


Welcome!

We will begin shortly...

 Please mute your microphones

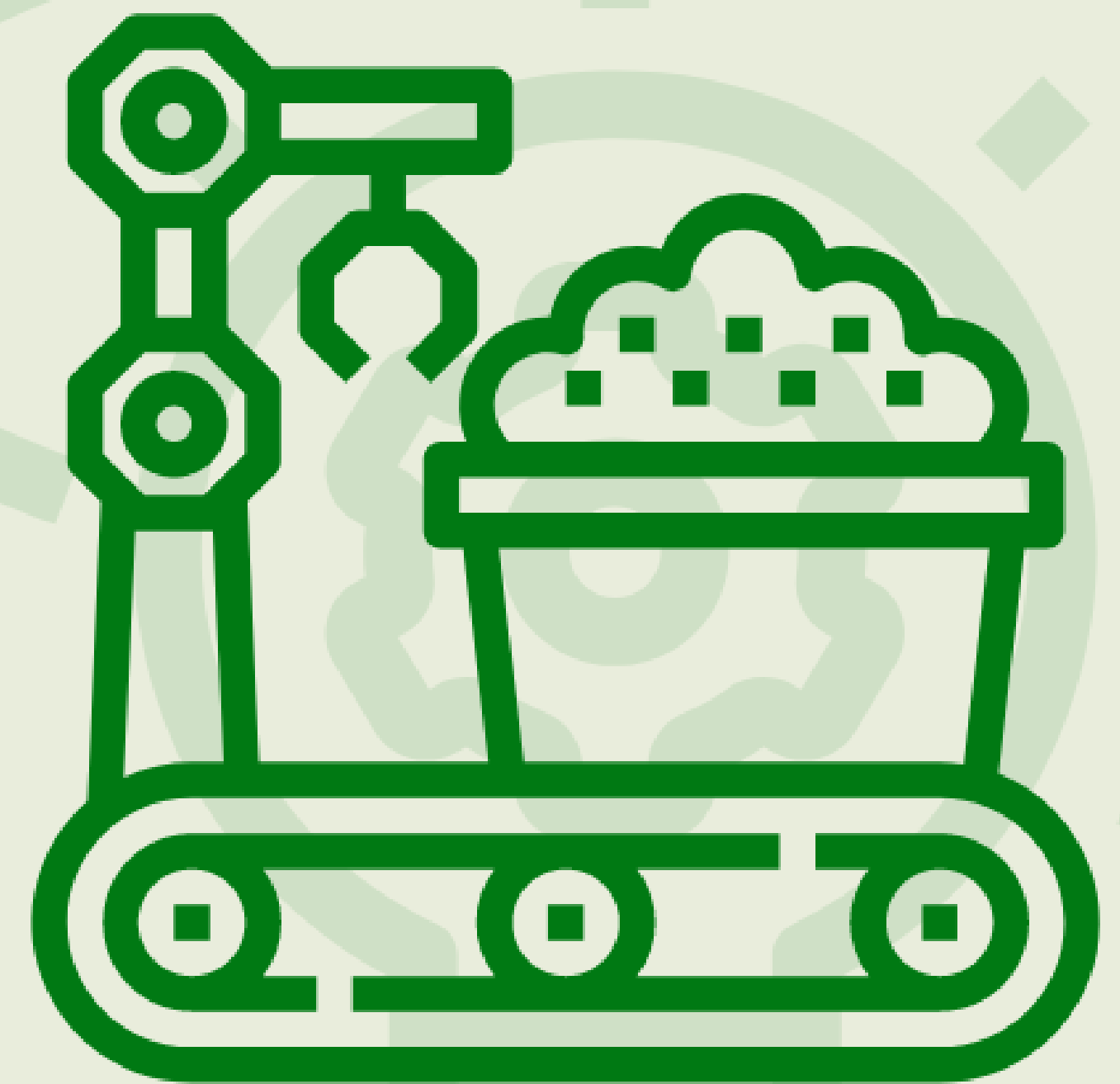
 Write your questions in the Zoom Chat



Paving the way for strategic autonomy

The role of R&I on materials for
the clean energy transition

Thursday 1 December 2022, 10:00 – 11:30





Agenda

Time	Title	Speaker
10:00 – 10:05	Welcome & Introductory remarks	Rosita Zilli, Senior Policy Officer - <u>EERA</u>
10:05 – 11:05	Panel Discussion Moderates: Adel El Gammal, Secretary General - EERA	Daniel Cios , Policy Officer, Energy Intensive Industries and Raw Materials - <u>DG GROW, European Commission</u>
		Dumitru Fornea , Rapporteur “Opinion on Critical Raw Materials” – <u>European Economic and Social Committee</u>
		Amada Montesdeoca Santana , Director of Open Innovation – <u>UMICORE</u>
		Sawako Nakamae , Coordinator of the Joint Programme on Advanced Materials and Processes for Energy Applications (AMPEA) – <u>EERA</u>
11:05 – 11:25		Q&A Session
11:25 – 11:30	Concluding remarks	Ivan Matejak , SUPEERA Project Coordinator - <u>EERA</u>



Introductory Remarks

Rosita Zilli, EERA

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What is your background?



What do you expect to primarily take out from this webinar?



► Panel Discussion

Moderates: Adel El Gammal,
EERA

Daniel Cios

Policy Officer, Energy Intensive Industries and Raw Materials

European Commission, DG GROW



EU R&I on raw materials for the clean energy transition

1 December 2022

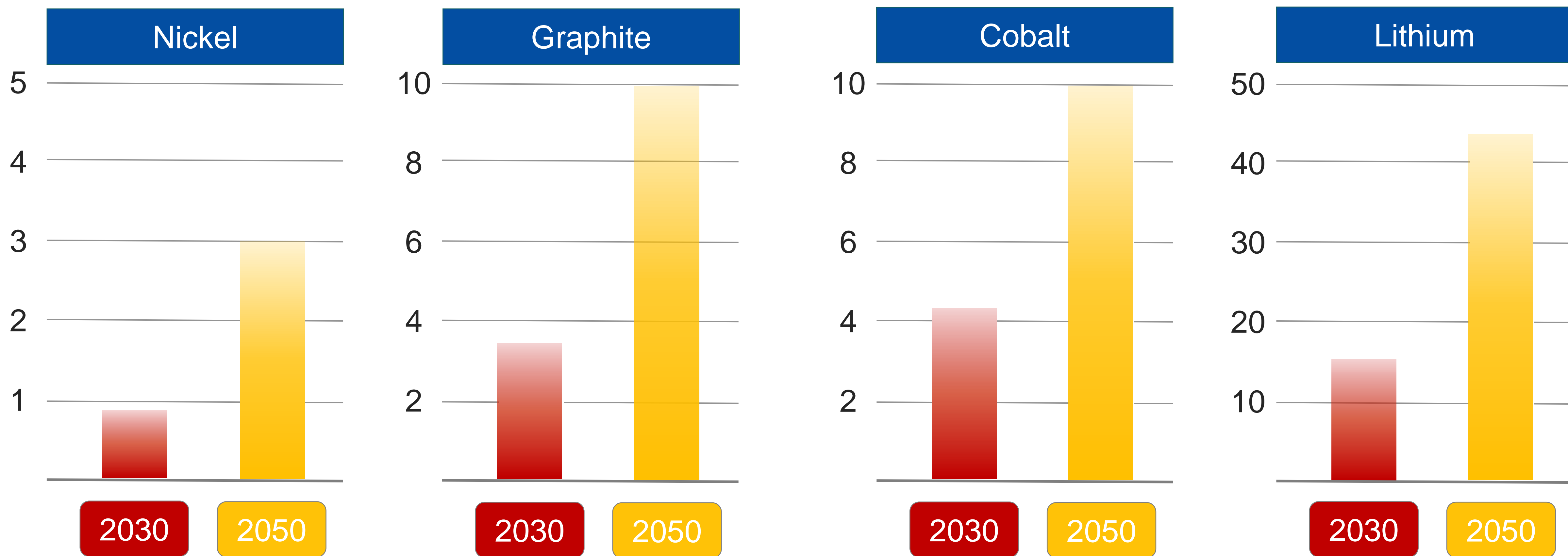
SUPEERA webinar

Daniel Cios

Policy Officer

*GROW I.1 – Energy Intensive Industries
and Raw Materials*

The demand for battery raw materials will increase



Source:
Critical Raw Materials for Strategic Technologies and Sectors in the EU; A Foresight Study.
Joint Research Centre, European Commission, 2020

Action Plan on Critical Raw Materials

10 actions to ensure Europe's access to raw materials

1. **European Industrial Alliances**
2. **Develop sustainable financing criteria for mining**
3. Research and innovation on waste processing, advanced materials and substitution
4. Map the potential supply of secondary CRM from EU stocks and wastes
5. **Identify priority mining and processing projects for critical raw materials in the EU**
6. **Develop expertise and skills**
7. Deploy Earth observation programmes for exploration, operation and post-closure environmental management
8. Develop research and innovation projects on exploitation and processing of CRMs
9. Develop strategic international partnerships to secure CRMs supply
10. Promote responsible mining practices for CRMs

Raw Materials in Horizon 2020 (2014-2020)

~ EUR 600 mln budget

Exploration	9 projects	EUR 55 mln
Extraction	15 projects	EUR 121 mln
Processing	19 projects	EUR 151 mln
Substitution	4 projects	EUR 19 mln
Reuse, recycling, recovery	6 projects	EUR 57 mln
Policy support	22 projects	EUR 43 mln

Raw materials innovation for the circular economy: sustainable processing, reuse, recycling and recovery schemes

TOPIC ID:

CE-SC5-07-2018-2019-2020

<https://ec.europa.eu/info/funding-tenders/opportunities/portal/screen/opportunities/topic-details/ce-sc5-07-2018-2019-2020;callCode=H2020-SC5-2018-2019-2020;freeTextSearchKeyword=;matchWholeText=true;typeCodes=1;statusCodes=31094501,31094502,31094503;programmePeriod=null;programCcm2Id=31045243;programDivisionCode=31047972;focusAreaCode=null;geographicalZonesCode=null;programmeDivisionProspect=null;startDateLte=null;startDateGte=null;crossCuttingPriorityCode=null;cpvCode=null;performanceOfDelivery=null;sortQuery=submissionStatus;orderBy=asc;onlyTenders=false;topicListKey=topicSearchTablePageState>

Raw Materials in Horizon Europe (2021-2027)

**1st Work Programme
2021-2022**
~ EUR 300 mln budget

6 topics in 2021

EUR 159.5 mln

7 topics in 2022

EUR 130.2 mln

**2nd Work Programme
2023-2024**
~ EUR 250 mln budget*

***Not adopted yet. Info based on the pre-published version available on:**
https://research-and-innovation.ec.europa.eu/document/download/c9c7b186-e31b-43b0-9825-b4bfc4d86946_en?filename=ec_horizon-europe-cluster-4-work-programme-2023.pdf

6 topics in 2023

EUR 118 mln

**Opening: 1 Dec 2022
Deadline: 20 Apr 2023**

5 topics in 2024

EUR 91,2 mln

**Opening: 19 Sep 2023
Deadline: 7 Feb 2024**

Raw Materials topics in Horizon Europe

~ EUR 300 million, 2021-2022

Opening: 22 Jun 2021
Deadline: 23 Sep 2021

Opening: 12 Oct 2021
Deadline: 30 Mar 2022

Innovation for responsible EU sourcing of **primary raw materials**

Monitoring and supervising system for exploration and future exploitation activities in the deep sea

Building **innovative value chains** from raw materials to sustainable products

Technological solutions for **tracking raw materials flows** in complex supply chains

Reducing **environmental footprint**, improving circularity in extractive and processing value chains

Earth observation technologies for the mining life cycle

Building **EU-Africa partnerships** on sustainable raw materials value chains

Developing digital platforms for the small scale extractive industry

Identifying future **availability of secondary** raw materials

Streamlining cross-sectoral **policy framework** throughout the extractive life-cycle environmentally protected areas

Developing **climate neutral and circular raw materials**

Innovative solutions for efficient use **and enhanced recovery** of mineral and metal by-products from processing of raw materials

Sustainable and innovative mine of the future

Thank you



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Slide xx: element concerned, source: e.g. Fotolia.com; Slide xx: element concerned, source: e.g. iStock.com

Paving the way for innovation on Critical materials for the autonomy: The role of R&I on materials for the clean energy transition

SUPEERA

webinar

Paving the way
for strategic autonomy:

*The role of R&I on materials
for the clean energy transition*

Dumitru Fornea, EESC



Explosive demand growth could lead to supply shortages in raw materials

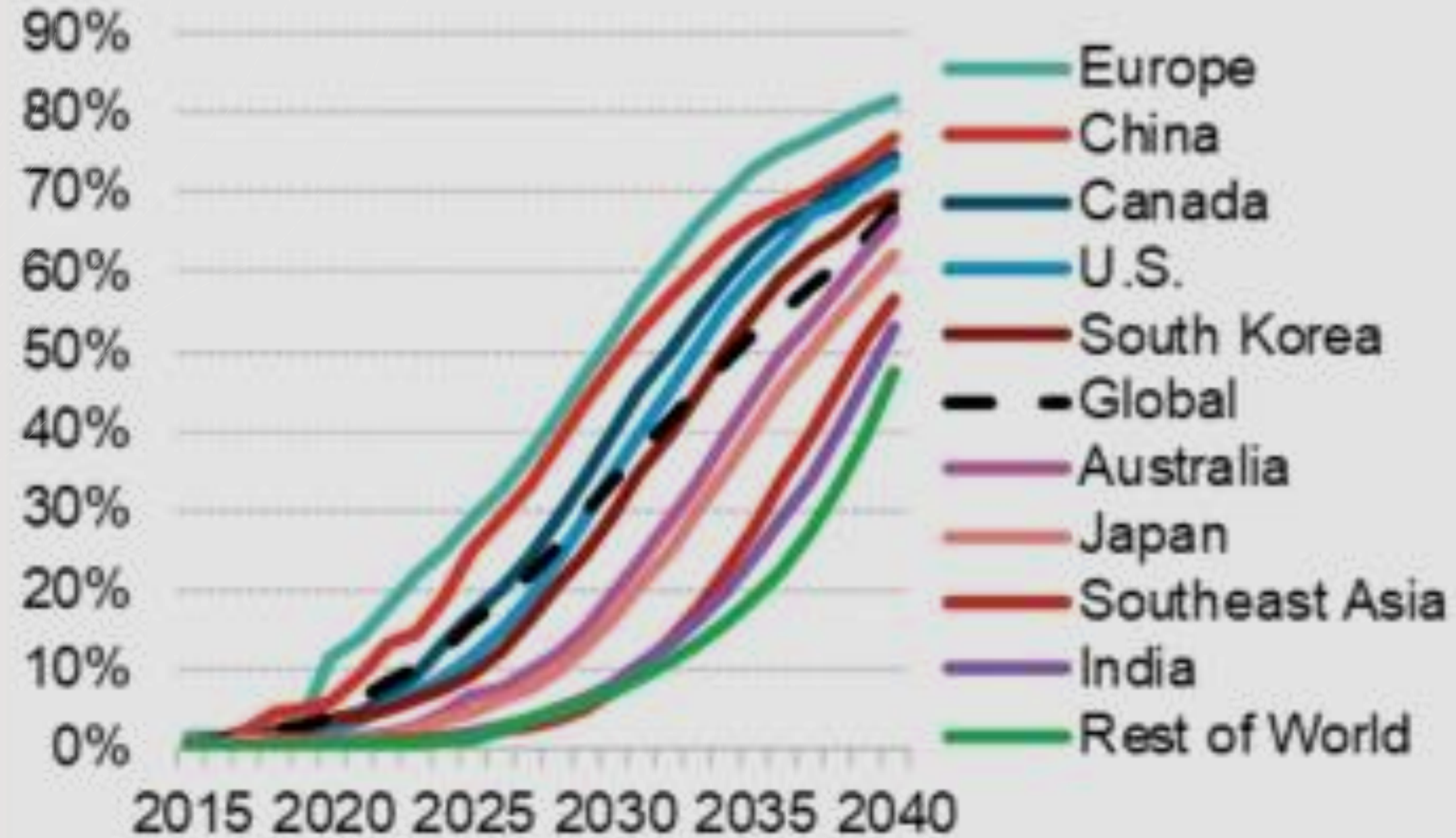
Green Economy



"We are facing a very unusual transition because we have never seen such explosive growth rates of demand in such a short time frame," Phillipe Varin, chairman of the World Material Summit that is being held in Nancy from Thursday to Saturday (16-18 June), told EURACTIV. [mykhailo pavlenko/Shutterstock]

Bloomberg New Energy Finance

EV share of new passenger vehicle sales outlook by market - Economic Transition Scenario



Source: BNEF. Note: EVs include battery-electric and plug-in hybrid electric vehicles. Battery-electric vehicles represent 88% of total electric vehicle sales in 2030. Europe includes the EU, the U.K. and EFTA countries.



"There are 12 million passenger EVs, one million commercial EVs, and over 260 million electric two- and three-wheelers on the road globally today."

Electric Vehicle Outlook 2021, BloombergNEF

Each megawatt of energy from a wind generator requires between 600 and 1000 kg of permanent magnets made of iron - boron - neodymium alloys

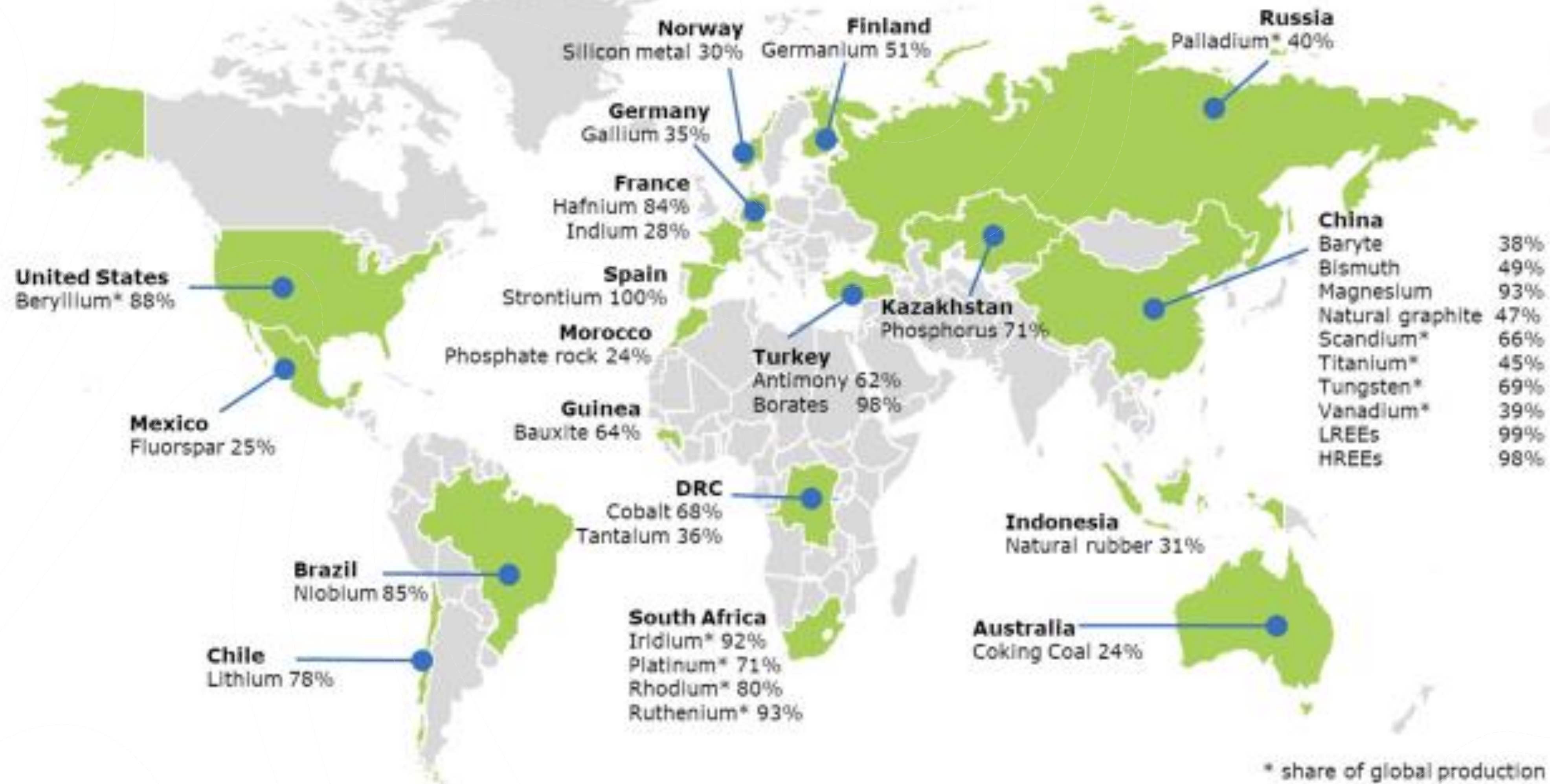


1 kg of neodymium
is needed for the hybrid
engine of a hybrid car

15 kg of lanthanum
for the batteries of
these cars



Countries accounting for largest share of EU supply of CRMs



Source: European Commission

2020 EC's list of critical raw materials (new as compared to 2017 in bold)

Antimony	Hafnium	Phosphorus
Baryte	Heavy Rare Earth Elements	Scandium
Beryllium	Light Rare Earth Elements	Silicon metal
Bismuth	Indium	Tantalum
Borate	Magnesium	Tungsten
Cobalt	Natural graphite	Vanadium
Coking coal	Natural rubber	Bauxite
Fluorspar	Niobium	Lithium
Gallium	Platinum Group Metals	Titanium
Germanium	Phosphate rock	Strontium



European Raw Materials Alliance

16,000 tonnes/year of rare earth magnets are imported by EU from China

98% of the EU's needs



Kazakhstan

Uzbekistan

Iran Kirghizstan

Afganistan

Pakistan

Nepal

India

Bhutan

Bangladesh

Myanmar
(Birmanian)

Sri Lanka

Mongolia

Bayan Obo Mining District

China

Coreea
de Nord

Coreea
de Sud

Japonia

Marea Ohotsk

Sea of Japan

Marea
Filipinelor



BAYAN OBO
MINING DISTRICT
白云鄂博矿区

WUBURI WULAN
HUDUGE
乌布日乌
兰呼都格



**Mining cobalt
Kolwezi DRC**

Source:
ROCKY KIRO K.

LinkedIn

YouTube

Source:
TIM MAUGHAN

**Toxic lake
Baotou, PRC**

#BayanObo



Kolwezi Mining Region - DRC





Country	Mine Production 2020	Reserves	% of Total Reserves
China	140,000	44,000,000	38.0%
Vietnam	1,000	22,000,000	19.0%
Brazil	1,000	21,000,000	18.1%
Russia	2,700	12,000,000	10.4%
India	3,000	6,900,000	6.0%
Australia	17,000	4,100,000	3.5%
United States	38,000	1,500,000	1.3%
Greenland	-	1,500,000	1.3%
Tanzania	-	890,000	0.8%
Canada	-	830,000	0.7%
South Africa	-	790,000	0.7%
Other Countries	100	310,000	0.3%
Burma	30,000	N/A	N/A
Madagascar	8,000	N/A	N/A
Thailand	2,000	N/A	N/A
Burundi	500	N/A	N/A
World Total	243,300	115,820,000	100%

Data: United States Geological Society (USGS)

**Rare Earths
Production
and Reserves**

Paris, le 8 novembre 2021, 7h30

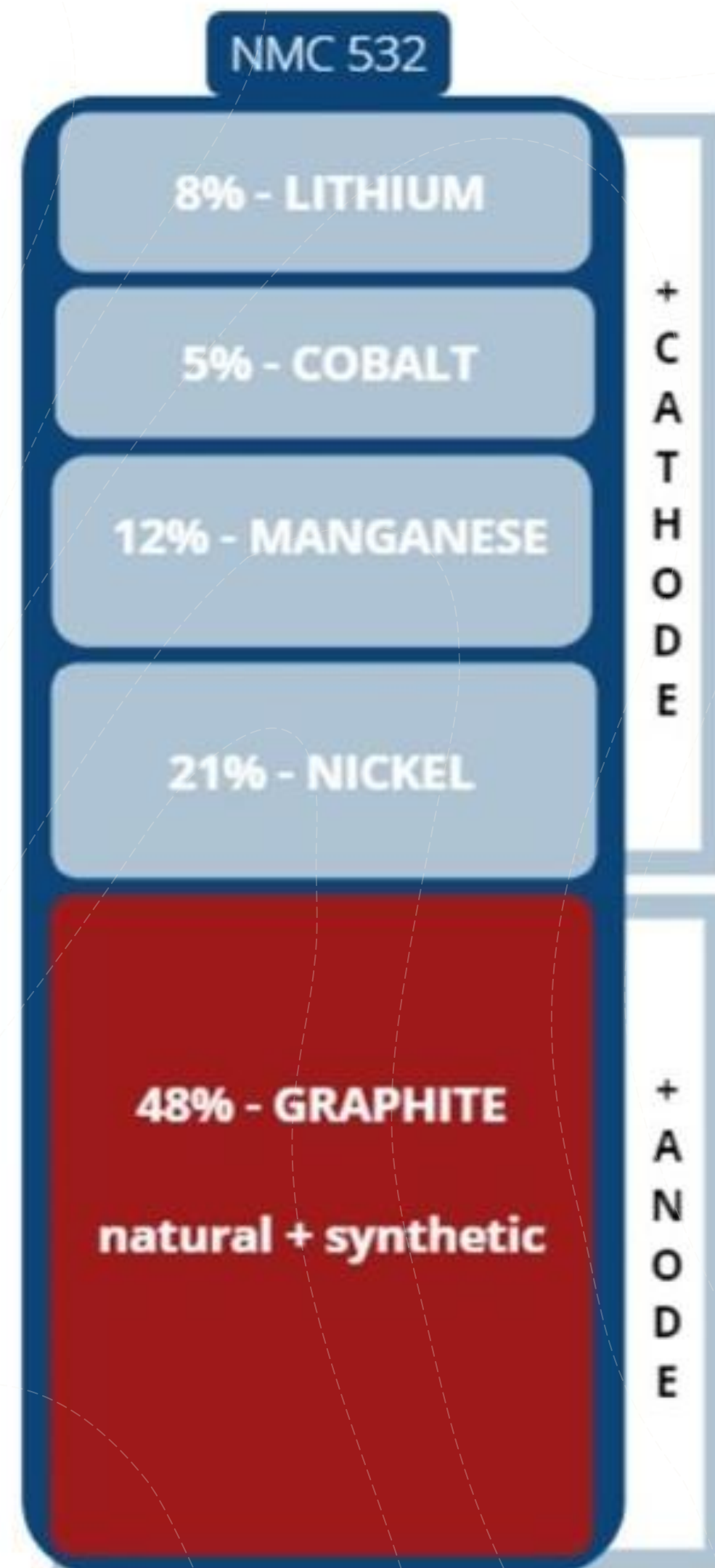
COMMUNIQUE DE PRESSE

Eramet accélère dans les métaux pour la transition énergétique en engageant la construction de son usine de lithium en Argentine

- Eramet relance la construction de son usine de lithium en Argentine, dans un contexte de **très forte croissance de la demande de ce métal critique de la transition énergétique** dont le groupe a fait son axe stratégique de développement
- La **construction de l'usine**, d'une production annuelle de **24 000 tonnes** de lithium (LCE¹), démarrera au **1^{er} trimestre 2022**, pour une **entrée en production début 2024**
- **Eramet contrôlera le projet**, avec une participation de 50,1 %, et assumera la responsabilité de la gestion opérationnelle ; son partenaire Tsingshan financera la construction de l'usine et entrera dans le projet à hauteur de 49,9 %. La production sera commercialisée par chacun des deux actionnaires à hauteur de leur quote-part de capital
- La taille du gisement permettra d'envisager des extensions ultérieures via la construction d'autres usines similaires par les deux partenaires

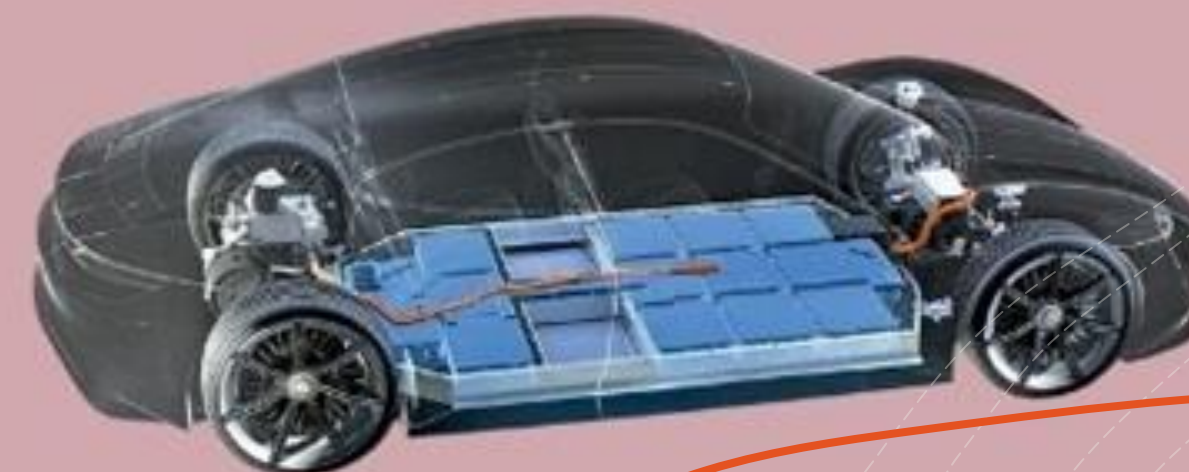
“The Lithium project site spans a total surface area of 500 km². This huge desert region, situated at an altitude of 3,800 m, is occasionally inhabited by around 15 people, the Puesteros. 50 km from there, the closest village, Santa Rosa de Pastos Grandes, has a population of 250.”

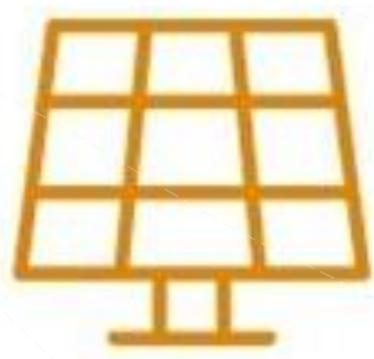
Critical Raw Materials in a lithium ion battery



Graphite is the anode material in a lithium ion battery and is **the single largest component.**

- Lithium ion battery contain 10-15 times more graphite than lithium
- There is up to 70kg of Graphite in electric vehicle



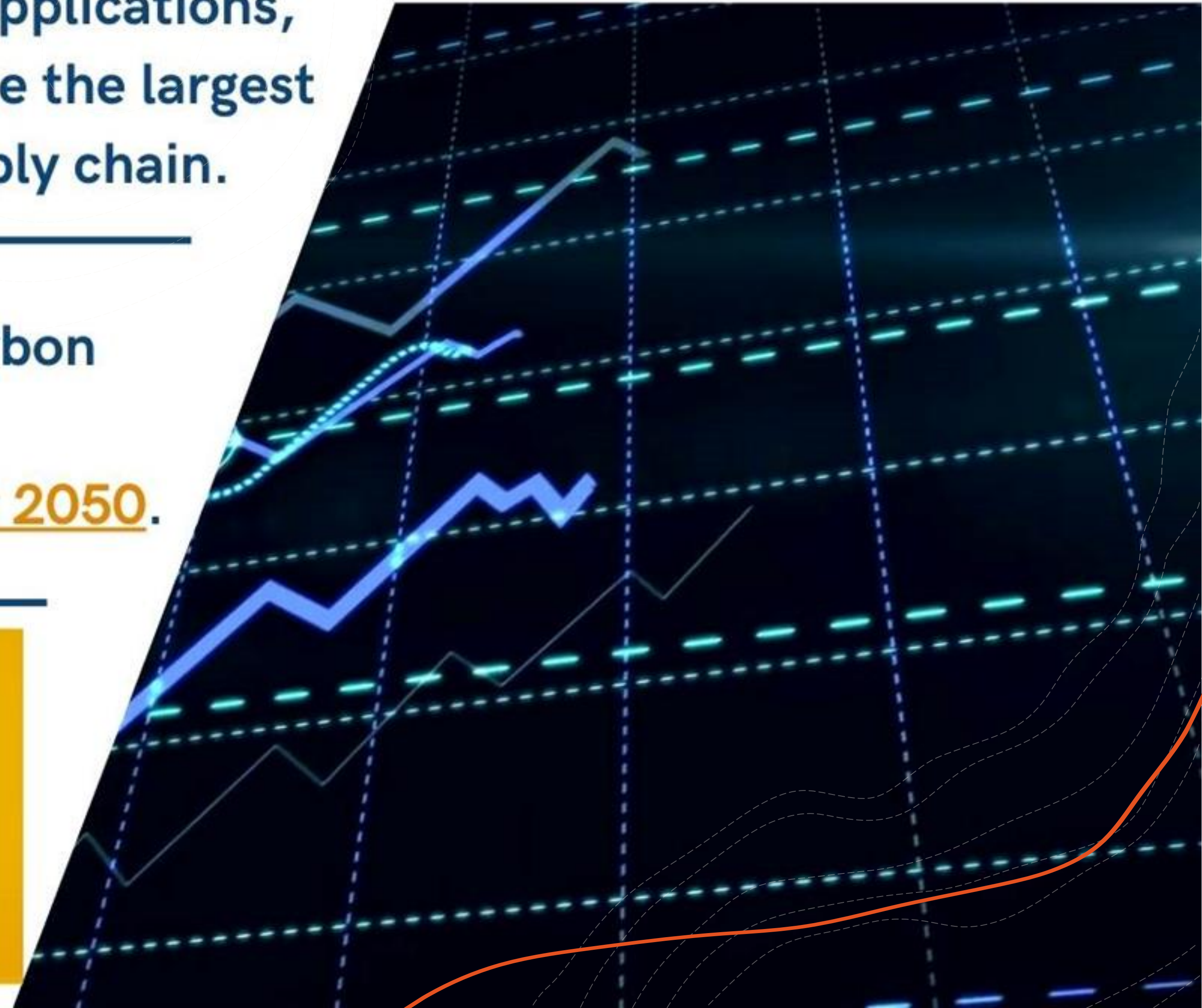


Alongside demand from energy storage applications, the battery industry is expected to become the largest sector of demand for the graphite supply chain.

The World Bank forecasts that low-carbon energy technologies will require 4.5 million tonnes of graphite per year by 2050.



500% increase over 2018 levels
318% increase over the total
graphite produced in 2019





Graphite - from critical to strategic

Materials

Natural Graphite



Synthetic Graphite

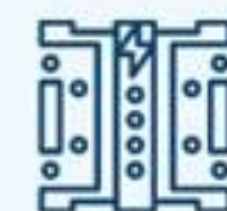


Technologies

Batteries



Fuel Cells



Wind



PV



Semiconductors



Steel recycling



Sectors

Renewables



E-mobility



Defence & Space



Metallurgy



Diversification of supply of natural graphite

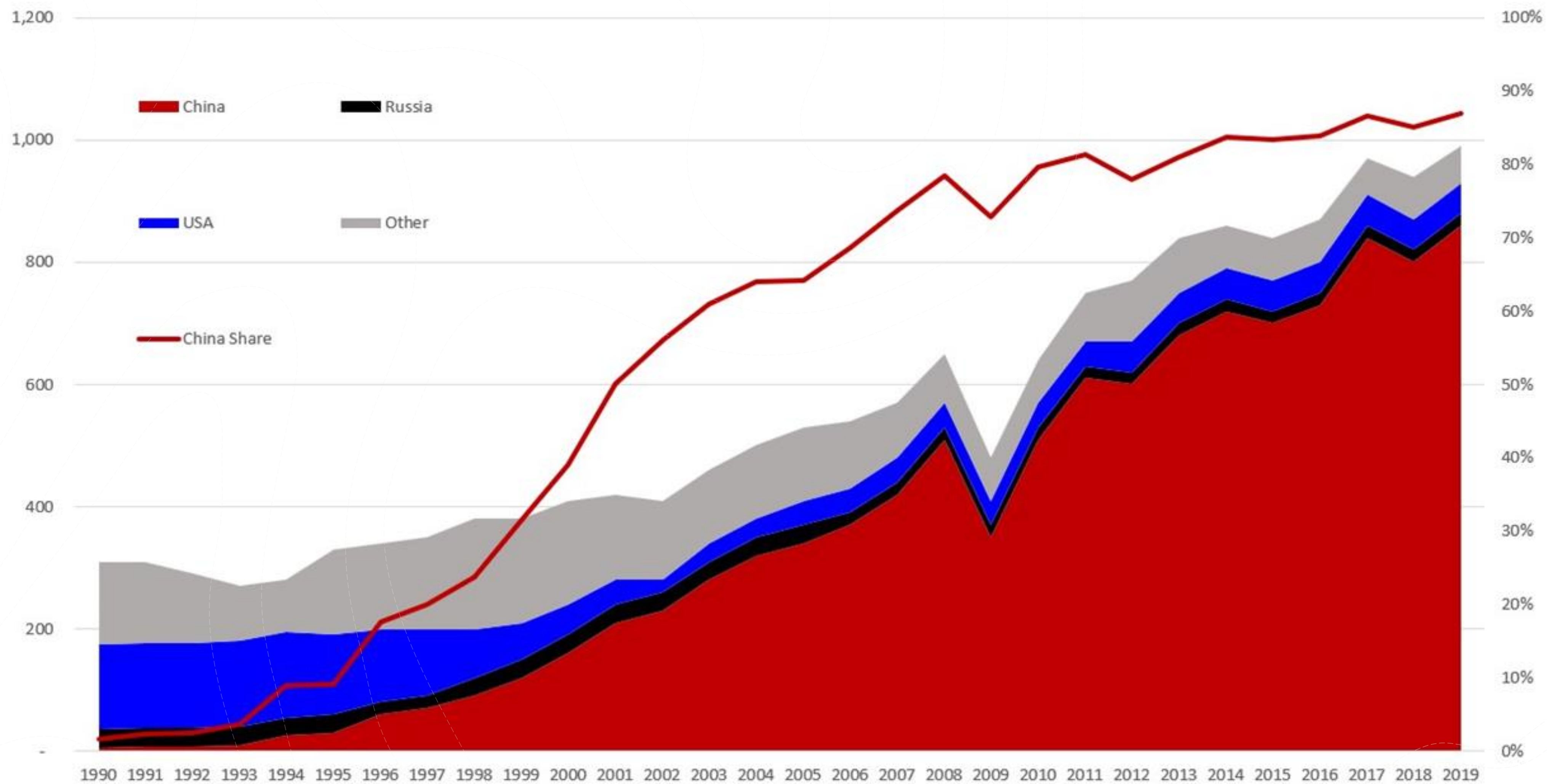
The past years have seen a reduction of the EU's dependency on Chinese sources of natural graphite since a number of mines worldwide have come on stream and exploration continues.

In the EU and EEA as well, several resources have been identified and some have come on stream or are in the process of being permitted and built.



Global Magnesium Supply since 1990

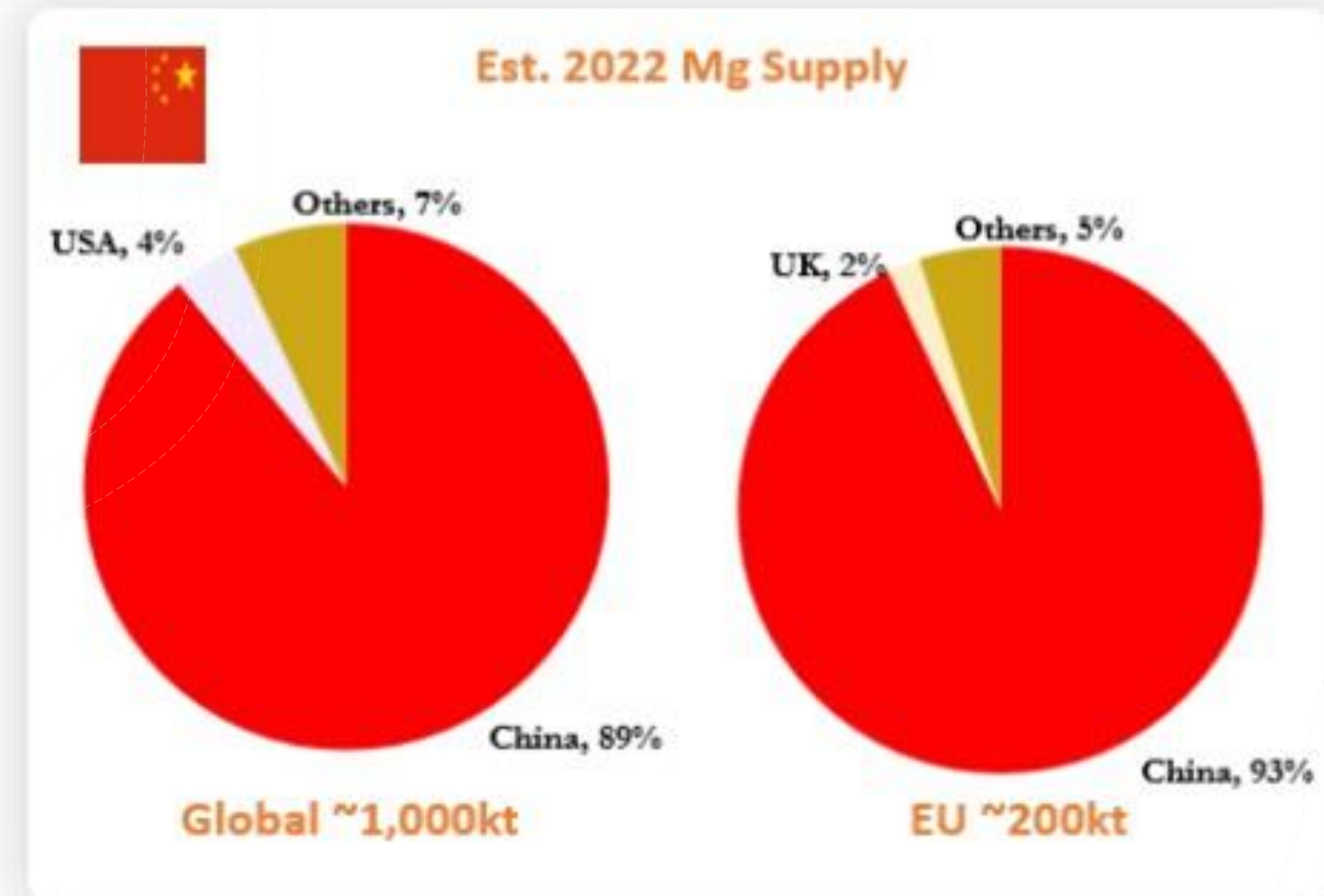
(kt/yr lhs, China share % rhs)



Magnesium as a CRM in EU



- Last smelter closed in France in 2001
- EU consumption is expected to reach **350-400 kt per year by 2035**
- EU is rich in MgO content minerals: dolomite, magnesite, carnallite, forsterite, brines
- EU misses a reliable technology able to produce primary Mg in a sustainable and economically feasible manner



Magnesium use in EU Industry :

- Aluminum & other alloys manufacturing
- Steel desulfurization
- Die-casting: Automotive, Aerospace, Defense
- Healthcare, Electronics

!!! Magnesium content in an EU produced car is lower than in an US or Chinese produced car



What's next?

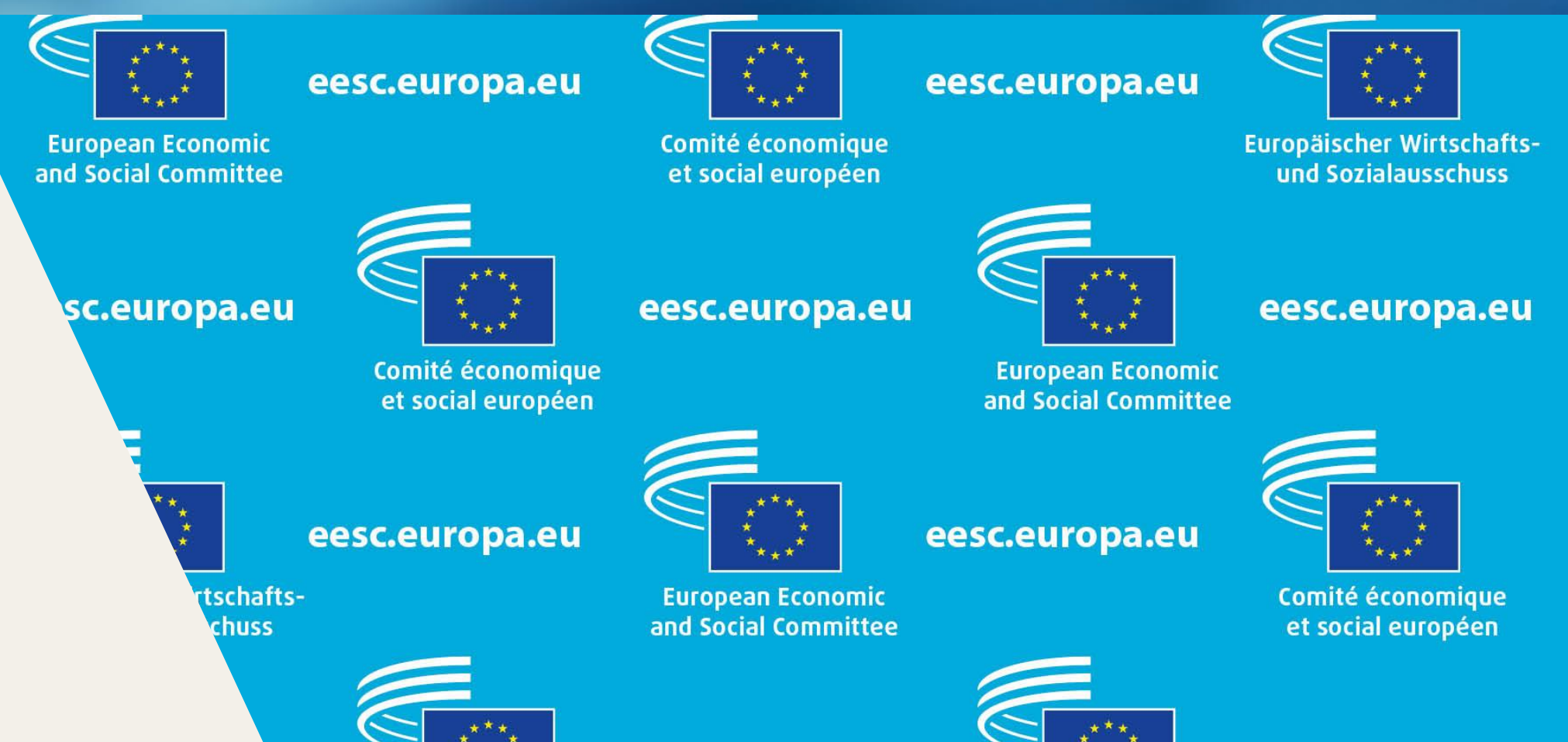
An Action Plan on Rare Earths Substitution



Thank you and see you soon !

Dumitru Fornea

**Member of the European
Economic and Social Committee**



UMICORE



Introducing

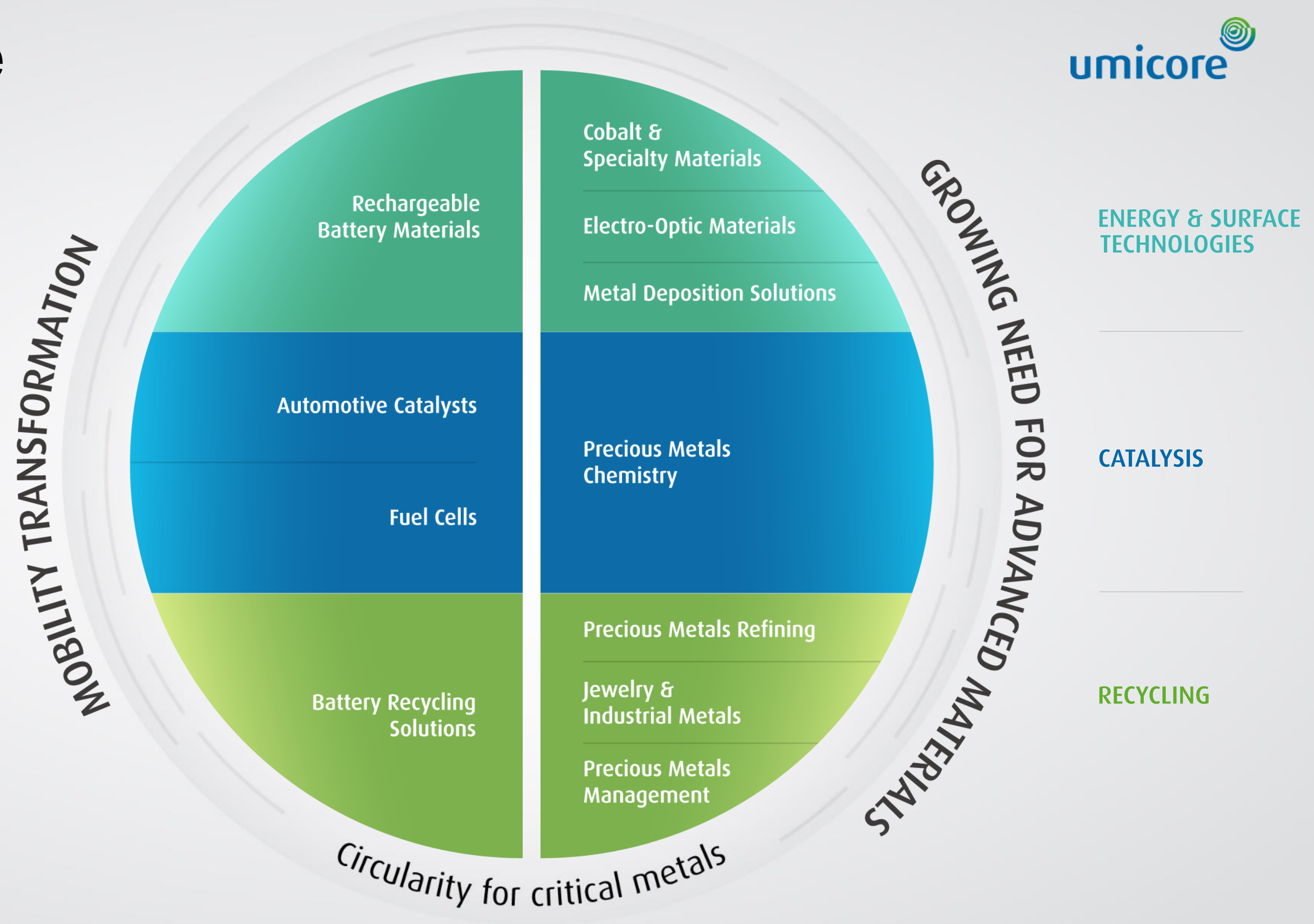
Umicore

SUPEERA webinar

Paving the way for strategic autonomy: The role of R&I on
materials for the clean energy transition

1st December 2022

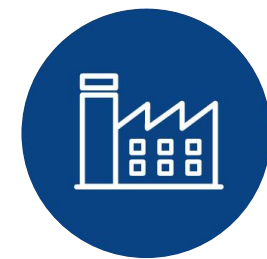
Who we are



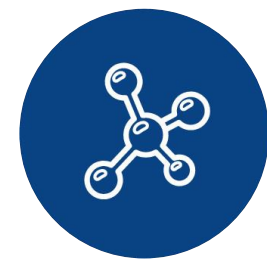
Some figures



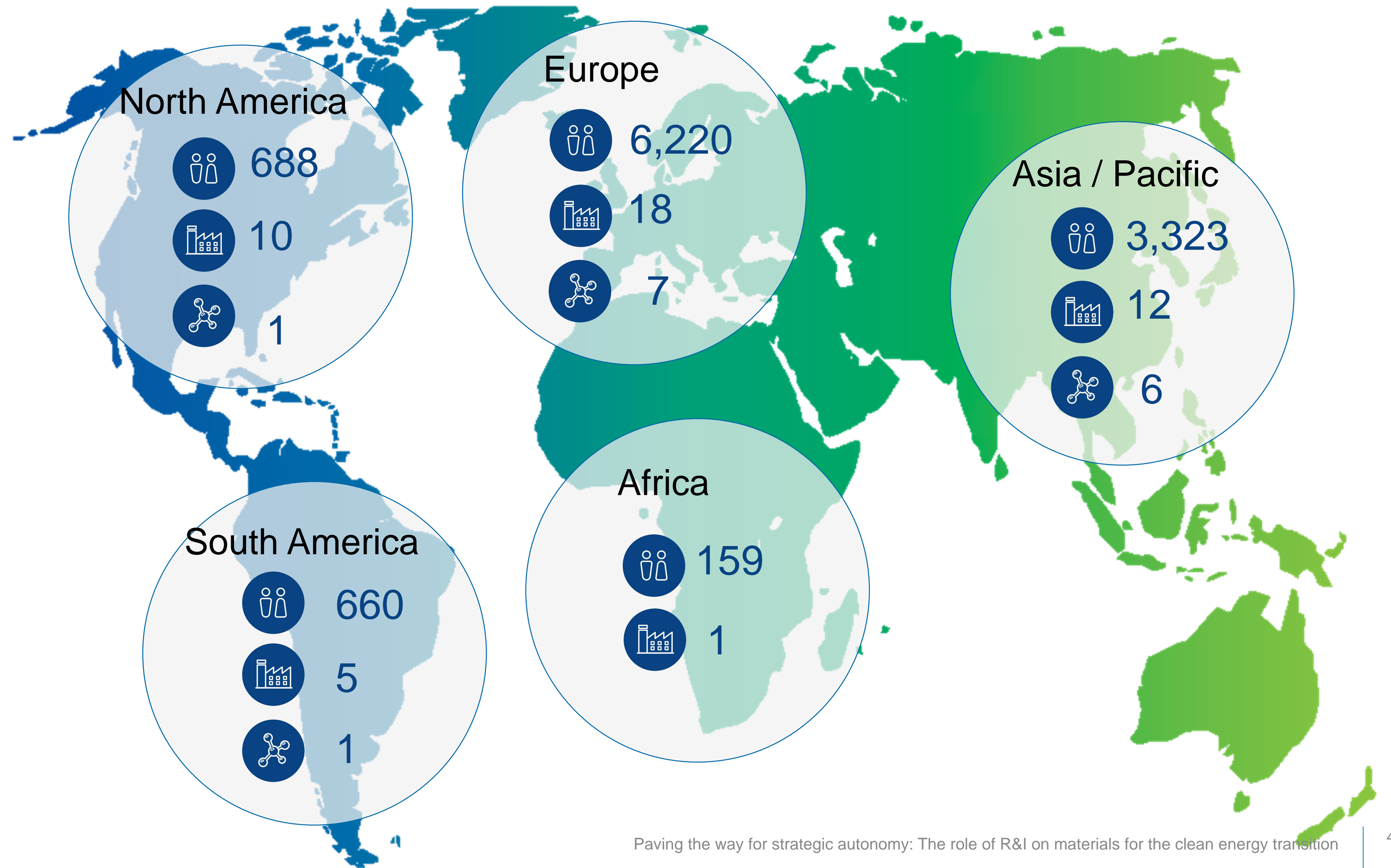
COLLEAGUES
11,050



PRODUCTION
SITES
46



R&D | TECHNICAL
CENTERS
15



Umicore Open Innovation activities

In practice: co-developing technology solutions

- Global footprint in place to identify and interact with emerging technology players:
 - Build connections to the emerging technology marketplace and global Open Innovation networks customized to geographic region
 - Strengthen relationships with innovation partners (universities, startups, peers...)
 - Identify value creation opportunities at an early stage
 - Match market need recognition and key technology inventions



Combined effort led by open innovation, business development and technical teams with excellent connections and global recognition from their peers and within the organization.

The role of R&I on materials for the clean energy transition

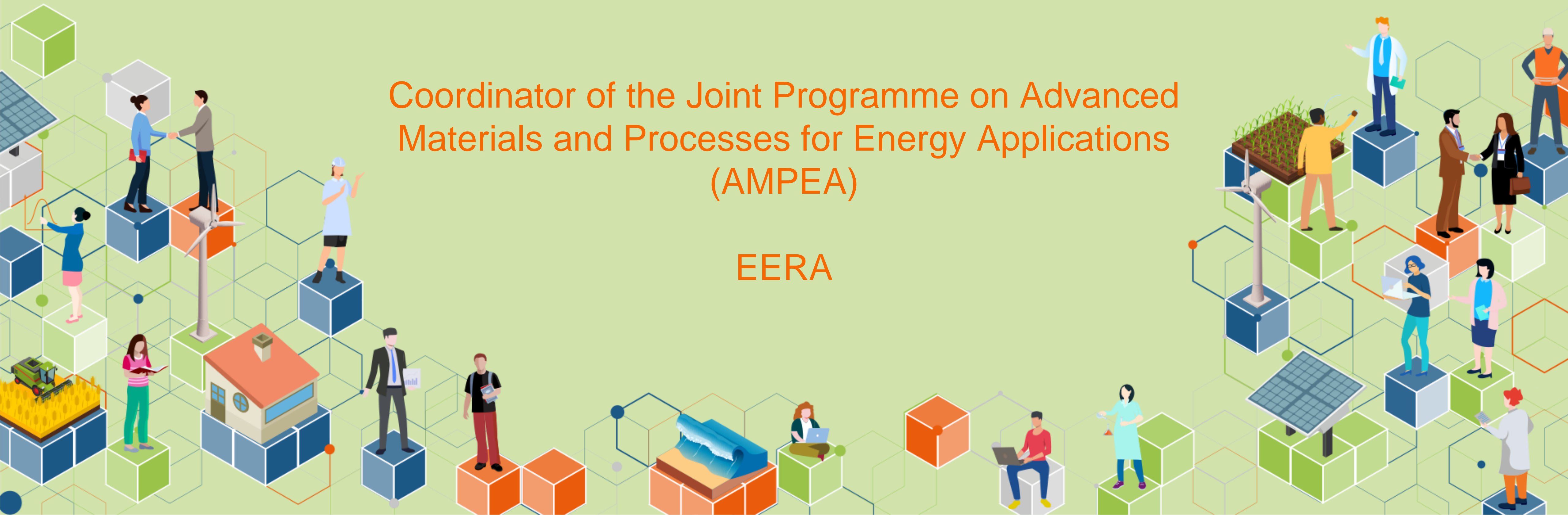
Looking forward

- **Deliver new technologies and solutions:**
 - Alternative materials: reducing dependency on critical raw materials
 - Materials production processes
 - Anticipation of new systems/ devices for less material consumption
 - Design for recycling
- **Advance in development of:**
 - Logistic models
 - Automation
 - Solid LCA and economical assessment models
- **Strengthen:**
 - Talent pool development with necessary skills to face the challenge
 - Intellectual property positioning

Sawako Nakamae

Coordinator of the Joint Programme on Advanced
Materials and Processes for Energy Applications
(AMPEA)

EERA





In order to strengthen EU's value chain in the CET and its lasting leadership which area should be the energy materials research community's priority?



What should be the EU's priority on the raw critical materials?



Q&A Session





Conclusions

Ivan Matejak, EERA



