The Role of critical raw materials for strategic technologies and sectors

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Context

- An energy system powered by clean energy technologies needs significantly more raw materials, notably
  - Lithium, nickel, cobalt, manganese and graphite for batteries
  - Rare earth elements for wind turbines and electric vehicles motors
  - Copper, silicon and silver for Solar Photovoltaics
  - Copper and aluminium for electricity networks
- Recent price rises for cobalt, copper, lithium and nickel highlight how supply could struggle to keep pace with the climate ambitions
- The energy transition calls for an evolving approach to energy security; Policy makers must act to reduce the price volatility and supply disruptions

Mission critical

Governments have identified commodities essential to economic and military security

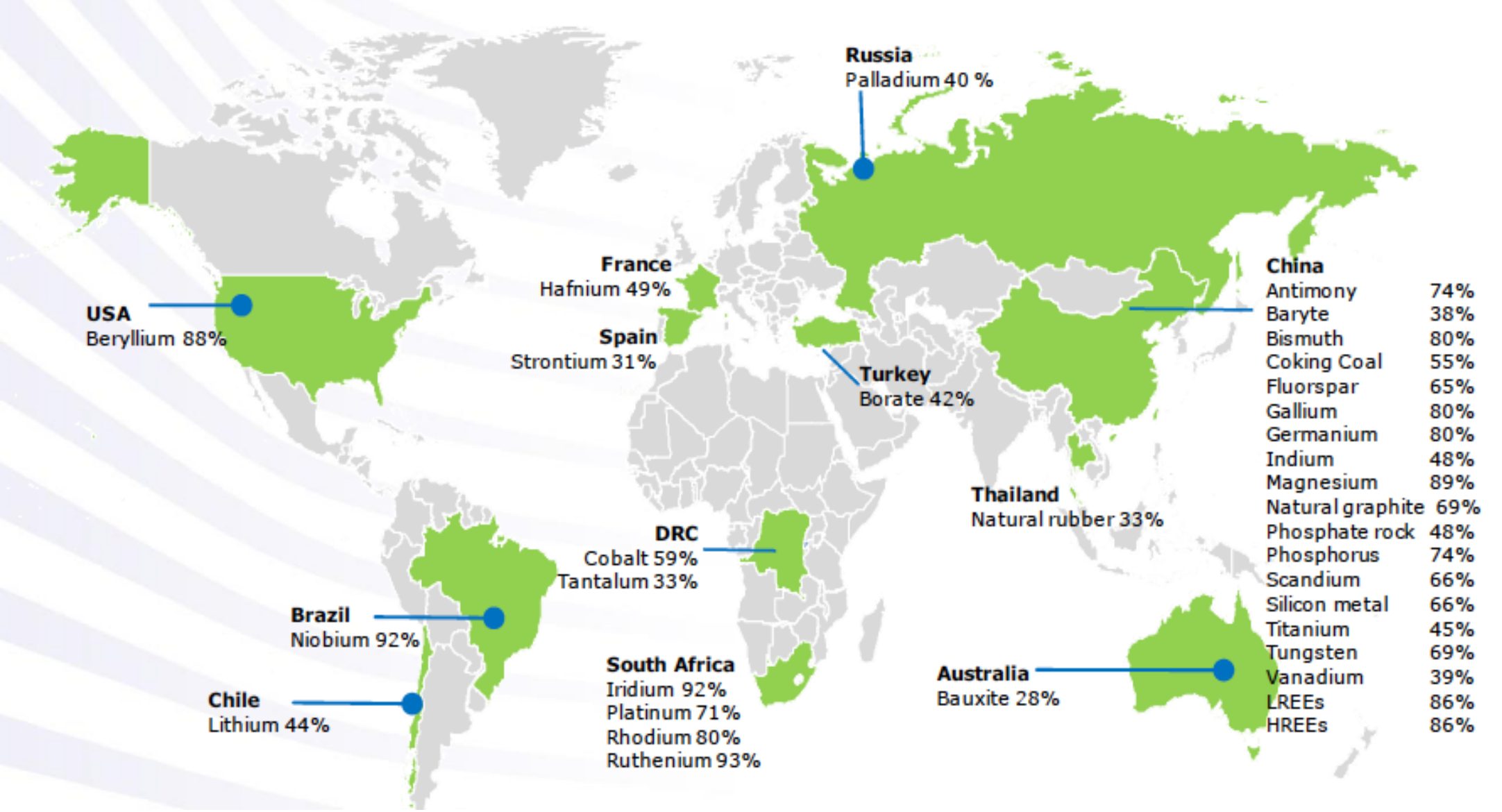
Obtaining them is another matter

What and how many are the critical raw materials for the EU

- Critical raw materials (CRM) are essential prerequisites for the development of strategic sectors such as renewable energy, electric mobility, defence and aerospace, and digital technologies
- Two main parameters, economic importance (EI) and supply risk (SR), are used to determine the criticality of the material for the EU
- The EU 2020 assessment covers a larger number of materials: 83 individual materials comprising 63 individual and 3 grouped materials: ten individual heavy rare earth elements (REEs), five light rare earth elements (LREEs), and five platinum-group metals (PGMs).

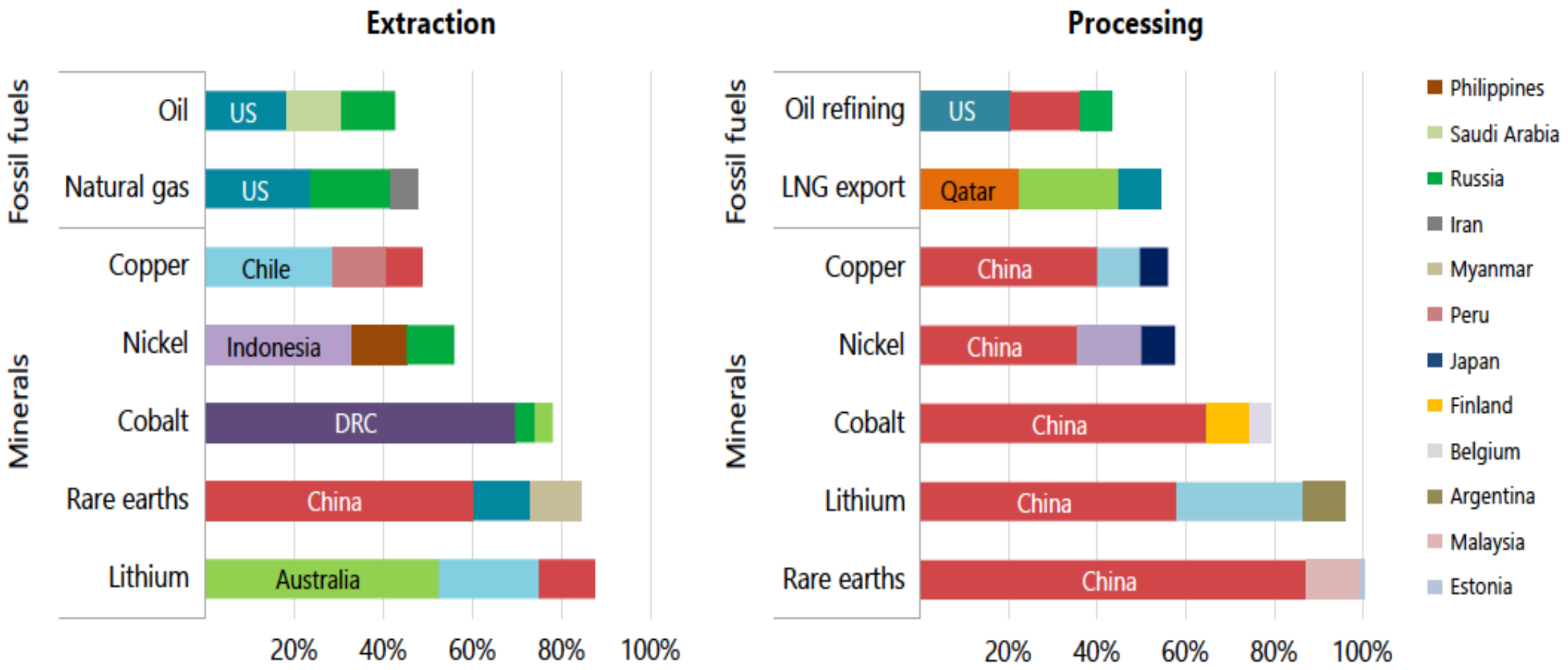
Countries accounting for largest share of global supply of CRM

Source: Study on the EU's list of CRM (2020)



Many raw materials supply chains lack diversity

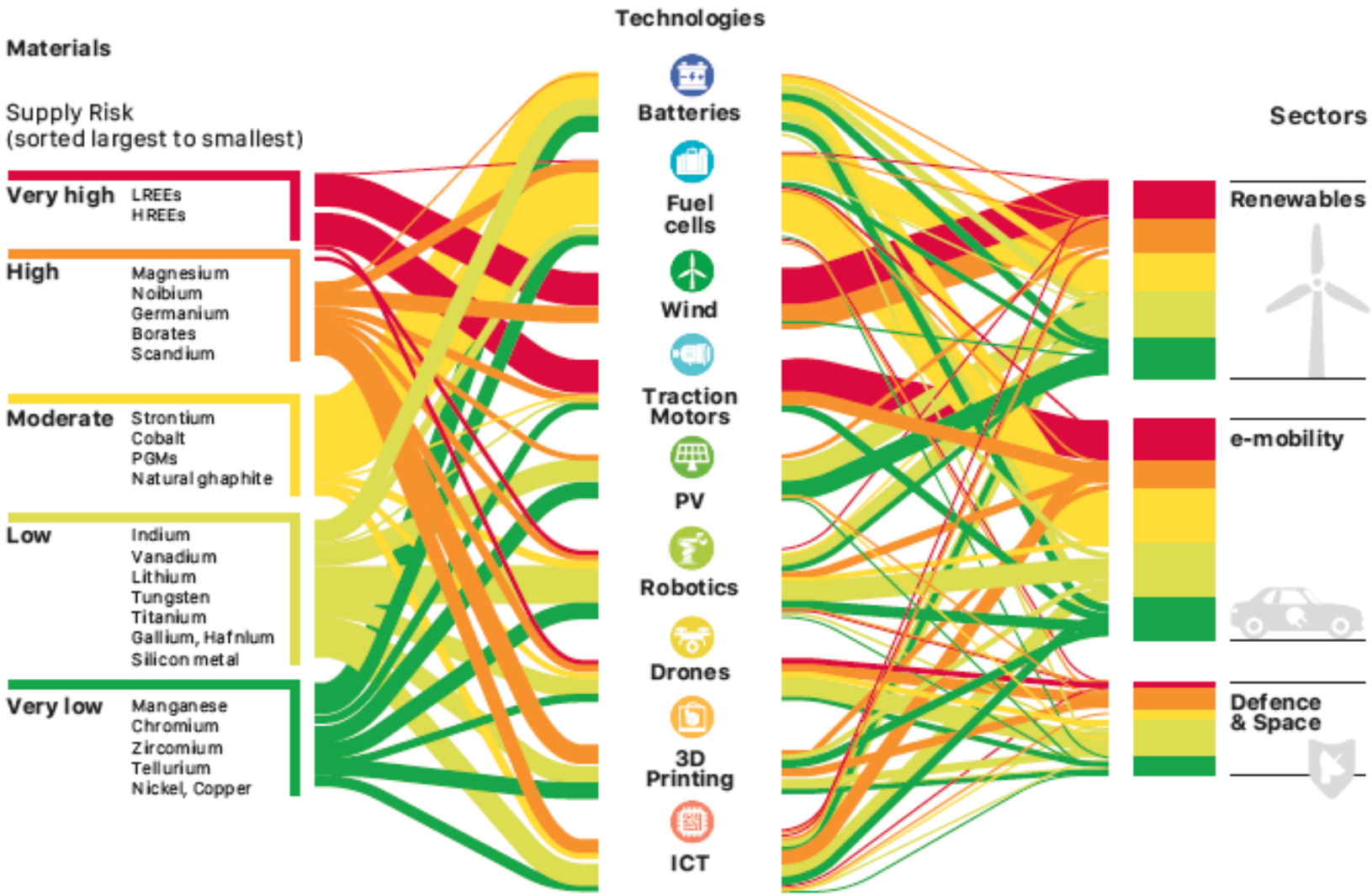
Share of top three producing countries of selected minerals and fossil fuels (IEA, 2021)



Extraction and processing of some minerals are geographically concentrated with the three top producers accounting for more than 75% of supply (Lithium, cobalt and some rare earth metals

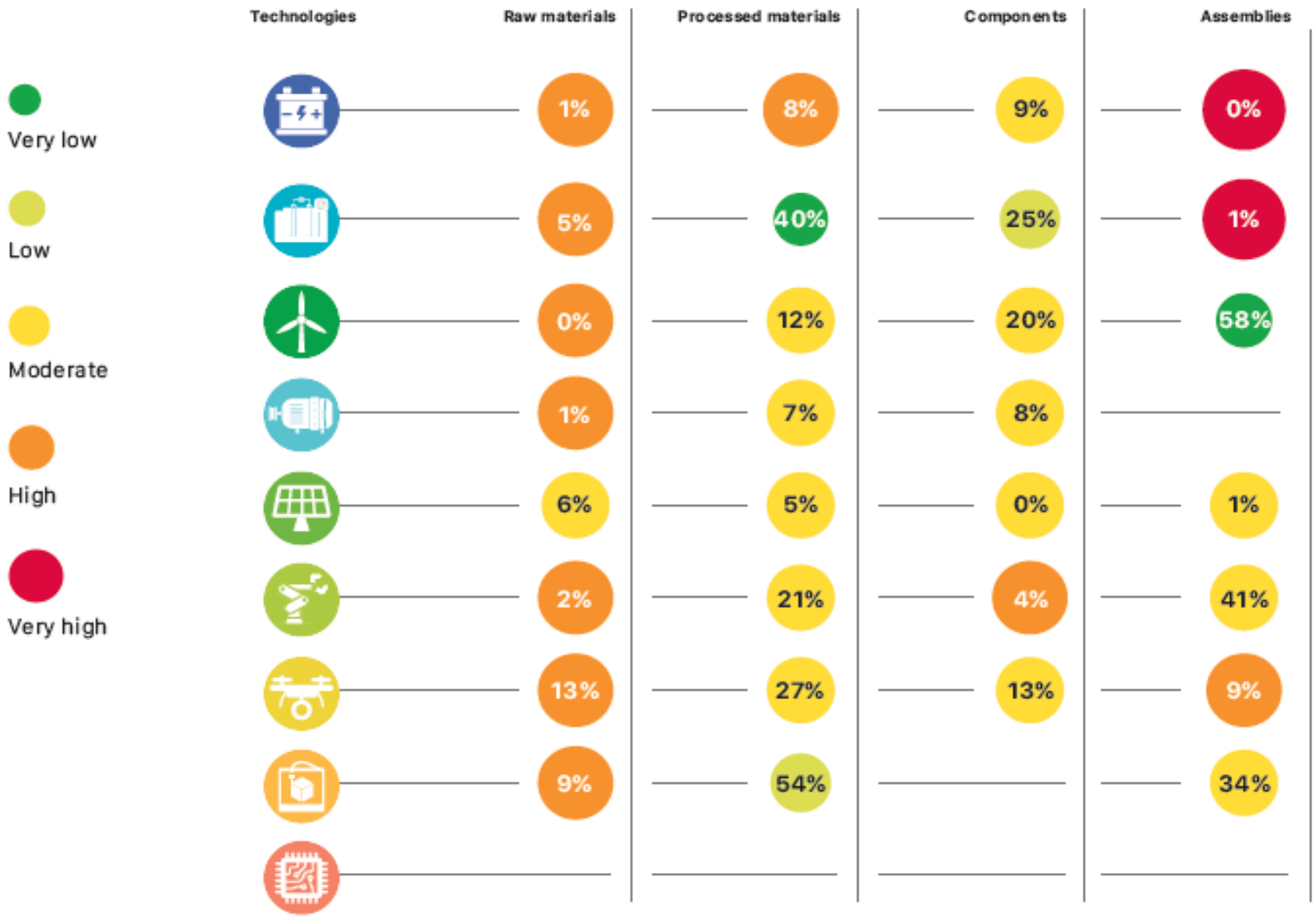
Semi-quantitative representation of flows of raw materials and their current supply risks to nine selected technologies and three sectors (based on 25 selected raw materials)

Source: CRM for Strategic Technologies and sectors in the EU (2020)



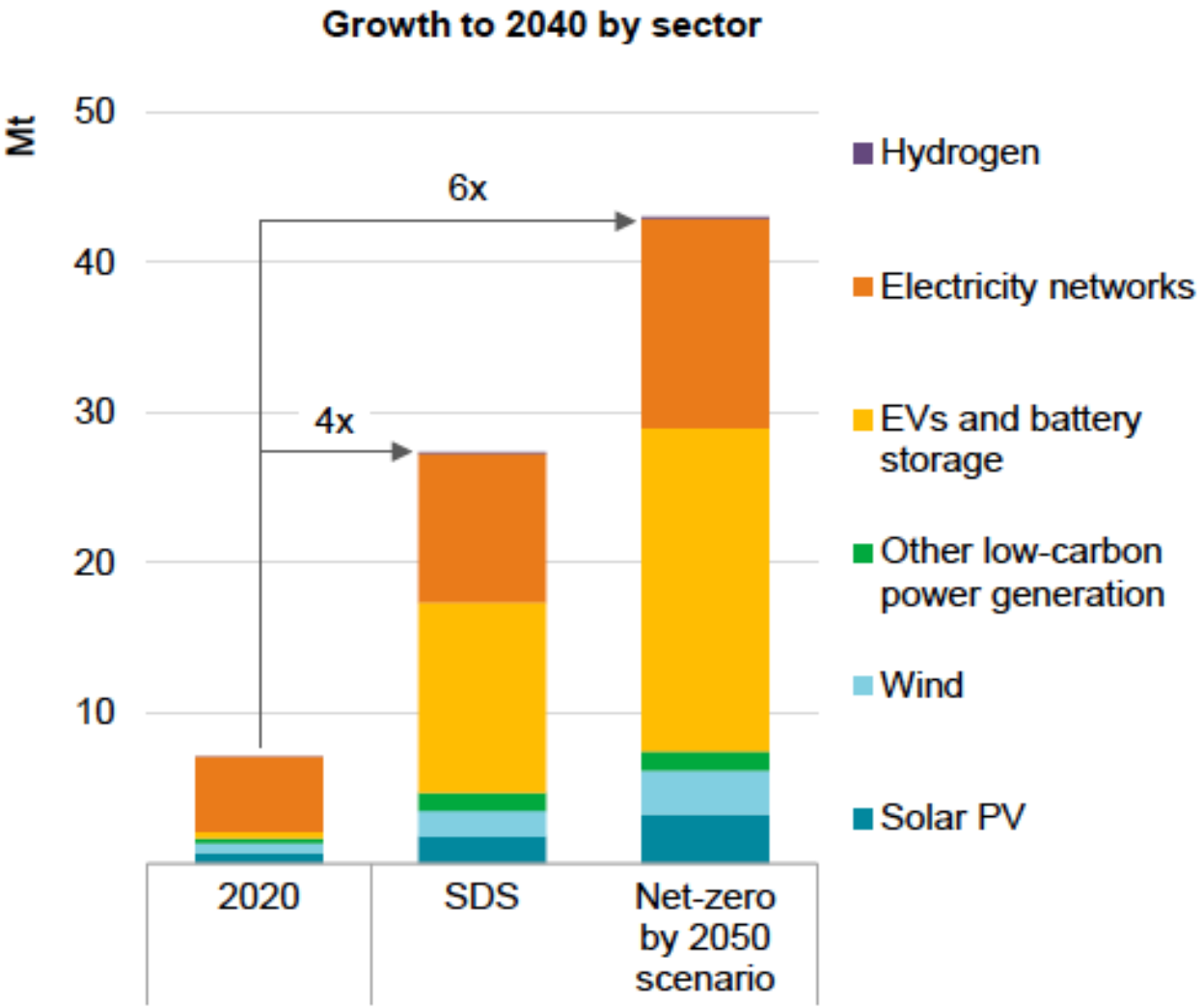
Identified supply risks for the EU and shares of production

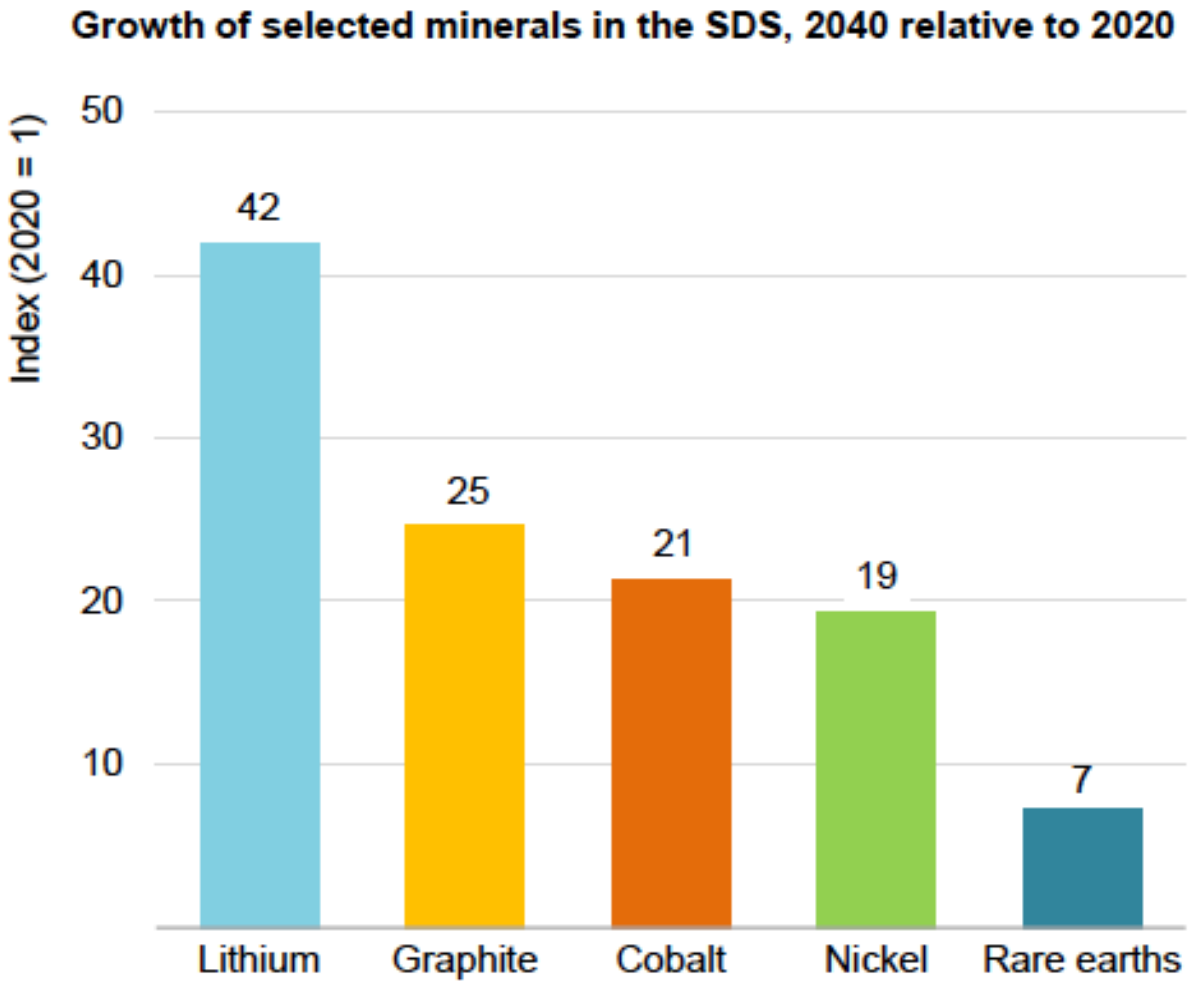
Source: CRM for Strategic Technologies and sectors in the EU (2020)



Mineral demand for clean energy technologies would rise by at least four times by 2040 to meet the climate goals, with particular increase in EVs

(IEA,2021)





Mt million tonnes, does not include steel and aluminium

IEA's six key recommendations for a new, comprehensive approach to mineral security

- Ensure adequate investment in diversified sources of new supply
- Promote technology innovation at all points along the value chain
- Scale up recycling
- Enhance supply chain resilience and market transparency
- Mainstream higher environmental, social and governance standards
- Strengthen international collaboration between producers and consumers

Thanks for your attention

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The Role of Critical Minerals in Clean Energy Transitions

World Energy Outlook Special Report

Back- up slides

EU Recommendations (1)

The EU needs to develop manufacturing opportunities to maintain a minimum of capabilities:

- For **batteries**, increasing EU raw materials production and processing to reduce the dependency on the Asian market;
- The weakest link of the **solar PV value chain** in the EU appears to be the insufficient manufacture capacity of solar cells
- For **UAV**, the EU faces a serious risk of missing the opportunity to catch up on this key technology, decisive to integrate comprehensive real-time geo-referenced intelligence;
- For **digital technologies**, technological sovereignty requires that the EU secures access to key raw materials and processed materials and redevelops manufacturing opportunities for key digital components and assemblies to the EU.

EU Recommendations (2)

To maintain leadership in value chains where Europe is currently strong, significant investment in R&D is needed.

- For fuel cells, improve reliability and reducing the cost through R&D with the goal to reduce the use of platinum;
- For wind, a more secure supply of rare earths, possibly via recycling, could also contribute to preserving EU capability in magnet manufacturing;
- For robotics, securing access to raw materials and improving the capacity for components as well as providing a skilled work force ;
- Diversifying materials supply as well as R&D investments are vital to keep the current EU strong position on 3DP technologies.