

# CRM supply: current and future challenges

Milan Grohol, European Commission



RESOURCE MANAGEMENT WEEK 2021

ENABLING SUSTAINABILITY PRINCIPLES IN RESOURCE MANAGEMENT

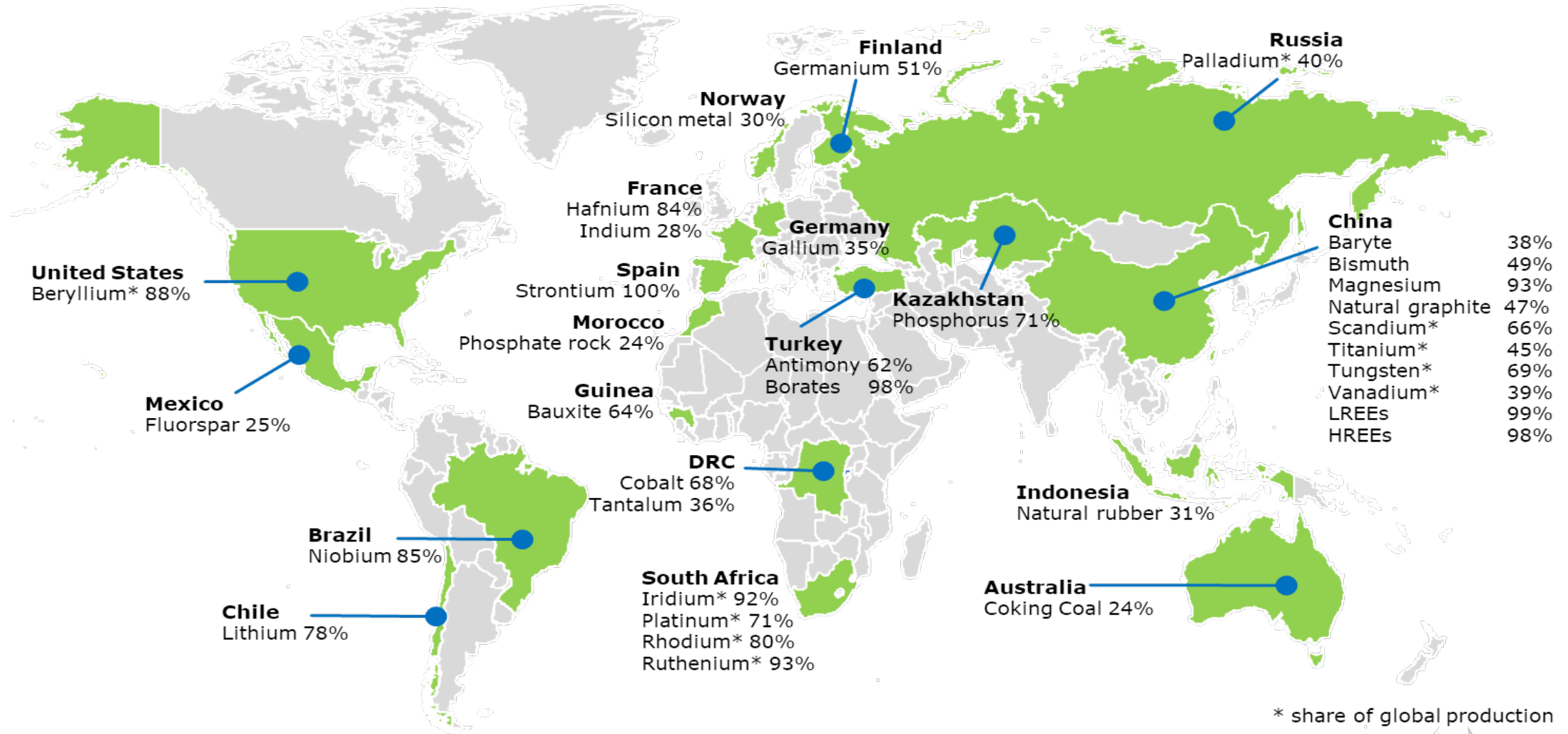


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# EU assessment 2020 identifies 30 critical raw materials

2020 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	<b>Bauxite</b>
Fluorspar	Niobium	<b>Lithium</b>
Gallium	Platinum Group Metals	<b>Titanium</b>
Germanium	Phosphate rock	<b>Strontium</b>

# Main CRM suppliers of the EU



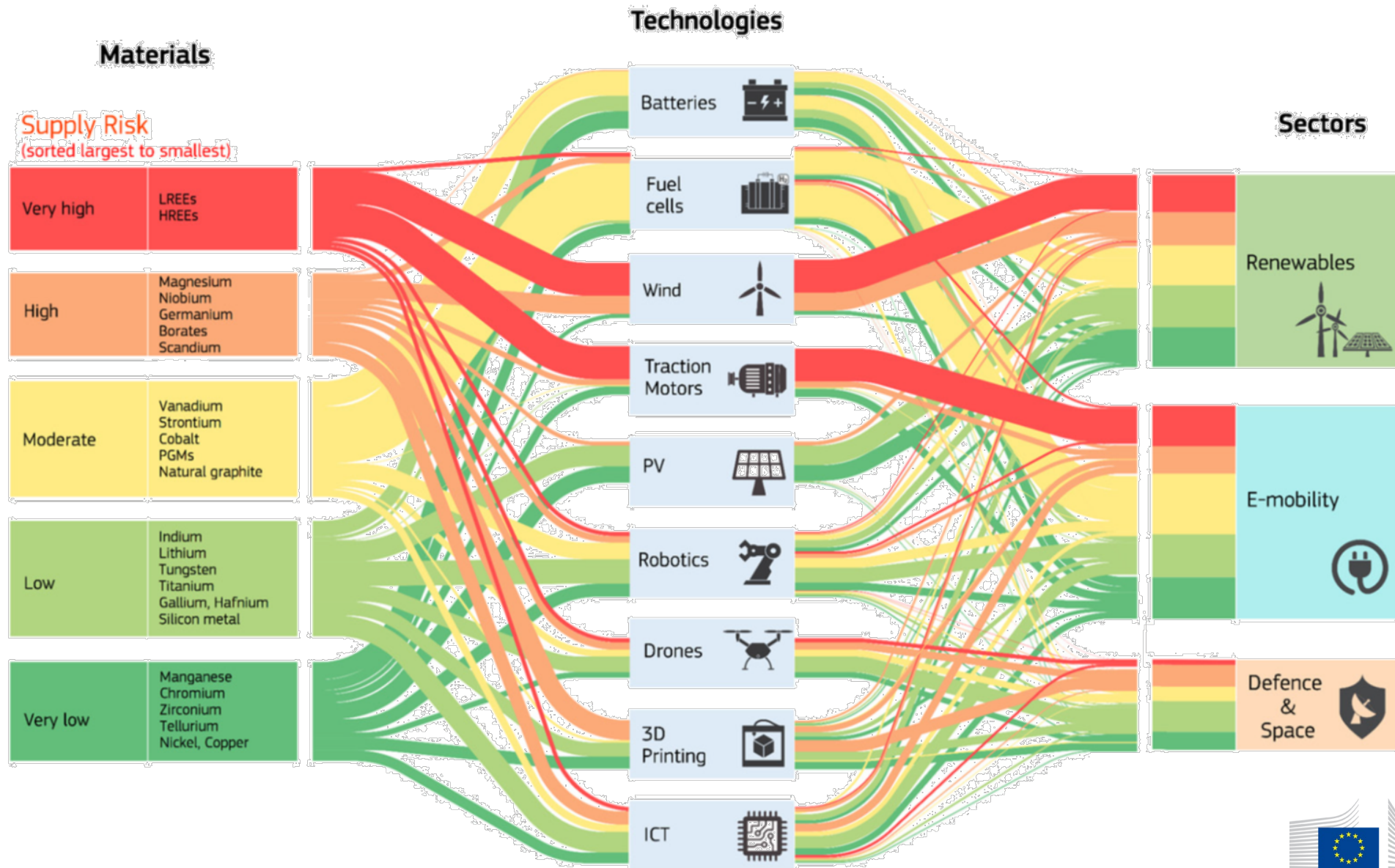
Source: "European Commission, Study on the EU's list of Critical Raw Materials – Final Report (2020)"

# Critical raw materials in EU's ecosystems

	Aerospace/ defence	Textiles	Electronics	Mobility/ Automotive	Energy-intensive industries	Renewable energy	Agri-food	Health	Digital	Construction
Antimony	✓	✓		✓						✓
Baryte				✓	✓			✓		✓
Bauxite	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Beryllium	✓		✓	✓		✓			✓	
Bismuth	✓		✓		✓			✓	✓	✓
Borate	✓		✓	✓	✓	✓	✓		✓	✓
Cobalt	✓	✓	✓	✓	✓	✓			✓	
Coking coal				✓	✓	✓				
Fluorspar					✓		✓			
Gallium	✓		✓	✓		✓			✓	✓
Germanium	✓		✓		✓	✓				
Hafnium	✓		✓		✓	✓			✓	
Indium	✓		✓			✓			✓	
Lithium	✓		✓	✓	✓	✓		✓	✓	
Magnesium	✓		✓	✓	✓				✓	✓
Natural graphite	✓		✓	✓	✓	✓			✓	✓
Natural Rubber	✓	✓		✓				✓		
Niobium	✓		✓	✓	✓			✓		✓
Phosphate rock					✓		✓			
Phosphorus	✓				✓		✓			
Scandium	✓			✓		✓				
Silicon metal	✓	✓	✓	✓	✓	✓		✓		✓
Strontium	✓		✓		✓			✓		✓
Tantalum	✓		✓		✓	✓			✓	
Titanium	✓		✓	✓	✓			✓		✓
Tungsten	✓		✓	✓	✓			✓		
Vanadium	✓			✓	✓	✓		✓		✓
PGM	✓		✓	✓	✓	✓		✓		
HREE	✓		✓	✓	✓	✓		✓		✓
LREE	✓		✓	✓	✓	✓		✓		✓



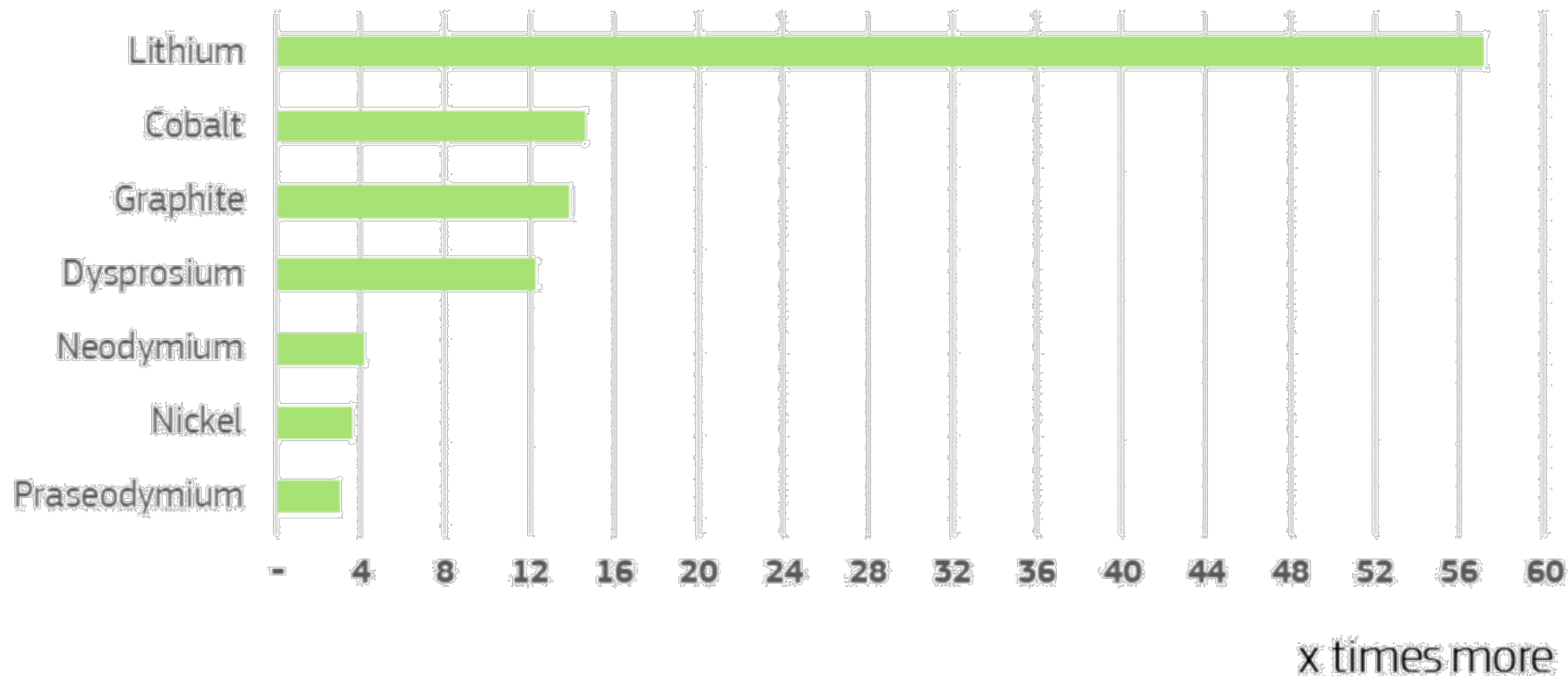
# Which materials do we use for green technologies?



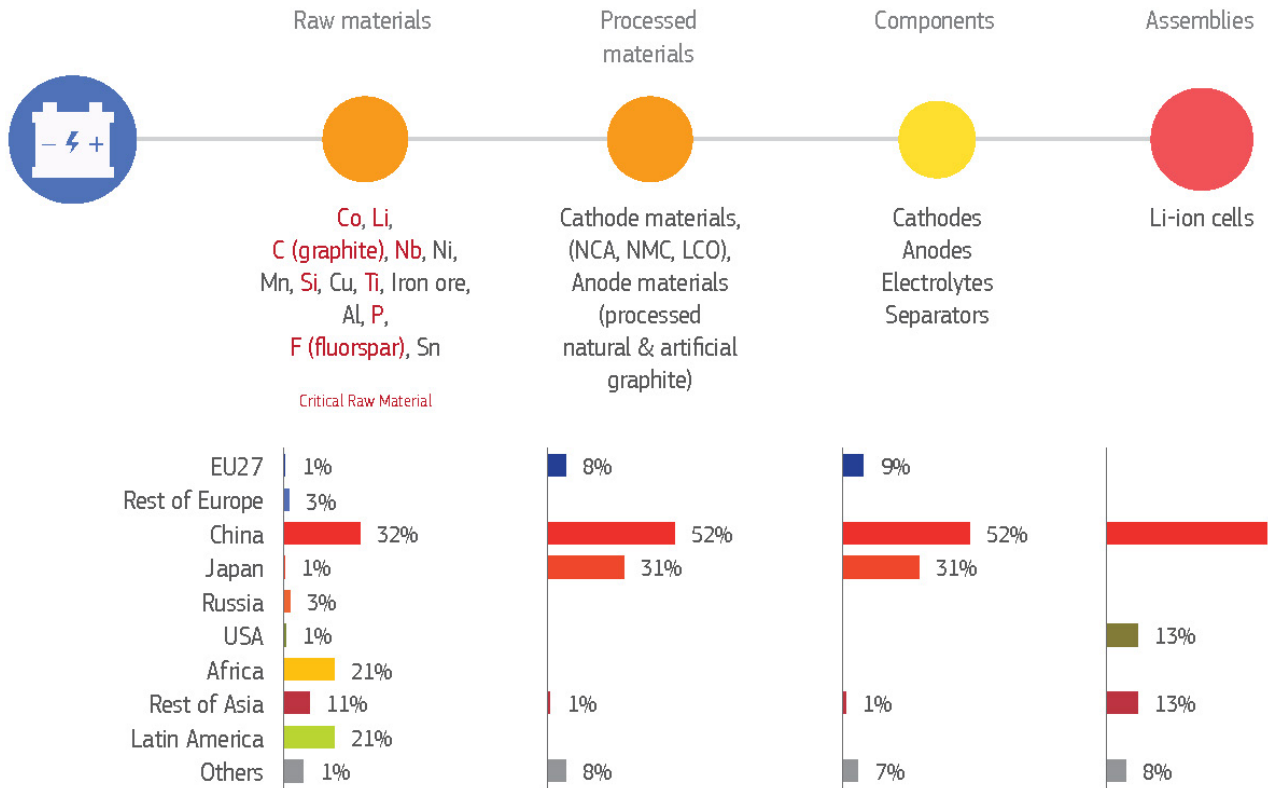
Source: "European Commission, Critical materials for strategic technologies and sectors in the EU - a foresight study,

# How much will we need for green transition?

**Additional** material consumption for batteries, fuel cells, wind turbines and photovoltaics in **2050** compared to current EU consumption of the material in **all** applications



# Li-ion batteries bottlenecks

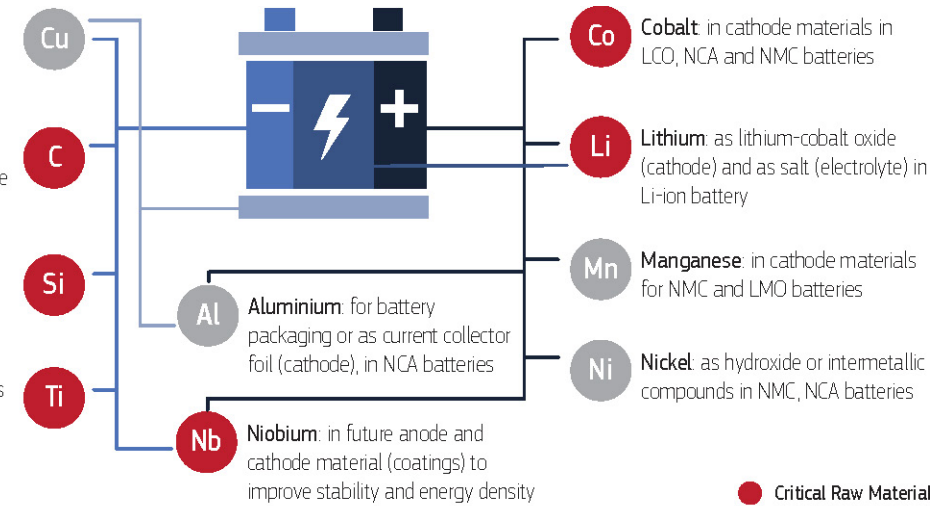


**Copper**: as current collector foil at anode side, in wires and other conductive parts

**Graphite**: natural or synthetic high-grade purity in anode electrode in all Li-ion battery types

**Silicon**: in (future) anodes to enhance energy density

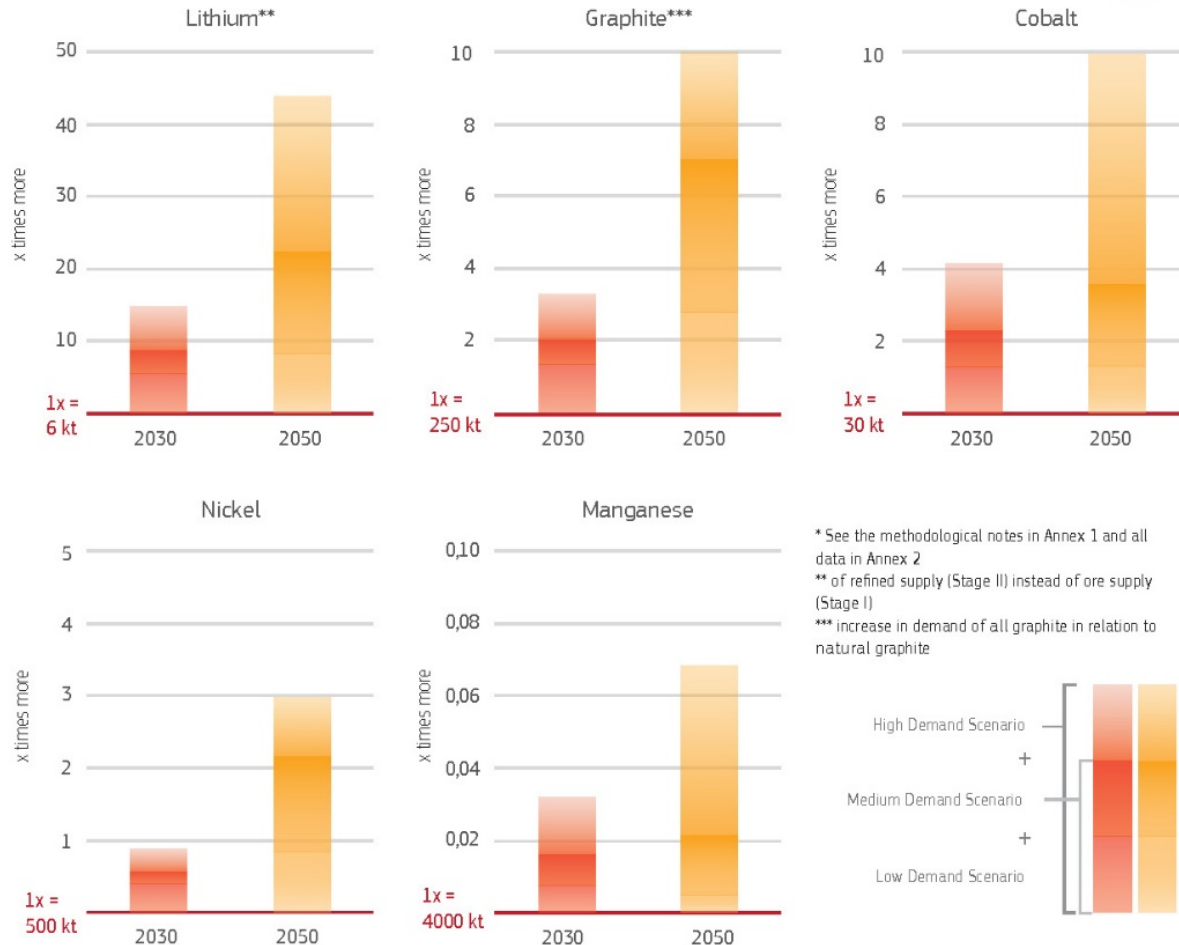
**Titanium**: in future anode materials and coatings, in LTO, for battery packaging



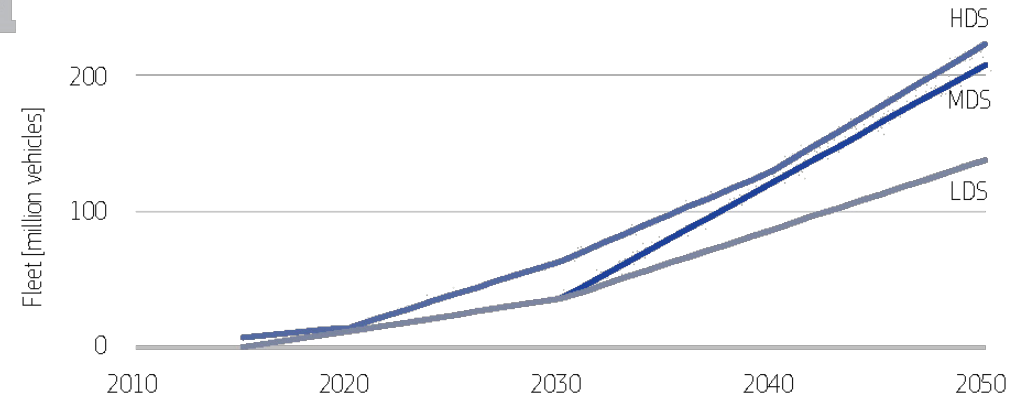
# Li-ion batteries for e-mobility in 2030, 2050



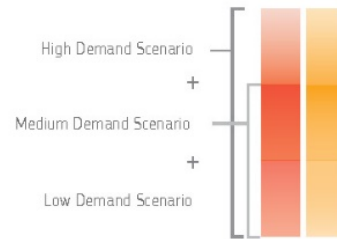
Additional material consumption for batteries in **e-mobility only** in 2030/2050 compared to current EU consumption\* of the material in **all applications**



EU - Electric Vehicle/Plug-in Hybrid Electric Vehicle Fleet

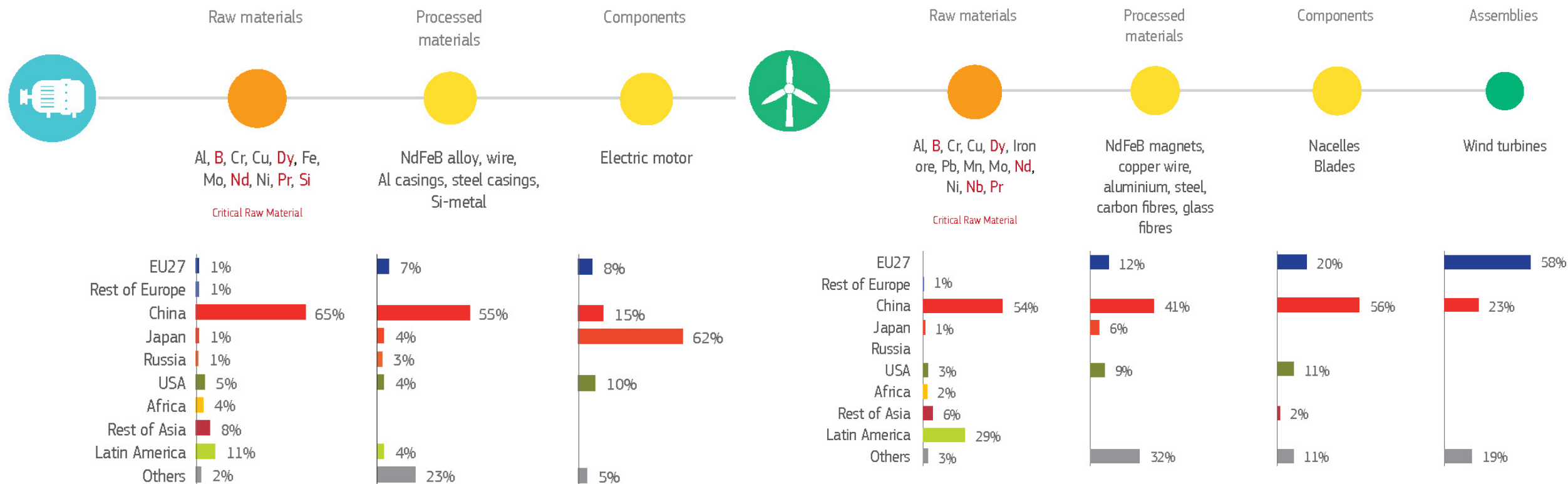


\* See the methodological notes in Annex 1 and all data in Annex 2  
 \*\* of refined supply (Stage II) instead of ore supply (Stage I)  
 \*\*\* increase in demand of all graphite in relation to natural graphite





# Electric motors and generators



# Action Plan on Critical Raw Materials

## 10 actions to ensure Europe's access to raw materials

1. European Raw Materials Alliance
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. Investment needs for mining projects that can be operational in 2025
6. Develop expertise and skills in mining
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

# Takeaways

CRMs are gradually replacing fossil fuels as the backbone of the green energy and digital transition.

- UNFC and UNRMS should pay proper attention to CRMs and their integrated life-cycle management to promote circularity.

CRMs are required from primary as well as secondary sources.

- EGRM - Mineral WG and Anthropogenic WG should strengthen CRM expertise and coordinate with initiatives, such as the IRTC and SCRREEN2 to undertake further work.

# Thank you!

Milan Grohol

Policy Officer, European Commission

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