

Market Dynamics and Technological Innovations of Critical Raw Materials

A paradigm shift needed?

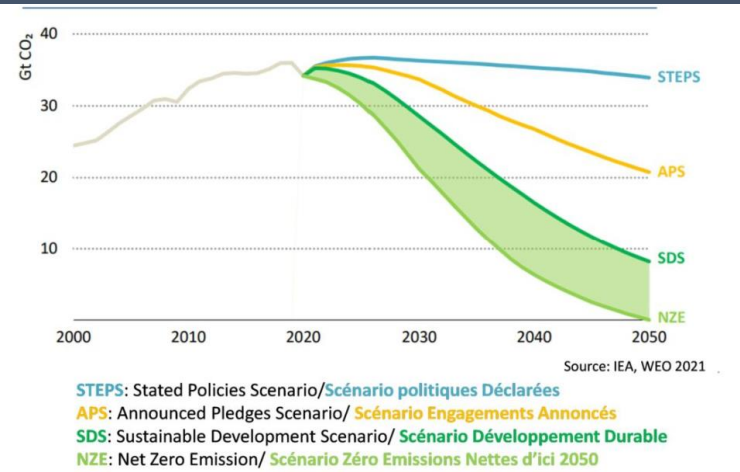
Christophe XERRI

President and Senior Consultant

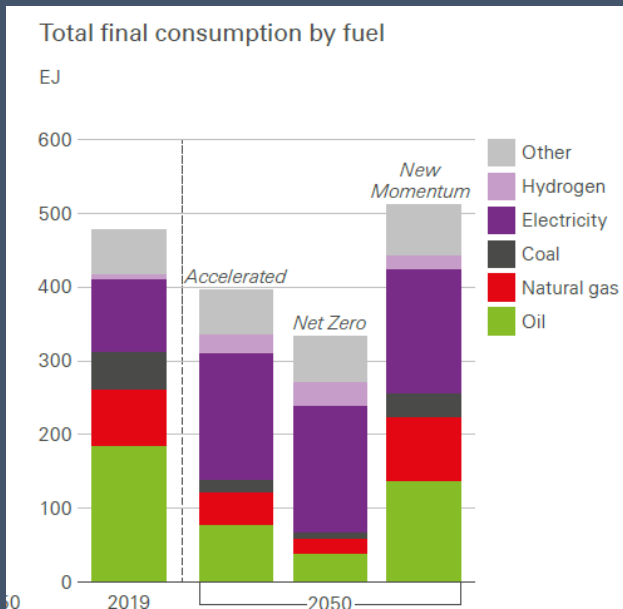
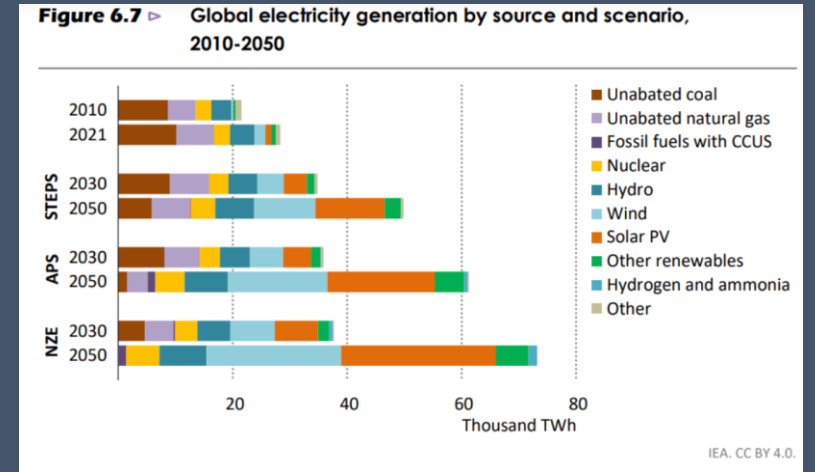
The Sailing Brain Consulting



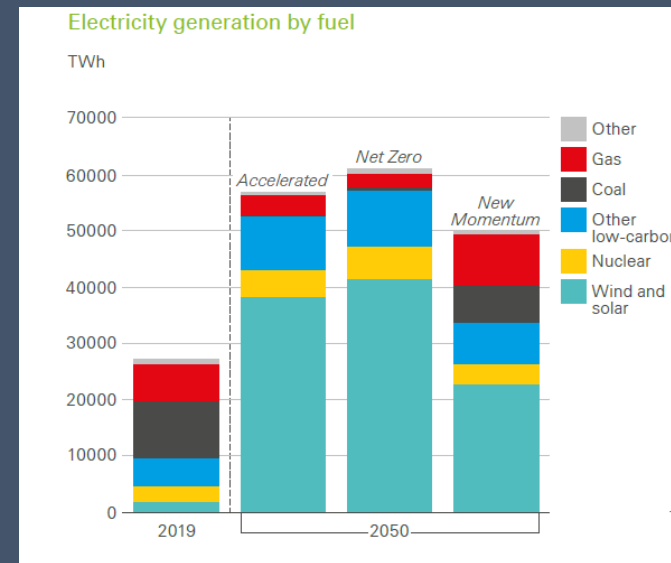
We all know this: more electricity needed ! And let's have it no / low carbon



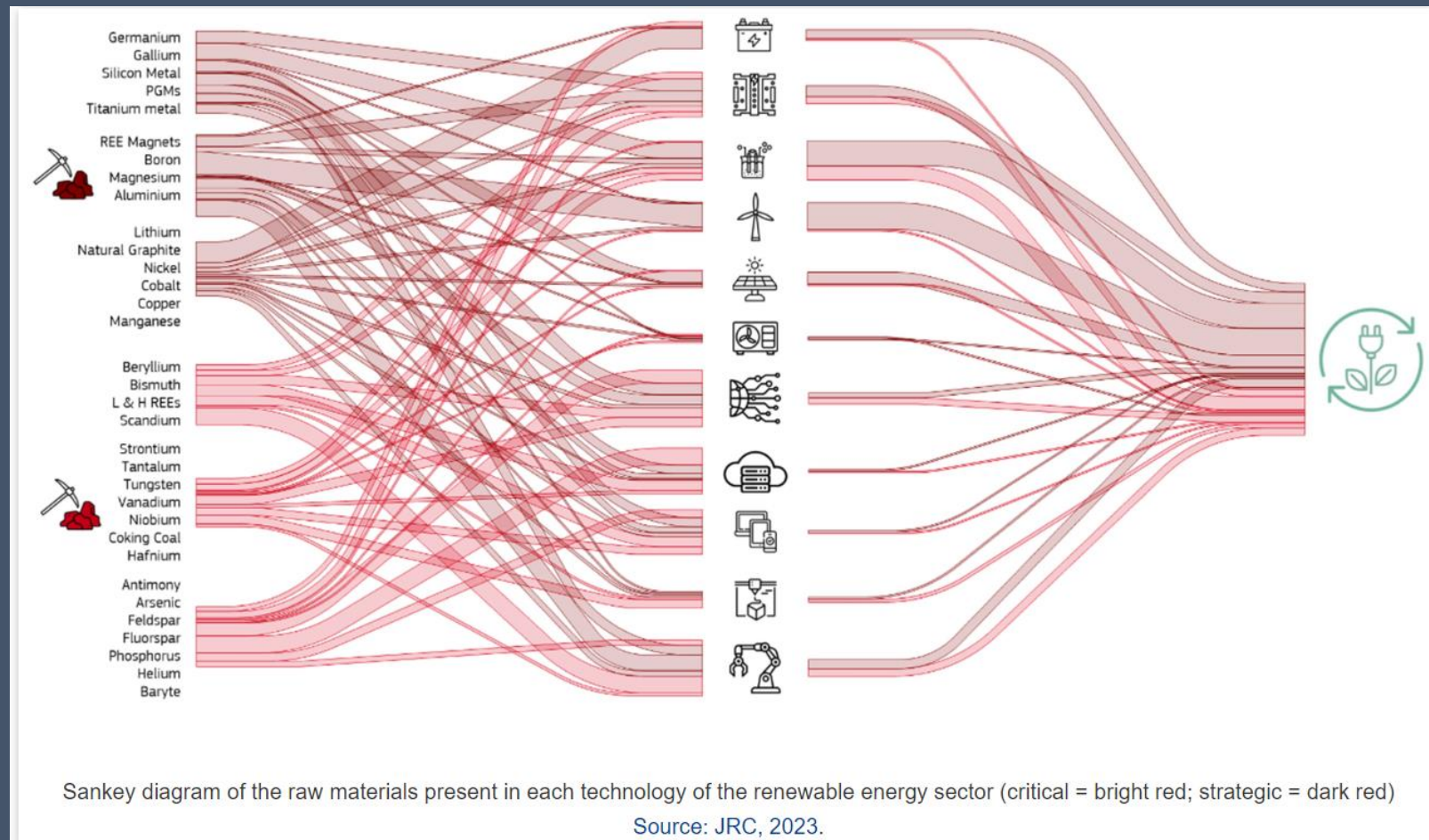
IEA / WEO scenarii



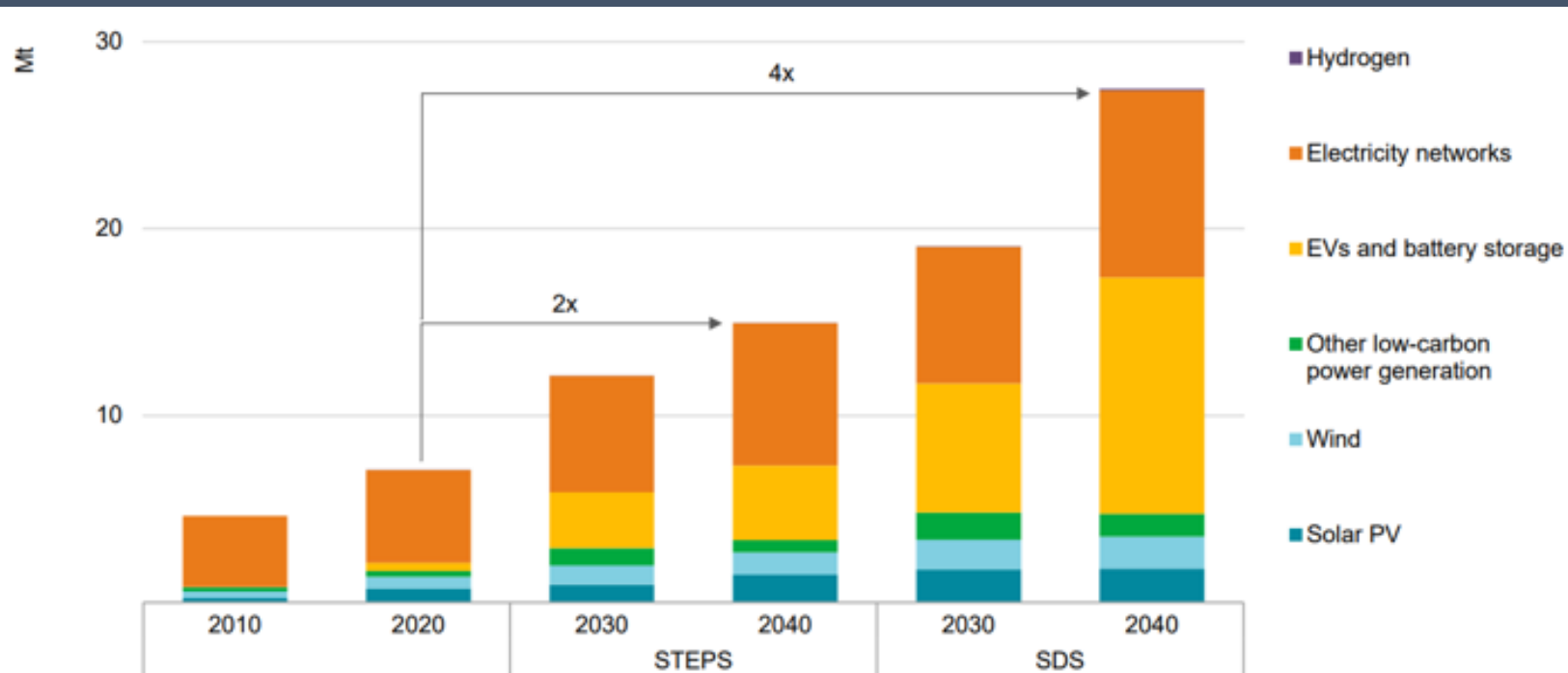
BP Outlook



We are all aware of this: Low Carbon energies need mineral resources



And we are talking big !!! Here is Growth of Mineral Demand

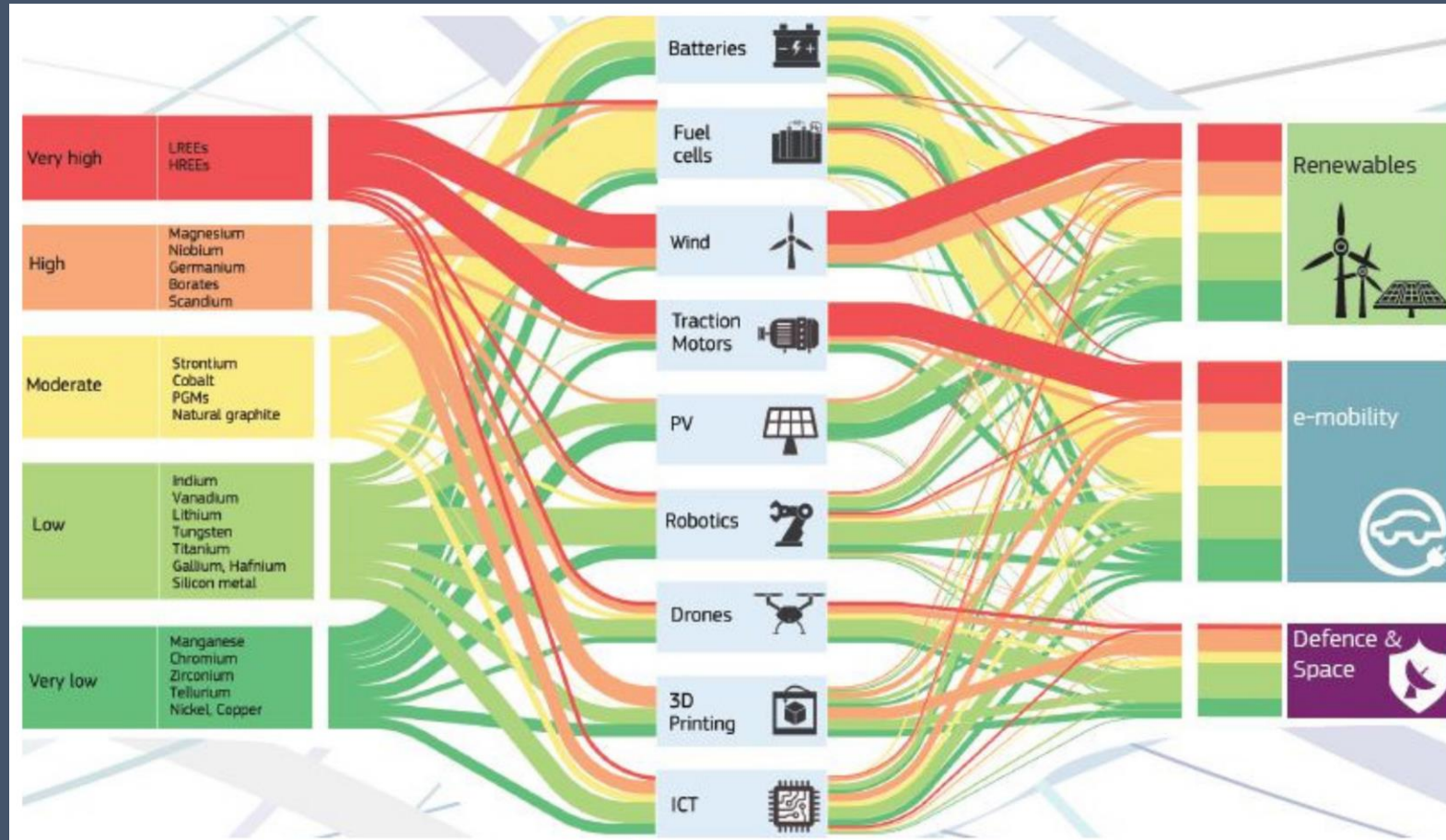


Projected trends in mineral demand for clean energy technologies by scenarios

Source: ESCAP 2023 based on IEA Scenarios: Stated Policies Scenario (STEPS); Sustainable Development Scenario (SDS)



So we are all aware of this: Supply risk must be managed



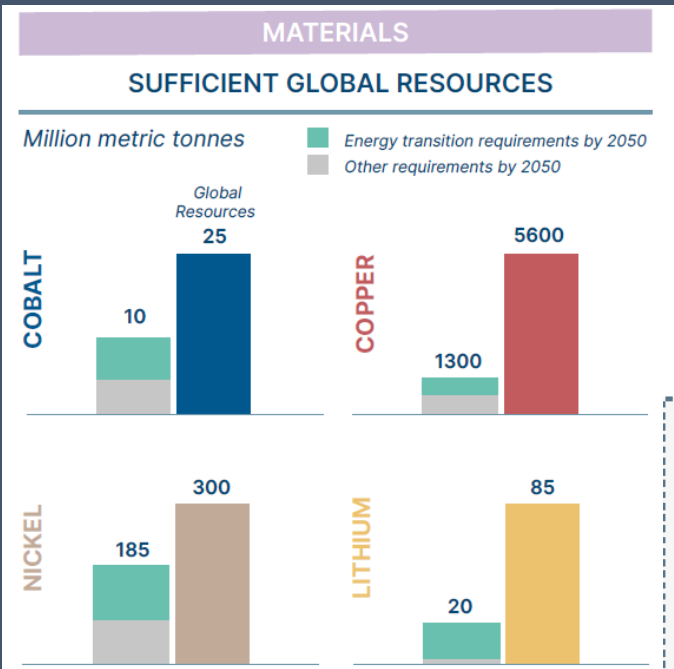
Where are investments going ?

- Solar and wind electricity generation
 - Permitting are slowing down projects' schedules
 - But also costs and concerns of availability of raw materials
- Batteries GigaFactory and R/D
 - Trend: geographical diversification / on-shoring

Is that enough to reach the target ?
What about upstream and downstream ?



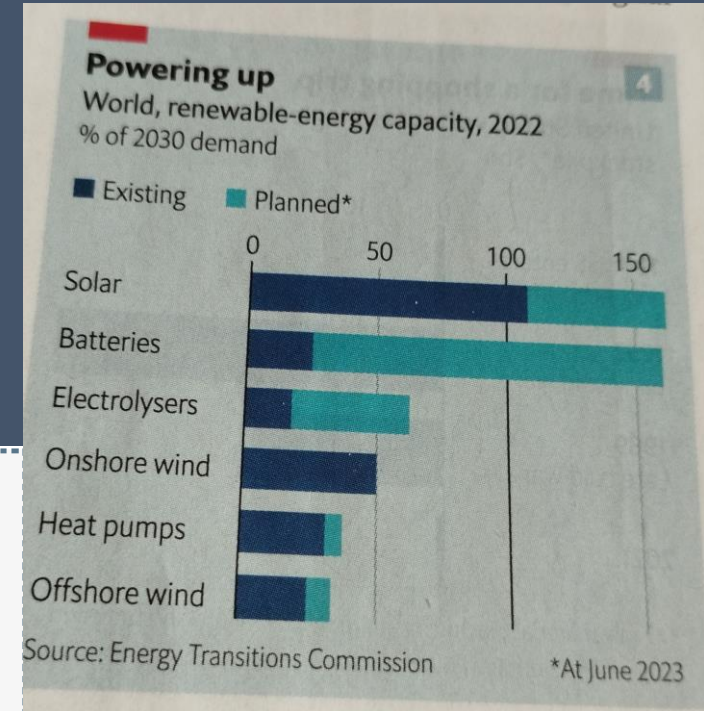
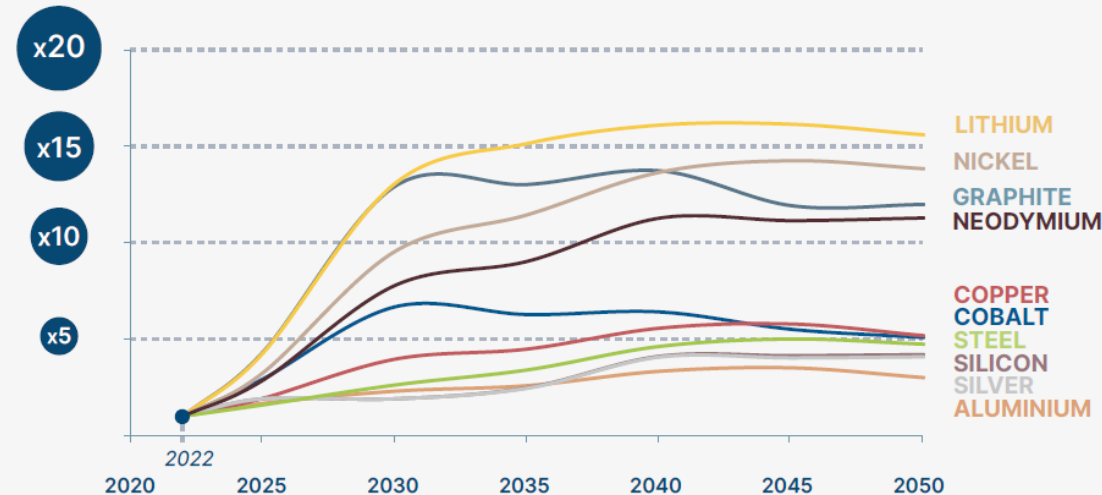
Upstream: a gap to close !



In the ground: OK !

REQUIRED SCALE-UP IN MATERIALS DEMAND BY 2050

Relative increase in demand for key materials from clean energy technologies, from 2022



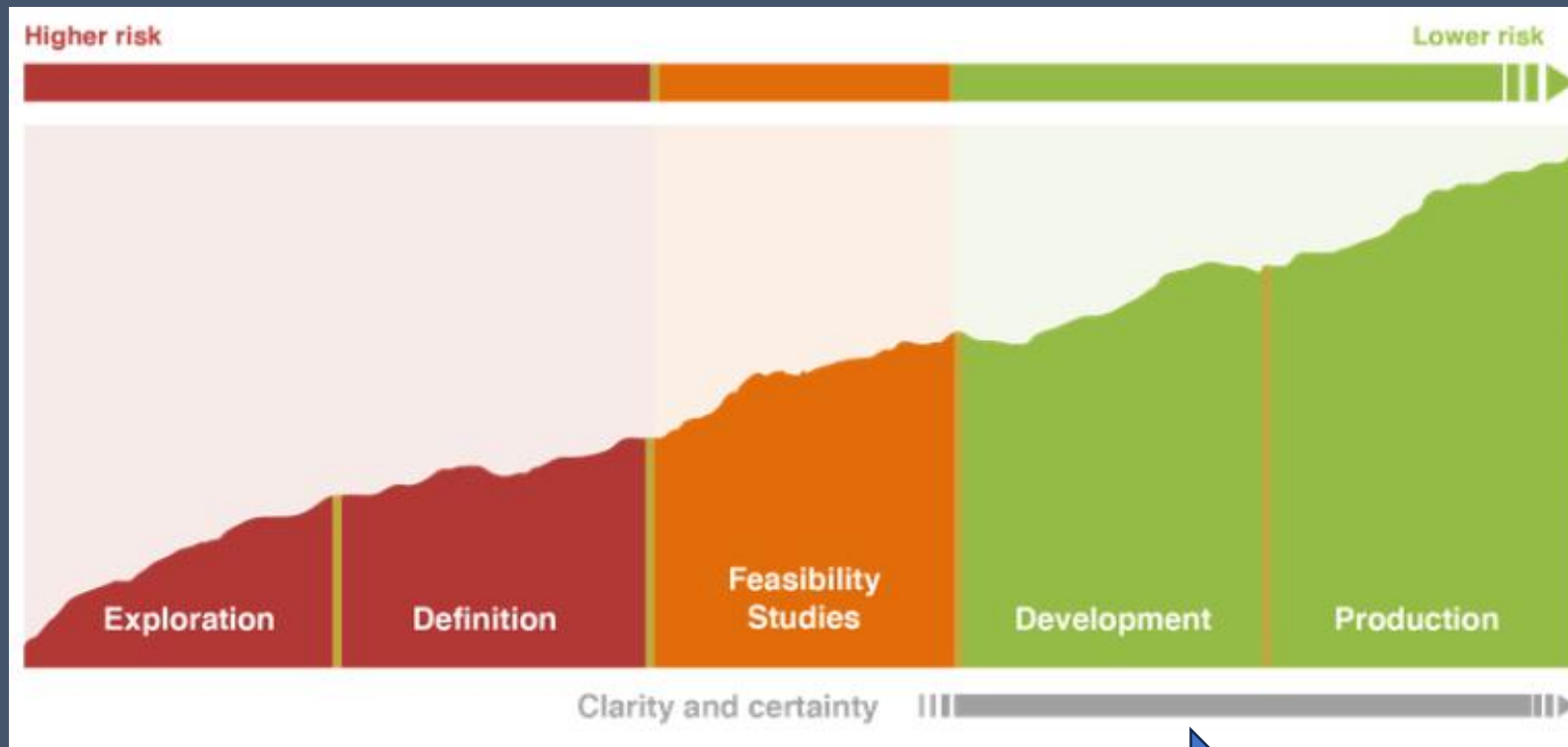
Manufacturing plants : OK !
There or can be easily added



Address long lead schedule to be on time

Investment
needed NOW

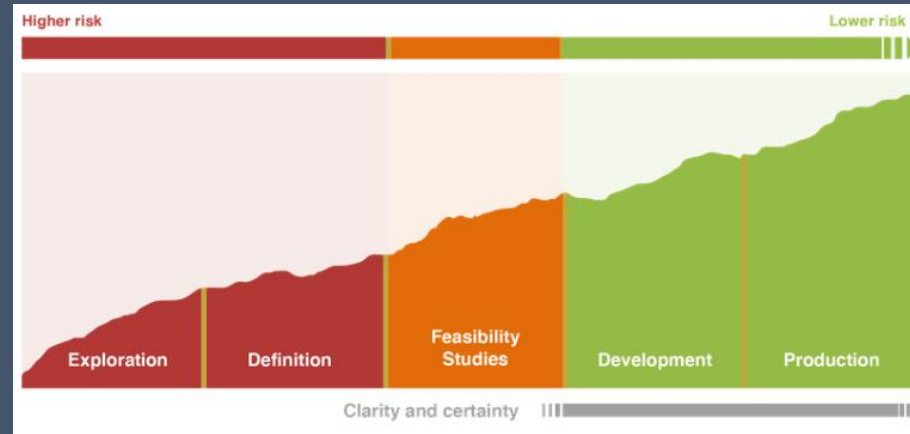
Enabler for
success of
next steps of
supply chain



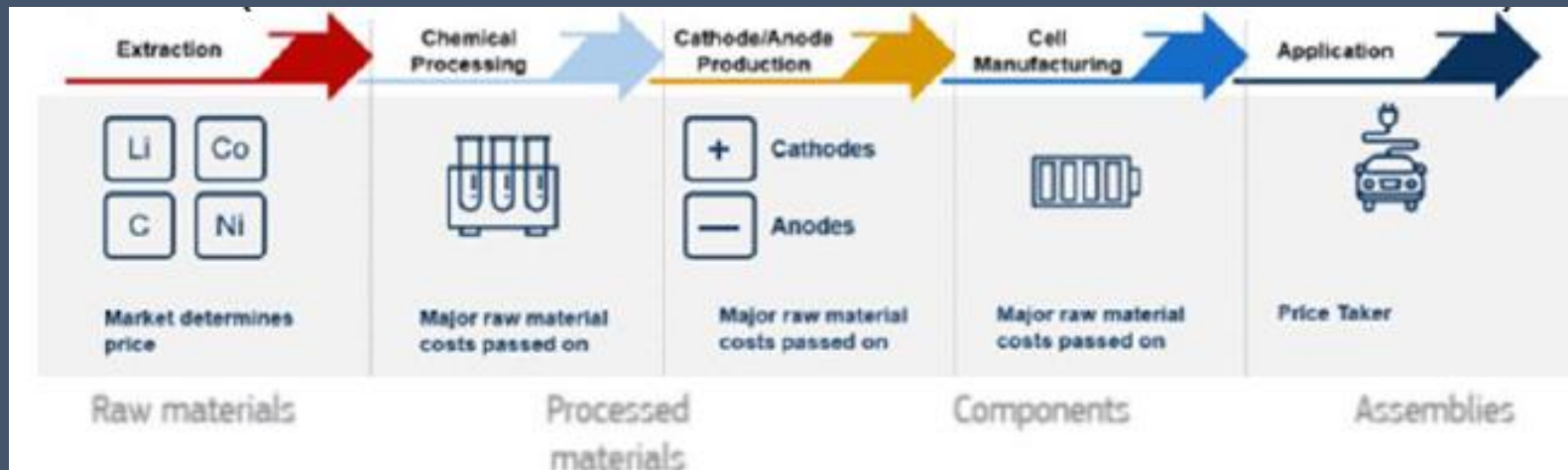
10 to 15 years



EV / Batteries: towards vertical integration ?



Should VC enter the mining world to secure their investment portfolio ?



What UNMRS brings: more information, more trust

- A way to address all dimensions of resources: exploration, mining, and circularity
- An approach to discuss environmental and social issues



What UNMRS shall develop: an international CRM information dashboard

- Voluntary contribution from all interested parties
- A trusted reference for all stakeholders
- A transparency framework
- An enabler of global cooperation

First step: mining –
resources in the ground

Second step: processing -
resources in the supply chain

Third step: in-service
resources in products

The UNRMS based dashboard should help
VCs and Financing Institutions to invest in
mining in line with their sustainability criteria

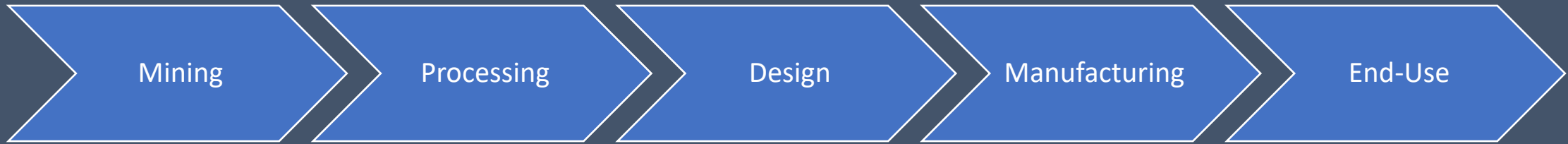


What about Technology and Use ?

What happens in the “above the ground “ space is
as important as what happens in
the “below the ground” space of geology and mining



Technology Improvements can be expected at each stage to make the best use of a finite resource



- Recovery of low-grade deposit
- Efficiency of refining and processing
- Energy density / efficiency
- LCA, no waste,

HORIZON-CL4-2024-RESILIENCE-01

RESILIENT VALUE CHAINS 2024

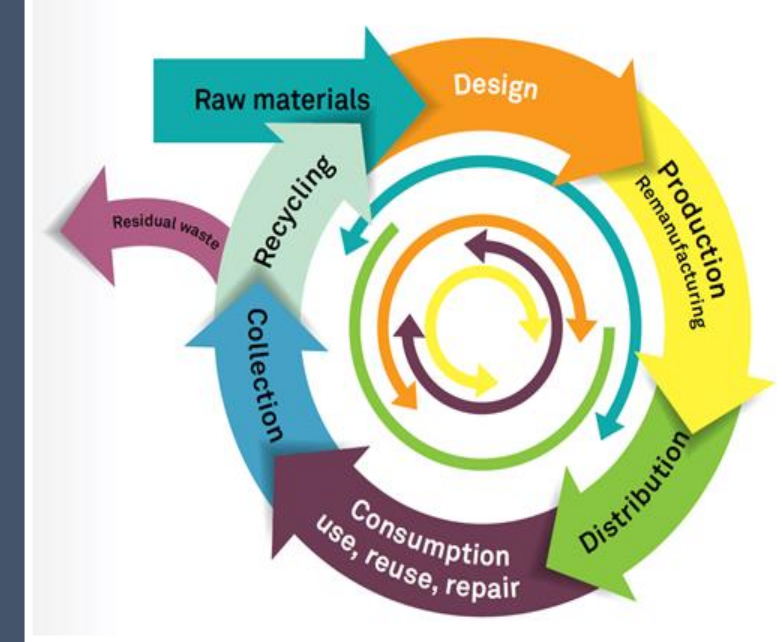
Topic(s)	Title	Budget disponible (€)	Action(s)	Ouverture	Clôture	Clôture (2nde étape)
HORIZON-CL4-2024-RESILIENCE-01-01	Exploration of critical raw materials in deep land deposits (RIA)	20 000 000	HORIZON Research and Innovation Actions	19/09/2023	07/02/2024	
HORIZON-CL4-2024-RESILIENCE-01-04	Technologies for processing and refining of critical raw materials (IA)	22 000 000	HORIZON Innovation Actions	19/09/2023	07/02/2024	

Strengthening R/D is on-going



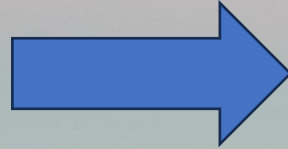
Servitization as a driving force

- Work on DESIGN !!! Do it NOW !!!
 - Think of resource as a service provider
 - Optimize material and energy requirement
- Develop recovering and next use technologies
 - Be ready to recover when resources will become available in large quantities
 - end of life of the first use
 - Investigate the new services and use a given material can offer
- Incentivize recycling for critical material resources' partner countries
 - Two steps royalties (primary use, next use) enabled by blockchain traceability
 - Localize manufacturing and then recycling technologies for low carbon systems (batteries, solar panel, wind mills, etc ...)



The Real Paragdim Shift

Green Renewable Energies



Red Critical Raw Material

Investments needed on both sides

UNRMS based dashboard to facilitate VCs and IDBs financing of CRM projects

Servitization and circular economy to be developed now, to provide additional CRM resources tomorrow as demand will increase

