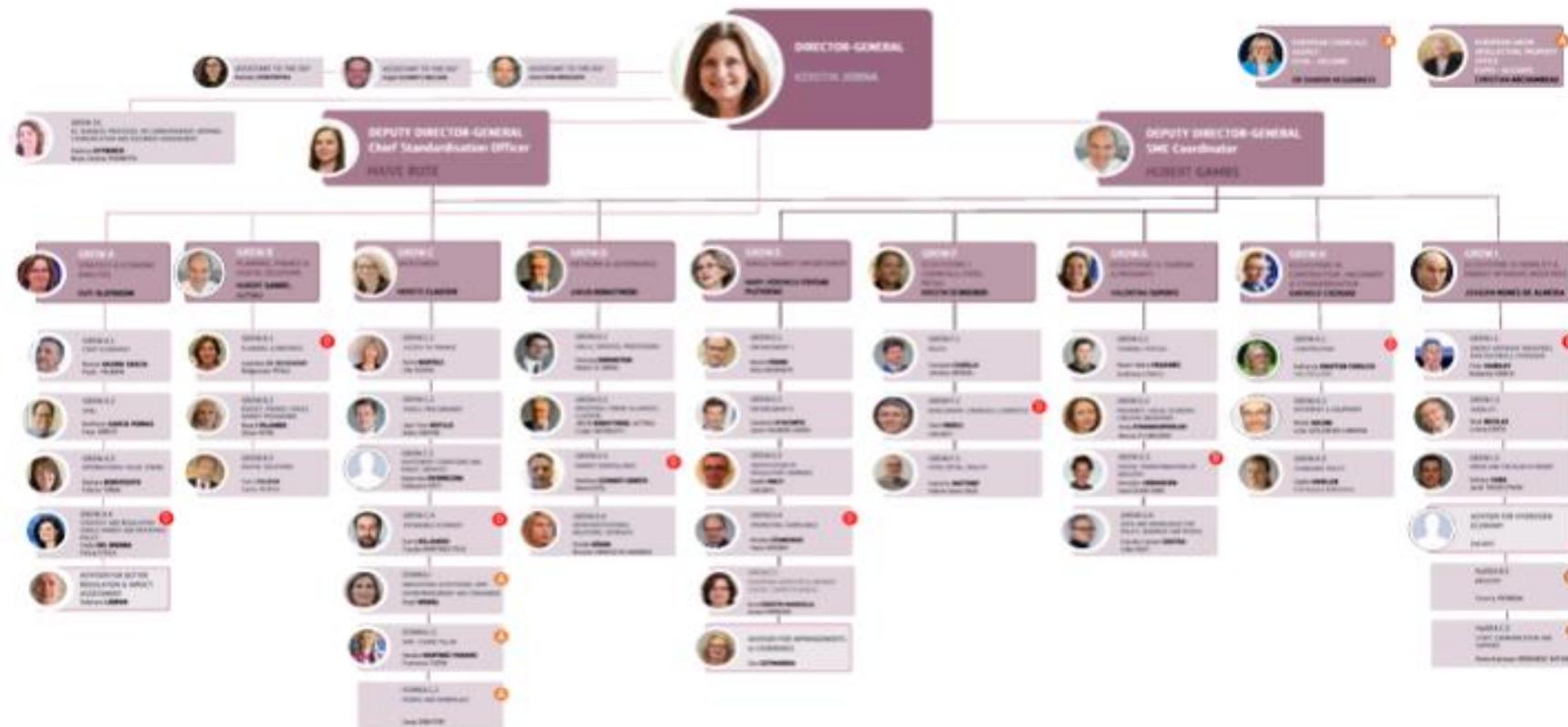




Global race for critical raw materials and cleantech. Europe between China and the US

Maive Rute, Deputy Director-General & Chief Standardisation Officer. DG Internal Market, Industry and SMEs, European Commission.

May 16, 2023



D Deputy to the Director
A Staff detached to Agencies

1. Portfolio of the assistants to the Director General and Deputy Directors General:
Natalia Zelenkova: Secretaries D, E, W + Unit F-X
Rajk Vishwakarma: Secretaries A, B, G + Units E3 & E4
Felix von Bogdani: Secretaries C, J + various task force (TFs)

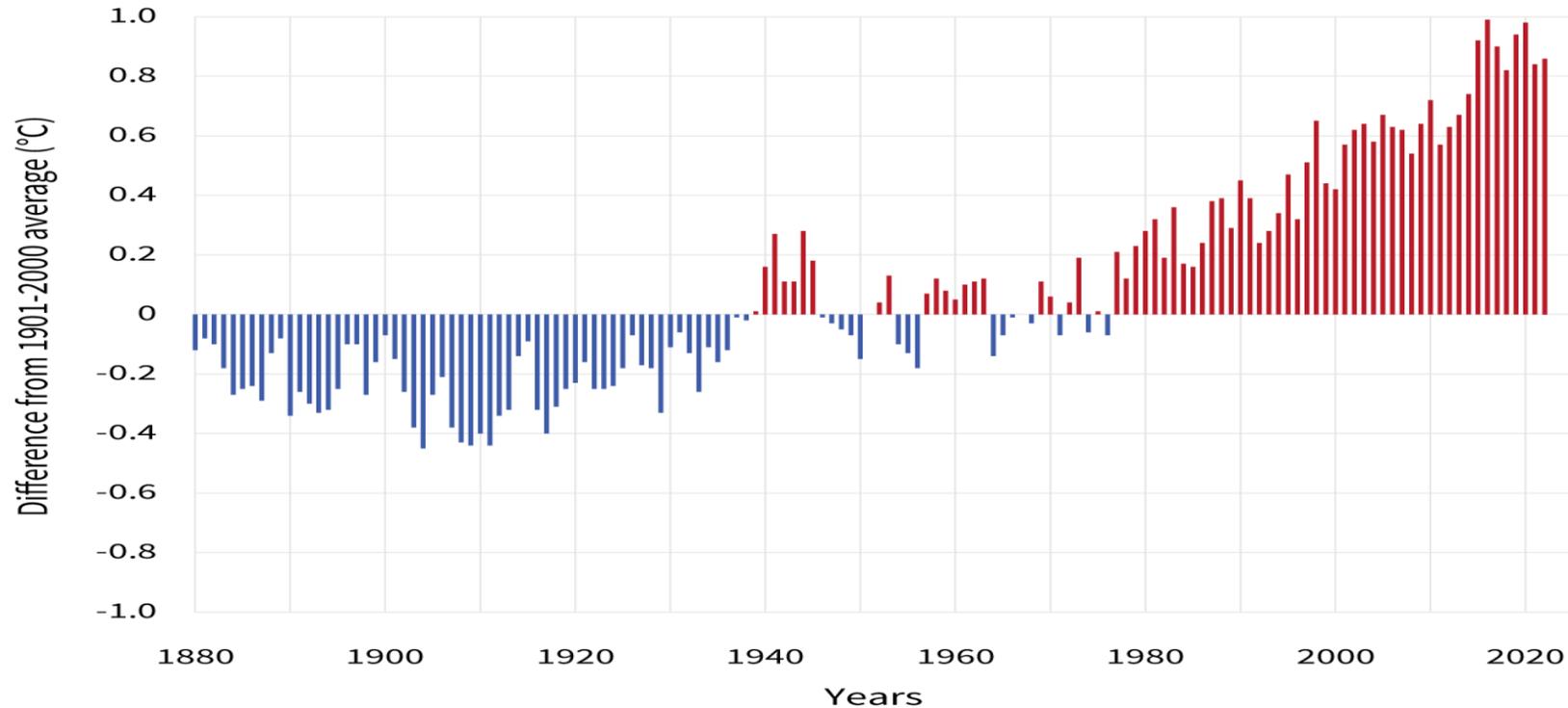
The following members of management staff are seconded to the content of the annex: L. Maron, J. Florin.

DATE OF EFFECT: 2023/05/25

Global economy has become
a different place

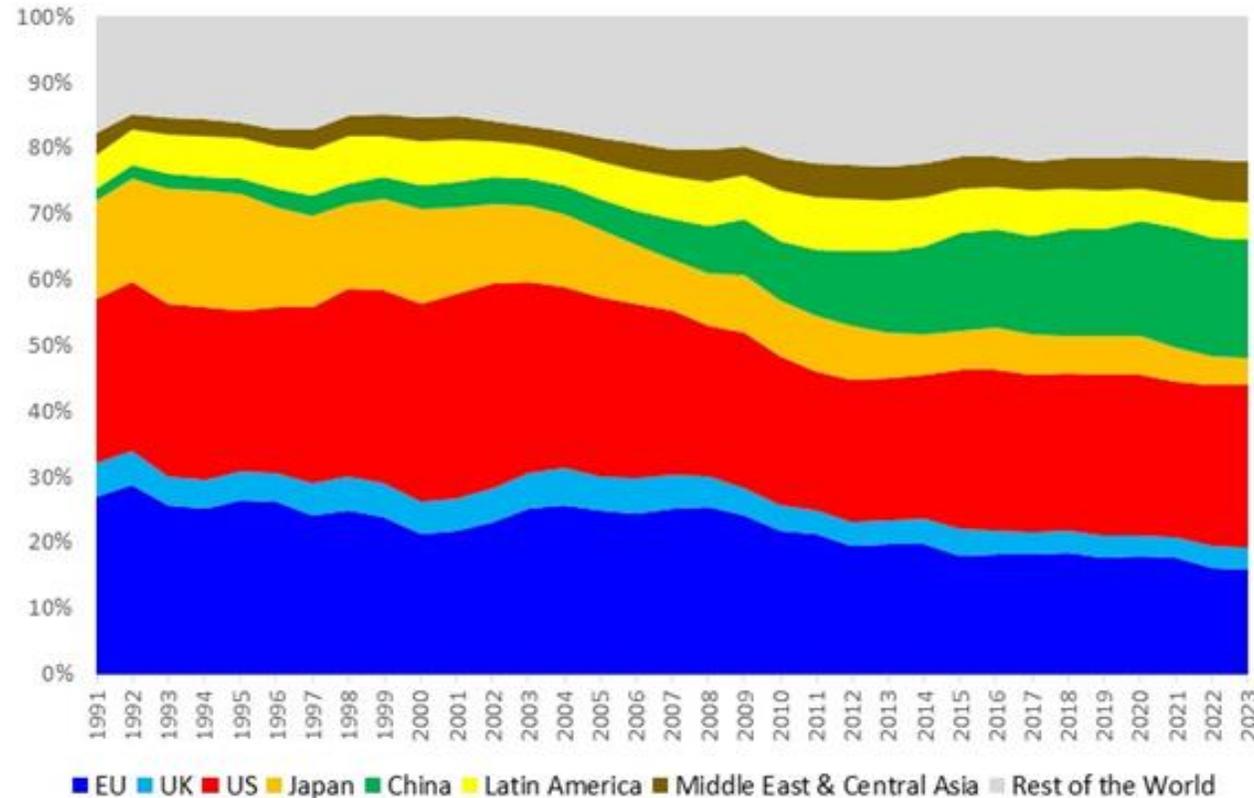
Rapid climate change

GLOBAL AVERAGE SURFACE TEMPERATURE



Yearly surface temperature compared to the 20th-century average from 1880–2022. Blue bars indicate cooler-than-average years; red bars show warmer-than-average years. NOAA Climate.gov graph, based on [data](#) from the National Centers for Environmental Information.

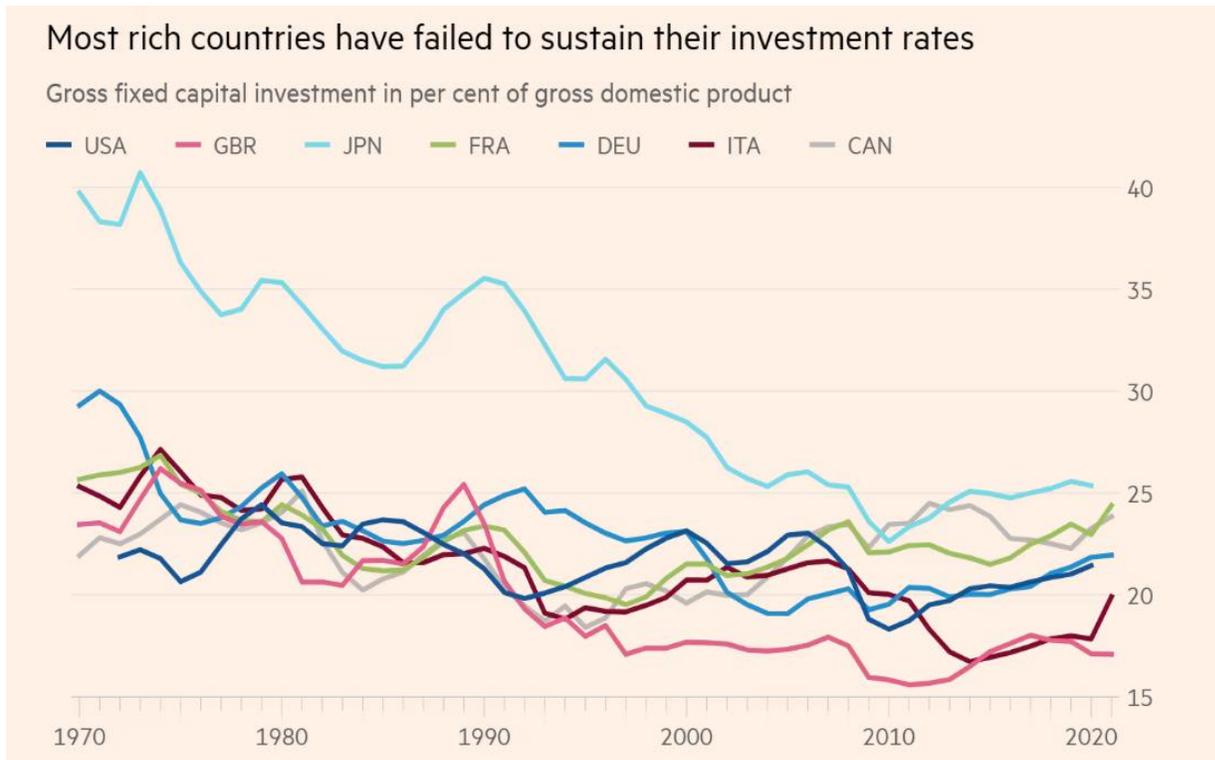
The share of the EU in the global economy continues to decline



Shares of World Gross Domestic Product (1991-2023)

Source: International Monetary Fund – WEO.

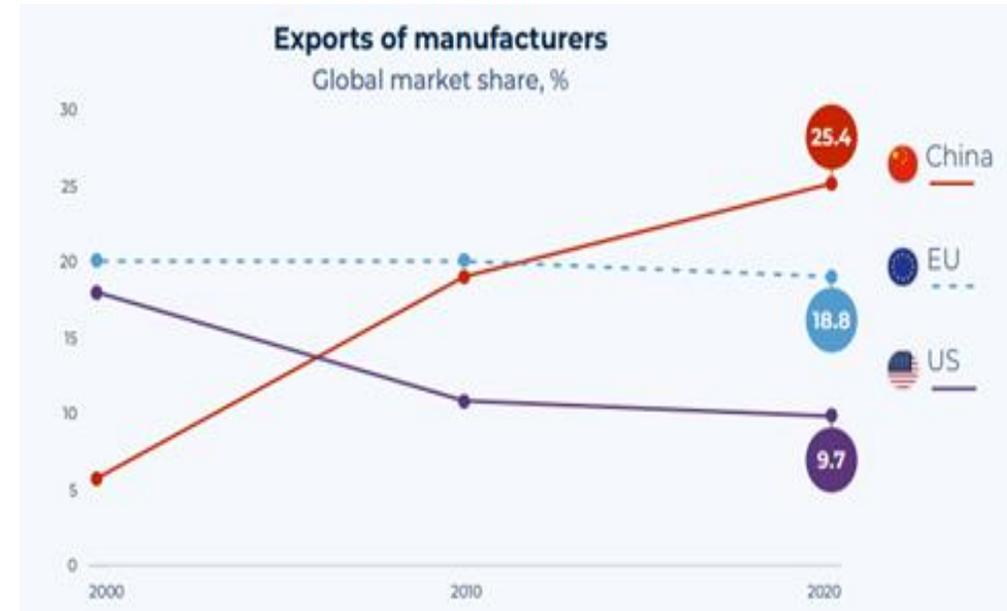
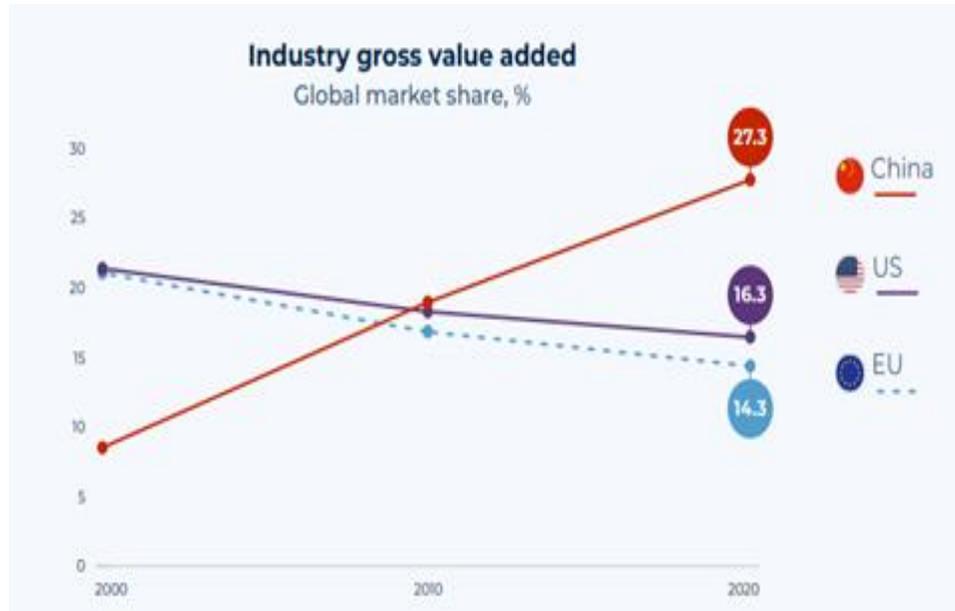
Lack of investments in the West for 20 years



According to the IEA, if G7 countries would restore their previous investment levels, this would cover half of the globally needed annual \$4 tn CleanTech investments. G7 annual GDP approximately \$45tn

Source: World Bank via Martin Sandbu, FT

Rise of China in manufacturing & exports



Source: ERT (2022).

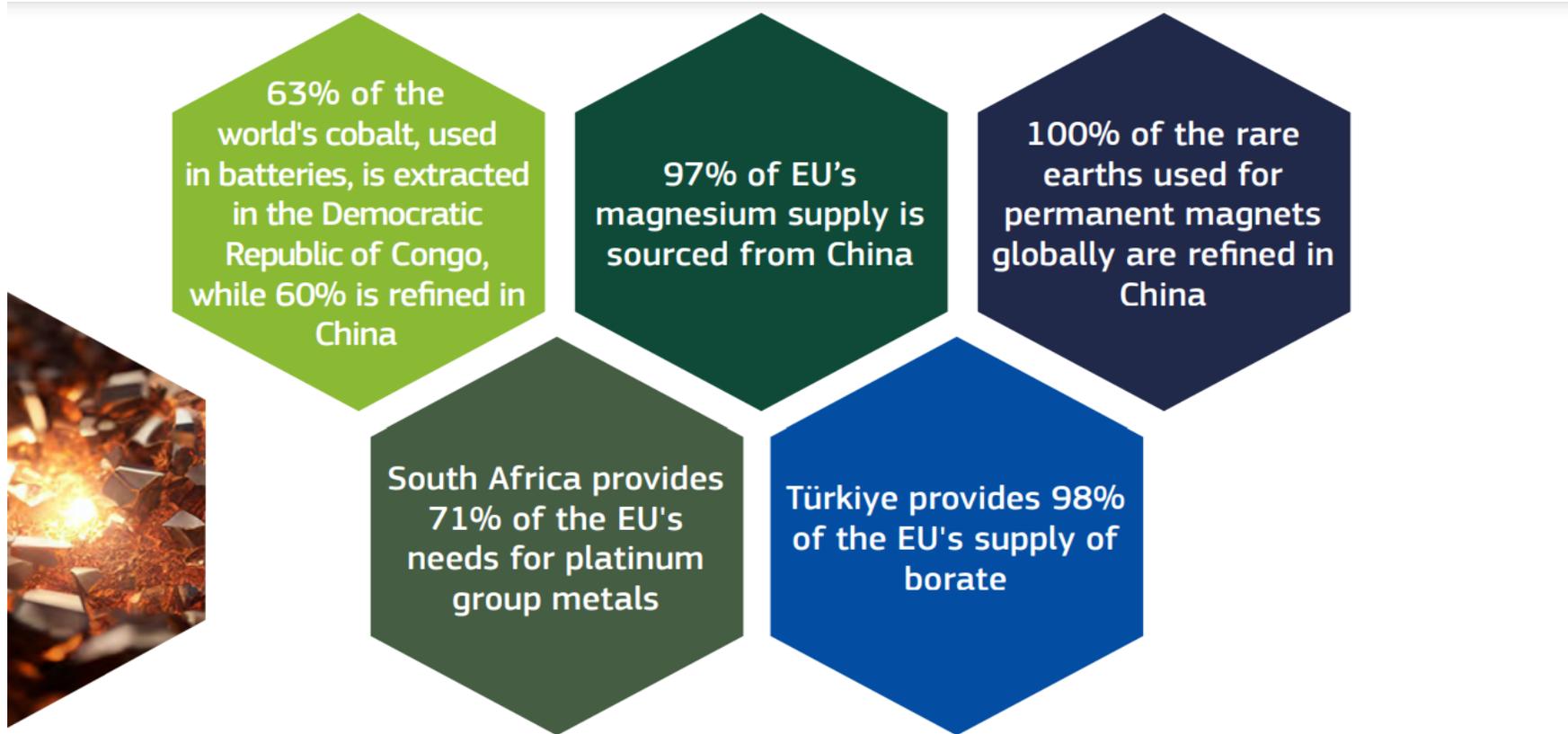
Dominant supplier impact: China

World fertilizer prices have continued to skyrocket after China curbed exports

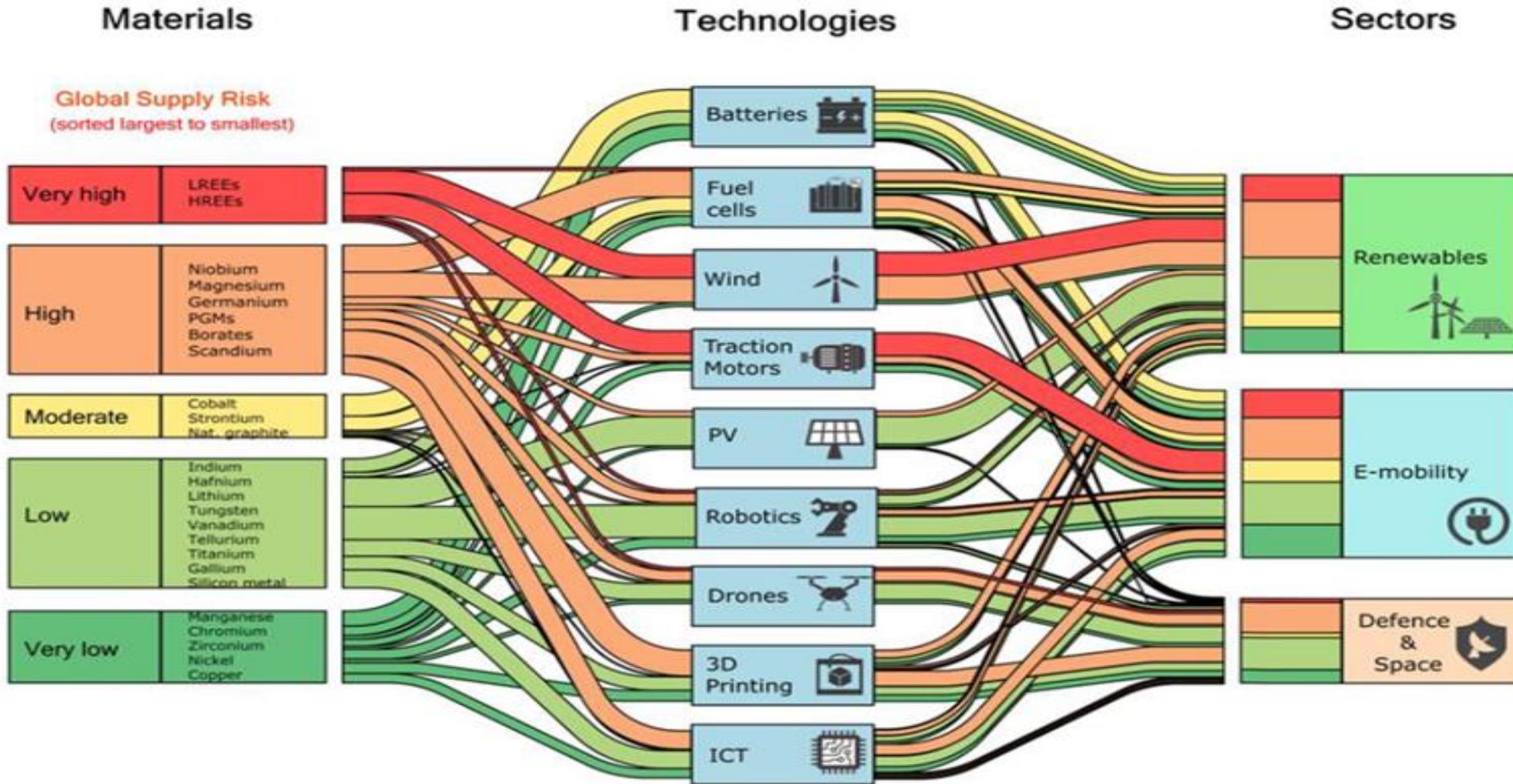
Fertilizer prices and exports January 2017–March 2022 (index: January 2019 = 100)



EU critical raw materials dependences

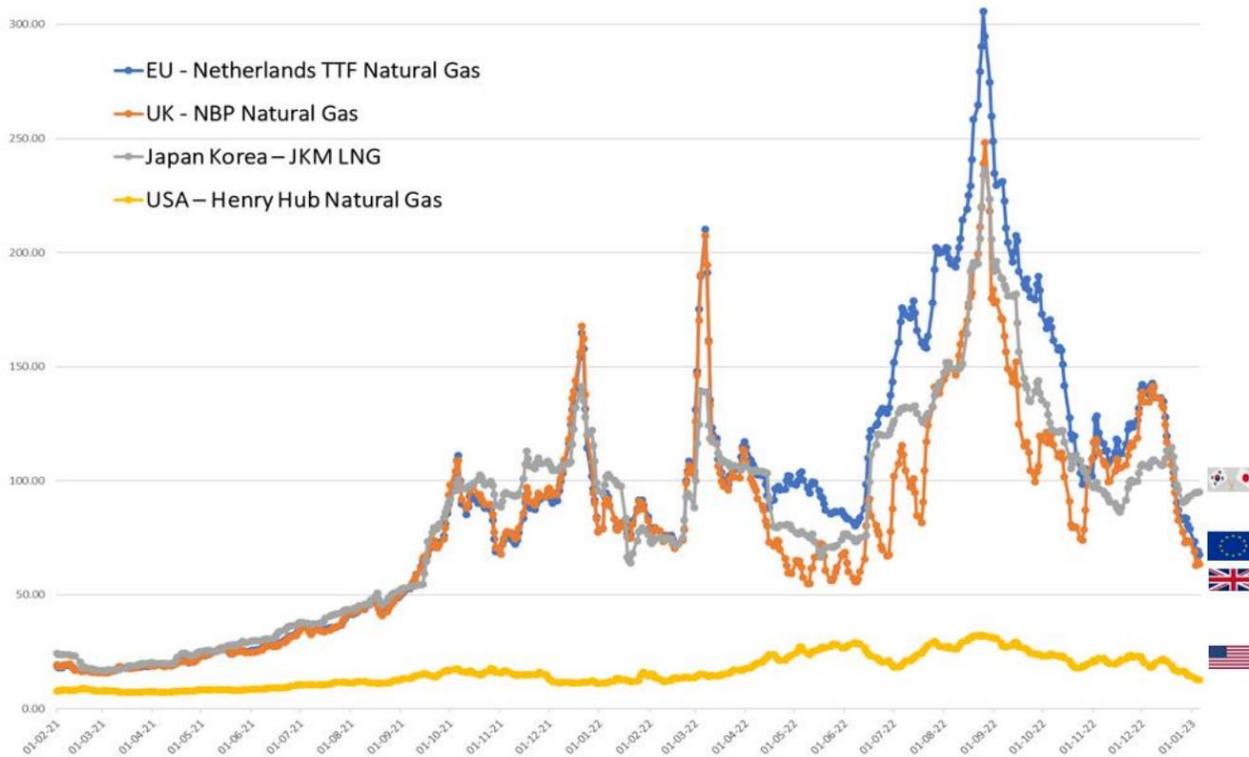


Supply risks of critical raw materials



Geopolitical risks – Russia

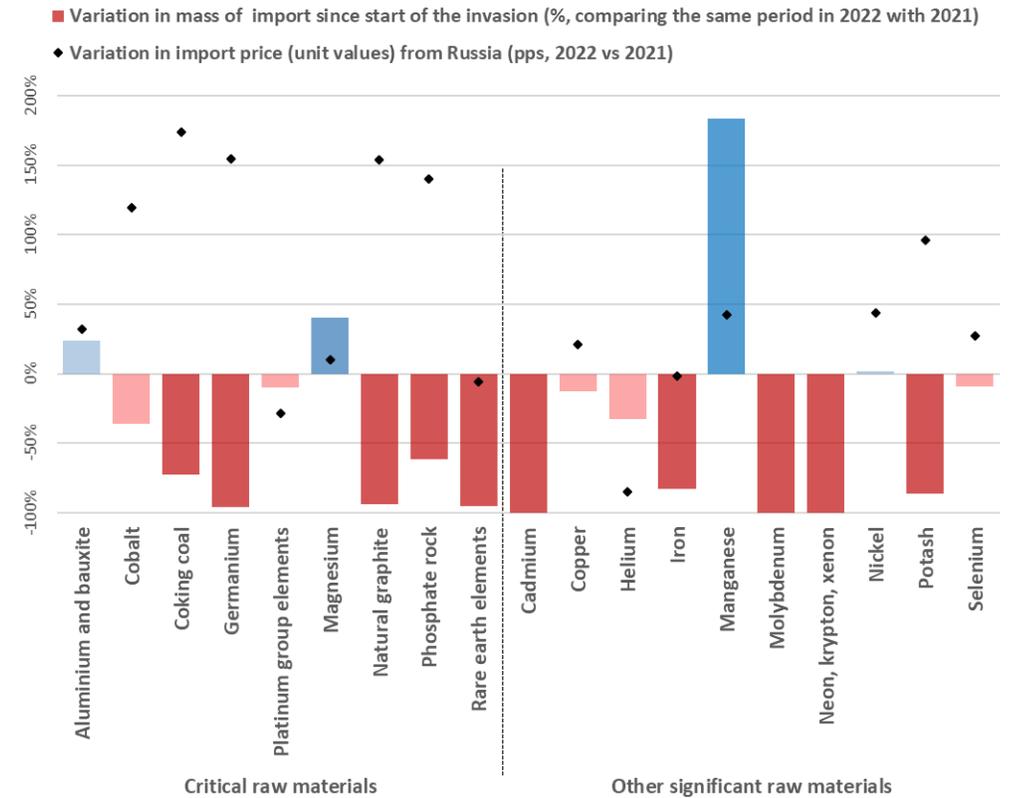
Evolution of gas prices (€/MWh) in EU and third partners



Source: Chief Economist Team – DG GROW based on Refinitiv.

Note: data are presented on a 3 day moving average base.

Critical and Significant Raw Materials imported from Russia



Source: "Decoupling from Russia", DG GROW Single Market Economy Papers (2022)

The global race is on for
green, digital and resilient

The previous Big Transition

5th AVE NYC
1900

Where is
the
car?



5th AVE NYC
1913

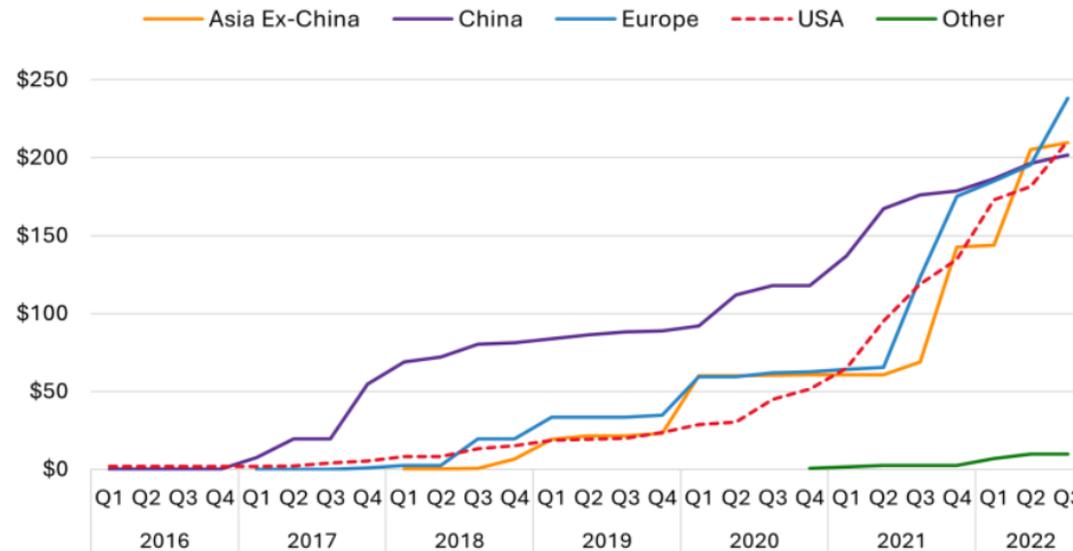
Where is
the
horse?



Source: internet, Tony Seba & A Learning a Day

\$860 billion globally by 2030 for electric vehicles

FIGURE 1: CUMULATIVE ANNOUNCED EV INVESTMENT BY REGION (\$BILLION)



As of the end of Q3 2022, Europe leads with \$238 billion announced, followed by the United States and Asia Ex-China each with \$210 billion, \$199 billion in China, and \$10 billion outside of these regions (including Mexico, Canada, and Australia).

The US Infrastructure Investment and Jobs Act (IIJA) and the Inflation Reduction Act (IRA) provide more than **30 times** more support than had previously been made available for electric vehicles by the federal government.

At the end of 2020, U.S. investments were lagging both Asia and Europe.

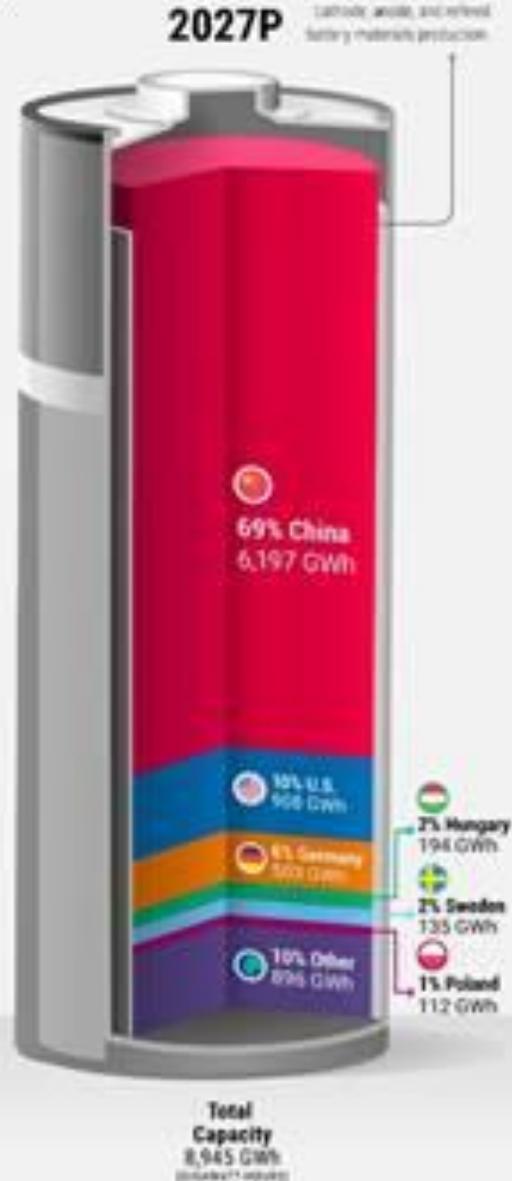
BATTERY MANUFACTURING CAPACITY BY COUNTRY

Global lithium-ion battery production capacity is projected to increase eightfold by 2027.

Here's a look at the top countries for battery manufacturing in 2022 and 2027, based on BloombergNEF's lithium-ion supply chain rankings.

Six of the top 10 battery manufacturing companies are headquartered in China.

U.S. battery production capacity is projected to grow over 10x by 2027.



- Global lithium-ion battery production capacity projected to **increase 8 fold by 2027**. 6 of the top 10 countries expected to be **European**.
- **China** is home to six of the world's 10 [biggest battery makers](#). Behind China's battery dominance is its vertical integration across the rest of the EV supply chain, from mining the metals to producing the electric vehicles. It's also the [largest EV market](#), accounting for 52% of global sales in 2021.
- Based on Bloomberg NEF, elements.visualcapitalist.com

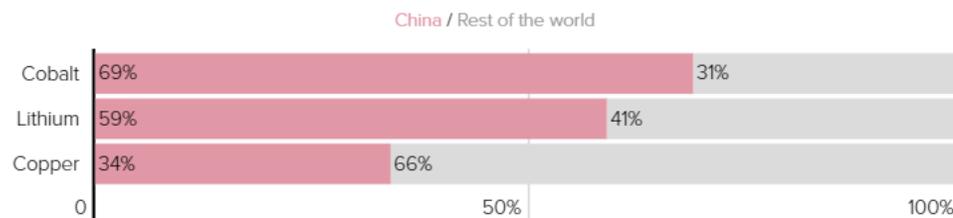
Value chain exposures in CleanTech

Over the past years, China developed a dominant position in the entire supply chain of green tech sectors:

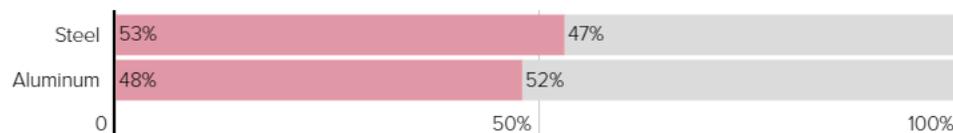
- **Raw materials;**
- **Intermediate products;**
- **Final manufacturing.**

CHINA LEADS THE CLEAN TECH RACE

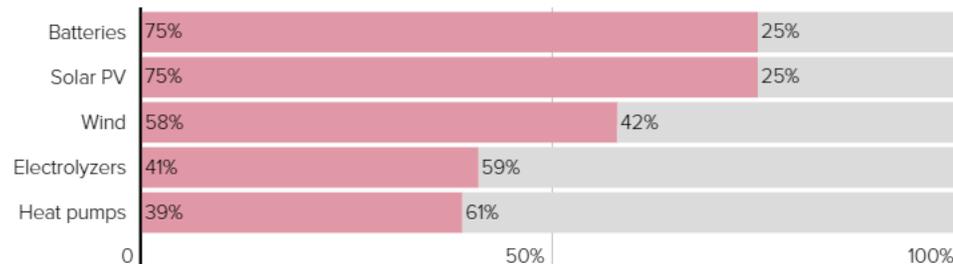
China was the largest producer across the supply chain of major clean energy technologies in 2021, from the production of bulk materials...



... and critical materials ...



... to manufacturing.



SOURCE: International Energy Agency



By Giovanna Coi

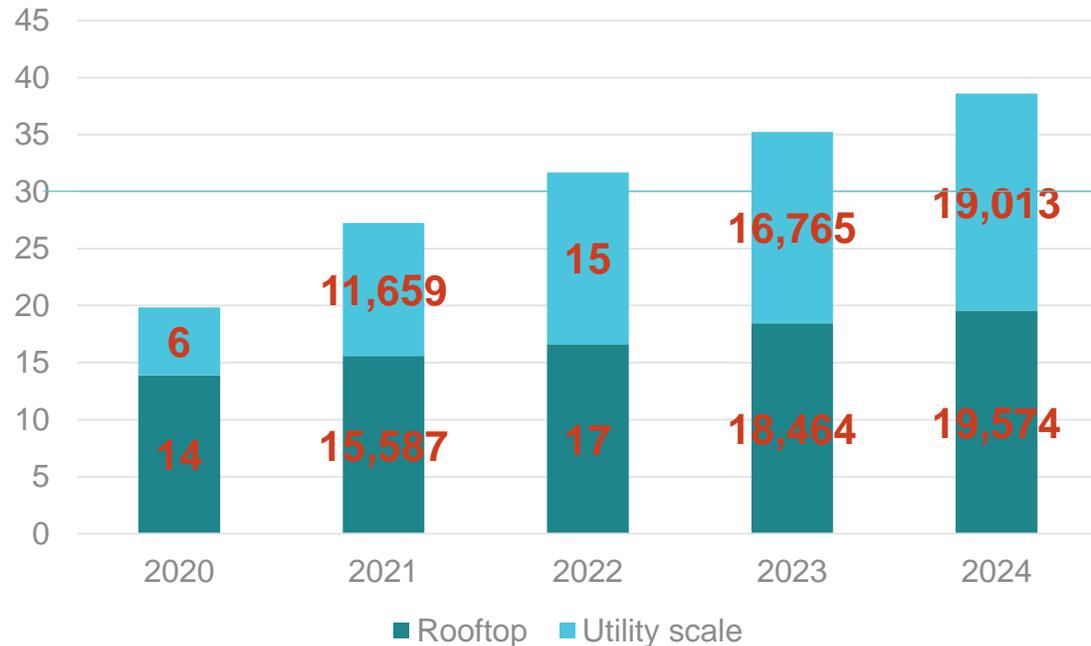
POLITICO



European
Commission

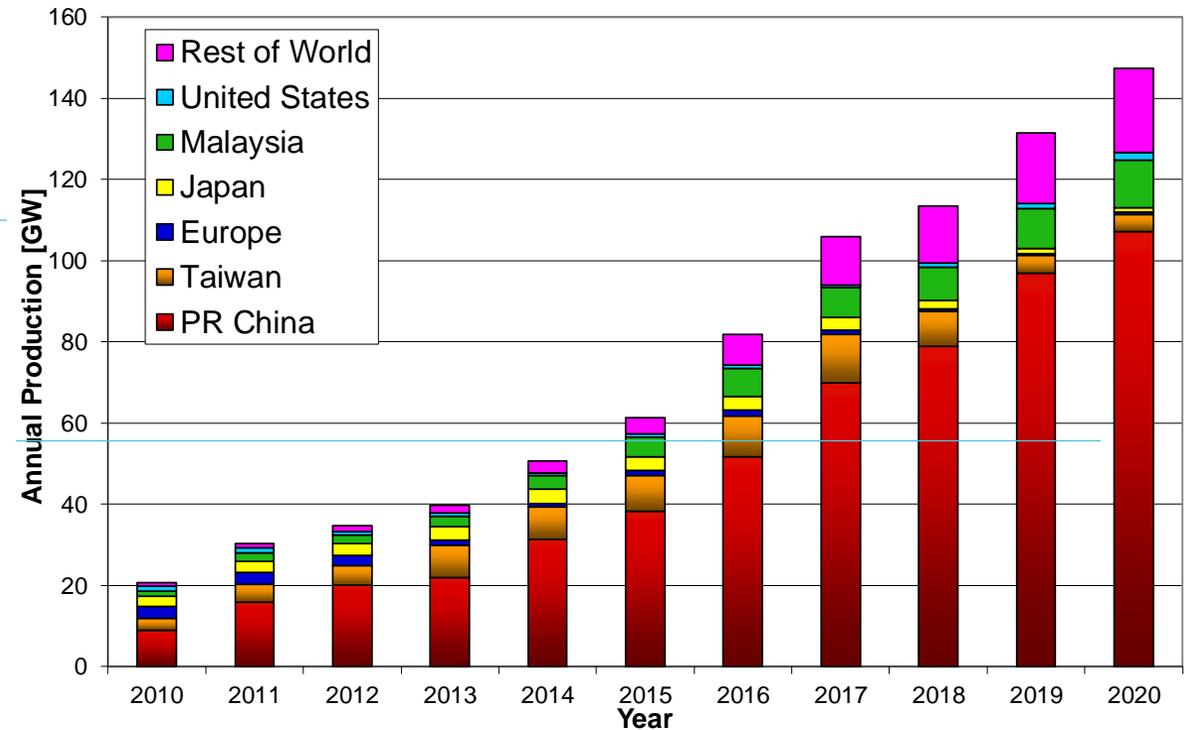
Energy transition: solar production and installation

Forecasts for annual solar PV market installations (until 2024, in GW in Europe)



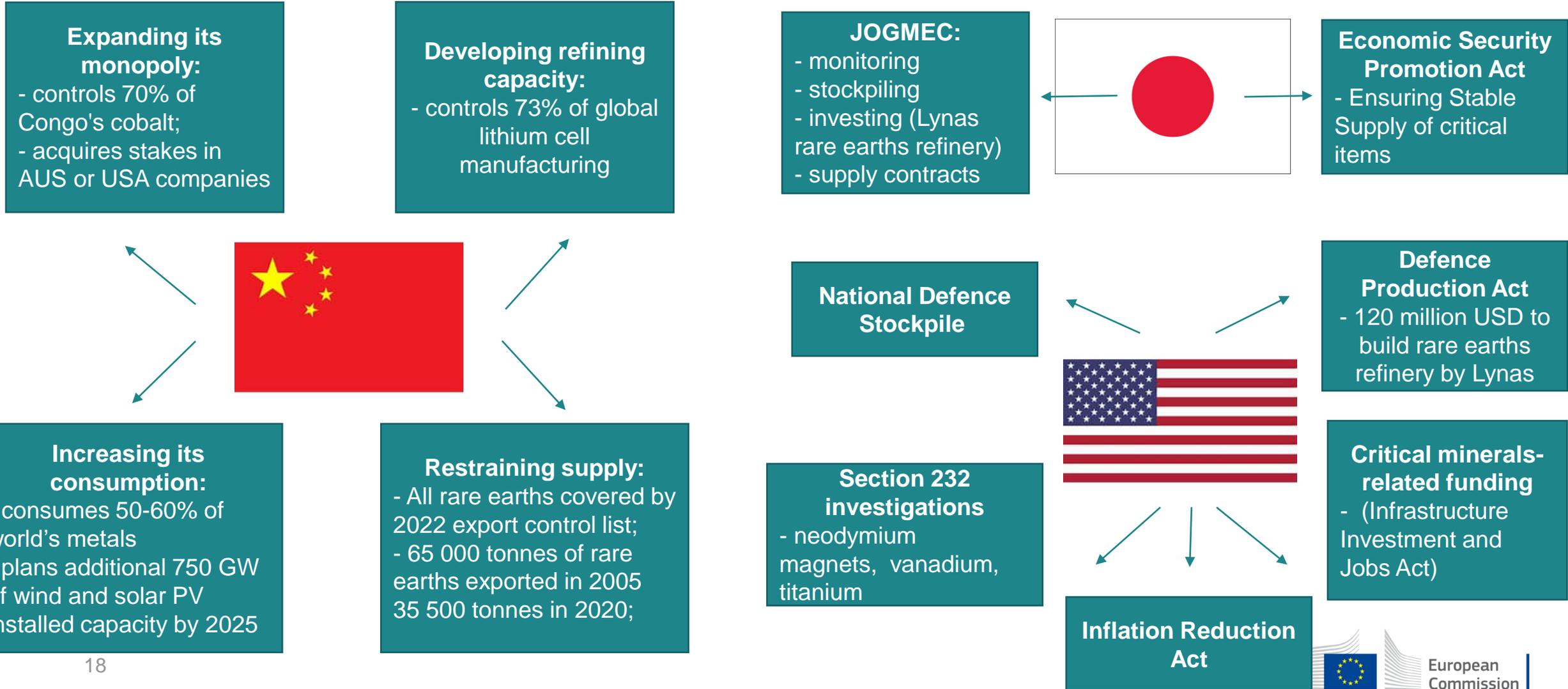
Source: Solar Power Europe

Production of PVs in the world (2010-2020)



Source: Jäger-Waldau (JRC)

Global race for CleanTech and CRM

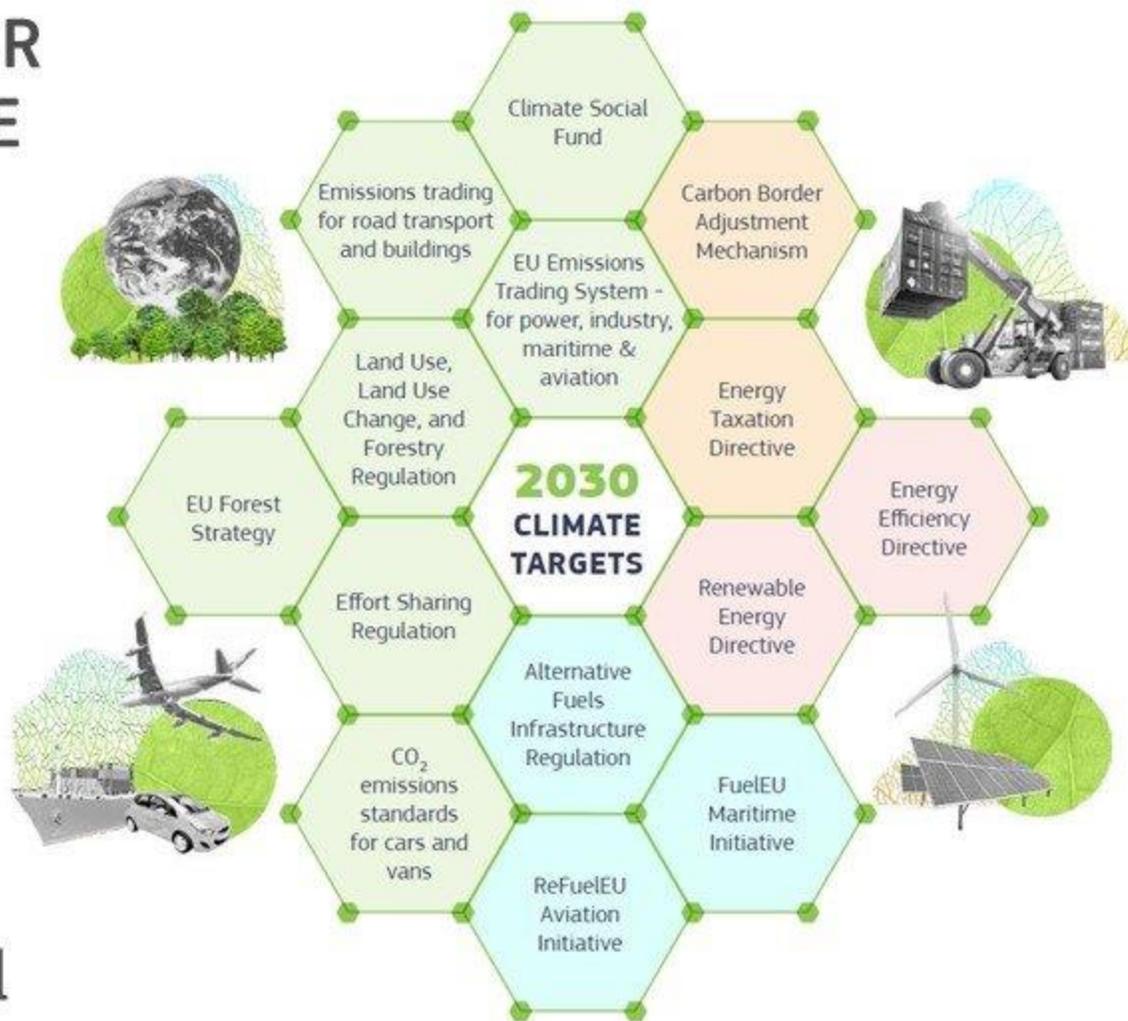


European Green Deal: both a Deal and Green

EUROPEAN GREEN DEAL

REACHING OUR 2030 CLIMATE TARGETS

Creating business opportunities in fast growing green/ clean markets

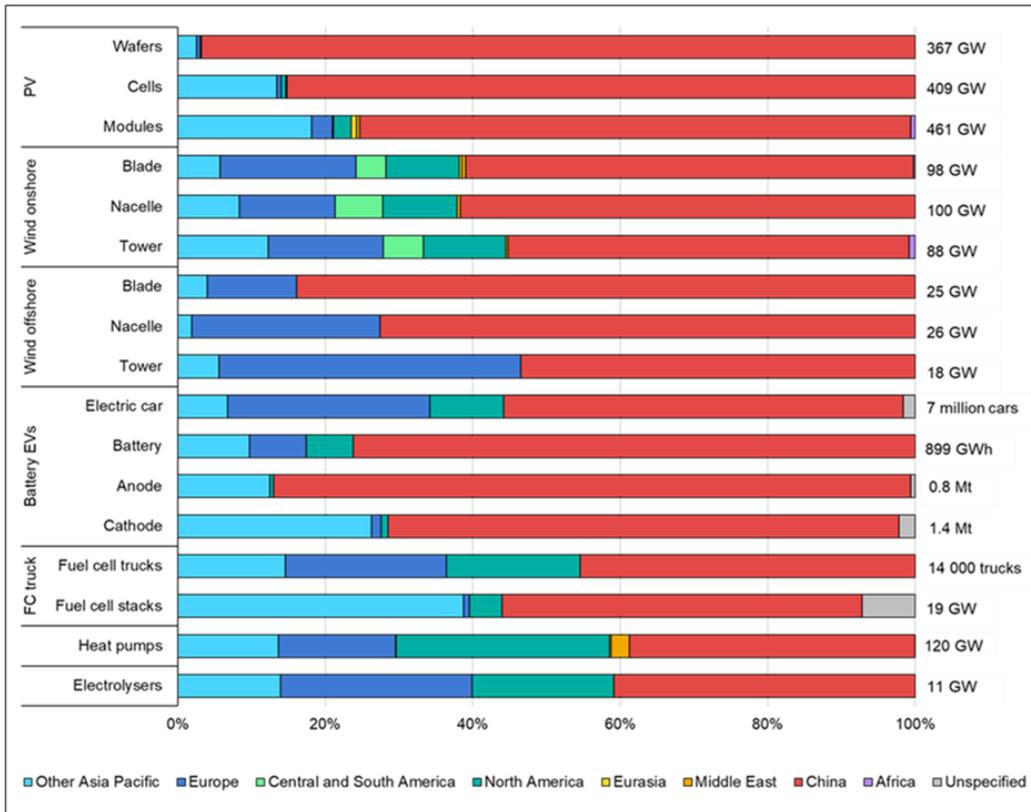


The Fit-for-55, i. e reduction of GHG by 55% by 2030 compared to 1990 became law in May 2021.

#EUGreenDeal

Net-Zero Industry Act: "the why"

1. Dependencies



2. Investment needs

- USD 1.2 trillion required in clean energy technology supply chains for global 2030 targets.
- Fit for 55 objectives require annual investments of EUR 487 billion in the energy system in next 2 years
- NZIA needs assessment establishes EUR 92 billion investments in 2023-2030 in EU manufacturing capacity required for five key technologies

3. Barriers

- Global supply chain and price constraints: volatility in international material prices, more expensive transportation and financing, and continued supply chain bottleneck
- Long Lead times slowing down production: e.g. up to 5 years for EV batteries production
- Lack of skilled workforce: 180.000 skilled workers in the hydrogen sector and 66.000 for solar PV by 2030

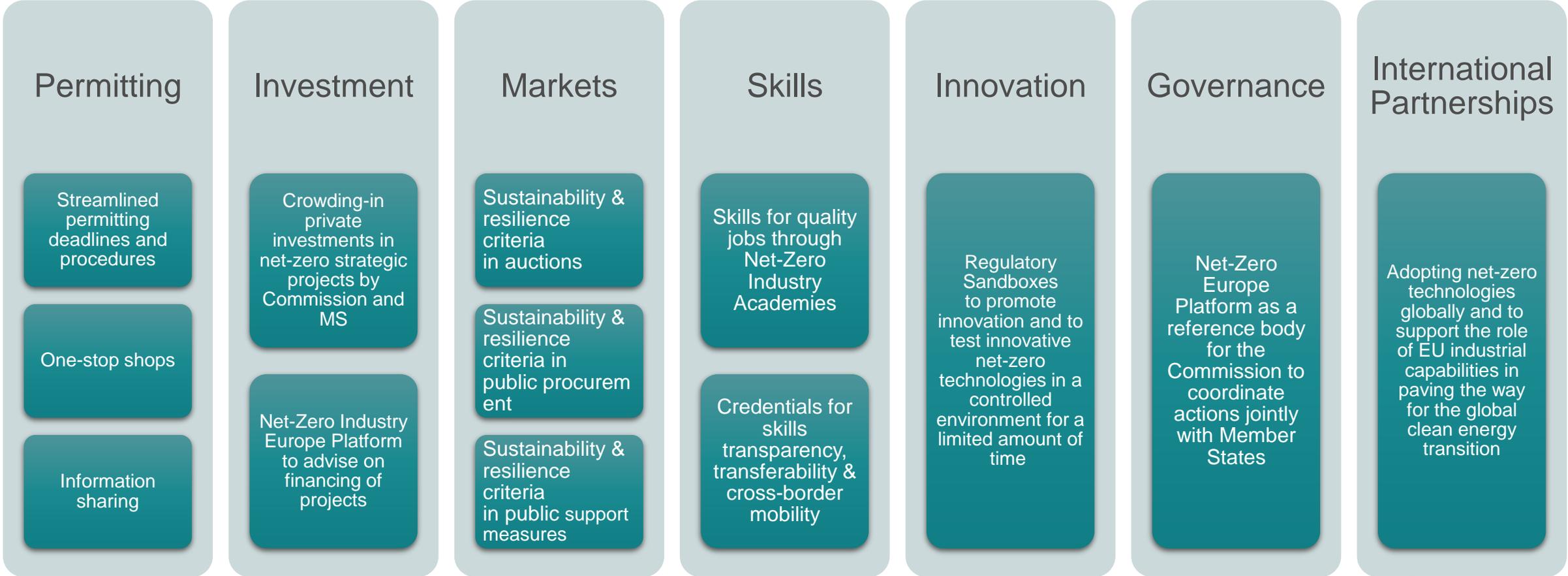
Global market for key mass-manufactured net-zero technologies to triple by 2030 with an annual worth of around EUR 600 billion

Once in a generation opportunity to pave the way with speed and ambition to secure the EU's industrial lead in the fast-growing net-zero technologies sector with the Net-Zero Industry Act

Net-Zero Industry Act: "the what"

Twofold scope:
(1) net-zero technologies & (2) net-zero strategic technologies

Benchmark:
Manufacturing capacity of strategic net-zero technologies to reach at least 40% of EU's annual deployment needs by 2030



Critical Raw Material Act: "the why"

1. Dependencies

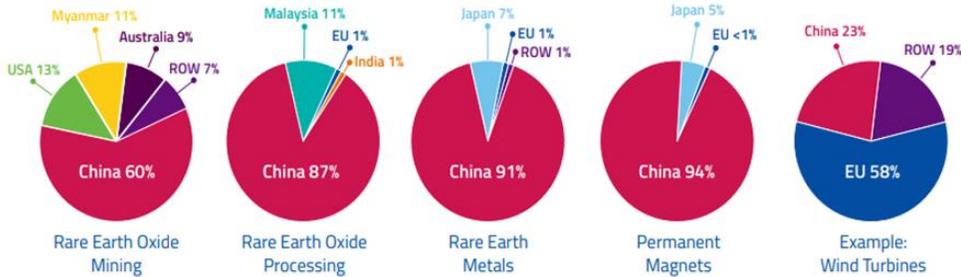
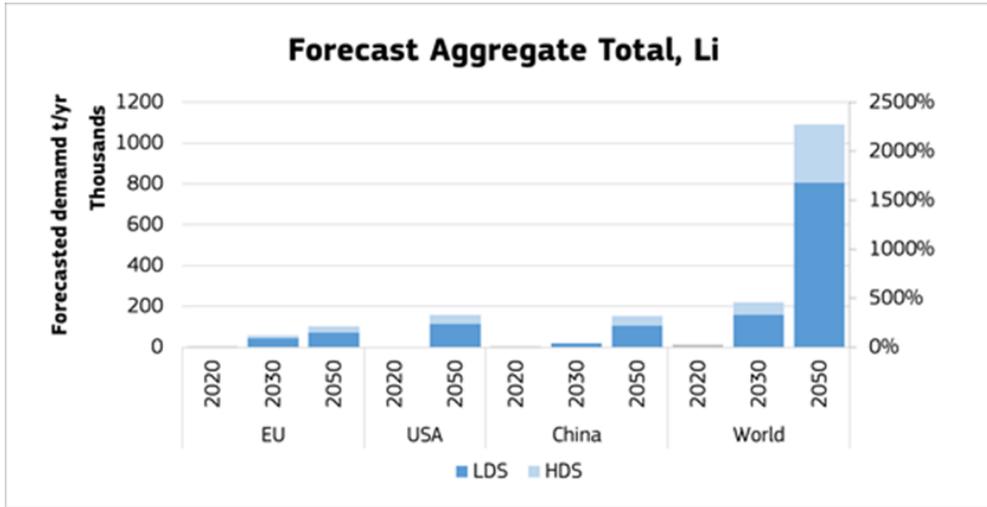


Fig. 3: From rare earths mining to wind turbine manufacturing: estimated market shares in 2019. Sources: Team analysis and Roskill 2018; Adamas Intelligence 2019; Peteves 2017; Carrara et al. 2020; IEA 2021; USGS 2021.

In 2030, global demand is likely to outstrip supply for Net-Zero Industry technologies – like cobalt, lithium, nickel and manganese, as well as for rare earth elements.

2. Growing demand

- 89-fold increase in global demand for lithium used to manufacture batteries for mobility and storage (21-fold for EU demand);
- 18-fold increase in global demand for cobalt, used for electrification ;
- 10-fold increase in EU demand for copper used for electrification;
- 6-fold increase in EU demand for aluminium;
- 6 to 7-fold increase in EU demand for rare earth elements (Nd and Dy)

3. Investments needs – the battery example

- **Investment needs** to ensure some ratio of domestic sources for extraction, processing and recycling of the European demand are enormous.
- Investment needs to ensure the **processing of 40% and recycling of 15%** of the European demand for the **five main raw materials for batteries** (lithium, cobalt, nickel, manganese and natural graphite) from domestic sources amount to **EUR 8.5 billion by 2030 and 14.9 billion by 2040**.
- The investment needs to ensure the **supply of 25%** of European demand of the same raw materials for batteries from domestic sources amount to **EUR 7 billion by 2030 and 13.2 billion by 2040**.
- Assuming a share of public spending to realise these projects comparable to the American Battery Materials Initiative, **public support of EUR 2.7 billion by 2030 and 4.7 billion by 2040 would be required**.

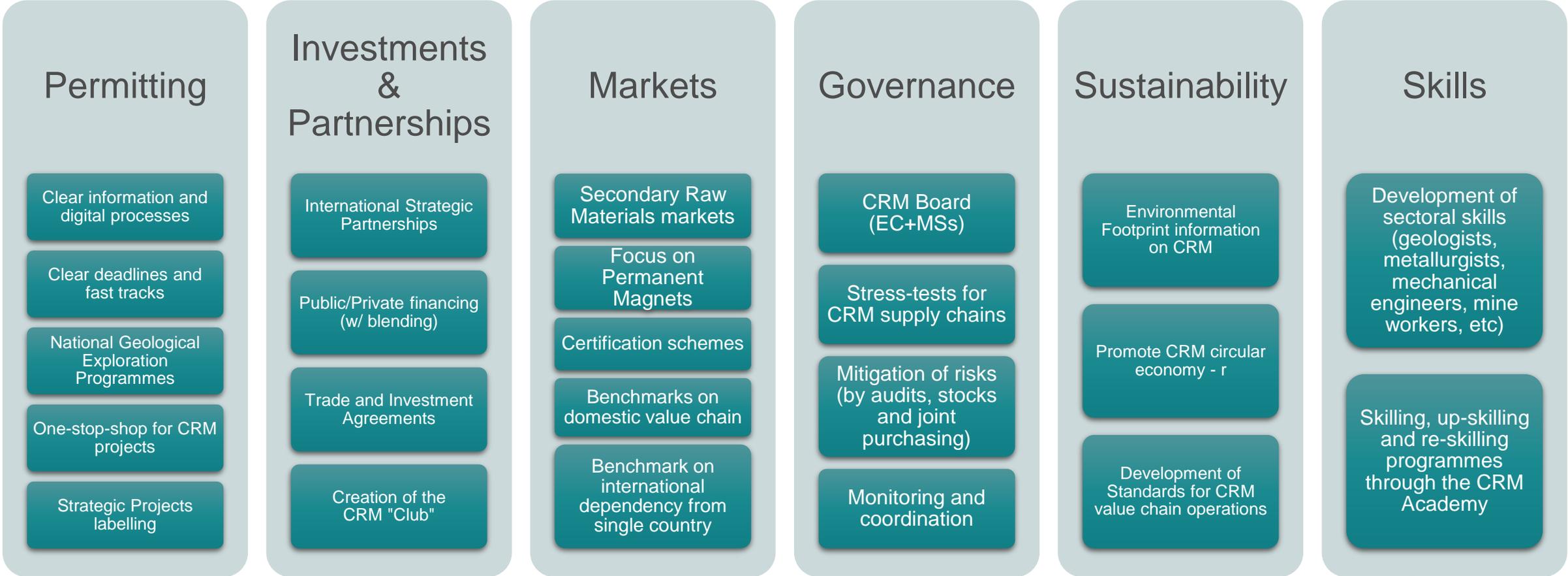
Driven by the twin transition and defence needs, significant growth in CRM demand, with risk of global supply/demand imbalance

Critical Raw Materials Act: "the what"

Scope:

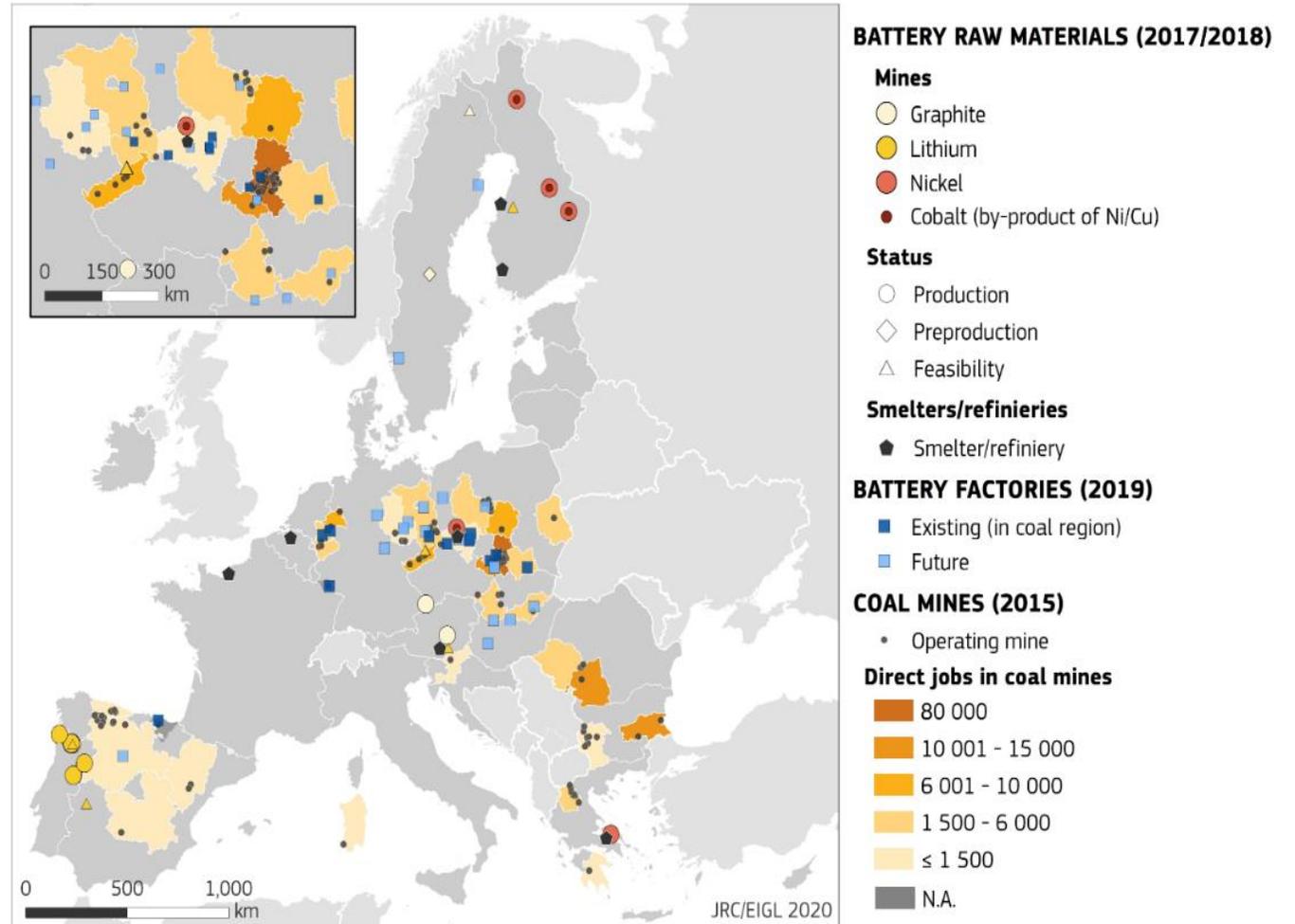
EU access to a secure and sustainable supply of critical raw materials by (a) improving EU capacity, (b) recycling CRM content and (c) diversifying supply

Benchmark for domestic capacities of the EU's annual consumption: at least 10% for extraction, at least 40% for processing, at least 15% for recycling.
 Not more than 65% dependency from a single third country.

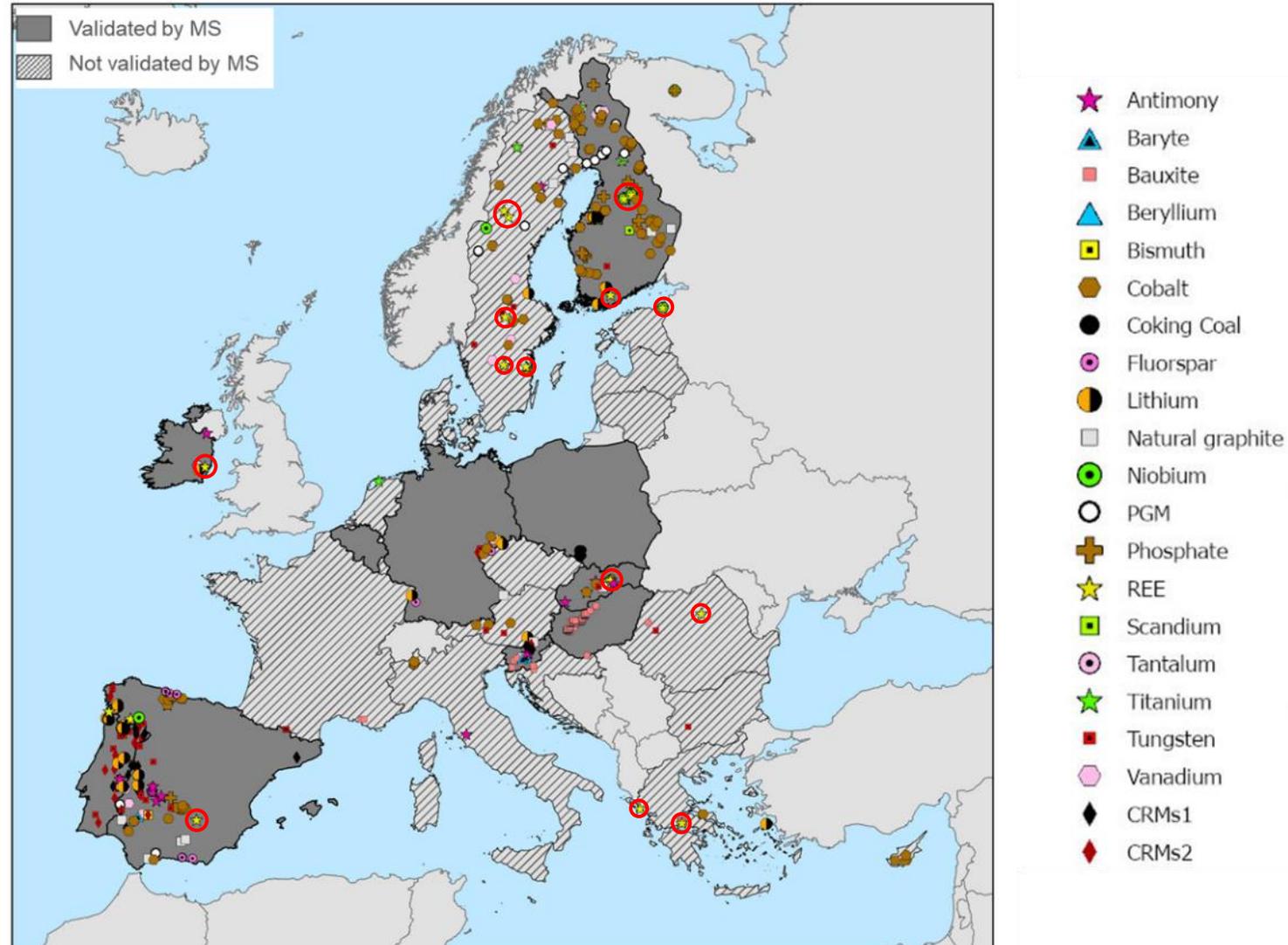


Battery raw materials potential in the EU

- There are **meaningful deposits** of relevant raw materials
- E.g.: potential EU projects for lithium could satisfy **38% of annual EU demand** for EV battery production in 2030 (15% by 2050)
- Just transition: CRM production can offer opportunities for **regional development and a new application for existing skills**



Rare earth elements occurrences in the EU



Data gathered by Commission and Member States to monitor potential viable mining projects in the EU. Work is on going with Member States to complete the data gaps and regularly monitor national progress.

Raw materials partnerships and diplomacy



New State aid tools to support the green transition and the Net-Zero Industry Act (NZIA)

Temporary Crisis and Transition Framework

Valid until end 2025

Setting up new tools

- **New section 2.8 to support NZIA**
 - **Scope:** key value chains (including critical raw materials) for the transition
 - **Support through schemes**
 - **Aid amount** up to EUR 150 million (350 in assisted regions)
 - **Aid intensity** up to 15% with bonuses for tax advantages (5%), SMEs (20%) and assisted regions
 - **Support through individual matching aid** for key projects located in assisted regions, aligning aid amount with subsidy offered outside the EEA

Adapting existing tools

- **Aid for deployment of renewables:** larger scope, aid intensities, investment and operating aid
- **Aid for decarbonation:** renewable H2 fuels covered

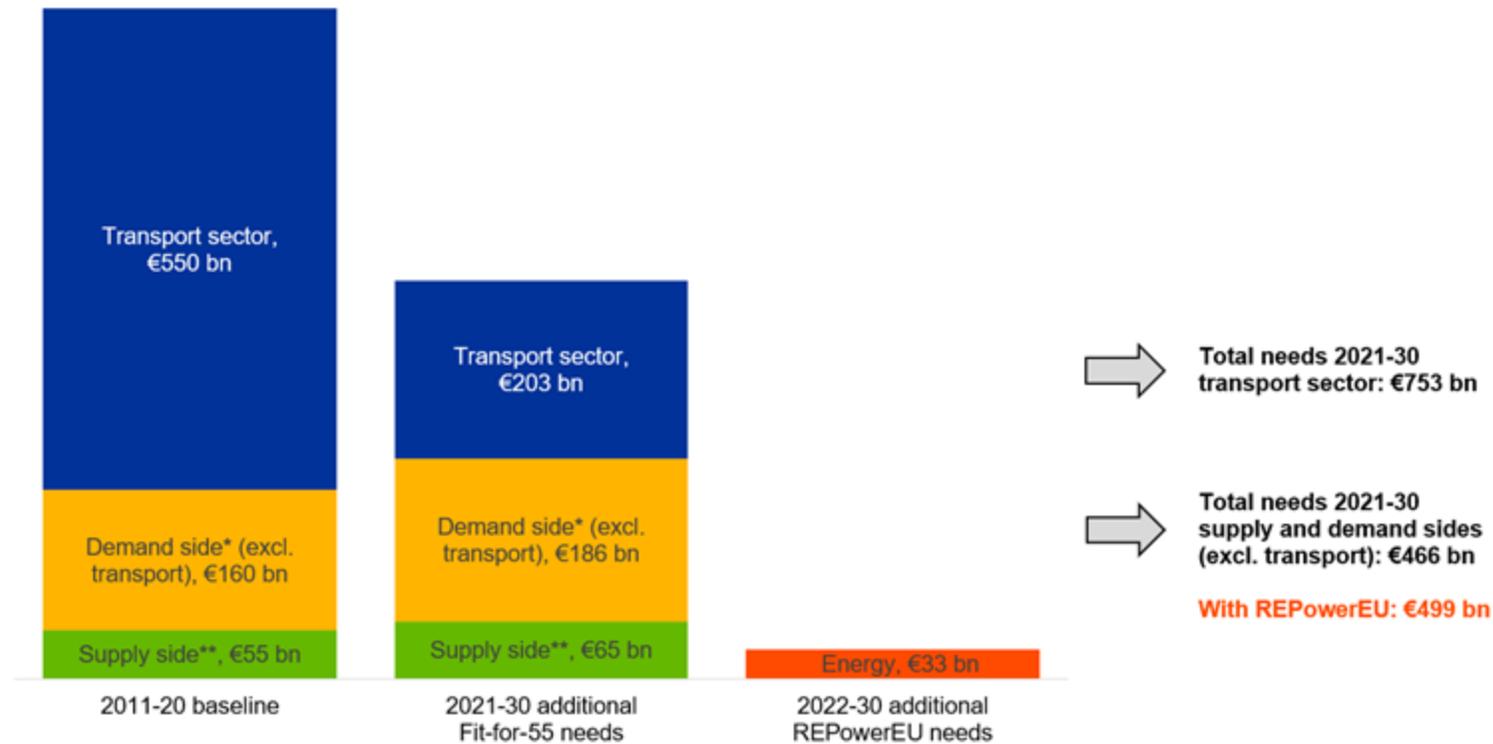
General block exemption Regulation

Valid until review in end 2026

- **New tool: “Mini-IPCEI”**
 - **New category of aid** for “industrial research and experimental development” projects
 - Aid intensity up to 80%
 - Schemes for R&D projects
 - Selected following an **open call** to form part of a project **jointly designed** by at least three Member States
 - Involving **effective collaboration** between undertakings

- Simplification of operational rules for **investEU schemes**
- Increase of **thresholds for renewable deployment aid**

Climate and energy security investment needs in the EU



Average annual needs over 2021-30, public and private; EUR billions in 2022 prices. Sources: ECB calculations based on Commission estimates of [Fit-for-55](#) and [REPowerEU](#) investment needs. * "Demand side excl. transport" includes industrial, residential and tertiary-related investments.

** Supply side includes power grid, power plants, boilers and new fuels production and distribution.