How worldwide coordinated research funding answers raw materials challenges: a case study

ERA•MIN 3

Raw Materials for the Sustainable Development and the Circular Economy

Dina Carrilho, Senior Science Officer, Foundation for Science and Technology, Portugal

Session 8 – Addressing criticality: Policy case studies

First IRTC Conference, 17 February, 2023 – Lille, France

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ERA-MIN3

Content

E R A•M I N 3

Raw Materials for the Sustainable Development and the Circular Economy

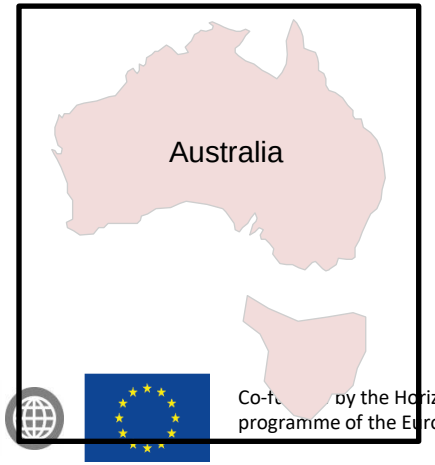
programme of the European Union

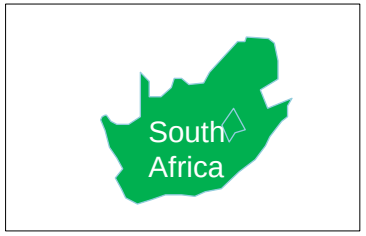
ERA-MIN Consortium

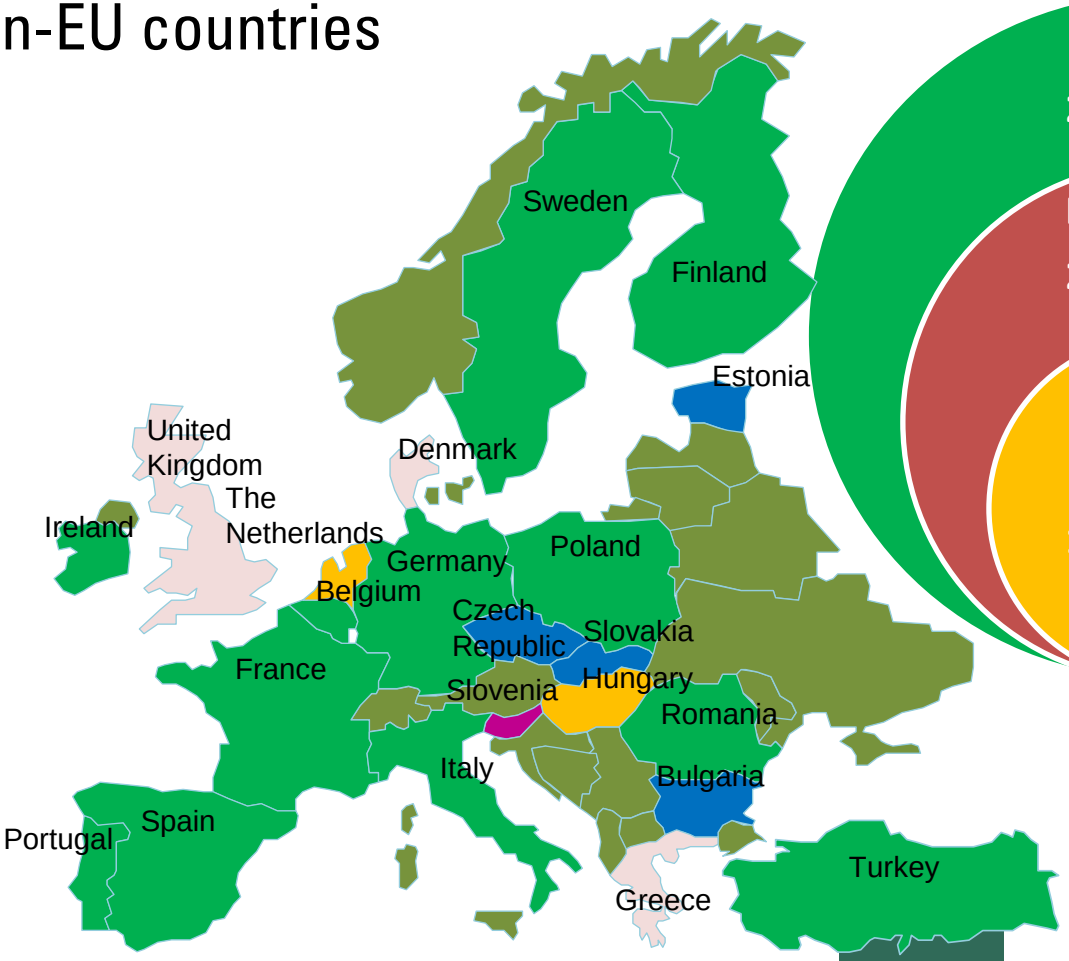
Evolution since 2011

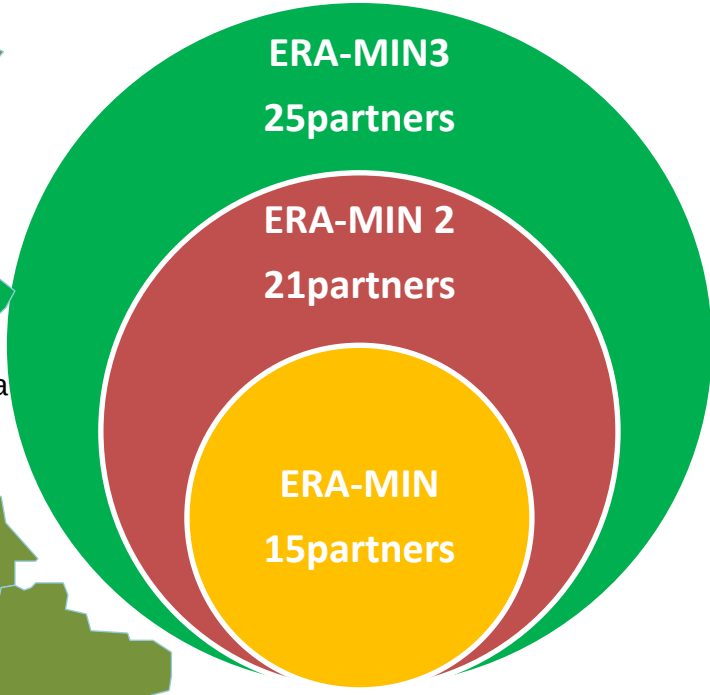
Countries involved in ERA-MIN network

EU Member States Countries/regions + Turkey
5 Non-EU countries









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Legend: ERA-MIN 1, 2 and 3 | ERA-MIN 2 | ERA-MIN 3 | ERA-MIN 2 and 3 | ERA-MIN 1 and 2 | ERA-MIN 1 | Observers

ERA-MIN3

Objectives

Pan-European, Innovative and Flexible Network of Public Research and Innovation Funding Organisations

01 Strengthen the **non-food, non-fuel mineral raw materials** community by securing the sustainable and responsible supply for **a circular economy**

02 Promote **world-wide** research and innovation (R&I) cooperation through **coordination of research and innovation funding programmes**

03 Implement **Joint Calls for transnational R&I projects** on **needs-driven research** on "Raw materials for the sustainable development and the circular economy"

04 Reduce the fragmentation of R&I funding addressing **metallic, construction materials and industrial minerals** across Europe and globally

05 Support international R&I projects between **universities, research institutes, small, medium and large enterprises**, NGOs, public authorities, etc

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Raw Materials for the Sustainable Development and the Circular Economy

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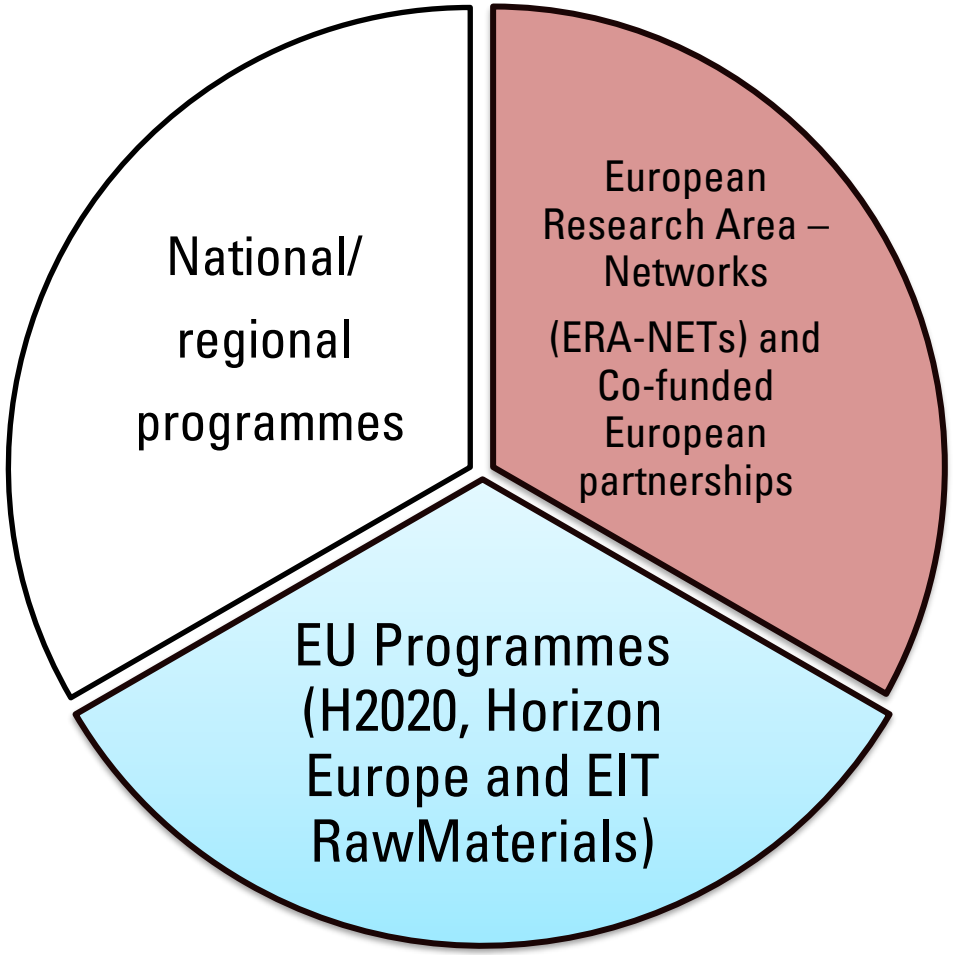
ERA-NET Raw Materials

Public-public partnership (P2P)

Learn more about partnerships at https://www.era-learn.eu/

Complements EU Programmes, EIT Raw Materials and national/regional research funding programme



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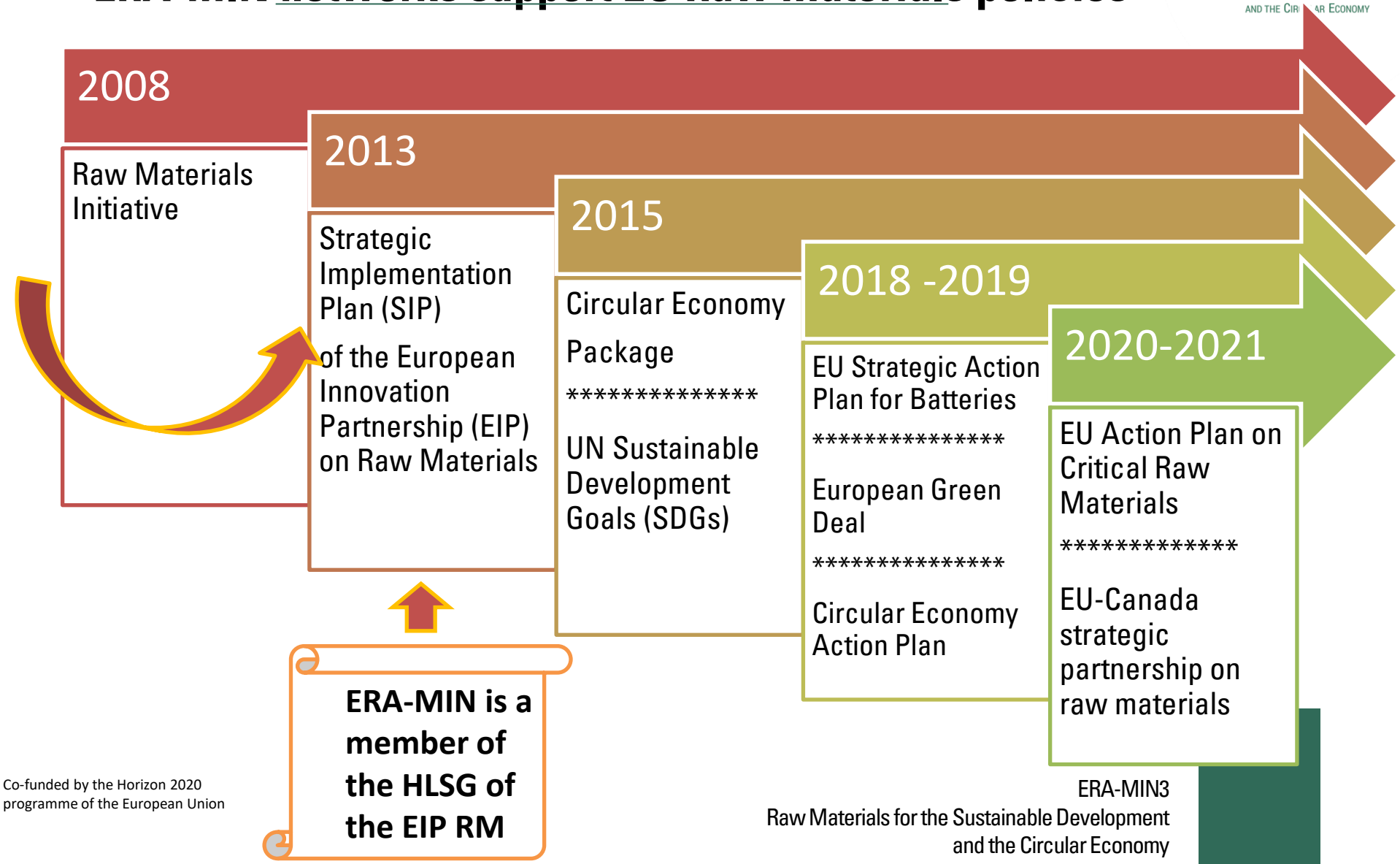
EU Raw Materials landscape

ERA-MIN networks support EU Raw Materials policies

ERA-MIN Research Agenda (2013)



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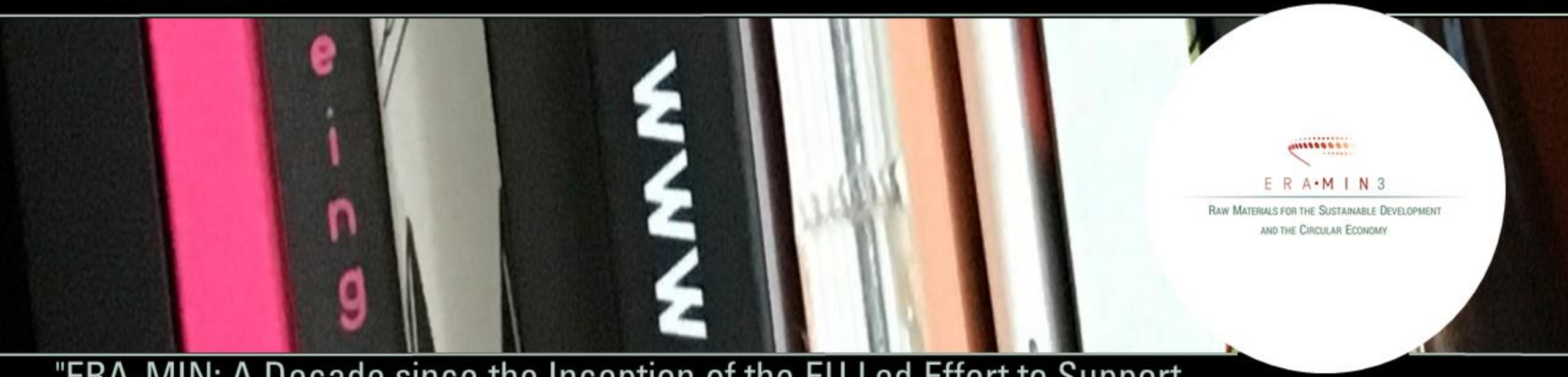
ERA-MIN 10th Anniversary Full Paper Published



"ERA-MIN: A Decade since the Inception of the EU Led Effort to Support the International Raw Materials Research Community" is an Open Access Proceeding Paper published on 28th January 2022 on the journal Material Proceedings

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3 Pan-European Networks of Public Research Funding Organisations

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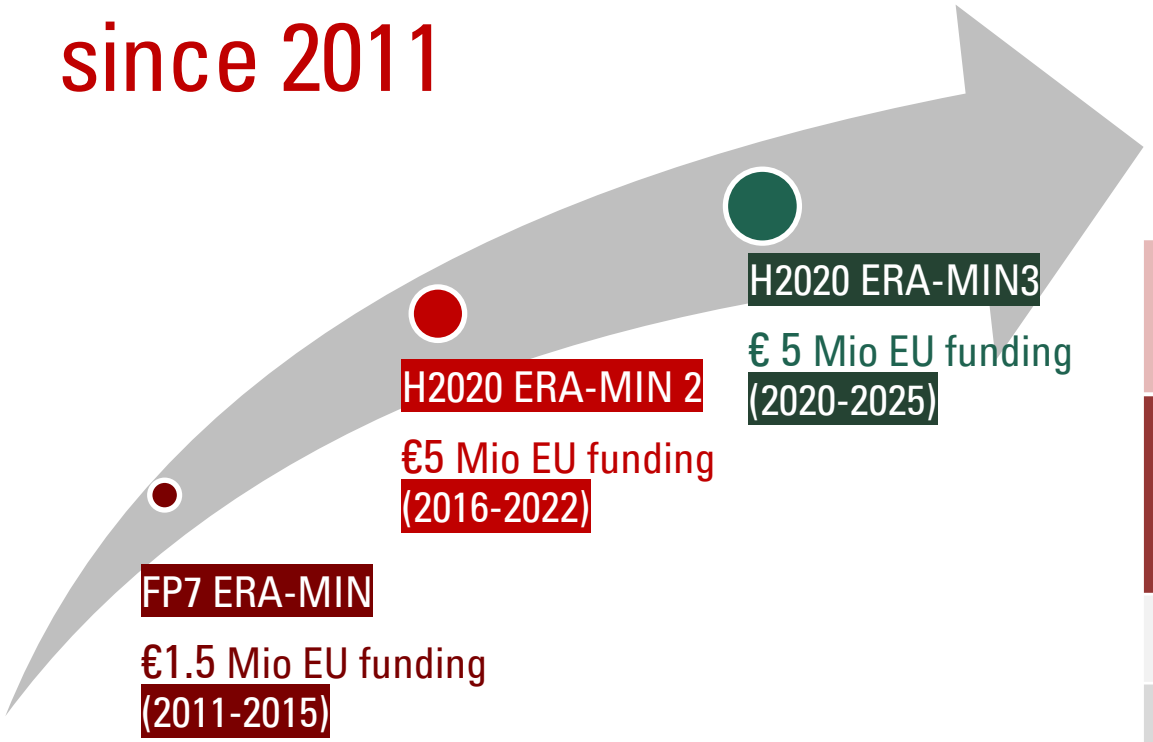
Raw Materials for the Sustainable Development and the Circular Economy

since 2011



✓ **8** Joint Calls for transnational R&I projects on **non-fuel, non-food industrial, construction and metallic minerals**

ERA-MIN Joint Calls			ERA-MIN 2 Joint Calls			ERA-MIN 3 Joint Calls	
2013	2014	2015	2017 (EU co-funded)	2018	2019	2021 (EU co-funded)	2023 (Open)
79 R&I transnational projects (total)							
30% enterprises (average)							
€60 Million total public funding							
€83 Million total project costs							

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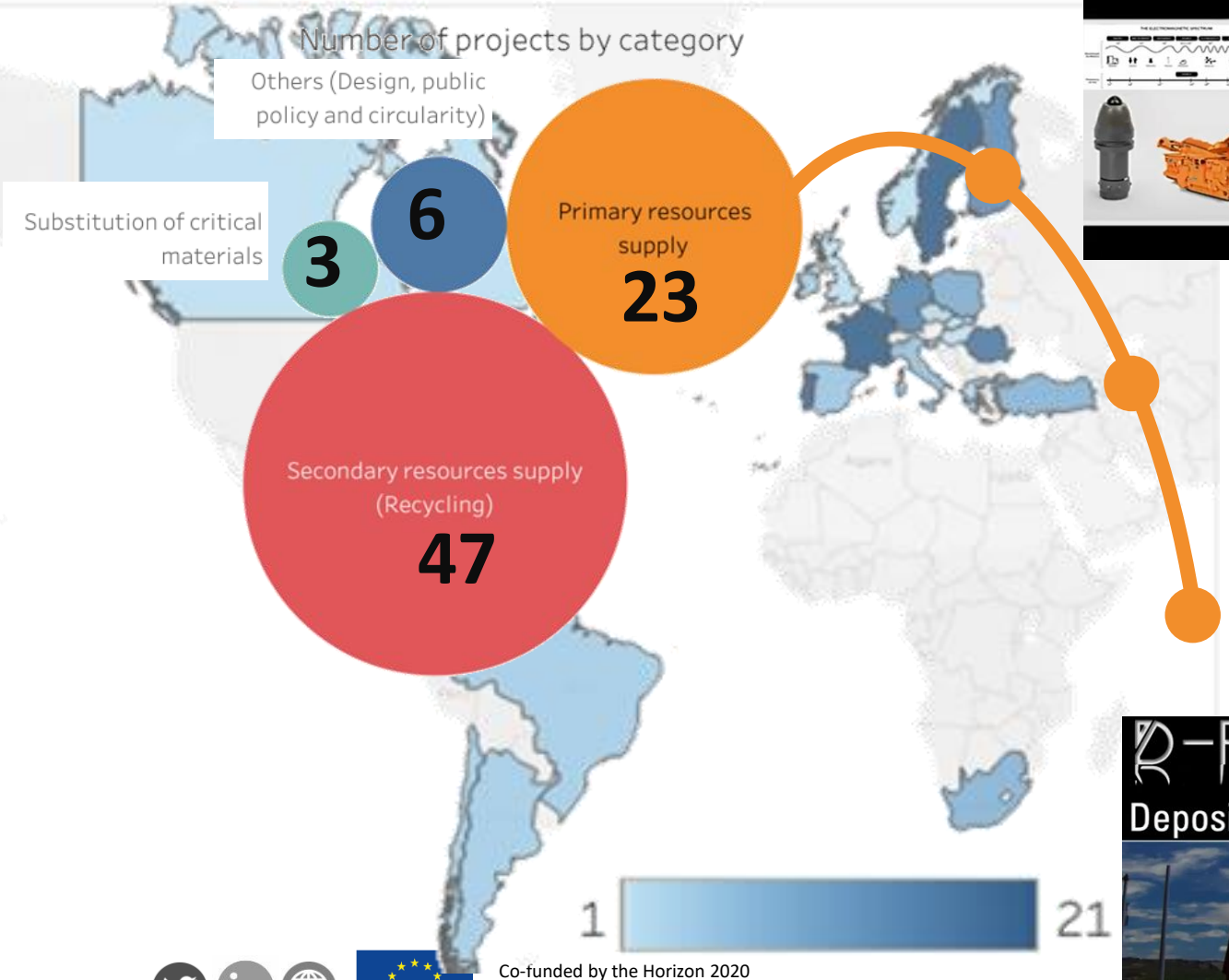
ERA-MIN Joint Calls
Dashboard

Transnational R&I projects (2013-2021)



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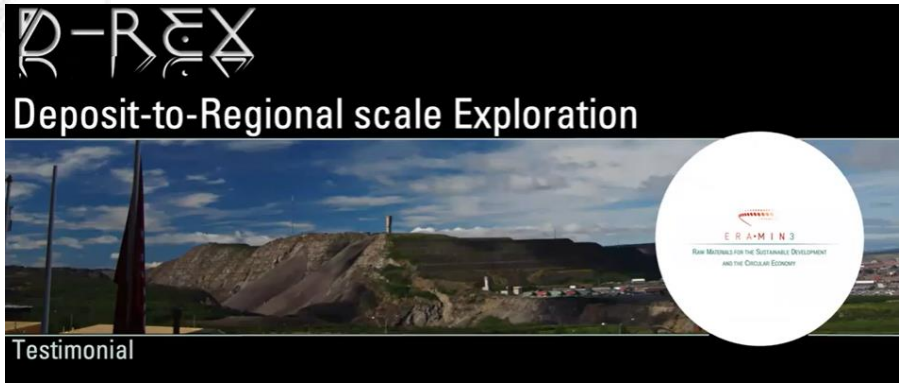
Raw Materials for the Sustainable Development and the Circular Economy

YouTube



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ERA-MIN Joint Calls

Keyword map of collaborative R&I projects

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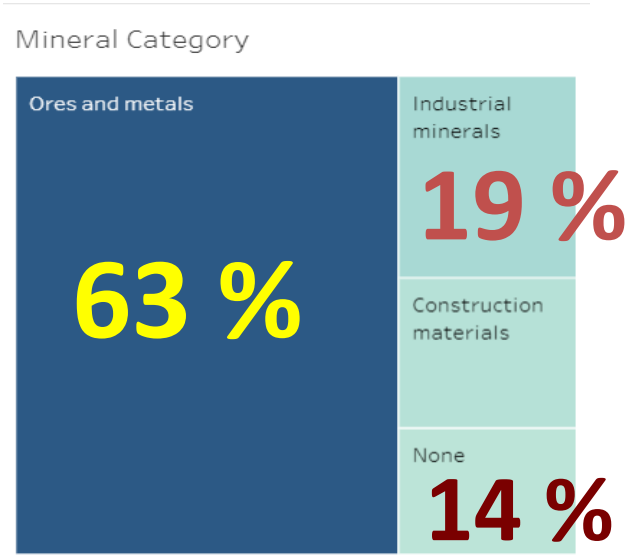
Dashboard



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ERA-MIN Joint Calls

Funded transnational R&I projects

Benefits

Testimonials from

Project coordinators

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EU co-funded ERA-MIN Joint Call 2021

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RAW MATERIALS FOR THE SUSTAINABLE DEVELOPMENT AND THE CIRCULAR ECONOMY

22 Transnational R&I funded projects

Project duration: May 2022 – April 2025

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EU co-funded Joint Call 2021

Distribution of projects by topics and countries/regions

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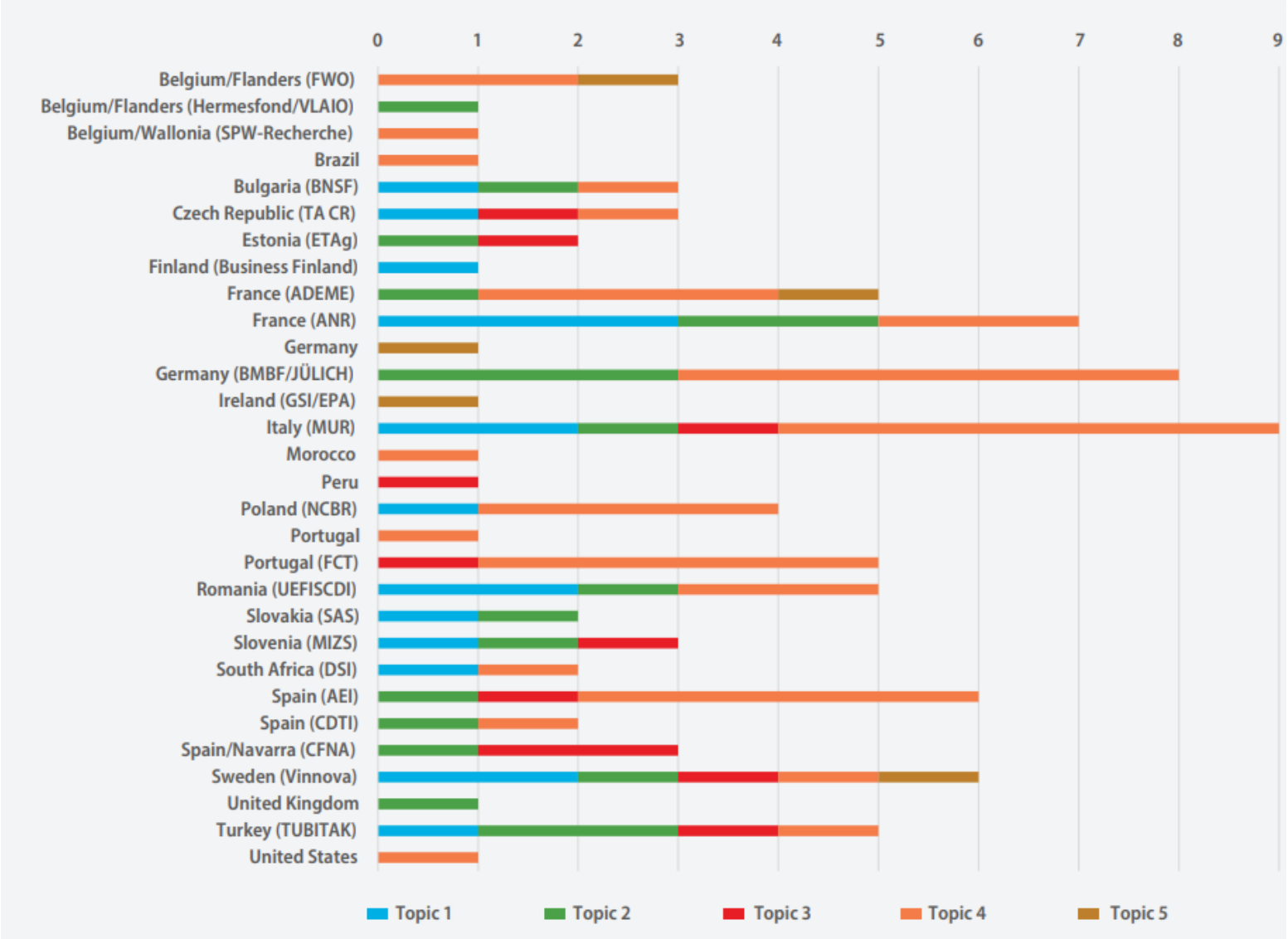
Call topics:

1. Supply of raw materials from exploration and mining
2. Circular Design
3. Processing, Production and Remanufacturing
4. Recycling and Re-use of End-of-Life Products
5. Cross-cutting topics

Learn more about partnerships at https://www.era-learn.eu/



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ERA-MIN Joint Calls

collaborative R&I projects - examples

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Raw Materials for the Sustainable Development and the Circular Economy

Project summaries

https://www.era-min.eu/results

https://www.era-learn.eu/network-information/networks/era-min3/eu-co-funded-era-min-joint-call-2021

TRL 3 – 5

2Boss - Toward sustainable batteries based on silicon, sulfur and bio-mass derived carbon

TRL 3 – 5

INN4MIN - Development of innovative and sustainable approaches applied to the recovery of gold and critical elements from ores and spent printed circuit boards

TRL 2 – 4

TailingR32Green - Mine tailings Reprocessing, Revalorization and Risk reduction connecting innovations in metal recovery, geopolymerization, ceramics & sealing layers

TRL 3 – 6

ABtomat - UTILIZATION OF ALUMINIUM BEARING RAW MATERIALS FOR THE PRODUCTION OF ALUMINIUM METAL, OTHER METALS AND COMPOUNDS

TRL 3 – 5

CO2TREAT -Accelerated CO2 Treatment of alkaline residues for low carbon binders

TRL 4 – 7

Cider - Circular product design for automotive components made from recycled and sustainable composite material

TRL 4 – 6

RecycleBIM - Integrated Planning and Recording Circularity of Construction Materials through Digital Modelling

TRL 5 – 7

AI-COSTSQO . Artificial Intelligence and Combined Survey Techniques for Stone Quarries Optimization

TRL 5 – 6

Scandere - Scaling up a circular economy business model by new design, leaner remanufacturing, and automated material recycling technologies

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ERA-MIN3 Joint Transnational Call 2023

Raw Materials for Sustainable Development and the Circular Economy

Call topics

ERA•MIN3

Raw Materials for the Sustainable Development and the Circular Economy

Call launch event, 14 Dec 2022 available on ERA-MIN3 Youtube Channel

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ERA-MIN Joint Call 2023

Raw materials for **sustainable development** and the **circular economy**

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Raw Materials for the Sustainable Development and the Circular Economy

- **Needs-driven** research on non-fuel, non-food raw materials (minerals and metals extracted from primary or secondary sources)
- Answering to one or several of the **call topics**
- **Technical** or **non-technical projects**
- Proposals should deliver **convincing arguments** on the potential **impact** of their innovation and research

Additional focus areas:

- Critical raw materials
- Secure supply of primary raw materials
- Digitalization
- Social and environmental sustainability

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ERA-MIN Joint Call 2023

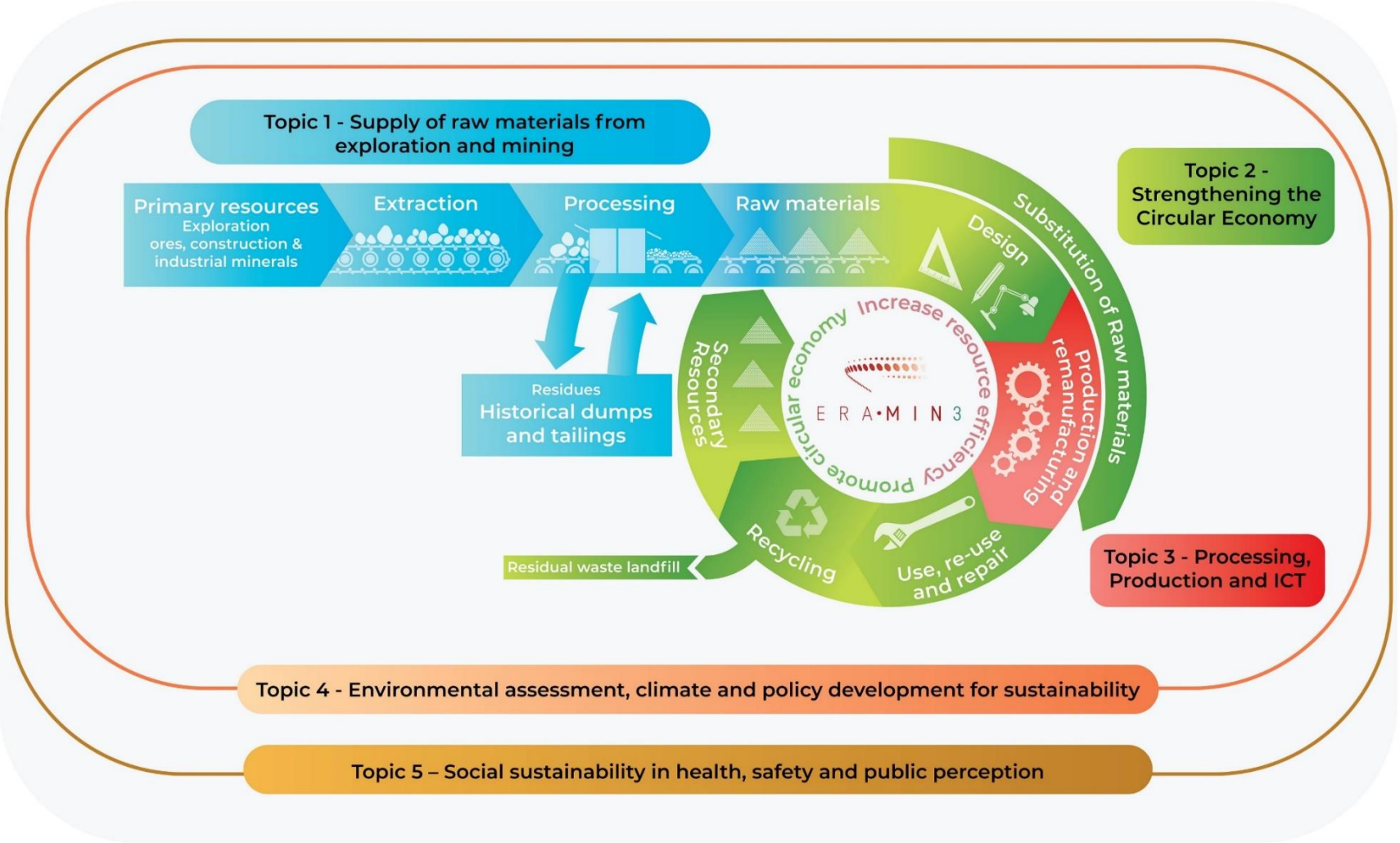
SCOPE

The scope of the 2023 Call is needs-driven research addressing non-fuel, non-food raw materials: metallic minerals; construction materials; industrial minerals.

- ✓ Call budget (virtual common pot): **€13.6M**
- ✓ **23** Participating **Funding Organisations**

March 30, 2023
Deadline for proposal submission.

Check all the information on ERA-MIN **website**



ERA-MIN Joint Call 2023

5 topics
Updated from the last call

ERA•MIN 3
Raw Materials for the Sustainable Development and the Circular Economy

Primary

Topic 1. Supply of raw materials from exploration to mining

Secondary

Topic 2. Strengthening the circular economy

Production

Topic 3. Processing, Production and ICT

Topic 4. Environmental assessment, climate and policy development for sustainability

Topic 5. Social sustainability in health, safety and public perception

Systems wide

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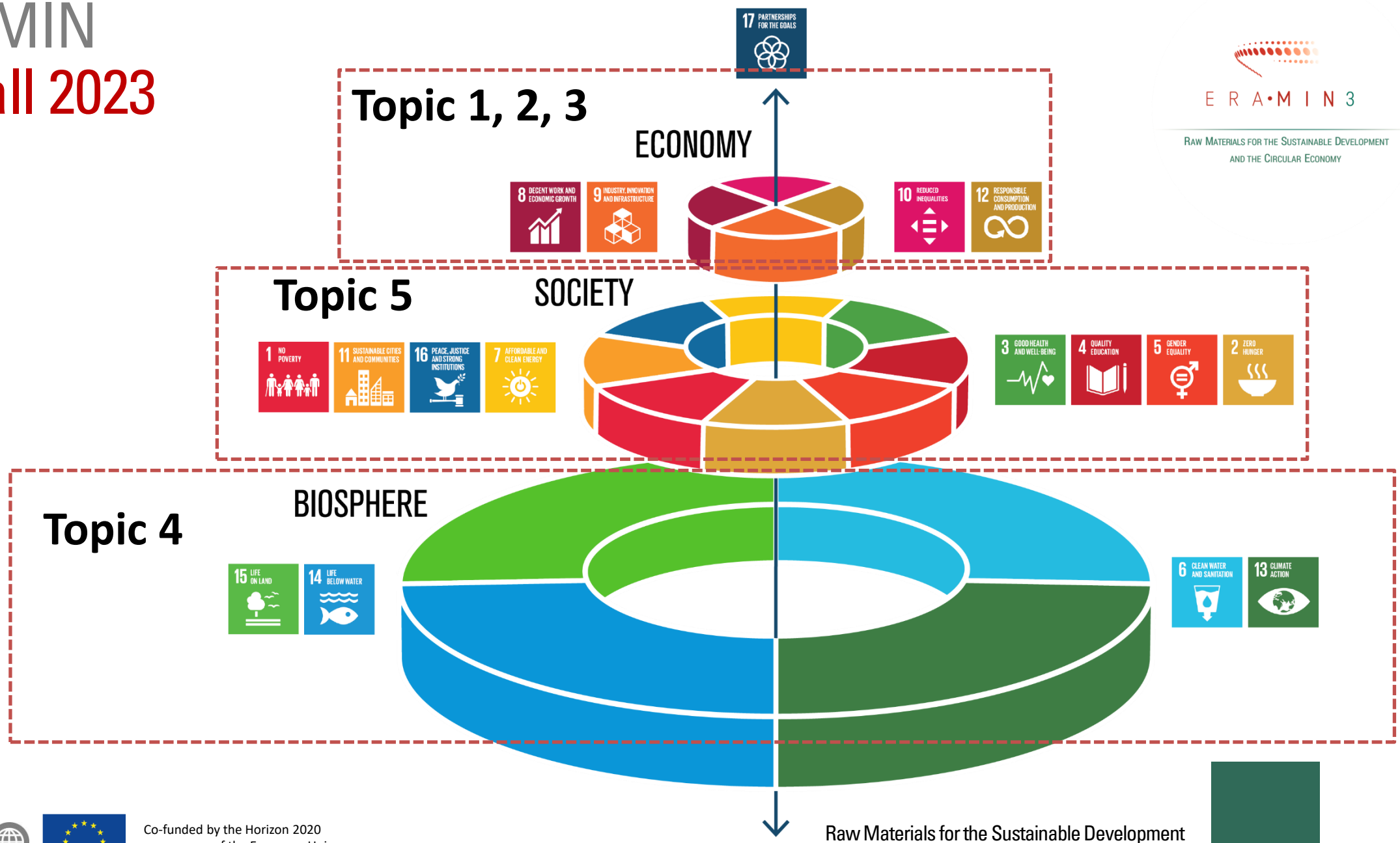
ERA-MIN
Joint Call 2023



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Raw Materials for the Sustainable Development and the Circular Economy

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Raw Materials for the Sustainable Development and the Circular Economy

Graphics by Jerker Lokrant

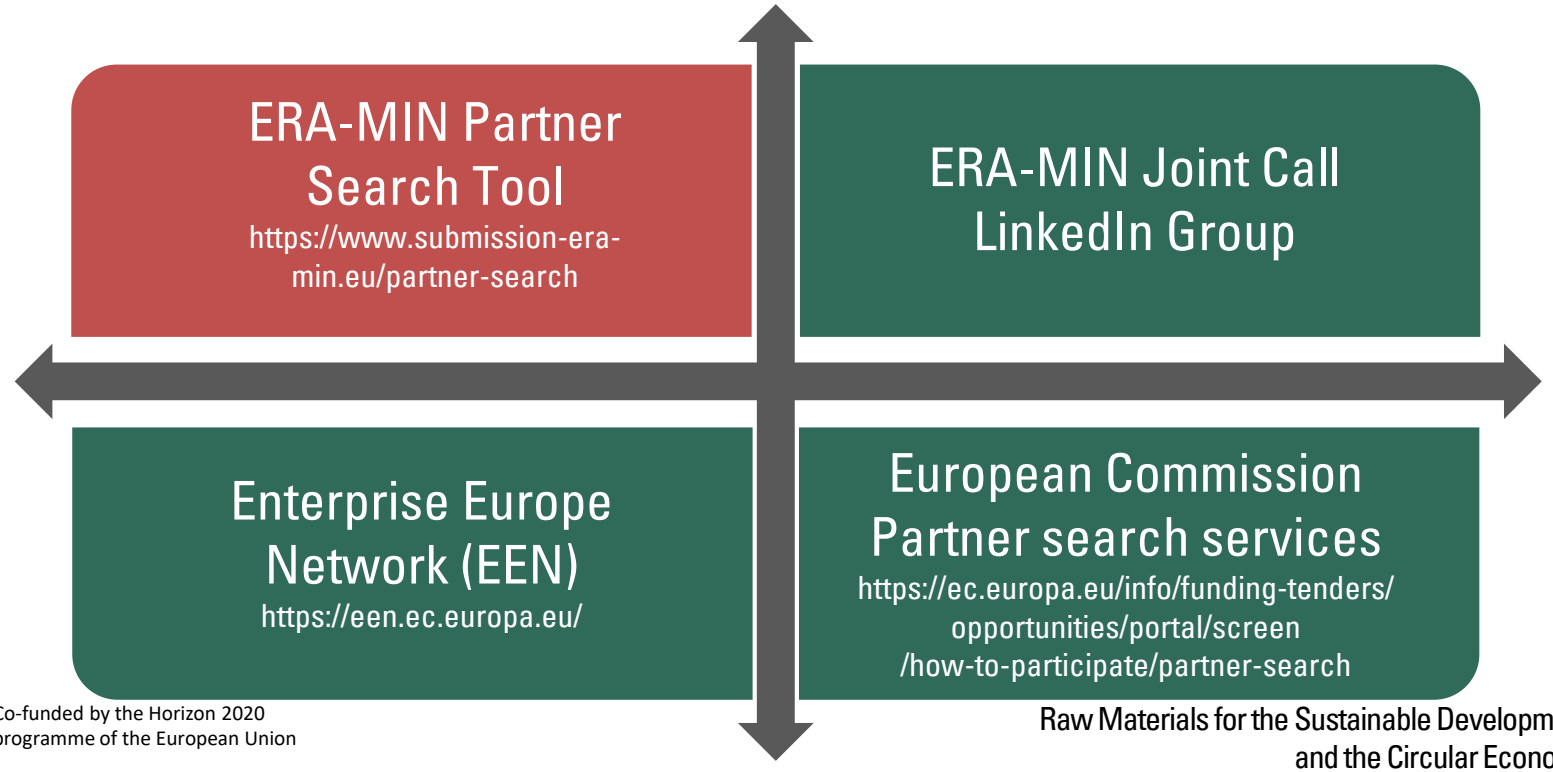
Joint Call 2023

ERA-MIN 3
Raw Materials for the Sustainable Development and the Circular Economy

Who can apply:

A consortium must consist of at least **three partners eligible** and **requesting funding** from the participating Funding Organisations of at least **three countries** whereof at least one is an EU Member State or EU Associated Country (Turkey) named in the Call.

Online Partner Search tools



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Get involved

Contact & Info

- ❑ If you are a **research performing organisation** (including enterprises) , **submit an application** to the 2023 Call for transnational R&I proposals;
- ❑ If you are a **raw materials related project or initiative, liaison with ERA-MIN3** to promote synergies.
- ❑ If you are a **research funding organisation** (Ministry or Agency), join the planned **EU co-funded Partnership on Raw Materials in 2025 (Horizon Europe)**.

Partner Search Tool

https://www.submission-era-min.eu/partner-search

Newsletter

https://www.era-min.eu/newsletter

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@eranetmin3

https://www.linkedin.com/in/era-min/

https://www.era-min.eu/

CONTACT DETAILS

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Project Manager

Mr. Stefano Amaral

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FCT Fundação para a Ciência e a Tecnologia

Criticality assessment, circularity, EU open strategic autonomy and Sustainable Product Initiative: how to join the dots?

Umberto EYNARD, Thibaut MAURY-MICOLIER, Fulvio ARDENTE, Fabrice MATHIEUX

European Commission - Joint Research Centre – Land Resources and supply chain assessment Unit (Ispra – IT)

European Commission

Content of the presentation

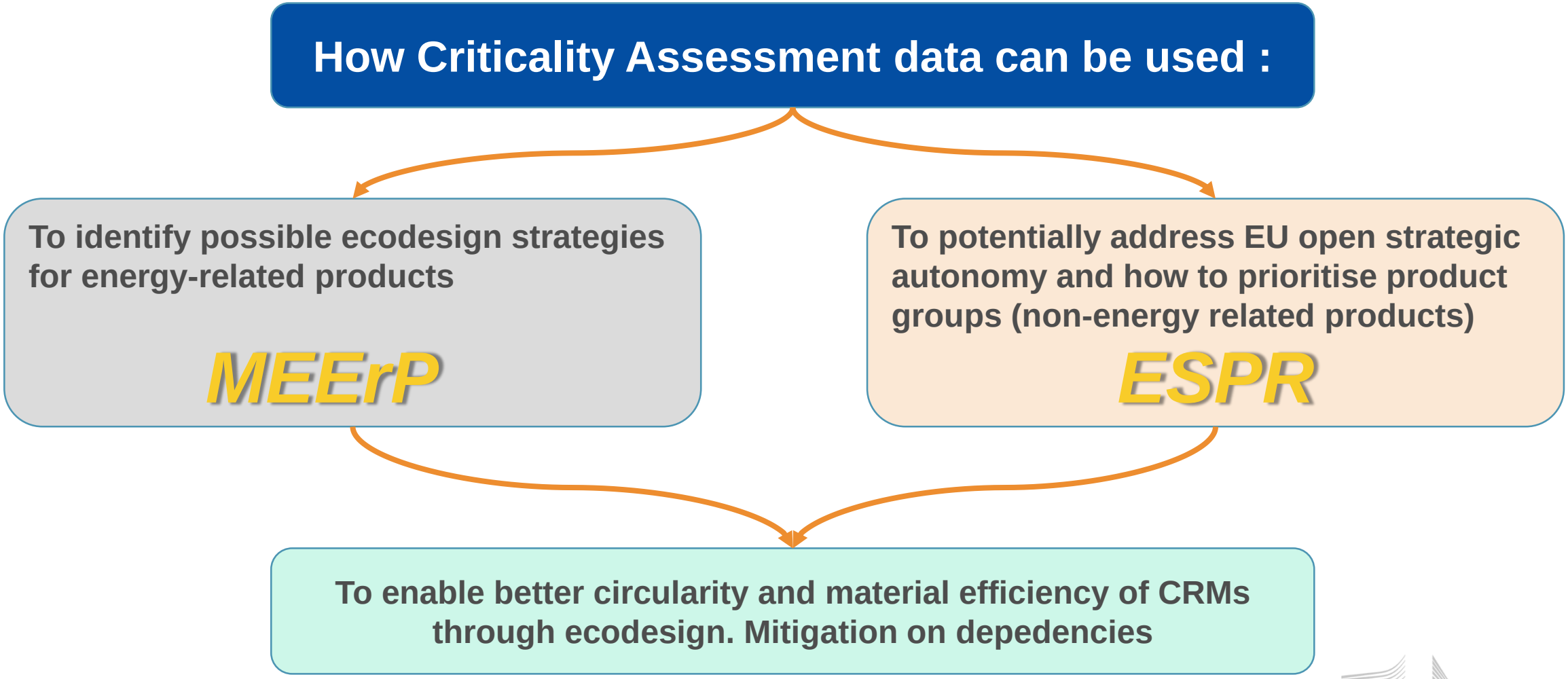
- Policy Context
- Goal of the analysis
- Proposed approaches
  - Methodology of Ecodesign of Energy related Products (MEErP): step by step approach
  - Ecodesign of Sustainable Products Regulation (ESPR) – Strategic autonomy: screening approach
- Perspectives and conclusions

Policy Context

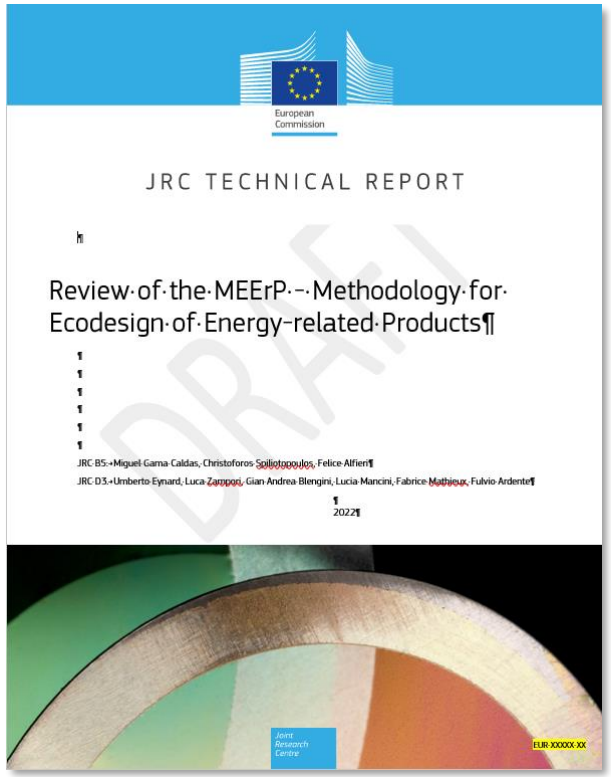
- Action Plan on Critical Raw Materials (COM(2020)474)
- Battery regulation proposal (COM(2020) 798 final)
- Europe's resilience and open strategic autonomy (COM(2021)66)
- Ecodesign Directive – new Methodology of Ecodesign for energy-related products (**MEErP**)
- **Green Deal Industrial Plan 2023**
  - **Critical Raw Materials Act**, expected March 2023
  - **Ecodesign for Sustainable Products Regulation (ESPR)** proposal

"The Commission will give a high priority to work on net-zero technologies under the existing and future Ecodesign working plans"

Goals of the analysis



Methodology for Ecodesign of Energy related Products (MEErP)



MEErP is a techno-economic-environmental assessment of specific **energy-related product groups**. Potential implementation of the Ecodesign legislation for specific product group.

2020-2023 Revision of the methodology.

- Alignment with EF method for material efficiency and EoL modelling (CFF)
- Review of the current **CRMs** approach

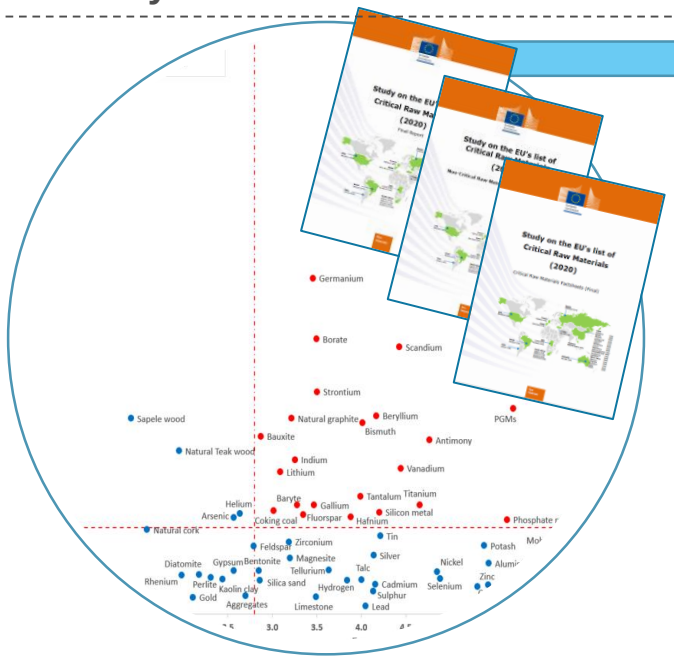
New **step-by-step approach on CRMs:**

- **Sequential screening of CRM** contained in the product under scrutiny
- Based on the results of **Criticality Assessment 2020** (and future 3 yearly updates)
- **Suggestions of strategies** supporting the mitigation of criticality

 https://susproc.jrc.ec.europa.eu/product-bureau//sites/default/files/2021-09/MEErP_revision_draft_report_Task_1-2_24-06-2021.pdf

Screening approach (MEErP)

Step 0: numerical results of the latest **EC Criticality Assessment**



Step 1: shortlist the **CRMs potentially in the product group**

Material	Application	Share	NACE-2 sector	EOL-RIR	EOL-RR	High priority	RECYCLE MORE or ADD RECYCLED CONTENT	DECLARE Q-TY	EXTEND LIFE
Beryllium	Electronic and telecommunications equipment	42%	C26 - Manufacture of computer, electronic and optical products	0%	0%	X		X	
Beryllium	Transport and Defence : Vehicle electronics	17%	C26 - Manufacture of computer, electronic and optical products	0%	0%	X			
Cobalt	Magnets	7%	C27 - Manufacture of electrical equipment	22%	32%	X	X		
Cobalt	Battery	3%	C27 - Manufacture of electrical equipment	22%	32%	X	X		
Dysprosium	Magnets	100%	C25 - Manufacture of fabricated metal products, except machinery and equipment	0%	0%	X		X	
Erbium	Lighting	26%	C27 - Manufacture of electrical equipment	1%	1%	X		X	
Europium	Lighting	100%	C27 - Manufacture of electrical equipment	38%	34%	X		X	
Fluorspar	Refrigeration and air conditioning	9%	C27 - Manufacture of electrical equipment	1%	4%	X			
Gadolinium	Magnets	38%	C25 - Manufacture of fabricated metal products, except machinery and equipment	1%	1%	X		X	
Gadolinium	Lighting	25%	C27 - Manufacture of electrical equipment	1%	1%	X		X	
Gadolinium	Magnetic Resonance Imaging - MRI	8%	C21 - Manufacture of basic pharmaceutical products and pharmaceutical preparations	1%	1%	X			
Gallium	Integrated circuits	70%	C26 - Manufacture of computer, electronic and optical products	0%	0%	X		X	
Gallium	Lighting	25%	C27 - Manufacture of electrical equipment	0%	0%	X		X	
Gallium	CIGS solar cells	5%	C26 - Manufacture of computer, electronic and optical products	0%	0%	X			
Germanium	Infrared optics	47%	C26 - Manufacture of computer, electronic and optical	2%	12%	X		X	

Step 2: **collect quantitative data** on the Bill of Material for the shortlisted CRMs

Step 3: look at available information from criticality assessment to define **possible strategies**, e.g.:

- Declare quantity (when data is not available)
- Extend lifetime (especially in the case of low substitutability)
- Improve recyclability and/or recycled materials (especially in the case of low substitutability)

European Commission

Ecodesign for Sustainable Product Regulation (ESPR) & Strategic autonomy

- ESPR (Commission's proposal from March 2022):

  "Making sustainable products the norm"

- JRC assessed a list of product groups (intermediary and final products) to prioritise suitable candidates under the ESPR

- The assessment is based on estimated **environmental impacts and improvement potentials**

- "**EU Strategic Autonomy**" has been added as one of the key criteria to select the most relevant end-use and intermediary products

➔ Enabling better **circularity through eco-design** is one of the **mitigation measures** to **decrease EU dependency** on strategic materials

https://susproc.jrc.ec.europa.eu/product-bureau//product-groups/635/documents

Strategic autonomy – initial Methodology

- A simplified "***Bill of Materials***" (max. 4 elements) for the 22 products under investigation

- ***4 evaluation criteria for CRMs***:
  1. ***Supply risk*** ***(quantitative)***
  2. ***Product share (%) in the total EU demand for the targeted CRM (quantitative)***
  3. ***CRM's quality grade used for the product (qualitative)***
  4. ***Estimated supply share from Russia and/or Ukraine (quantitative)***

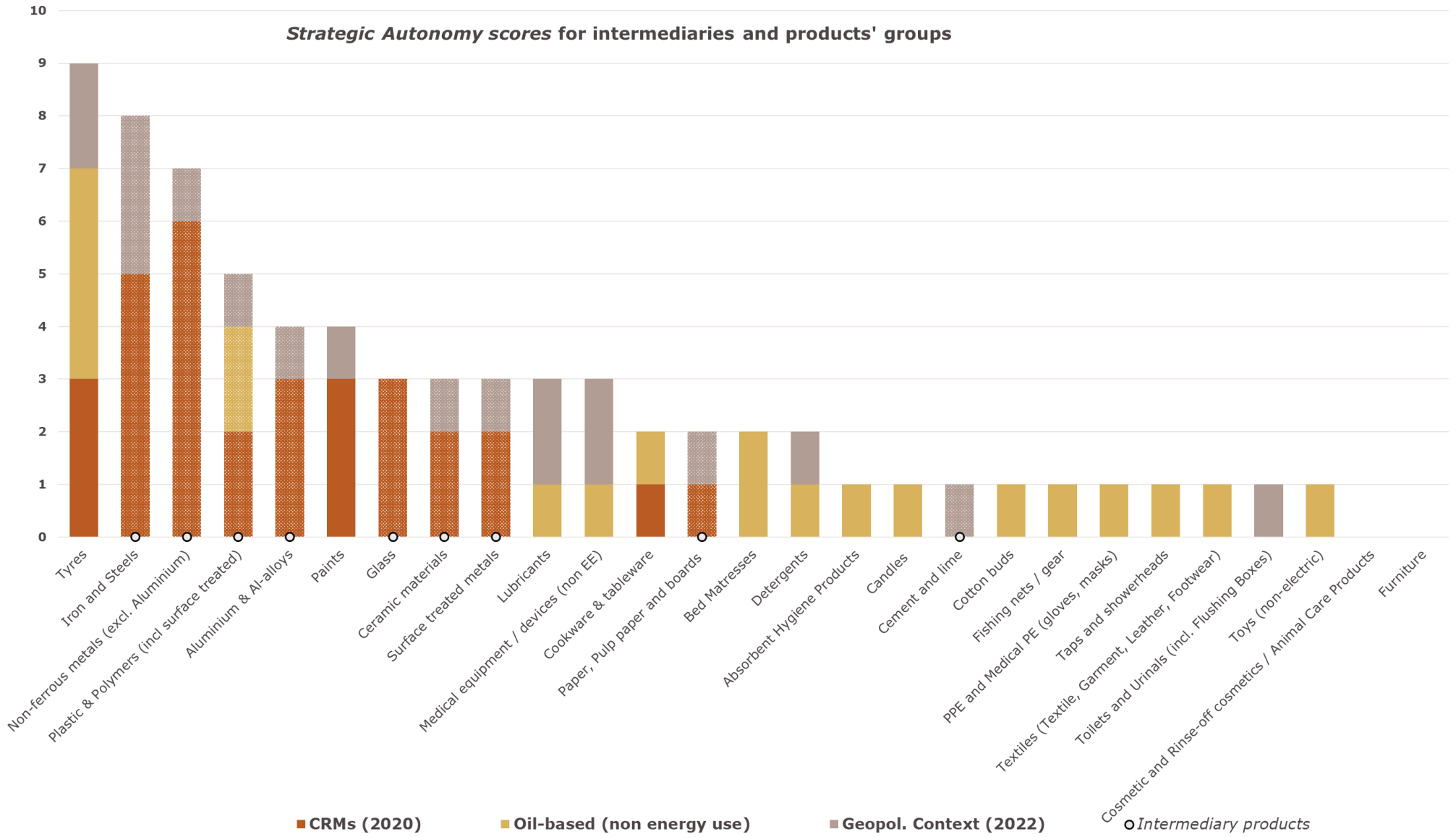
- ***3 evaluation criteria for other materials***:
  1. **The material is derived from crude oil (yes/no)**
  2. ***Product share (%) in the total EU demand for targeted materials***
  3. ***Estimated supply share from Russia and/or Ukraine (quantitative)***

CRMs | Other materials

	#1	#2	#3	#4
Product group name	**CRM1**	**CRM2**	**other (strategic) material #1**	**other (strategic) material #2**
Tyres	Natural rubber	-	Synthetic rubber	Carbon black
Iron and Steels	Coking coal	Niobium	Vanadium	Chromium
Non-ferrous metals (excl. Aluminium)	Magnesium	Titanium	Copper	Cobalt
Plastic & Polymers (incl surface treated)	Titanium	Baryte	Crude oil	-
Aluminium & Al-alloys	Bauxite	Silicon metal	Fluorspar	Scandium
Paints	Titanium	Baryte	Talc	Cobalt
Glass	REEs	Borate	Lithium	Silica sand
Ceramic materials	Yttrium	Borate	Kaolin clay	Zirconium
Surface treated metals	Tungsten	Phosphorus	Chromium	Zinc
Lubricants	Lithium	Natural graphite (flake)	Mineral oil	-
Paper, Pulp paper and boards	Baryte	-	Kaolin clay	Talc
Bed Matresses	Natural rubber	-	PU foam	-
Detergents	Phosphate rock	-	Sodium salts	Chemicals (organic compounds)
Absorbent Hygiene Products	-	-	Natural cellulose fibres (cotton)	Synthetic fibers
Cotton buds	-	-	Natural cellulose fibres (cotton)	Plastics
Fishing nets / gear	-	-	Synthetic fibers	-
PPE and Medical PE (gloves, masks)	Natural rubber	-	Synthetic fibers	Natural cellulose fibres (cotton)
Taps and showerheads	-	-	Stainless steel	Plastics
Textiles (Textile, Garment, Leather, Footwear)	-	-	Natural cellulose fibres (cotton)	Synthetic fibers (from crude oil)
Toilets and Urinals (incl. Flushing Boxes)	-	-	Kaolin clay	Feldspar
Toys (non-electric)	Natural rubber	-	Plastics	-
Cosmetics	-	-	Talc	Sodium salts
Furniture	Natural rubber	-	Natural teak wood	Sapele wood

- ***Impact assessment:*** *Definition of a score for each material of the BoM based on 3 features:*
  1. Critical raw materials embedded in the product group
  2. Crude oil and petroleum products (non-energy use)
  3. Geopolitical context (2022)

Strategic autonomy – initial ranking



European Commission

Conclusions and perspectives

- Systematic consideration of CRMs and strategic autonomy aspects under Ecodesign legislation on its way, with relevant data and indicators;

- Relevant circular strategies (e.g. use less/substitution, report quantities, making CRMs rich components dismantlable, recycling efficiency for CRMs, recycled content, etc.)

  - still to be identified at product group level;
  - and translated into mandatory product requirements

  } work starting now

- Future:

  - information collected during studies applying the MEErP could fill data gaps and contribute to future revision of the EU CRMs lists;
  - How the EoL modelling of MEErP based on Environmental Footprint method (Circular Footprint Formula) could help monitoring resource efficiency
  - Potential ability to assess how circularity can effectively mitigate criticality

Keep in touch

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Thank you

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POUR LES FILIÈRES INDUSTRIELLES

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A PUBLIC/PRIVATE PARTNERSHIP

Stéphane Bourg, Director

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ifp Energies nouvelles

ADEME
AGENCE DE LA TRANSITION ÉCOLOGIQUE

le cnam

ifri
institut français des relations internationales
1979 2019

conseil national de l'industrie
CSF Mine & Métallurgie

FRANCE 2030

OFREMI at a glance

French public policy support
Industry strategic Intelligence support

Public-Private partnership
A dedicated team

Facing sovereignty and responsibility Challenges

A dedicated information and analyses system for an up to date knowledge

The context

Increased frequency and intensity of HAZARDS + **Increase in VULNERABILITY factors** = **Increase in major RISKS**

#1 Repeated major unanticipated crises

#2 Effects of competition between value chains

#3 Complexity of value and supply chains

#4 Explosion of metal needs and dependence on Europe

#5 Need for coordination between French actors

! Risk for French and European industrial sovereignty

! Risk of supply disruption and loss of strategic autonomy

! Ethical and reputational issues if non-virtuous value chains

OFREMI's Offer

CURRENT SITUATION	OFREMI'S SOLUTION	
	Tools	Profits
# Complexity of value and supply chains	• Mapping of reserves, resources • Mapping of transformation capacity • Mapping of raw materials flows • Market monitoring, price dynamics	Monitoring and multi-criteria analysis of value chains characterizing the international offer
# Explosion of metal needs and dependence on Europe # Competition between value chains	• Materials/technologies intensity database • Materials flows/uses database • Potential evolution of demand	Analysis of the uses and material needs of current and emerging technologies
# Repeated major unanticipated crises	• Criticality analyzes • Resilience tests • Identification of crises • Preventive actions • Risk quantification and monitoring (KPI)	Analyzes of the vulnerability of value chains and resilience of downstream strategic industrial sectors
# Need for coordination between French actors	• A place for consultation and action between industry and public authorities	A public-private partnership and a unifying dynamic across the entire value chain

OFREMI's Assets

OFREMI
OBSERVATOIRE FRANÇAIS
DES RESSOURCES MINÉRALES
POUR LES FILIÈRES INDUSTRIELLES

- ✓ A complete vision of value chains "from mine to object" and including recycling loops
- ✓ Permanent studies and the possibility of carrying out custom studies
- ✓ Integration of economic, environmental and geopolitical dimensions
- ✓ Vulnerability analysis and search for supply alternatives
- ✓ Integration of secondary resources
- ✓ Permanent monitoring of all strategic mineral resources for French industrial sectors (~40)

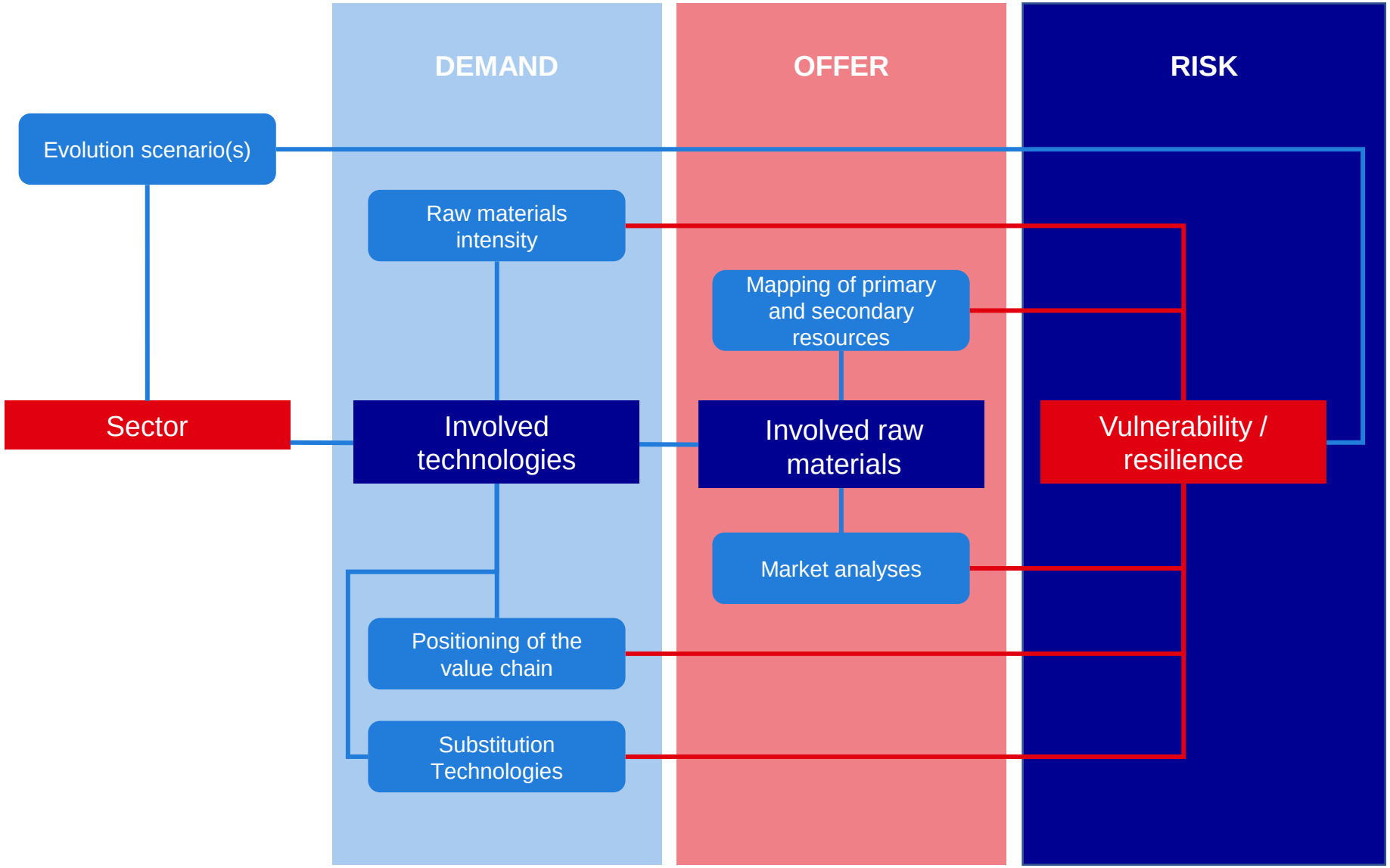
OFREMI's Services

Monitoring

OFFER	DEMAND	RISK ANALYSES
Mapping of world production	Technologies raw materials intensity survey	Criticality factsheets
Market analyses	Evolution of the demand in raw materials	Anticipation of geopolitical crises
Raw materials price monitoring	Evolution of uses/end-uses of strategic raw materials	Regulation monitoring, Responsible supply
Geographic sector surveys		

OFREMI's Services

Industry Sector Analyses

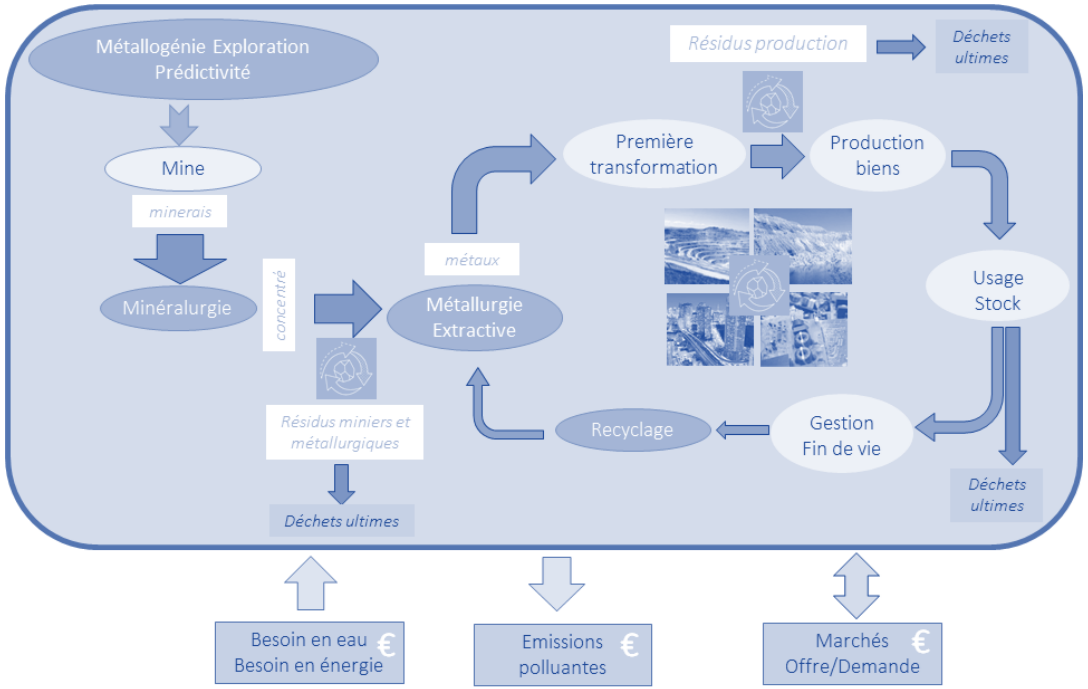


OFREMI and R&D: methodological developments

- To Develop **observation methods** to assess and predict the mineral resources life cycle along industrial value chains
- To **identify innovative actions** in order to make the Mineral Resources available in the frame of a more circular economy

Methodological developments

- Criticality Assessment
- Metals/materials market analysis
- Development of LCA approaches adapted to RM sector
- Material Flow dynamics & Material footprint
- Analysis of industrial value chains
- Scenarios



Connected to French Priority Research Programs and Equipment (PEPR) with CNRS and universities

- Sous-Sol (underground)
- Recyclage
- Hydrogène
- …

Links with the BRGM « scientific Programme on RM and The Circular Economy »

To conclude

A dedicated team for an always up-to-date knowledge

- Public-private pooled funding model
- Collective definition of strategic priorities
- Multi-partner expertise (BRGM, CEA, IFPEN, Ademe, IFRI, CNAM)
- 20-25 dedicated staff

A response to issues of sovereignty and responsibility

- Fragility of value chains when facing major crises
- Explosion of demand for mineral resources and metals
- Need to identify alternatives within the chains
- Responsible and sustainable supplies imposed by the climate, health and geopolitical crises

Services

- Analysis of metal supply and changes in demand
- Monitoring of supply chains from the mine to the object
- Risk Quantification
- National alert system
- Tailored services to meet specific challenges

Reliable and up-to-date data

- Knowledge of value chains
- Material flow
- Stimulate reflection on
  - strategic stocks
  - Industrial projects (mines, processing industries, etc.)
  - Mining Resource Diplomacy
  - Alternative supply channels