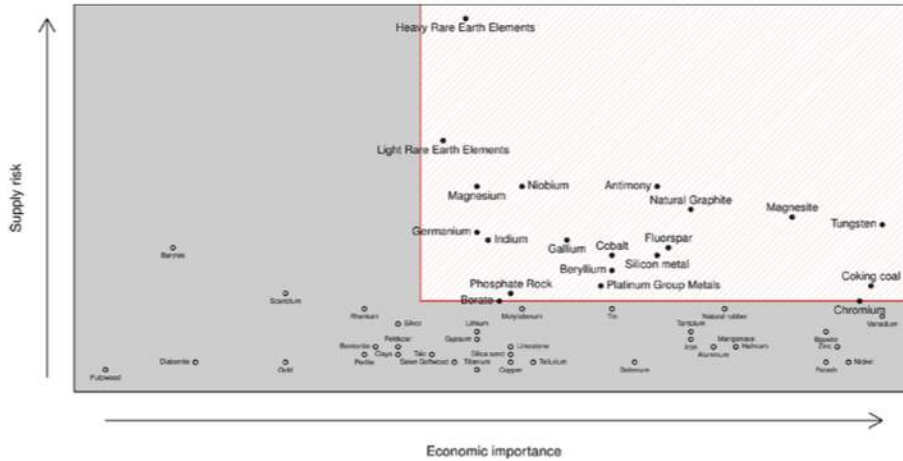
Example: Magnesium Metal dilemma

Magnesium metal has an EU import rate from China of 86%, and is associated to important sectors such as transport and consumer electronics.

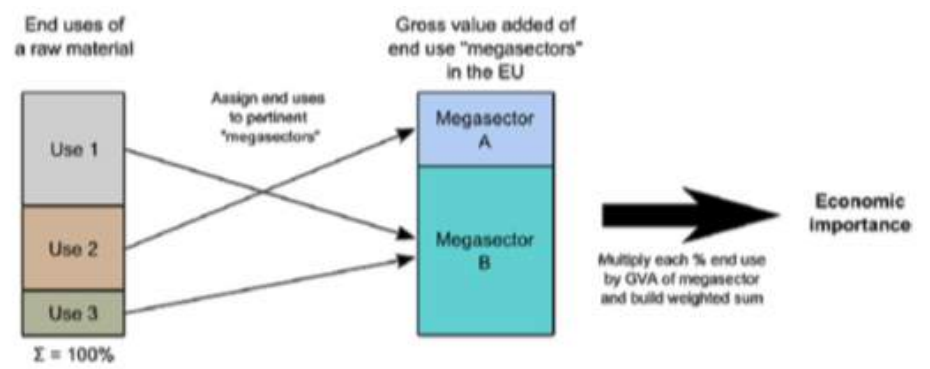
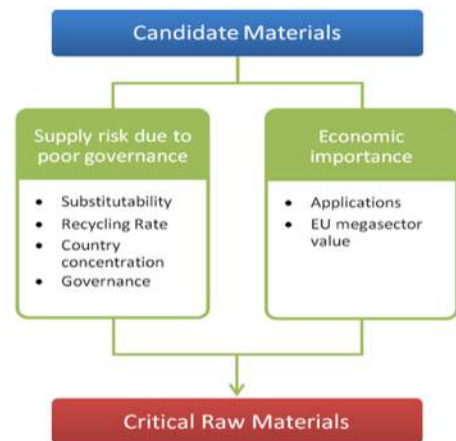


Dependence and concentration of supply

It is also worth emphasising that all raw materials, even if not classed as critical, are important for the European economy and that a given raw material and its availability to the European economy should therefore not be neglected just because it is not classed as critical.



World primary supply of the 54 candidate raw materials



Example: Supply risk from Turkey?

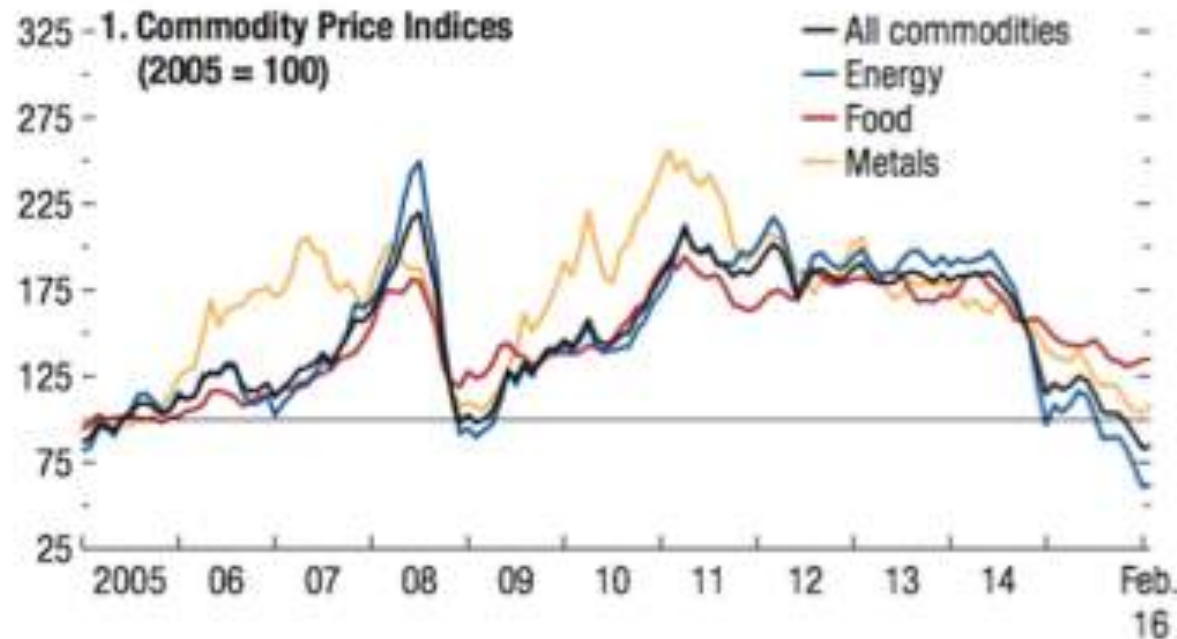
The Supply Risk for EU is associated with the concentration of production and in many cases compounded by low substitutability and low recycling rates.

Raw materials	Main producers (2010, 2011, 2012)	Main sources of imports into the EU (mainly 2012)	Substitutability index*	End-of-life recycling input rate**
Borates	Turkey 41 %	Turkey 98 % (natural borates) and 86 % (refined borates)	0.88	0 %
	USA 33 %	USA 6%, Peru 2% (refined borates); Argentina 2% (natural borates)		
Chromium	South Africa 43 %	South Africa 80 %	0.96	13 %
	Kazakhstan 20 %	Turkey 16 %		
	India 13 %	Others 4 %		
Magnesite	China 69 %	Turkey 91 %	0.72	0 %
	Russia 6%; Slovakia 6 %	China 8 %		



The fundamentals for CRM

EU policy has been a response to *high commodity prices* and *resource scarcity*.



CRM Alliance: “To ensure the continued supply of CRM, a specific critical raw materials policy is needed which underlines the importance and dependence of the European economy on them. This policy needs to be directed away from *substitution* .”



The forming of the CRM Alliance

“The Voice of the Critical Raw Materials Sector”

The Critical Raw Materials Alliance (CRM Alliance) has been created by industry to advocate the importance of CRMs for the European economy and to promote a strong European CRM policy.

It is the representative body of primary producers, traders and associations of CRMs. Through its membership, the CRM Alliance represents almost all of the 20 listed critical raw materials and we are steadily growing.

We also oversee an MEP Interest Group on Critical Raw Materials to connect industry with policy-makers through bi-annual political luncheon events.



The 5 Key Recommendations

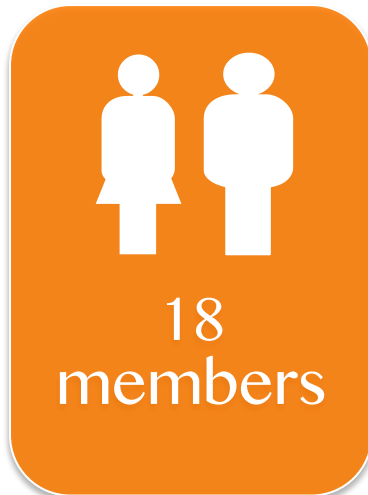
“Look for enhanced supply & use and not substitution of CRMs”

- CRM policies should look for enhanced raw material supply and use rather than substitution of the CRMs
- Industrial Sector Policies should incorporate and highlight the economic and strategic importance of Critical Raw Materials (CRMs) and their value to future innovation
- Waste legislation should not include disincentives for usage of CRMs
- Legislation affecting CRMs should require a special socio- economic analysis of potentially harmful impacts to the supply of CRMs
- Trade policy should incorporate principles of both free and fair trade for CRMs



Broad & open member base

“The Voice of the Critical Raw Materials Sector”



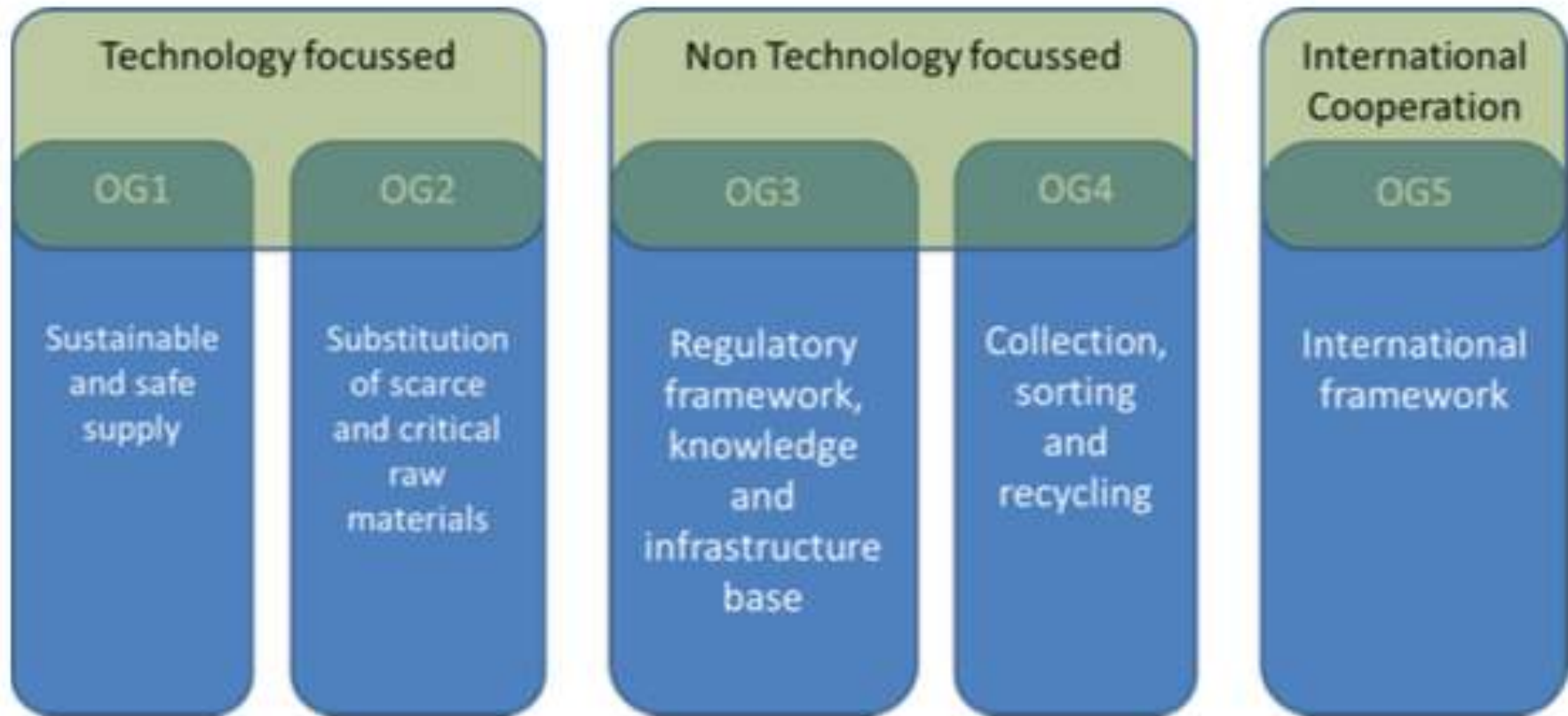
IMMC 2016
18th International Metallurgy and Materials Congress
18. Uluslararası Metalurji ve Malzeme Kongresi



CRM Alliance
Critical Raw Materials

The framework for CRMs

The EU EIT (EU Institute of Innovation & Technology) and Horizon 2020 input



The EU dependency on Raw Materials

- All countries are dependent on raw materials, particularly true for Europe.
- About 30 million jobs in the EU are directly reliant on access to raw materials.
- However, very little primary production occurs within Member States themselves,
- The total EU28 contribution to overall materials supply can be estimated at around 9%,

Global supply of raw materials (54 materials assessed in EU 2014 CRM list)

Country	Materials Produced*	Total % of supply	Country	Materials Produced*	Total % of supply
China	48	30%	South Africa	26	3.9%
USA	36	10%	Chile	18	3.4%
Russia	42	4.9%	Canada	30	3.2%
Brazil	36	4.6%	India	30	2.5%
Australia	34	4.0%	Turkey	25	2.1%



Example: Automotive in EU28

Economic screening for CRM supply chain analysis. Data from 2012, except sector values from 2011

Sector and its production value (2011)	Application	CRM-Use	EU economic importance			Progress to full Supply chain analysis
			Value (2012)	Share of prod. >25%	Share of products in sector >0.2%	
Manufacture of motor vehicles, trailers and semi-trailers €678906 M	Automobiles	Pt, Pd, Rh, Ta, Nb, Mg, Sb, Nd, Gd, Be, In, Ce, Dy, La, Tb, Tm, Y, Er, Eu, Ga, Ho, Graphite	223808 M€	95%	39.97%	Yes
	Heavy vehicles	Pt, Pd, Rh, Ta, Nb, Mg, Sb, Nd, Gd, Be, In, Ce, Dy, La, Tb, Tm, Y, Li, Zn, Co, Ag	33369 M€	91%	4.9%	Yes
	Buses	Assumed similar as auto/heavy vehicles	3855 M€	86%	0.57%	(Yes)
	Goods vehicles	Assumed similar as auto/heavy vehicles	23878 M€	85%	3.52%	(Yes)
Manufacture of other transport equipment €198311 M	Helicopter	Assumed similar as aeroplane	3709 M€	83%	1.9%	(Yes)
	Commercial aeroplanes	Sb, Ge, Mg, Gd, Rh, Pd, Be, Pr, Sm, W, Ta, Ru, Nb, Y	7850 M€	27%	2.5%	Yes
	Motorcycle	Assumed similar as automobile	3463 M€	68%	1.6%	(Yes)
	Bicycle	Mg, Sc, Be	2165 M€	66%	1.1%	No

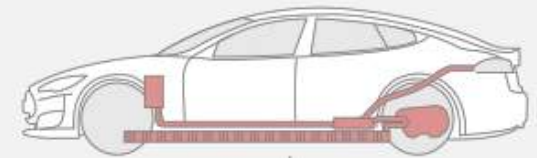
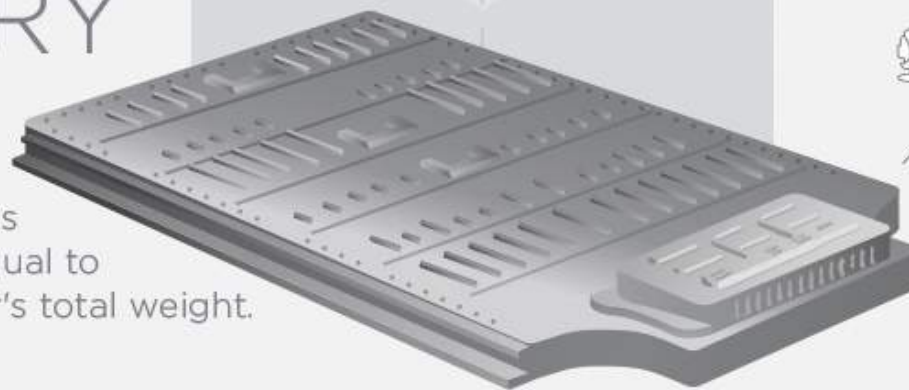


Raw Materials are essential

“incredible raw materials that go into the Tesla Model S that help to make all of these things possible..”

BATTERY

The Tesla battery pack weighs 1,200 lbs (540 kg), which is equal to about 26% of the car's total weight.



This puts the car's center of gravity a mere 44.5 centimeters off the ground, giving the car unprecedented stability.

⊕ CATHODE

An NCA formulation is used with the approximate ratio:



80%
Nickel



15%
Cobalt



5%
Aluminum



Lithium

⊖ ANODE



Silicon



Graphite (natural or synthetic) to hold lithium ions

ELECTROLYTE



Lithium Salt

OTHER



Copper or Aluminum Foil

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CRM Alliance
Critical Raw Materials

The use/value/shortfalls of the CRM list

Assessment of the methodology on the CRM list, Background Report EU, 2016)

Are you aware?	
Using it?	
Meet the needs?	
Particular use?	
Own list; EU ref.?	
Own list; how adopted?	
Own list; consistant with EU?	

- Inappropriate calculation of the Economic Importance and the Supply Risk component;
- Need for supply chain approach;
- Lacking exact statistical data on global, EU and national scale;
- Need of wider scope – more materials to be screened;
- Need of dynamic approach – different scenarios of general shortage of supply to be taken into consideration;
- The substitution should be considered more carefully;



Example: ESAN Magnesium

15.000 mt primary magnesium smelter started-up in late 2015

- Serves the EU CRM policy to re-establish primary production in Europe
- Enable full participation in H2020 etc. as Turkey is recognised as EU associated country
- Contributes to a less carbon emitting industry supply in Europe
- Evolvment of specific smelter know-how in Europe
- Reduces EU dependence on imported raw materials
- Base for greener procurement in European & global supply networks
- Using renewable energy on large scale



The CRM Alliance continues...

- ... to advocate on Critical Raw Material policy issues on behalf of its members at both the European and International level and
- ... membership is open for all producers, traders and associations of CRMs, as well as for associate members i.e. downstream users and candidate CRMs.



18th International
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Links & info

- Apple iphone: <http://www.visualcapitalist.com/extraordinary-raw-materials-iphone-6s/>
- EU CRM list 2014: https://ec.europa.eu/growth/sectors/raw-materials/specific-interest/critical_en
- CRM Alliance: <http://criticalrawmaterials.org>
- CRM InnoNet on Transport: <http://www.criticalrawmaterials.eu/project-summary/>
- Commodity Special Feature: <https://www.imf.org/external/np/res/commod/pdf/WEOSpecialOCT15.pdf>

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