

# Mining in Europe

## Non-energy raw materials



***Skills and Research for the Mining of the Future***

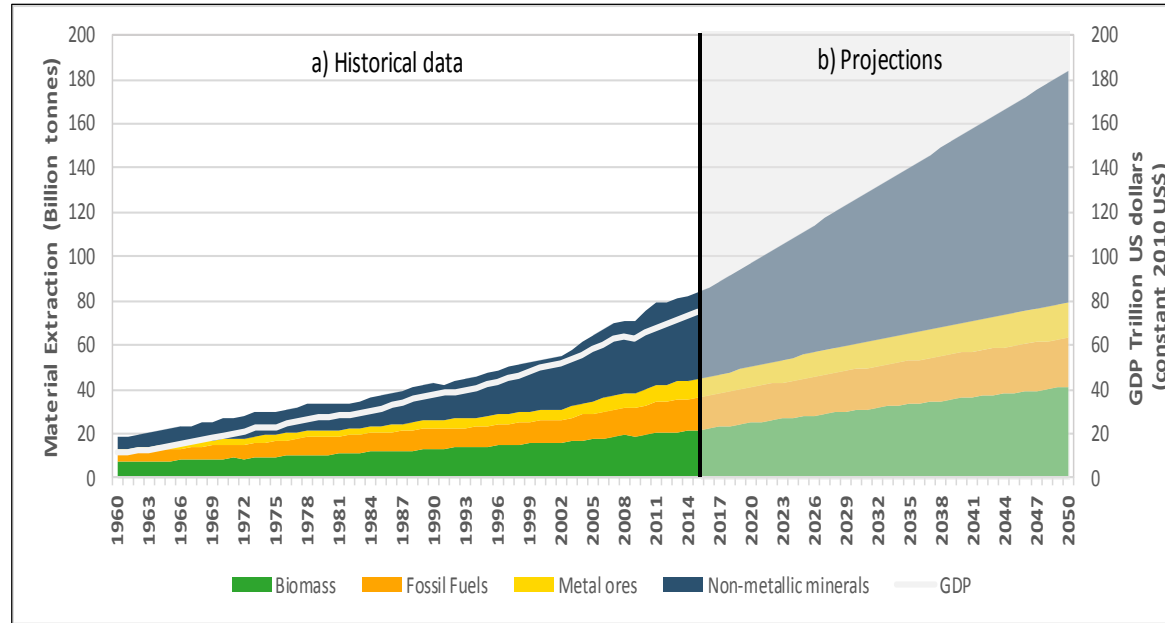
*10 October 2018, Saxony Liaison Office, Brussels*

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European Commission. Directorate-General for Internal Market,  
Industry, Entrepreneurship and SME's (DG GROW).  
Unit C2 - «Resource Efficiency and Raw Materials»

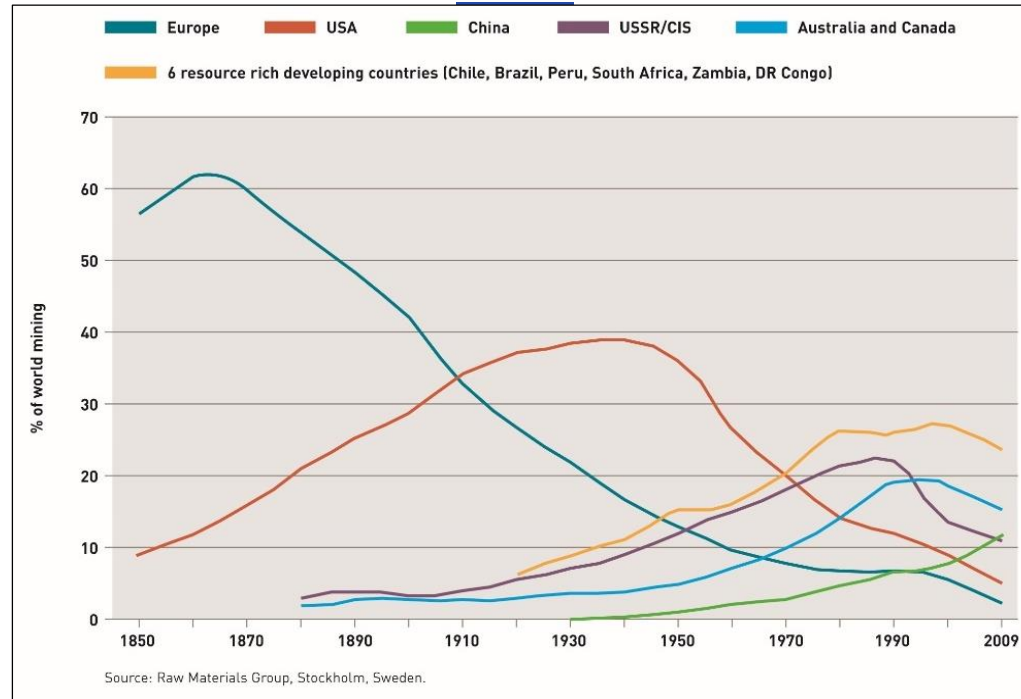
- 1. Supply of raw materials in the EU**
- 2. Extraction of raw materials in the EU**
- 3. EU policy on non-energy raw materials**

# **1. Supply of non-energy RM to the EU**

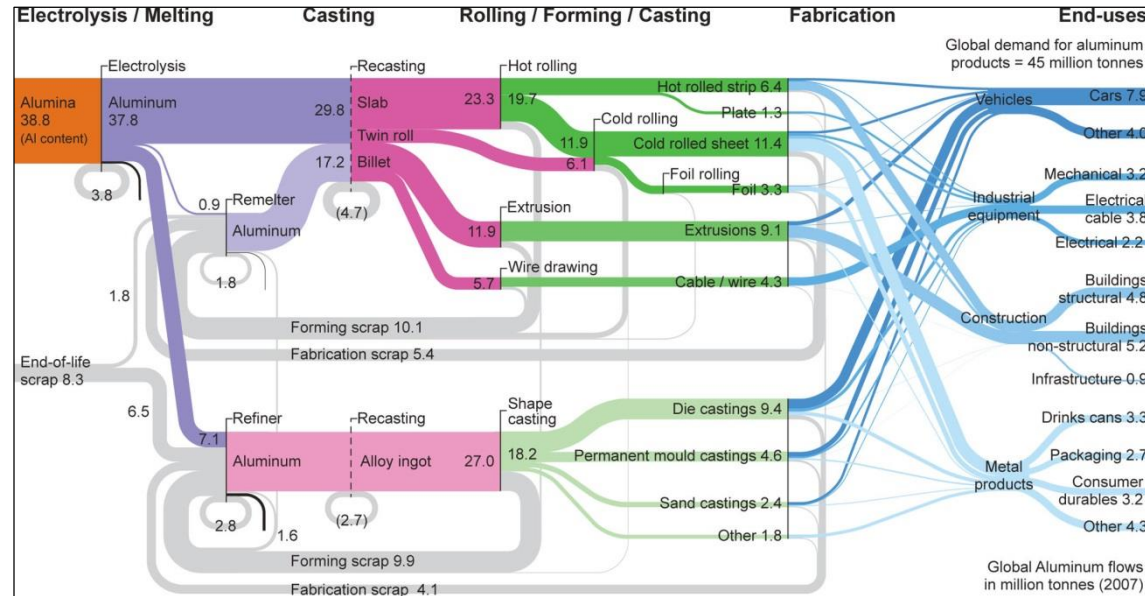


**Figure 1 – Global material extraction by: a) historical (world, 1990-2015) and b) projected data (world, 2015-2050)**

(Source: Raw materials Scoreboard 2018 in preparation, UNEP, World Bank)

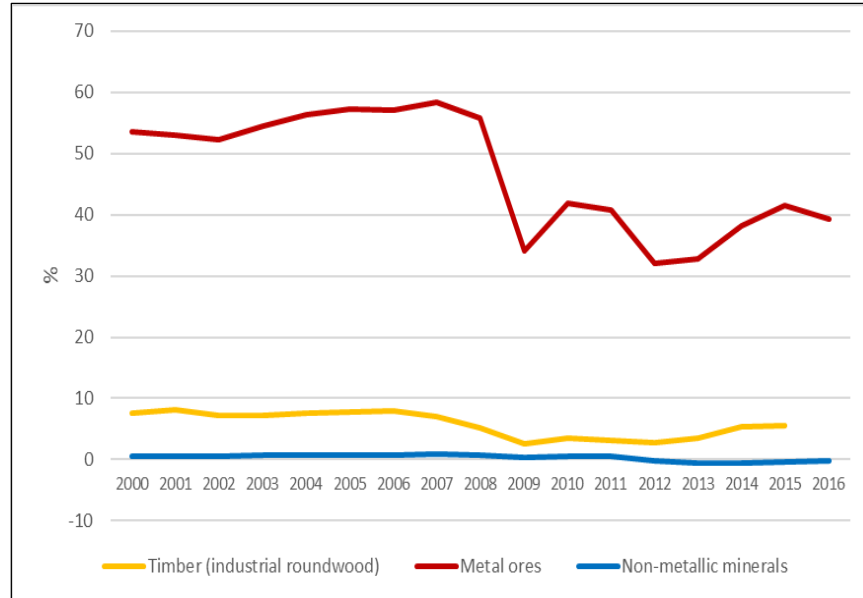


**Figure 3 - Share of world metals mining by world region (1850-2009)**  
(Source: EU 2016 RM Scoreboard; © ICMM, 2012, 'Trends in the mining and metals industry — Mining's contribution to sustainable development')



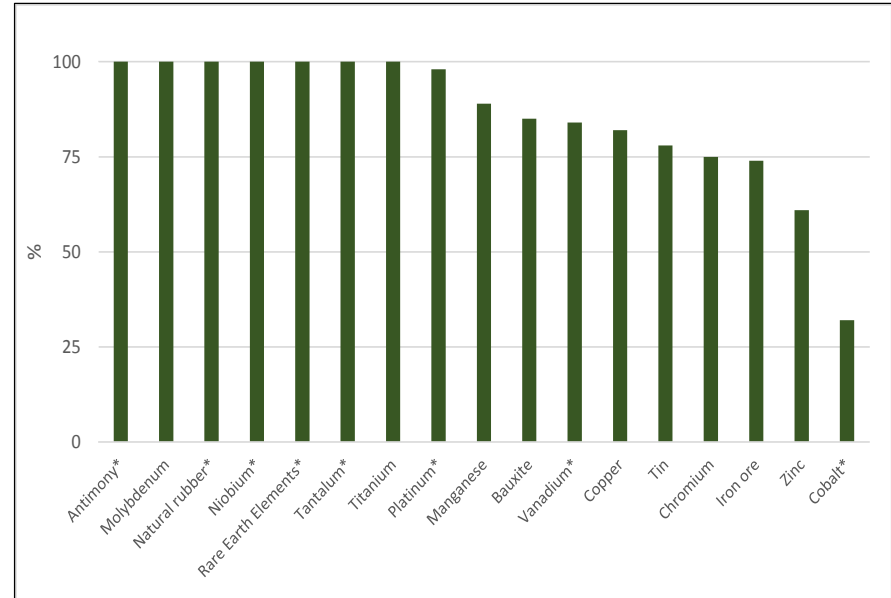
**Figure 2 - Global material flow across the value chain for aluminium**

(Source: Raw materials Scoreboard 2018 in preparation; Reprinted with permission from Cullen, J.M. and J.M. Allwood, 2013. 'Mapping the Global Flow of Aluminum: From Liquid Flow of Aluminum to End-Use Goods'. Environmental Science & Technology 47(7) (pp. 3057-3064). Copyright 2013 American Chemical Society)



**Figure 4 - Import reliance in the EU-28 for raw materials in the initial stage of supply chain (2015)**

(Source: RM Scoreboard 2018 in preparation)



**Figure 5 - Import dependence for selected raw materials**

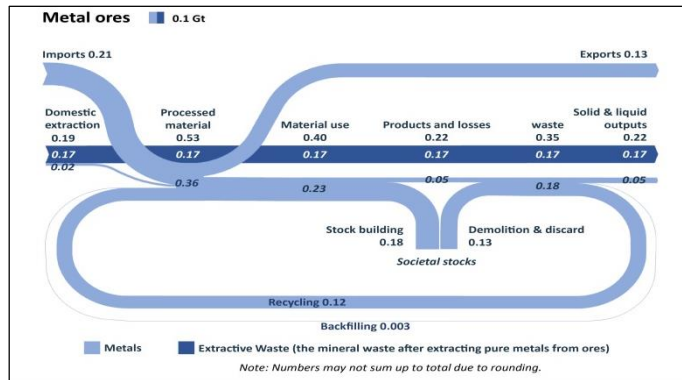
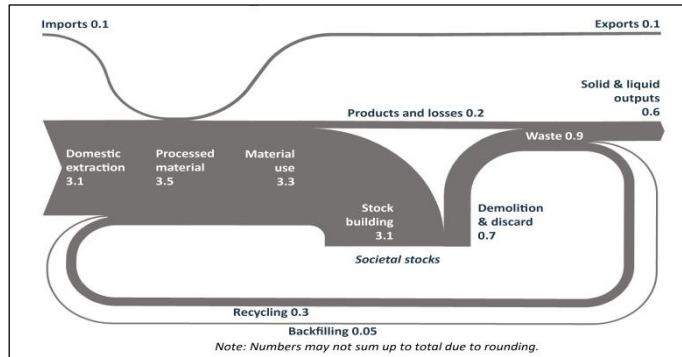
(Source: RM Scoreboard 2018 in preparation)

# Strategic importance of raw materials on economy

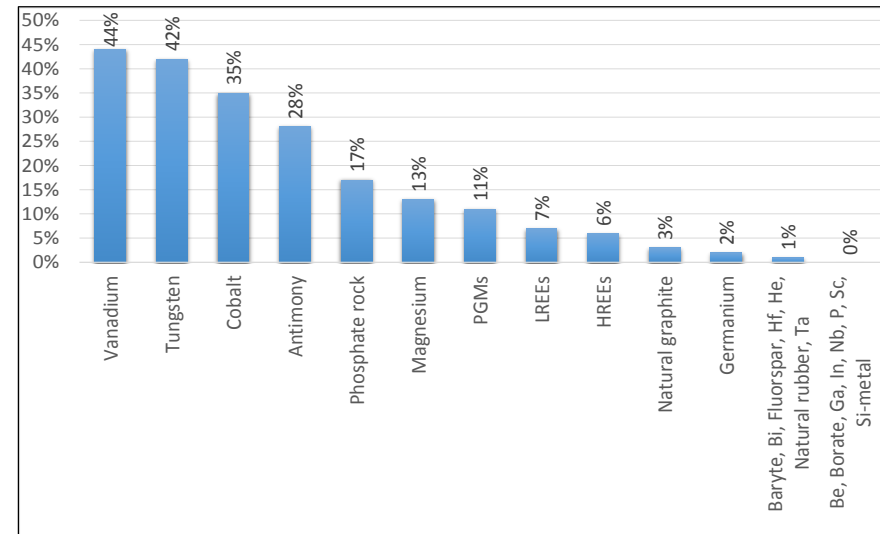


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## End-Of-Life recycling Input Rate (EOL-RIR)



**Figure 6 – Material flows for non-metallic minerals and metal ores** (Source: RM Scoreboard 2018 in preparation)



**Figure 7 - End-Of-Life recycling Input Rate (EOL-RIR)**

(JRC elaboration. EOL-RIR measures recycling's contribution to meeting materials demand, i.e. how much of the total material input into the production system comes from recycling)



# Report on CRM and the Circular Economy

Issued in January 2018, taking into account the list of 27 critical raw materials (Sep 2017)

## Objectives:

- To help **Member States** implement the new provisions on **critical raw materials** in the **Waste Framework Directive** – i.e. in relation to waste prevention and waste management
- To ensure a coherent and effective EU approach to critical raw materials in the transition to a circular and low-carbon economy.
- Provide **information to stakeholders**.
- Provide **key data sources** and identify **best practices** and possible further actions.

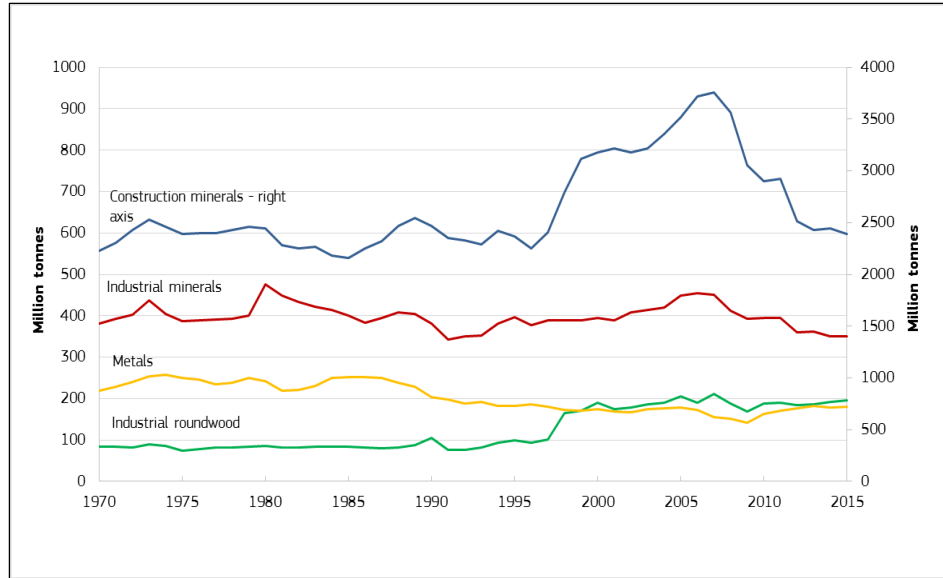


## **2. Extraction of non-energy RM in the EU**

# Strategic importance of raw materials on economy

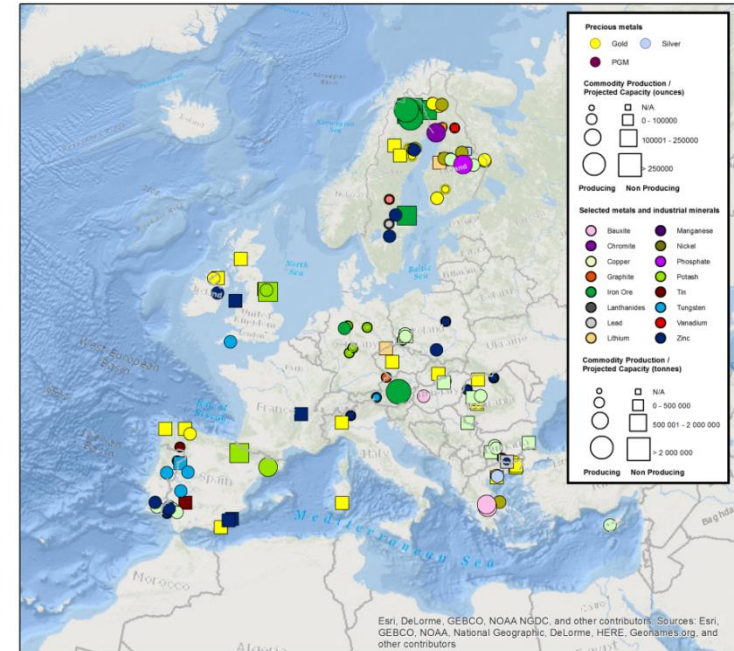


# EU produces metals and has a strong mineral potential



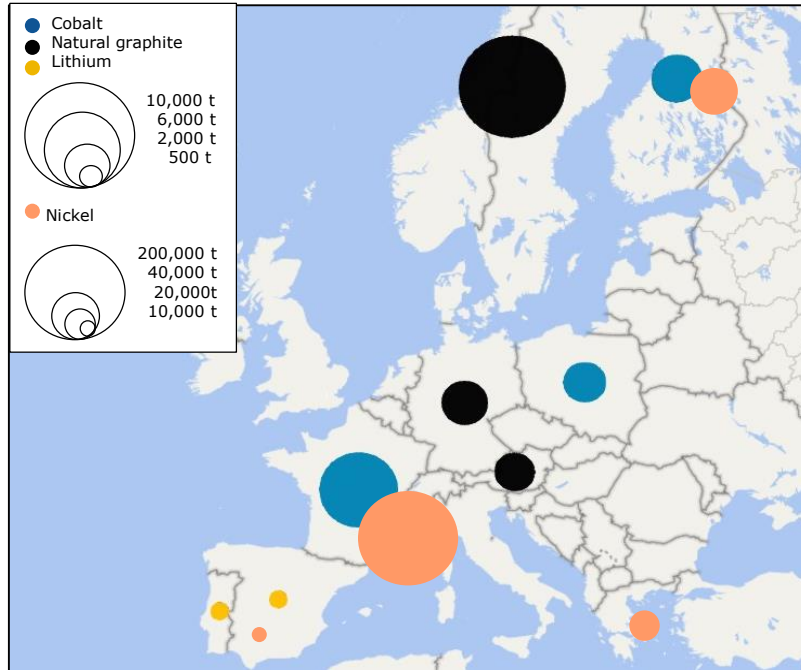
**Figure 8 - Domestic extraction of raw materials by raw materials category (EU-28, 1970-2015)**

(Source: RM Scoreboard 2018 in preparation)



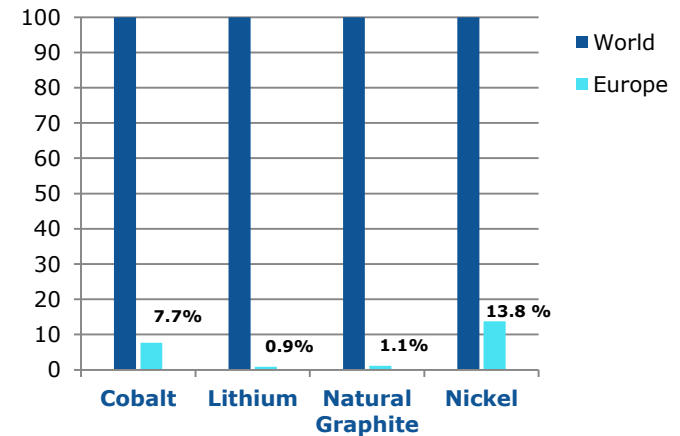
**Figure 9 - Domestic extraction of raw materials (2015)**

(Source: RM Scoreboard 2018 in preparation)



**Figure 10 – Mining production in Europe: cobalt, lithium, natural graphite, nickel; metallic content, tonnes (2016)** (Source: Survey Member States- RMSG, 2018)

**Cobalt:** 9,698 t (7.7%)  
**Lithium:** 322 t (0.9%)  
**Natural graphite:** 12,650 t (1.1%)  
**Nickel:** 270,126 t (13.8%)



**Figure 11 – World share of European production (2016)**  
 (Source: Survey Member States- RMSG, 2018)

### Lithium projects (advanced stage)

### Commercial projects

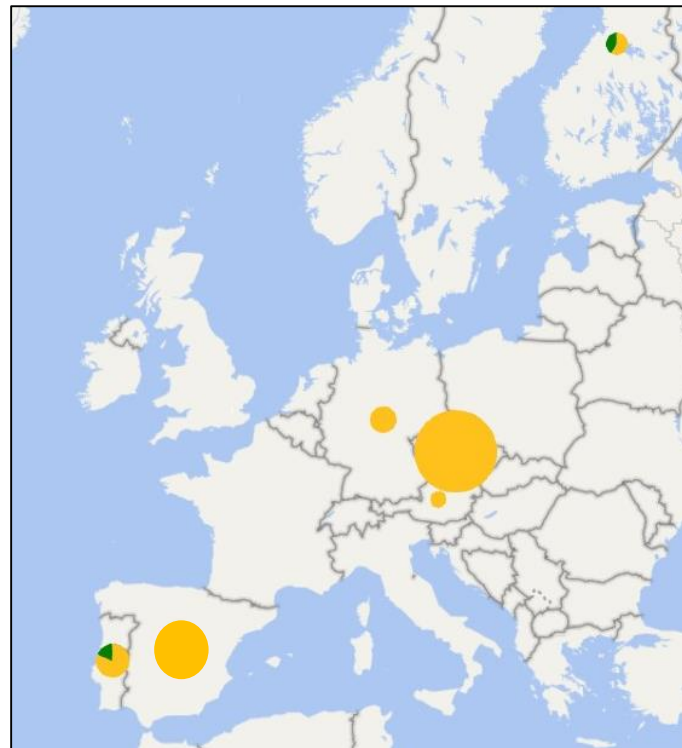
#### Lithium (reserves)

- Alvarrões, Mina do Barroso (PT): 38,940 t
- Keliber (FI): 35,750 t

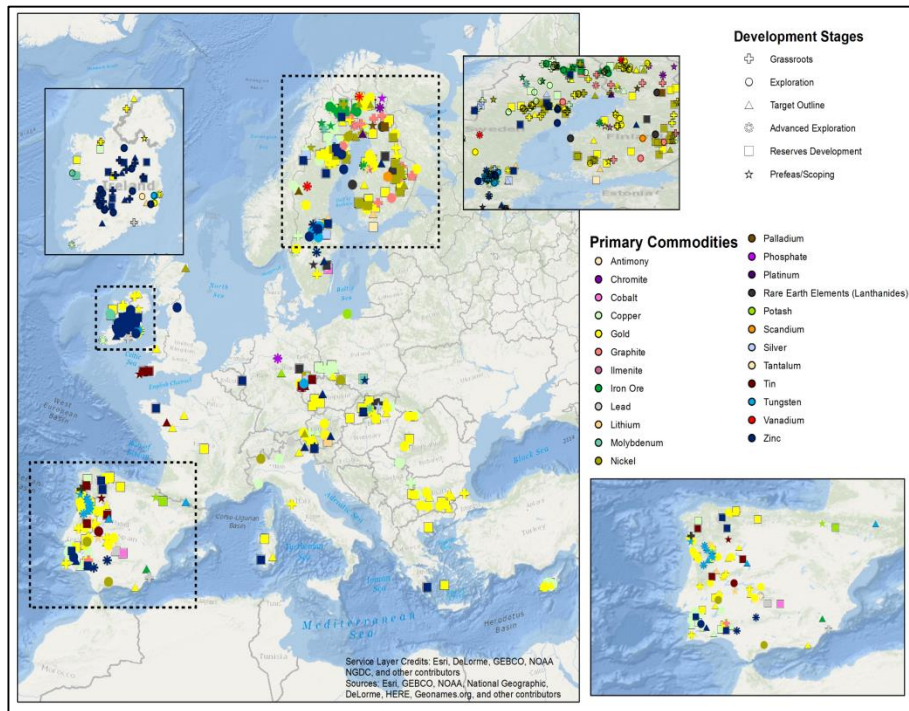
### Potentially commercial projects

#### Lithium (resources;(reserves))

- Alvarrões, Mina do Barroso: 79,110 t
- Argemela, Sepeda (PT): 89,810 t
- Cinovec (CZ): 1,285,790 t
- Keliber (FI): 50,970 t
- San Jose (ES): 313,860 t
- Wolfsberg: 51,160 t
- Zinnwald (DE): 132,740 t



**Figure 5 – Lithium potentially commercial projects (2016)**  
(Source: Survey Member States- RMSG, 2018)



**Figure 12 –Mineral exploration activities the EU (2017)**  
(Source: RM Scoreboard 2018 in preparation)

	Australia	Canada	Europe <sup>1</sup>
<b>Grassroots</b>	13	15	3.5
<b>Late stage</b>	14	19	1.4
<b>Mine-site</b>	14	8	1.6

Note 1 – Including non-EU countries

**Figure 13 –Share of global exploration budgets by stage of development (2017)** (Source: Horizon 2020 project, STRADE; based on data from S&P Global Market Intelligence)

### United Nations Framework Classification for Resources (UNFC)

	<b>Commercial projects (E1;F1; G1,2,3)<sup>1</sup></b>	<b>Potentially commercial projects (E2;F2;G1,2,3)<sup>1</sup></b>	<b>Non-Commercial projects (E3;F2;G1,2,3)<sup>1</sup></b>	<b>Exploration projects (E3;F3;G4)<sup>1</sup></b>
<b>Cobalt</b>	--	3 SE(3)	10 ES(1), FI(5), SE(4)	25 AT(2), CY(3), CZ(1), ES(7), FI(1), IE(1), NO(1), PL(1), SE(5), SK(2), UK(1)
<b>Lithium</b>	3 FI(1),PT(2)	7 AT (1), CZ(1), DE(1), ES(1), FI(1), PT(2)	3 AT(1), ES(1), UK(1)	16 (40) <sup>2</sup> CZ(1), DE(2), ES(2), FI(1), FR(2), GR(1), IE(3), NO(1) SE(3), PT(40) <sup>2</sup>
<b>Natural graphite</b>	1 SE (1)	2 SE(1), SK (1)	2 SE(2)	28 CZ(3), DE(1), FI(10), ES(4), SE(2) NO(8)
<b>Nickel</b>	--	3 SE(3)	6 FI(3),SE(1), UK(2)	21 AT(2), CY(3), DE(1), ES(5), FI (4), LV(1), SK(2), SE(3)

Note 1 – UNFC, Definition of categories (see United Nations Framework Classification (ECE ENERGY SERIES No. 42):

E axis: E1, extraction and sale has been confirmed to be economically viable; E2, expected to become economically viable; E3, not expected to become economically viable or evaluation is at too early a stage.

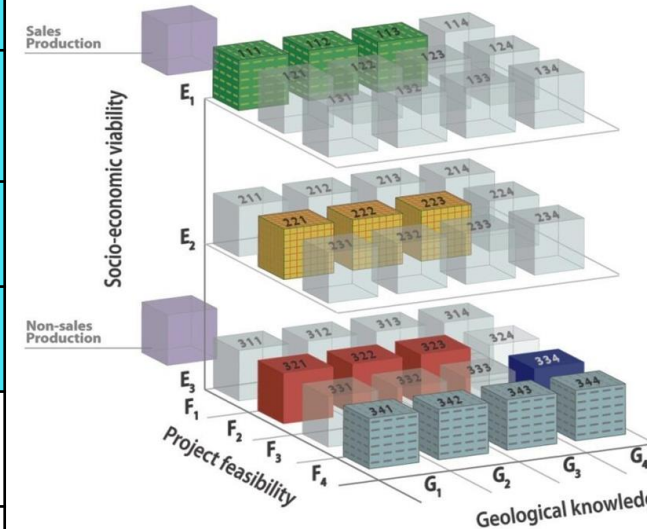
F axis: F1, feasibility of extraction by a development project or mining operation has been confirmed; F2, feasibility is subject to further evaluation; F3, feasibility cannot be evaluated due to limited technical data.

G axis: G1, quantities associated with a known deposit that can be estimated with a high level of confidence (G1), moderate level of confidence (G2), a low level of confidence (G3)

Note 2 – 40 applications for lithium exploration have been submitted; 12 blocks have been defined for lithium exploration in the Centre and North of Portugal. Public tenders are going to be launched in 2018.

**Figure 14 – Project categories, exploration (UNFC-2009)**

(Source: Survey Member States- RMSG, 2018)



### **3. EU policy on non-energy RM**



# EU Raw Materials Strategy and Commission priorities



## Raw Materials Initiative = EU policy

EIP on Raw Materials  
Strategic Implementation Plan

- ✓ CRM list
- ✓ H2020 funding

### Commission priorities 2015-19

1. Jobs, Growth and Investment
  - *circular economy and green growth*
3. Energy Union
  - *transition to a low-carbon economy*  
(renewables, electricity market, transport...)
4. Internal Market
  - *unlock the full potential of the single market*  
- *a renewed EU Industrial Policy Strategy*
6. Trade policy to harness globalisation
  - *economic diplomacy*
  - *raw materials chapters in FTAs*
9. A stronger global actor
  - *international cooperation and development*

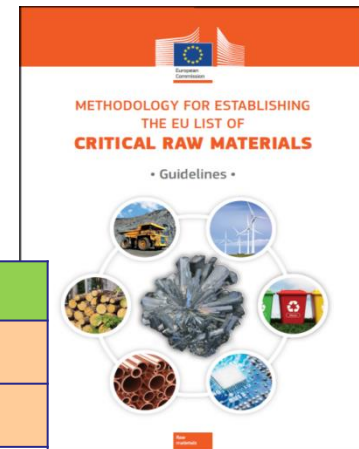
- keep the EU industry **competitive** on the way to a **low-carbon and circular economy**;
- help the EU industry to master: **digitalisation, sustainability and innovation**;
- strengthen **domestic production** and **EU industrial value chains**, all starting with raw materials, particularly critical raw materials (e.g. EU Battery Alliance);
- strengthen partnerships between the **EU, Member States and regions**;
- attract **young** generation and develop relevant **skills, build knowledge** and **engage society**

# Raw materials in EU policy



- **78 raw materials** evaluated with **fact sheets available, revised methodology**
- Commission's Communication on **2017 list of Critical Raw Materials for the EU**, COM(2017)490, 13.9.2017

2017 CRMs (27)			
Antimony	Fluorspar	*LREEs	Phosphorus
Baryte	Gallium	Magnesium	Scandium
Beryllium	Germanium	Natural graphite	Silicon metal
Bismuth	Hafnium	Natural Rubber	Tantalum
Borate	Helium	Niobium	Tungsten
Cobalt	*HREEs	*PGMs	Vanadium
Coking coal	Indium	Phosphate rock	



**EU RMIS**

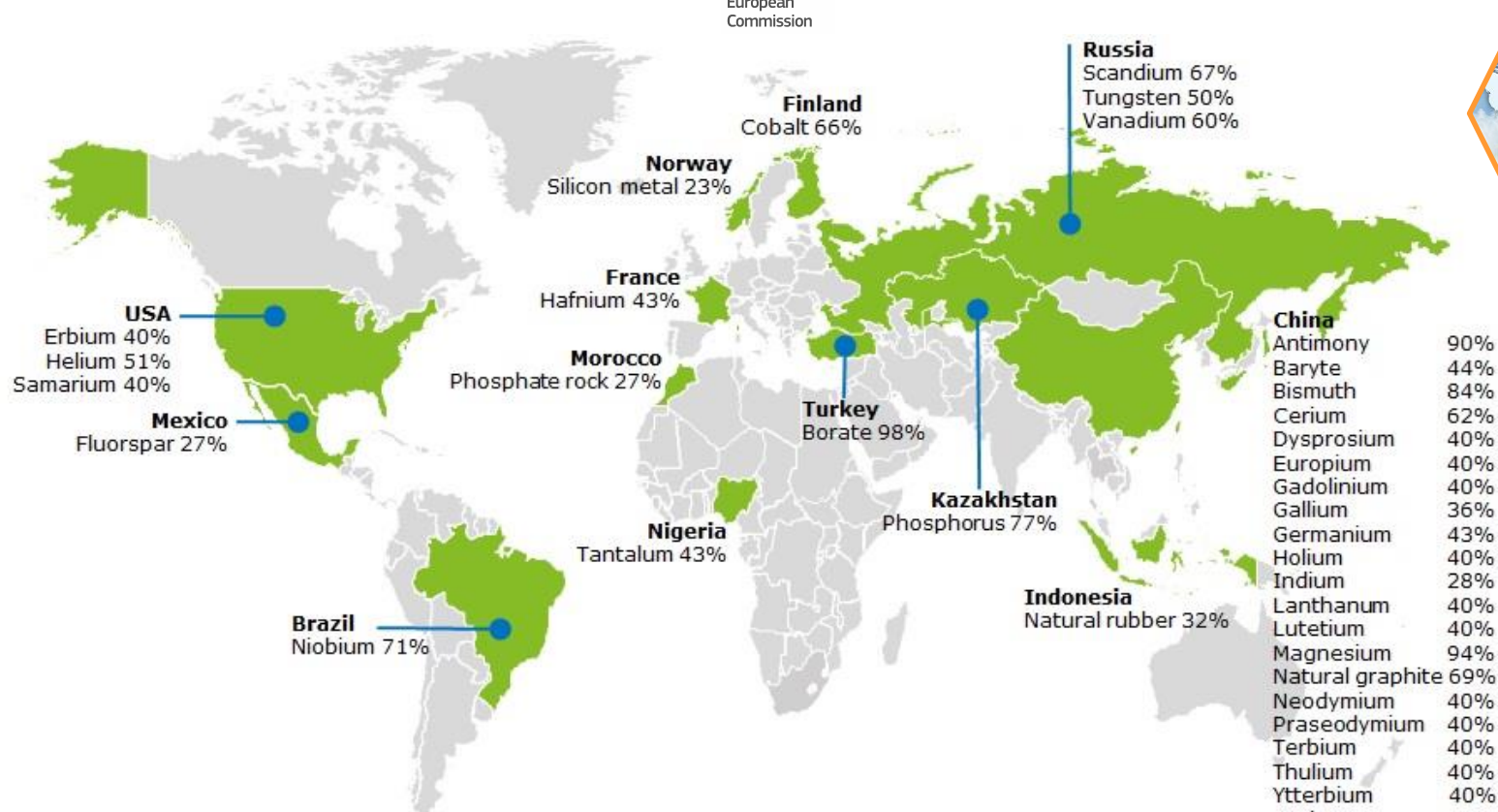


\*HREEs=heavy rare earth elements, LREEs=light rare earth elements, PGMs=platinum group metals

# Biggest suppliers of CRM to the EU



# Raw Materials Initiative EU Critical Raw Materials Trade



Source: Study on the review of the list of critical raw materials 2017

## "Strategic Action Plan on Batteries"

Commission's Communication COM(2018) 293 final, 17<sup>th</sup> of May

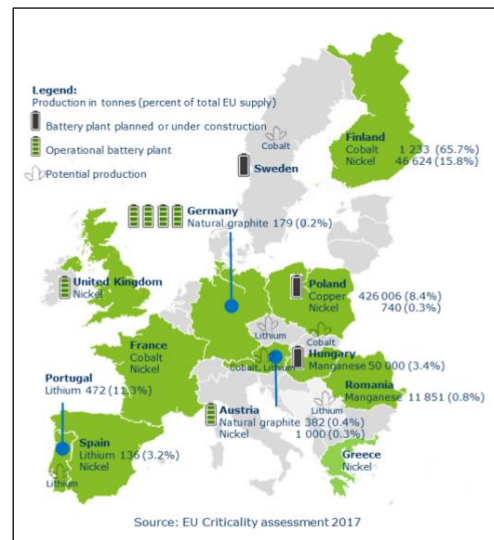
**Objective:** Make Europe a global leader in sustainable battery production and use, in the context of the circular economy (annex "Sustainable Mobility for Europe safe, connected, and clean" communication)

### Action Area "Securing the sustainable supply of raw materials"

- **Map** the current and future **primary RM for batteries**.
- **Assess** the **potential within the EU for sourcing battery RM materials** Cobalt, Lithium, Natural Graphite, and Nickel [Q4 2018]
- **Dialogue with Member States** to determine the **fitness** of their **raw materials policies, mining codes and incentives for exploration** to address the strategic needs of materials for batteries. [Q4 2018]

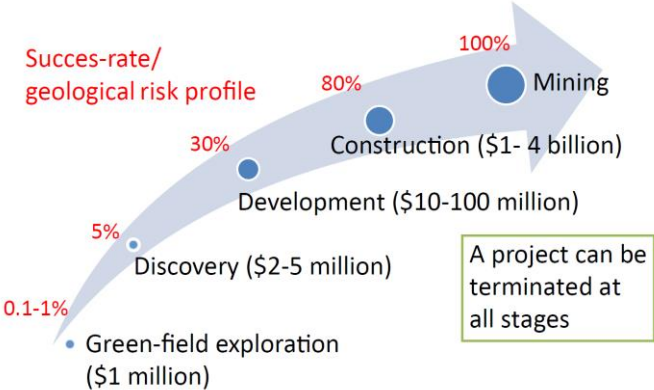
### "Report on Raw Materials for Battery Applications"

Staff Working Document Commission SWD(2018) 245 final



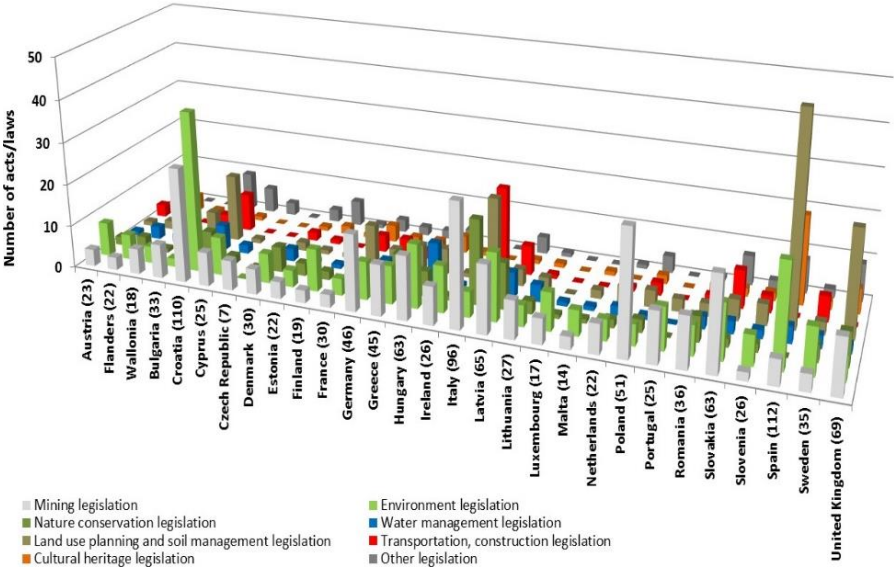


### Time to market? Permitting time costs a lot!



Source: MINLEX study  
Note: Germany has a decentralised system, and total number of laws only represents the example of Mecklenburg-Western Pomerania. The UK includes laws for England, Wales and Northern Ireland.

### Total number of laws per MS relevant for mining permitting procedures



### Minerals framework

- **MIREU - EU network of mining and metallurgy regions** (2017-2020)
- **REMIX - Smart and Green Mining Regions of EU** (2017+)
- **MIN-GUIDE** (2016-2018) developing a "Minerals Policy Guide"
- **MINLEX** study (2017) - Legal framework and permitting procedures in the NEEI in EU28
- **STRADE** (2015-2018) - European raw-material supply from EU, non-EU countries
- Report "Evaluation and **Exchange of Good Practice for the Sustainable Supply of Raw Materials**" (2014)

### Access to mineral potential in the EU

- **MINELAND** (2017-2019) Mineral resources in sustainable land-use planning
- **MINATURA2020** (2015-2017)  
To develop a concept and methodology for the definition and subsequent protection of "mineral deposits of public importance"



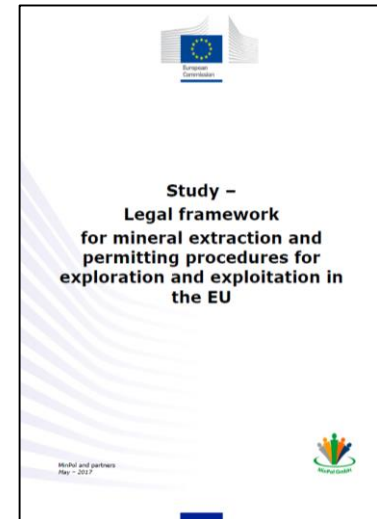
### MINLEX - Study

#### Legal framework for mineral extraction and permitting procedures for exploration and exploitation in the EU

##### Content

- Legislation at national, regional and local level in EU MS
- EU legislation impacting the permitting procedures
- Court cases

Published in August 2017





### **SC5-09-2018-2019: New solutions for the sustainable production of raw materials (RIA)**

- b) Digital mine (2019)

### **SC5-10-2019-2020: Raw materials innovation actions: exploration and Earth observation in support of sustainable mining**

- a) Integrated exploration solutions (2019)
- b) Services and products for the extractive industries life cycle (2019)

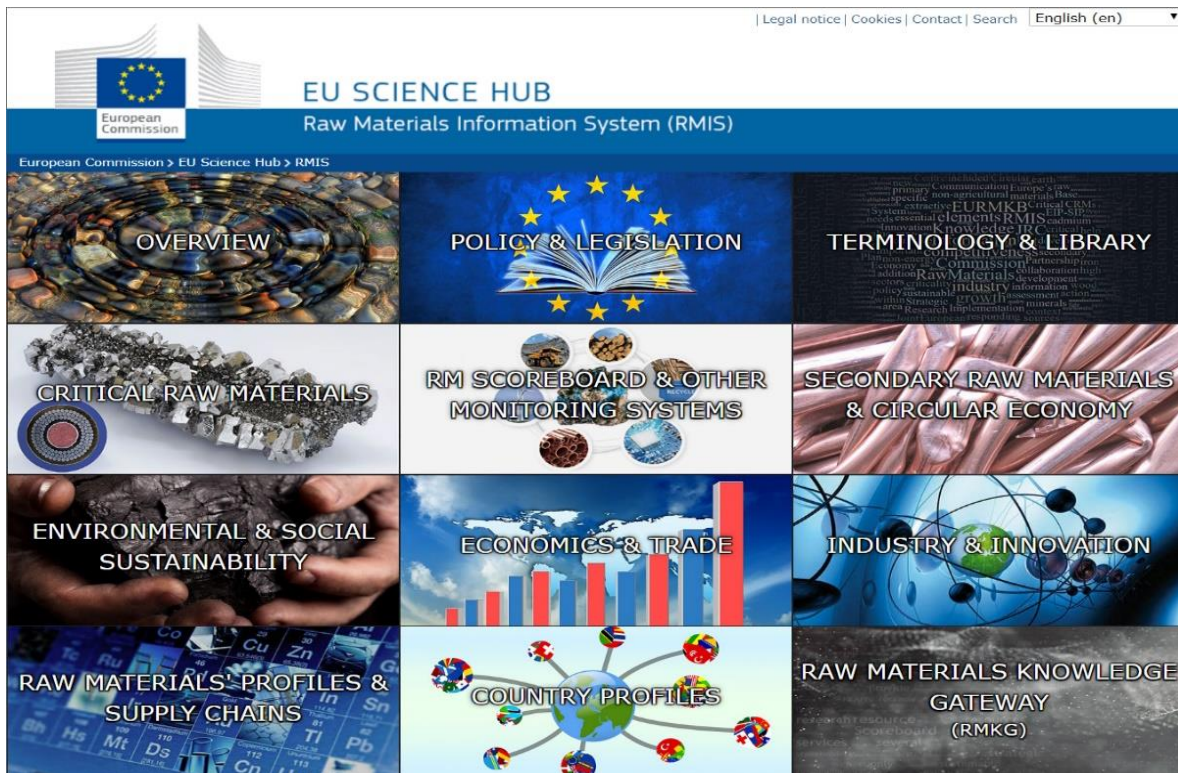
### **CE-SC5-08-2018-2019-2020: Raw materials policy support actions for the circular economy (CSA)**

- c) Responsible sourcing of raw materials in global value chains (2019)

# Raw Materials Information System



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RMIS, developed by JRC, is the Commission's reference web-based knowledge platform on non-fuel, non-agricultural raw materials from primary and secondary sources

<http://rmis.jrc.ec.europa.eu>



**12 - 16 November 2018 in Brussels, Belgium**  
**[eurawmaterialsweek.eu](http://eurawmaterialsweek.eu)**

- ❖ **6<sup>th</sup> annual High Level Conference of EIP on raw materials "Raw materials for low carbon and circular economy" on 14 November**
- ❖ Responsible supply of raw materials
- ❖ Raw Materials Industries and Natura 2000 / Biodiversity
- ❖ Critical Raw Materials in our everyday life
- ❖ The EU Raw Materials Knowledge Base event
- ❖ Copernicus for raw materials
- ❖ Horizon 2020 Infoday & and brokerage event
- ❖ EIT RawMaterials event
- ❖ Forests for the future
- ❖ EU-Canada Raw Materials Stakeholders Forum



## Raw Materials Week

European Innovation  
Partnership on Raw Materials



# Thank you!



## **EU Raw materials, metals, minerals and forest-based industries:**

[https://ec.europa.eu/growth/sectors/raw-materials\\_en](https://ec.europa.eu/growth/sectors/raw-materials_en)

## **Critical raw materials for the EU:**

[http://ec.europa.eu/growth/sectors/raw-materials/specific-interest/critical\\_en](http://ec.europa.eu/growth/sectors/raw-materials/specific-interest/critical_en)

## **Commission Staff Working Document "Report on Raw Materials for Battery Applications":**

<https://ec.europa.eu/transport/sites/transport/files/3rd-mobility-pack/swd20180245.pdf>

## **EIP on Raw Materials:**

<https://ec.europa.eu/growth/tools-databases/eip-raw-materials/en>

## **Horizon 2020 - raw materials and calls:**

<https://ec.europa.eu/research/participants/portal/desktop/en/opportunities/h2020/index.html>

## **Horizon 2020 – experts:**

<http://ec.europa.eu/research/participants/portal/desktop/en/experts/index.html>

## **Raw Materials Week 2018**

[eurawmaterialsweek.eu](http://eurawmaterialsweek.eu)

## **Raw Materials Information System:**

<http://rmis.jrc.ec.europa.eu/>

## **EIT Raw materials:** [www.eitrawmaterials.eu](http://www.eitrawmaterials.eu)