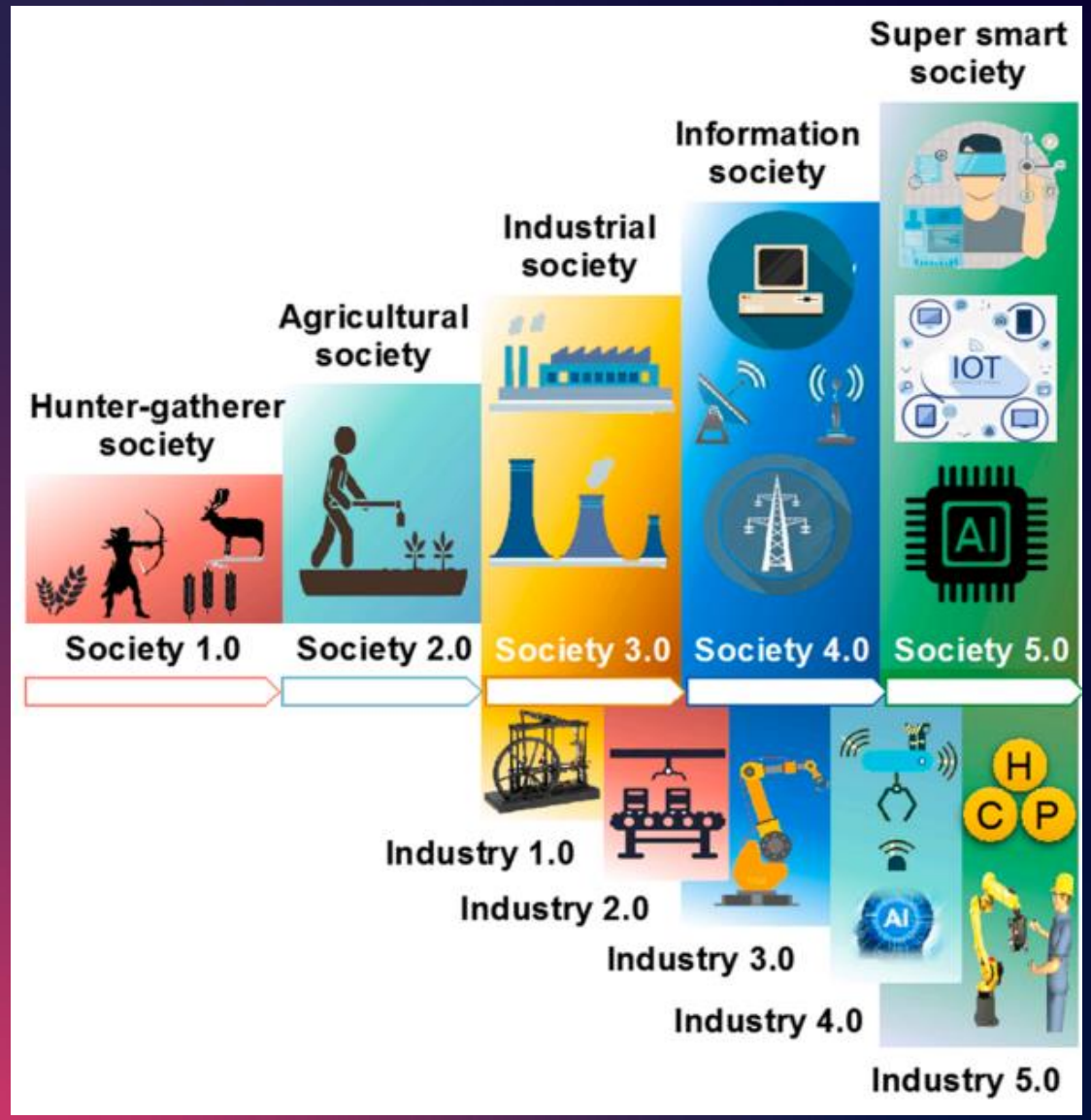

Les opportunités technologiques de l'industrie minière du futur

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Rafael Jaimes Contreras
Industry & Society 5.0
Business Developer
25 avril 2024

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Agenda

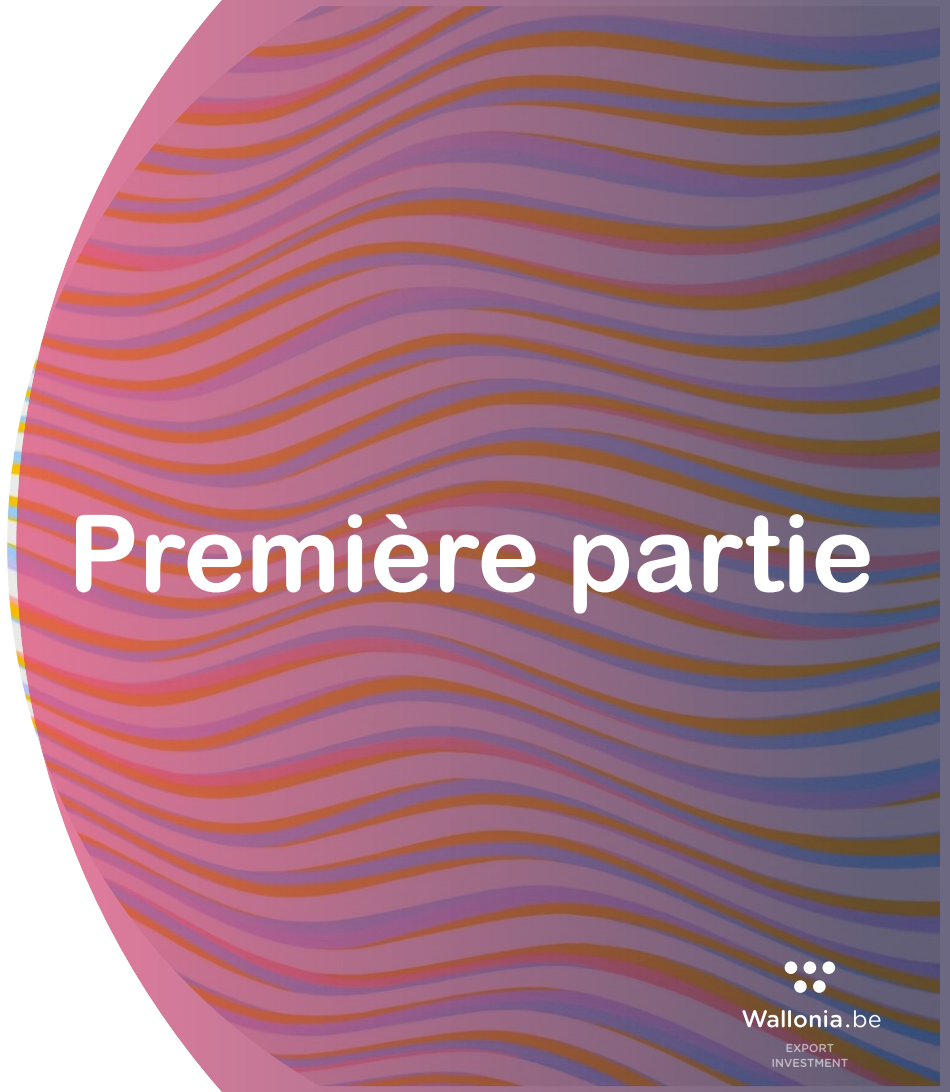
Première partie: 5 minutes

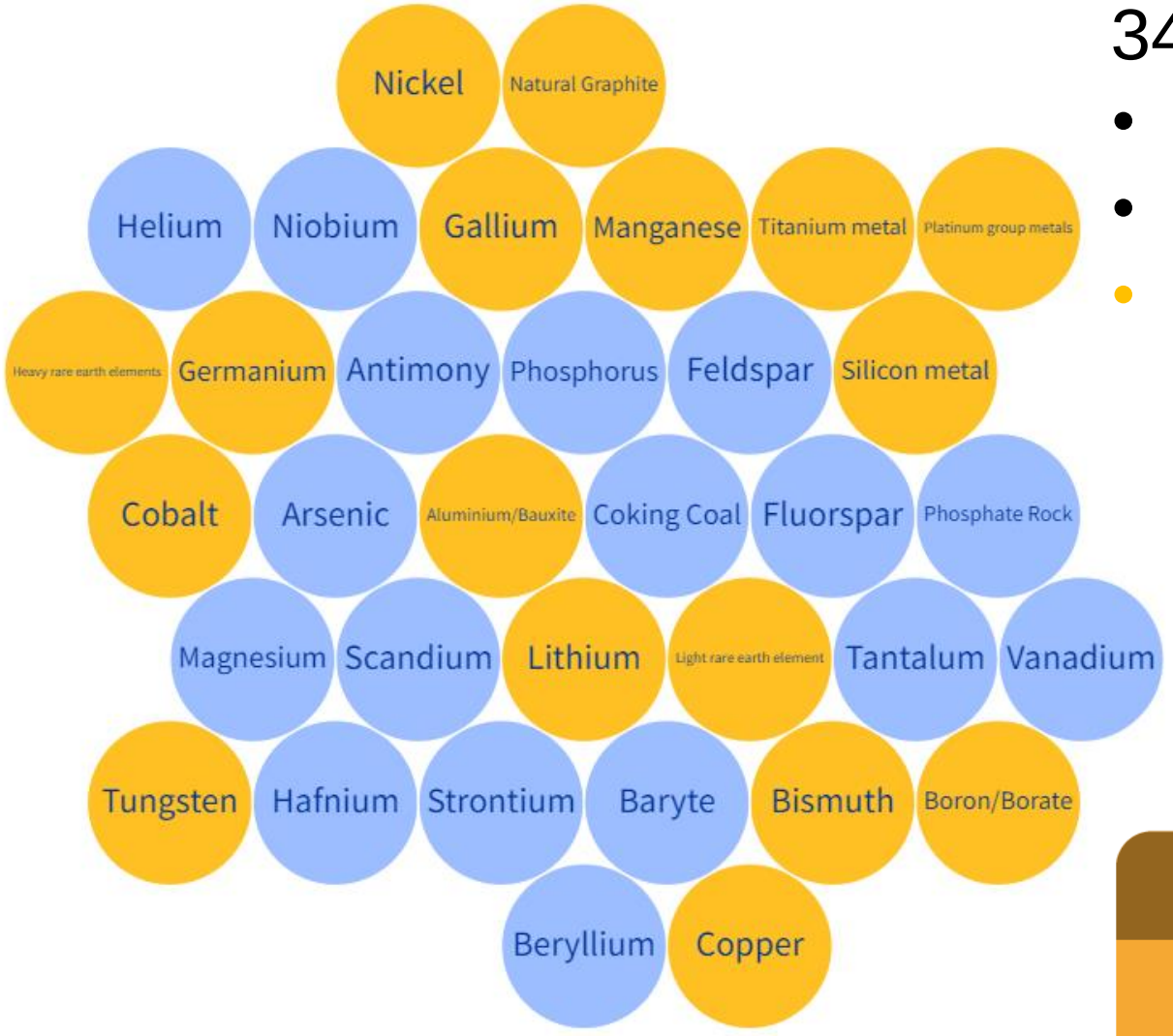
- Background

Deuxième partie: 10 minutes

- Les opportunités technologiques de l’industrie minière du futur

Background

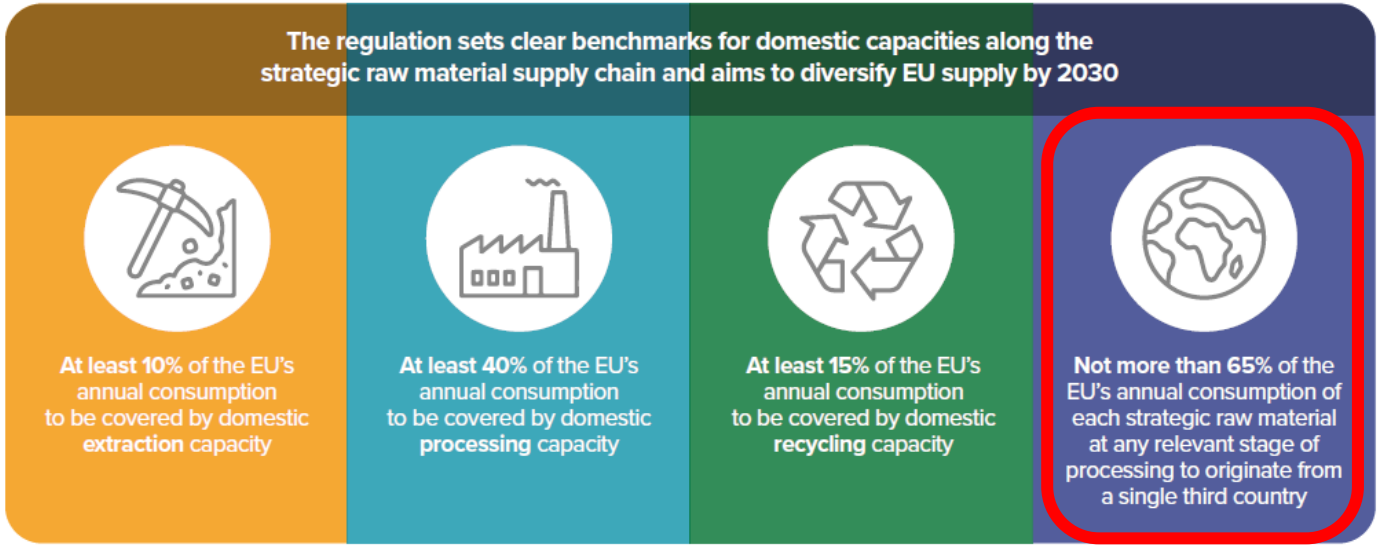




34 Critical raw materials (CRMs)

- High economic importance for the EU
- High risk of supply disruption
- **Include 17 Strategic**

Key objectives of the Critical Raw Materials Act



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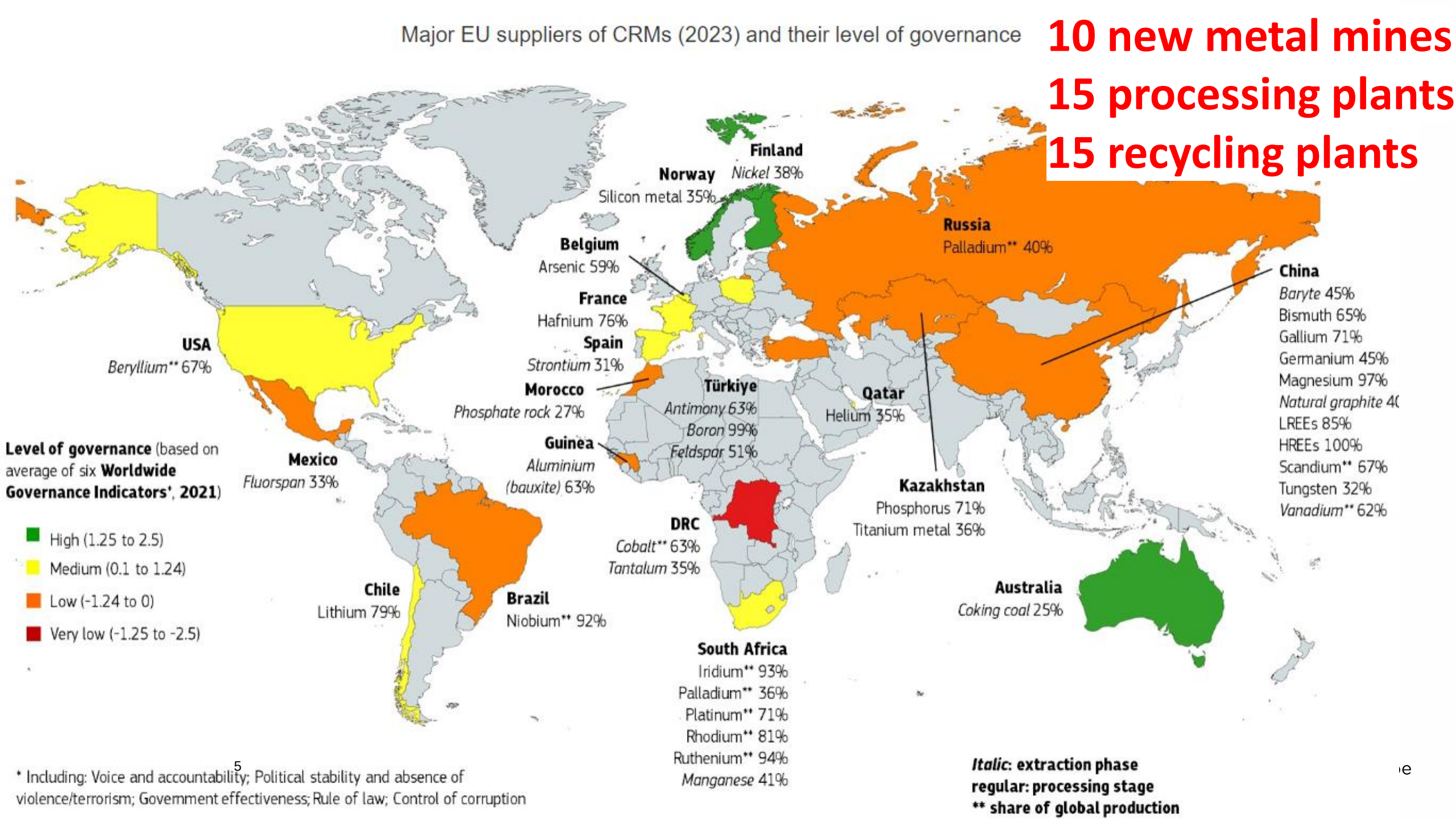
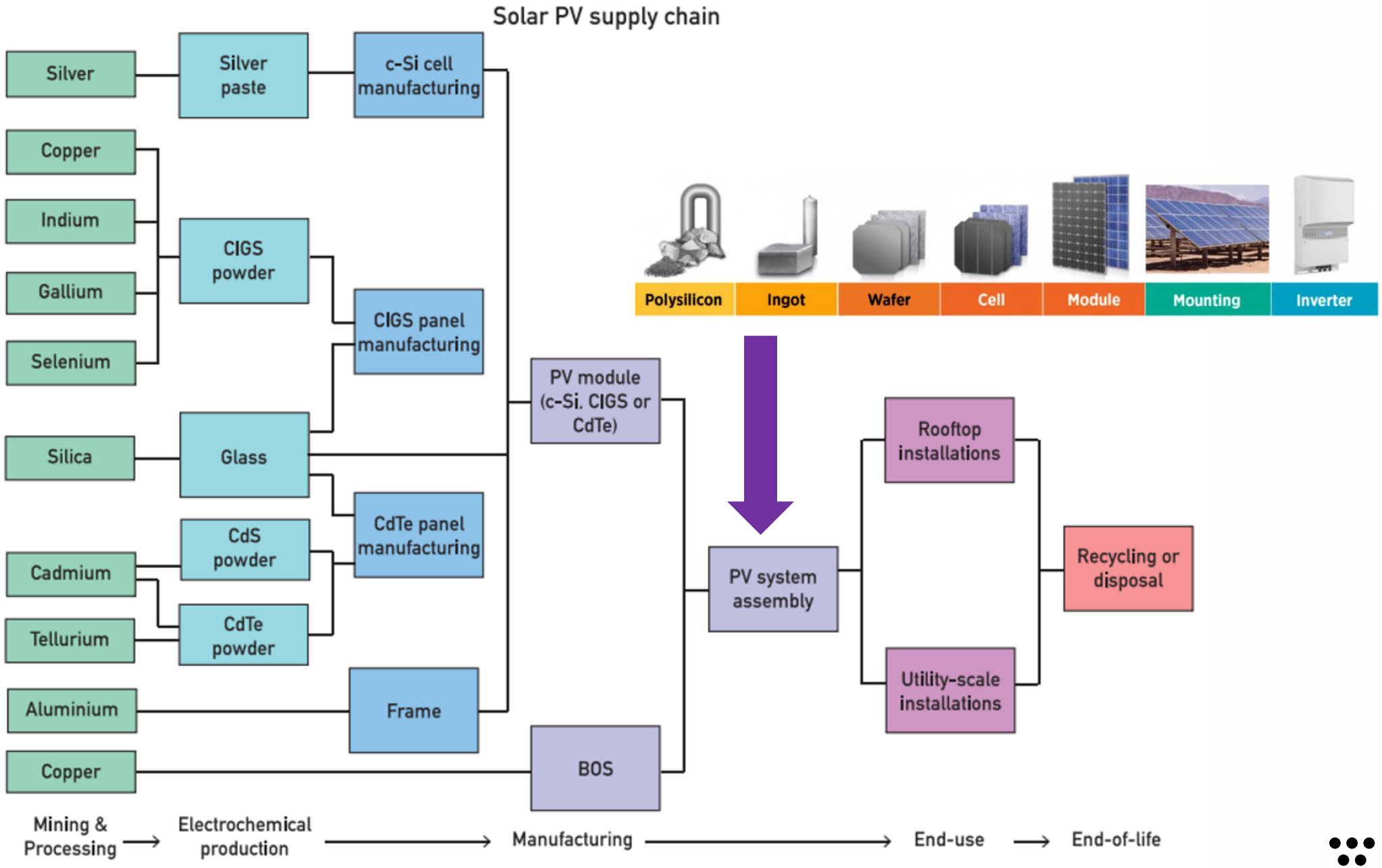

Major EU suppliers of CRMs (2023) and their level of governance
10 new metal mines
15 processing plants
15 recycling plants
Finland
Nickel 38%
Norway
Silicon metal 35%
Russia
Palladium** 40%
Belgium
Arsenic 59%
France
Hafnium 76%
Spain
Strontium 31%
China
Baryte 45%
Bismuth 65%
Gallium 71%
Germanium 45%
Magnesium 97%
Natural graphite 4(
LREEs 85%
HREEs 100%
Scandium** 67%
Tungsten 32%
Vanadium** 62%
USA
Beryllium** 67%
Morocco
Phosphate rock 27%
Türkiye
Antimony 63%
Boron 99%
Feldspar 51%
Qatar
Helium 35%
Guinea
Aluminium (bauxite) 63%
Mexico
Fluorspan 33%
Kazakhstan
Phosphorus 71%
Titanium metal 36%
DRC
Cobalt** 63%
Tantalum 35%
Chile
Lithium 79%
Brazil
Niobium** 92%
Australia
Coking coal 25%
South Africa
Iridium** 93%
Palladium** 36%
Platinum** 71%
Rhodium** 81%
Ruthenium** 94%
Manganese 41%
Level of governance (based on average of six Worldwide Governance Indicators*, 2021)
High (1.25 to 2.5)
Medium (0.1 to 1.24)
Low (-1.24 to 0)
Very low (-1.25 to -2.5)
* Including: Voice and accountability; Political stability and absence of violence/terrorism; Government effectiveness; Rule of law; Control of corruption
Italic: extraction phase
regular: processing stage
** share of global production



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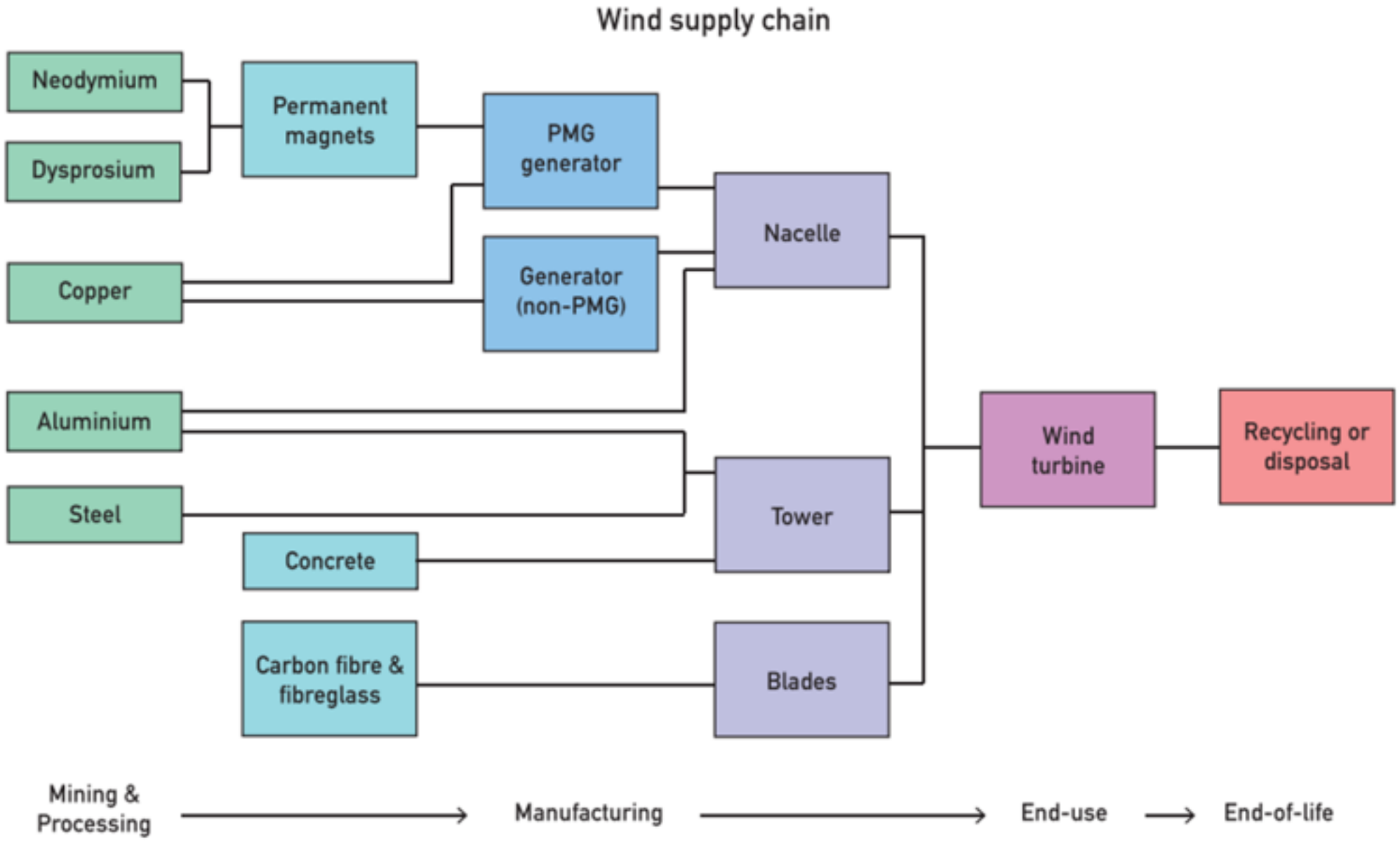
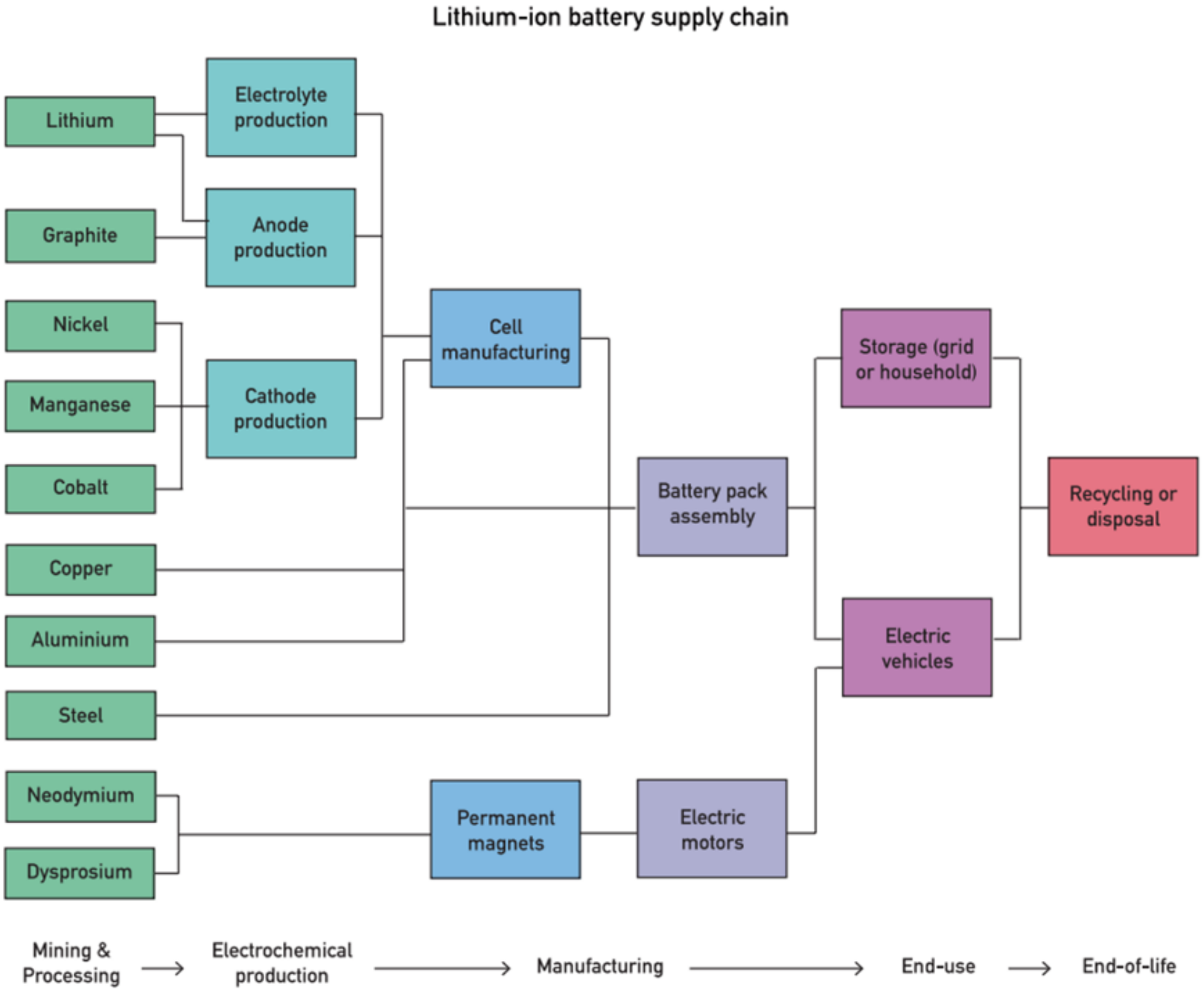
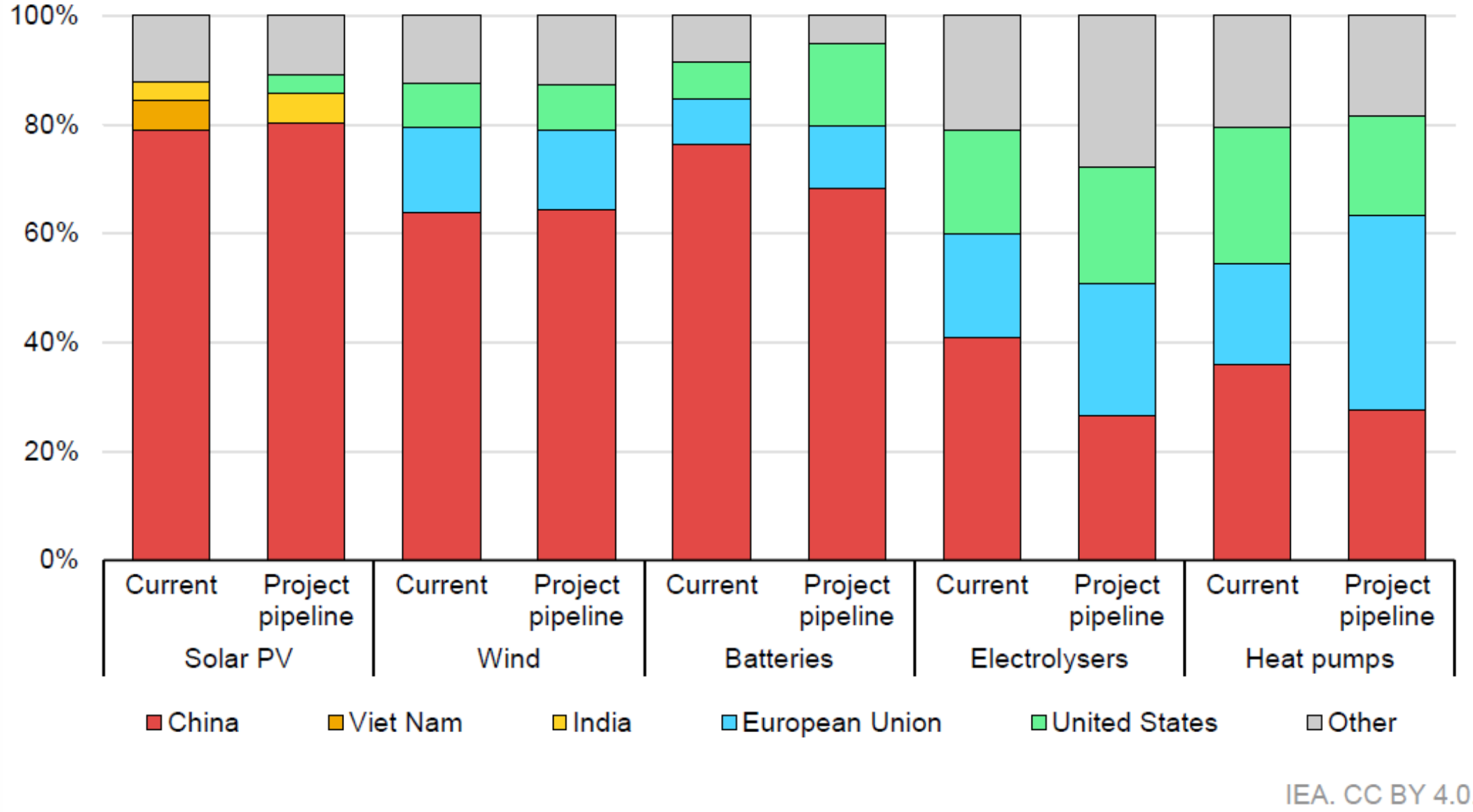

Wind supply chain
Neodymium
Dysprosium
Permanent magnets
PMG generator
Copper
Generator (non-PMG)
Nacelle
Aluminium
Steel
Concrete
Tower
Wind turbine
Recycling or disposal
Carbon fibre & fibreglass
Blades
Mining & Processing
Manufacturing
End-use
End-of-life





Concentration géographique actuelle et prévue des activités de fabrication des principales technologies propres

Les opportunités technologiques de l'industrie minière du futur

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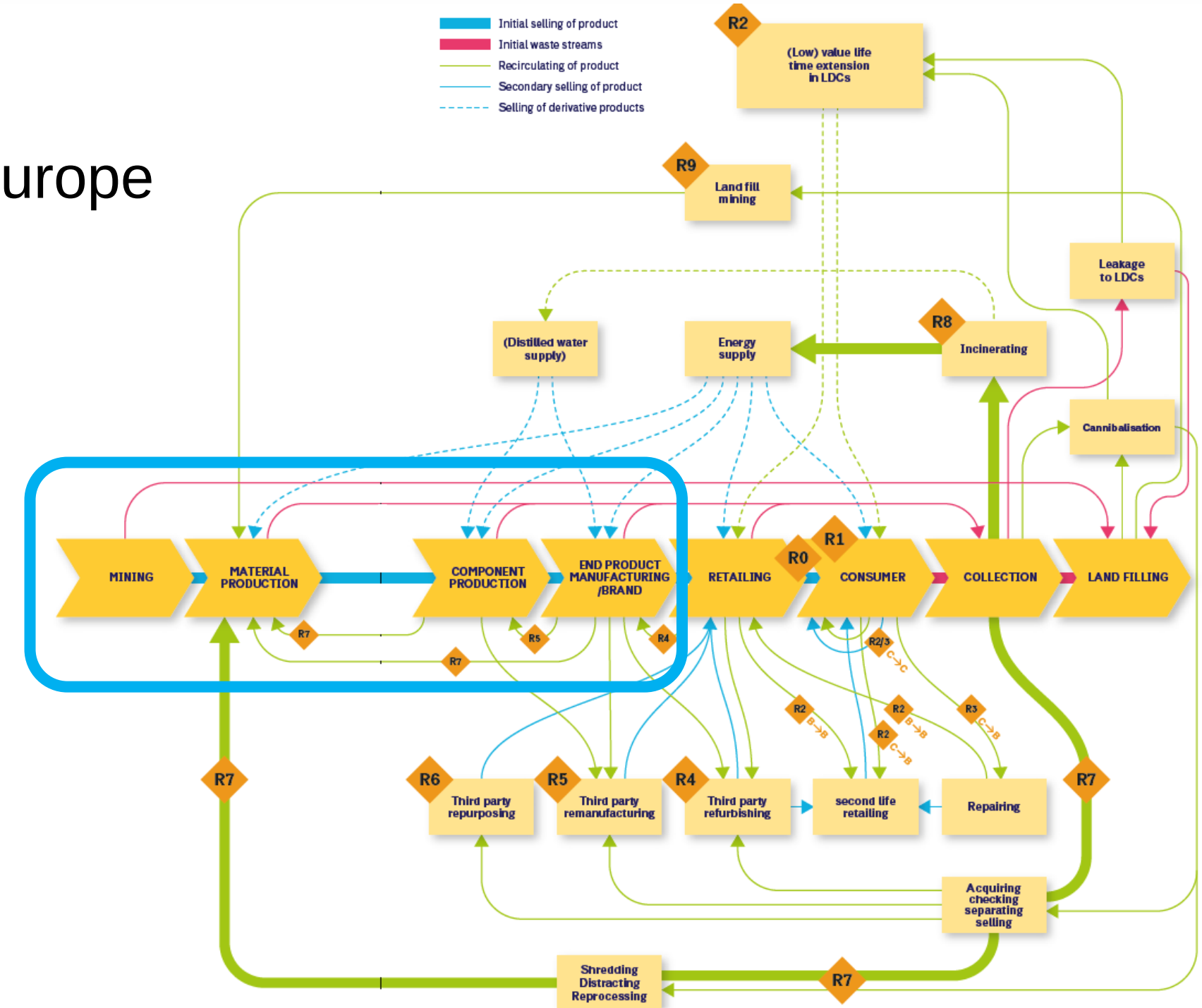
Conserver les matières en Europe

R0 = Refuse
R1 = Reduce
R2 = Resell, Reuse
R3 = Repair
R4 = Refurbish
R5 = Remanufacture
R6 = Re-purpose
R7 = Recycle materials
R8 = Recover energy
R9 = Re-mine



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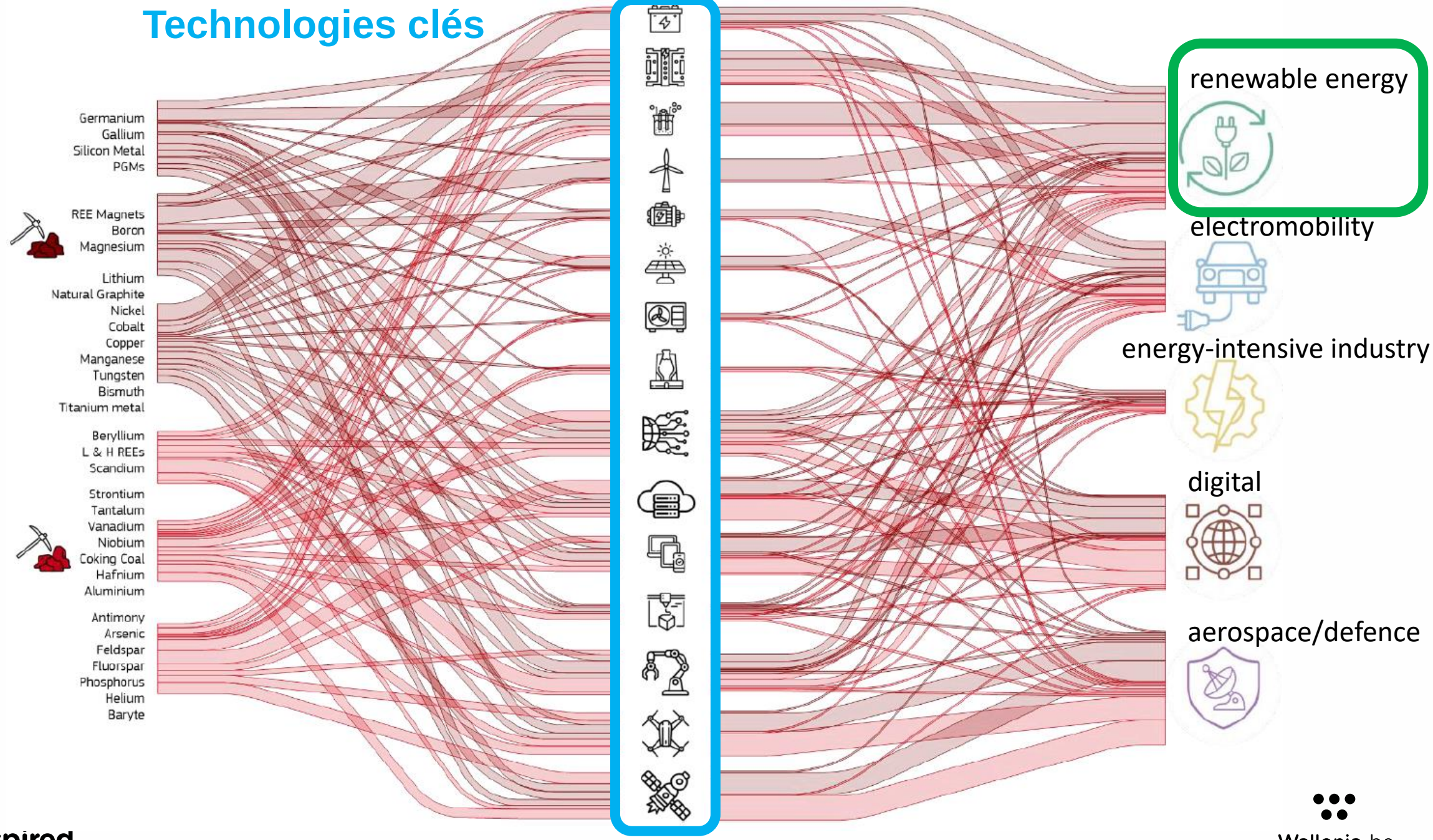
Technologies clés



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Supply chain analysis and material demand forecast in strategic technologies and sectors in the EU – A foresight study, Publications Office of the European Union,

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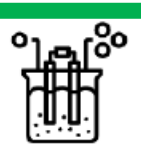
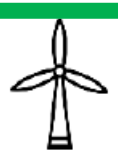
Technologies clés

Secteur: énergies renouvelables

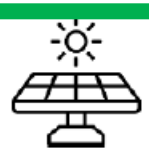

Li-ion batteries


Fuel cells

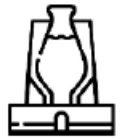

Electrolysers


Wind turbines


Traction motors


Solar photovoltaics (PV)


Heat pumps


Hydrogen direct reduced iron and electric arc furnaces (H2-DRI)


Data transmission networks


Data storage and servers


Smartphones, tablets and laptops


Additive manufacturing (AM)


Robotics


Drones


Space launchers and satellites

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Supply chain analysis and material demand forecast in strategic technologies and sectors in the EU – A foresight study, Publications Office of the European Union,

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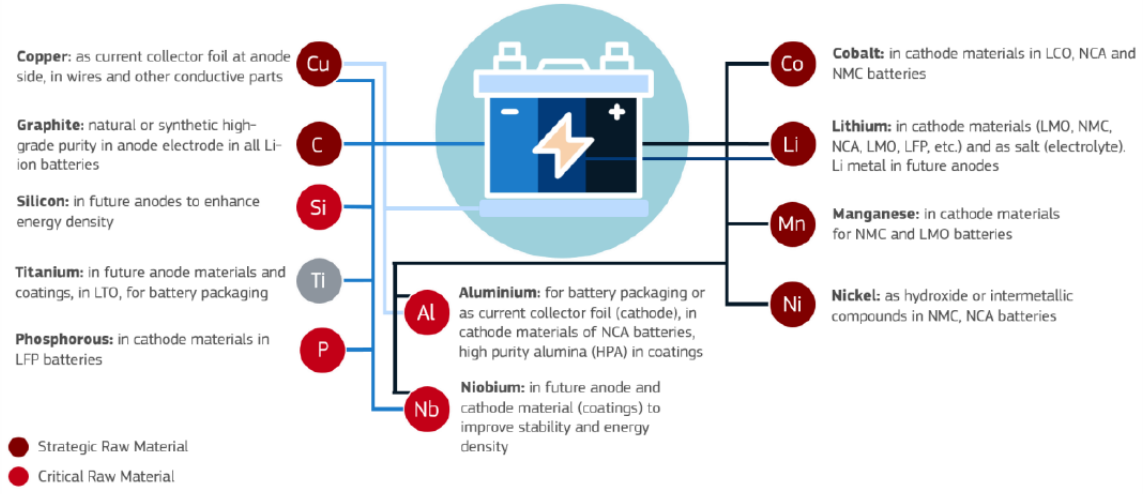
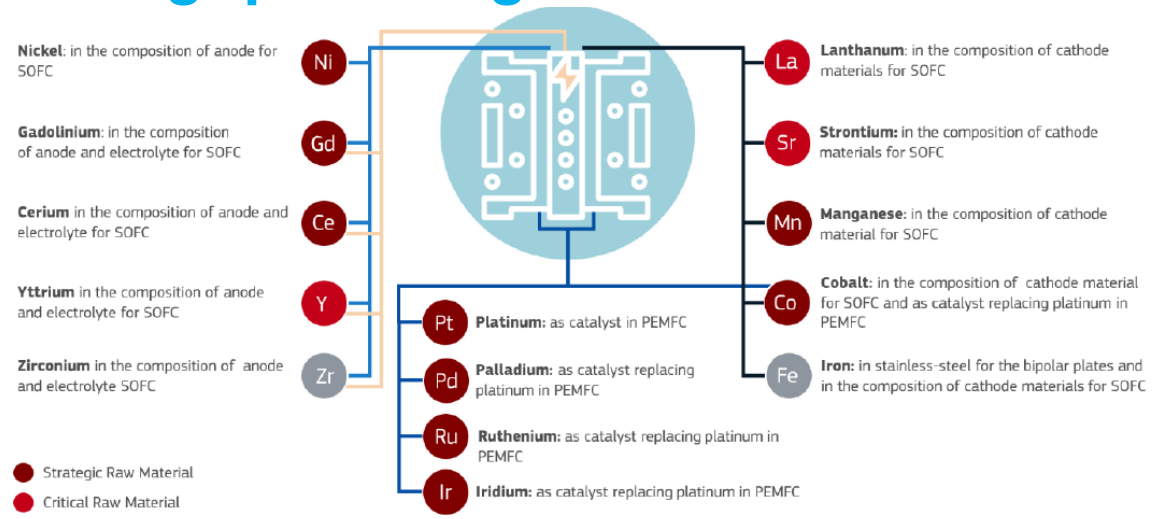
Technologies clés secteur stratégique énergies renouvelables



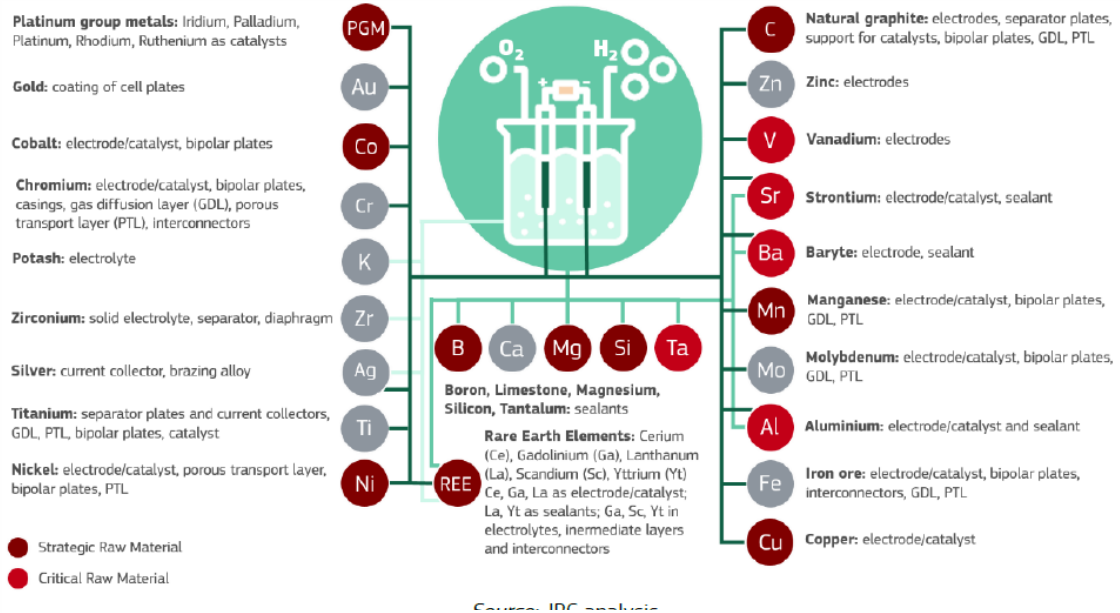
Source: JRC analysis.

Amérique Latine:
16% matières premières

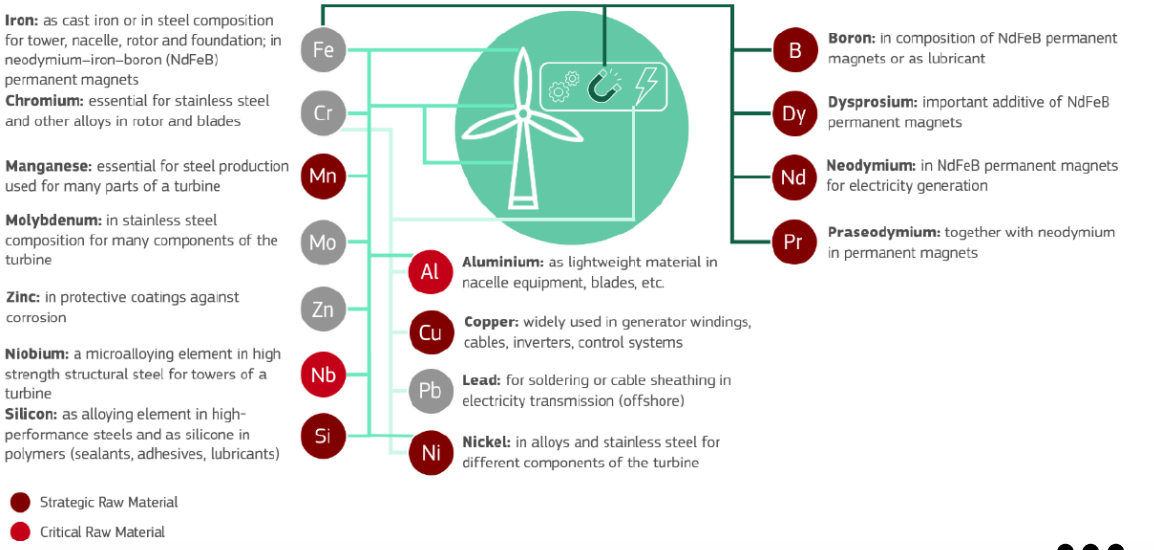


Source: JRC analysis.

Amérique Latine:
7% matières premières, 1% matériaux transformés



Amérique Latine:
Matières premières: 13% AWE, 8% PEM, 12% SO, 12% AEM



Amérique Latine:
18% matières premières, 9% matériaux transformés,
3% composants, 5% assamblages

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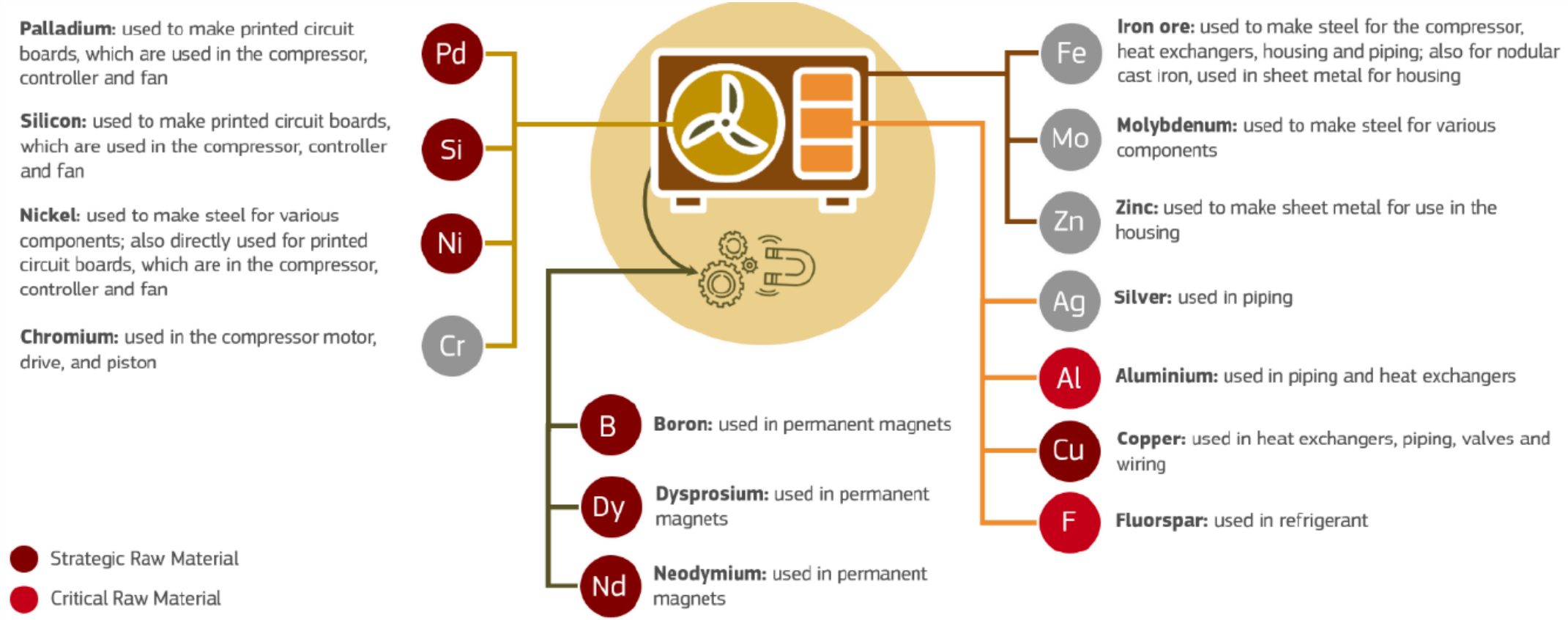
Technologies clés secteur stratégique énergies renouvelables



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<u>Amérique Latine:</u> 17% matières premières

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Se positionner face à la demande croissante de métaux pour la transition énergétique

Opportunités pour les entreprises wallonnes

- Développement de technologies avancées
- Automatisation de l'exploitation minière
- Partenariats stratégiques
- Innovation dans le recyclage

Avantages concurrentiels

- Accès à de nouveaux marchés
- Diversification économique

Répondre aux exigences ESG et aux innovations technologiques

Alignement avec les considérations ESG

- Technologies vertes
- Amélioration de l'empreinte sociale

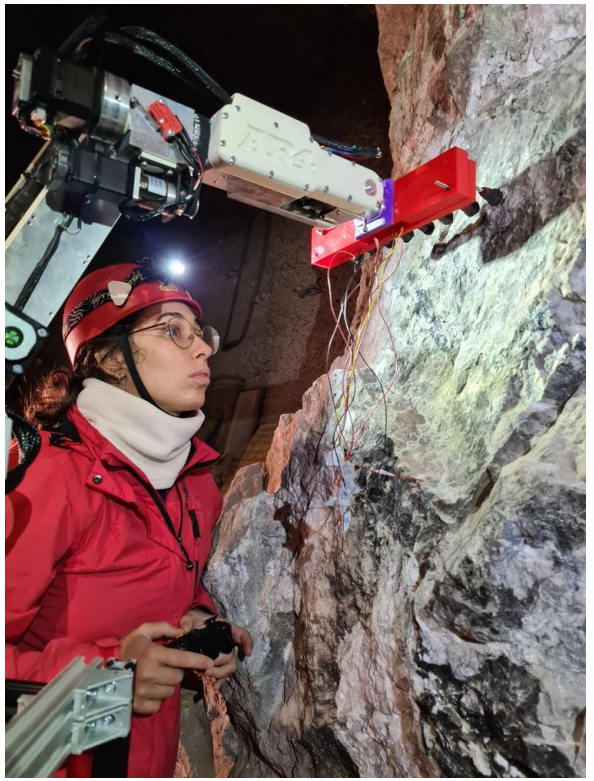
Avancées technologiques clés

- Intelligence Artificielle (IA) et Internet des Objets (IoT)
- Plateformes numériques pour ESG

Conclusion : Technologies et Synergies

Les technologies innovantes issues de divers domaines se renforcent mutuellement, offrant des perspectives nouvelles pour l'industrie minière :

- **Outils de numérisation**
  - Capteurs d'identification par radiofréquence (RFID)
  - Équipements portables
  - Drones et satellites
- **Mégadonnées ("Big Data")**
  - Utilisées en apprentissage automatique et intelligence artificielle
- **Intégrateurs de mégadonnées**
  - 5G
  - Internet des objets (IoT)
  - Logiciels de gestion de systèmes
  - Technologie "blockchain"
- **Optimisation des processus**
  - Équipements automatisés et véhicules électriques
  - "Jumeaux numériques"
  - Technologies de gestion de l'eau et de récupération des résidus
  - Production d'énergie renouvelable



Robominers

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www.awex.be

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