Agenzia nazionale per le nuove tecnologie,
l'energia e lo sviluppo economico sostenibile

Convegno CONOU - AIEE
Il ruolo dell'Economia Circolare nella politica energetica europea

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Spazio Europa – Roma

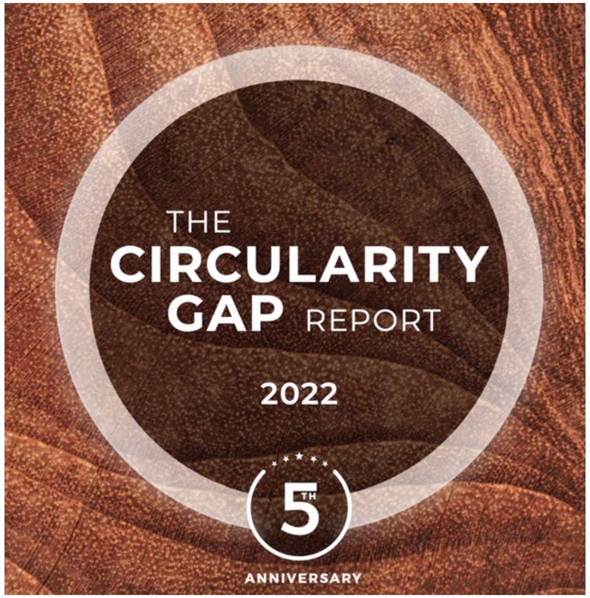
7 Marzo 2023

Fonti


ELLEN MACARTHUR FOUNDATION
MATERIAL ECONOMICS
COMPLETING THE PICTURE
How the circular economy tackles climate change
2021 Reprint


TOWARDS A CIRCULAR ENERGY TRANSITION
Exploring solutions to mitigate surging demand for critical metals in the energy transition


Energy Technology Perspectives 2023
iea

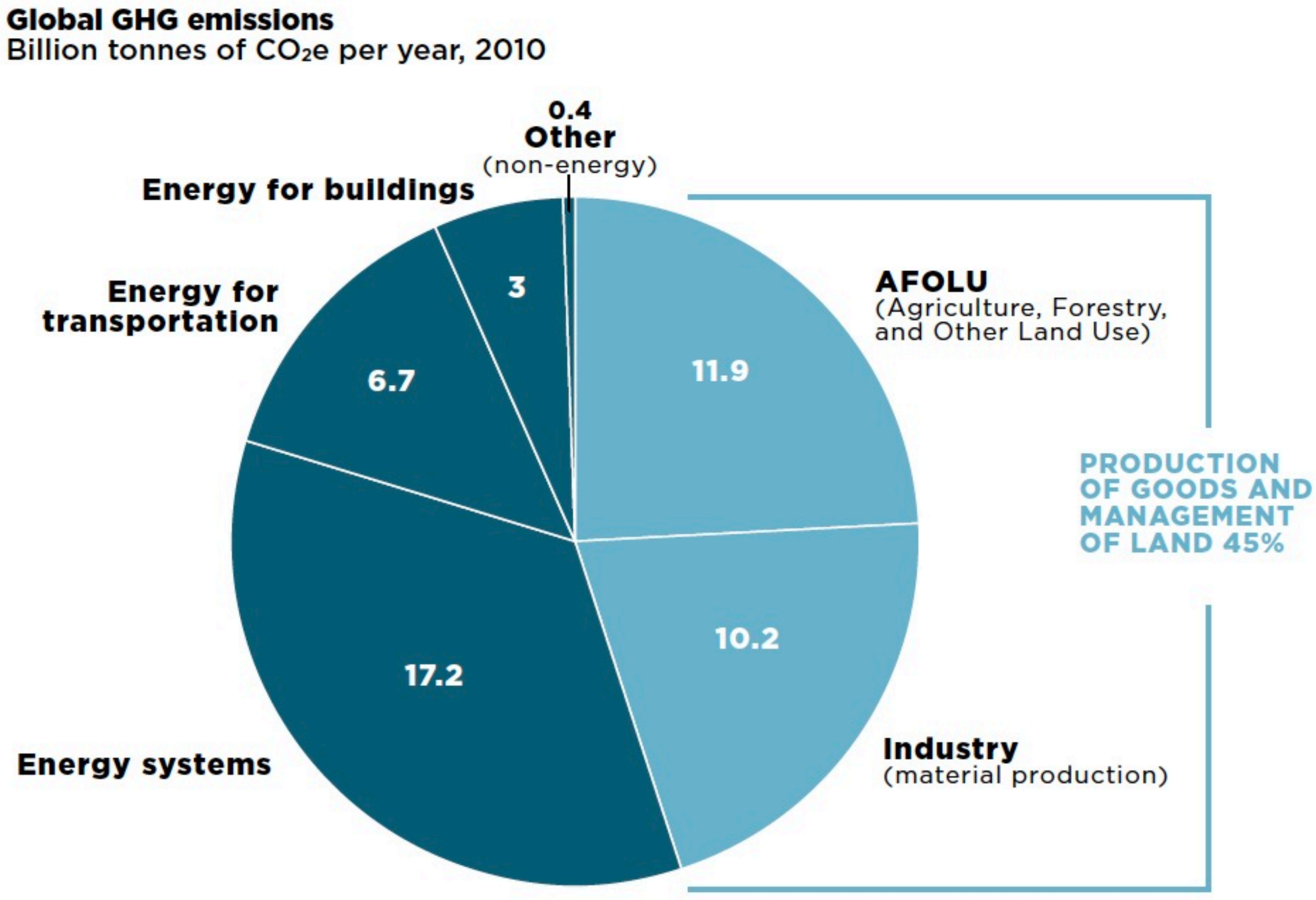

THE CIRCULARITY GAP REPORT
2022
5TH
ANNIVERSARY


McKinsey Sustainability
How a 'materials transition' can support the net-zero agenda
As the energy transition continues, advances toward low-emissions materials and the circular economy can also speed progress to net zero. Research on Europe shows the value in such a materials transition.
by Per-Anders Enkvist, Per Klevnäs, Robert Westerdahl, and Anders Åhlén
July 2022

Emissioni globali di GHG

Ellen Macarthur Foundation 2019

FIGURE 1: 45% OF GLOBAL GHG EMISSIONS CAN BE ATTRIBUTED TO THE PRODUCTION OF MATERIALS, PRODUCTS, AND FOOD, AS WELL AS THE MANAGEMENT OF LAND



Note: 'Industry' and 'AFOLU' include their own energy-related emissions but not indirect emissions from electricity and heat production.
Source: IPCC, "IPCC's Fifth Assessment Report (AR5)" and Material Economics analysis.

Il consumo mondiale di materiali

The Circularity Gap Report 2022

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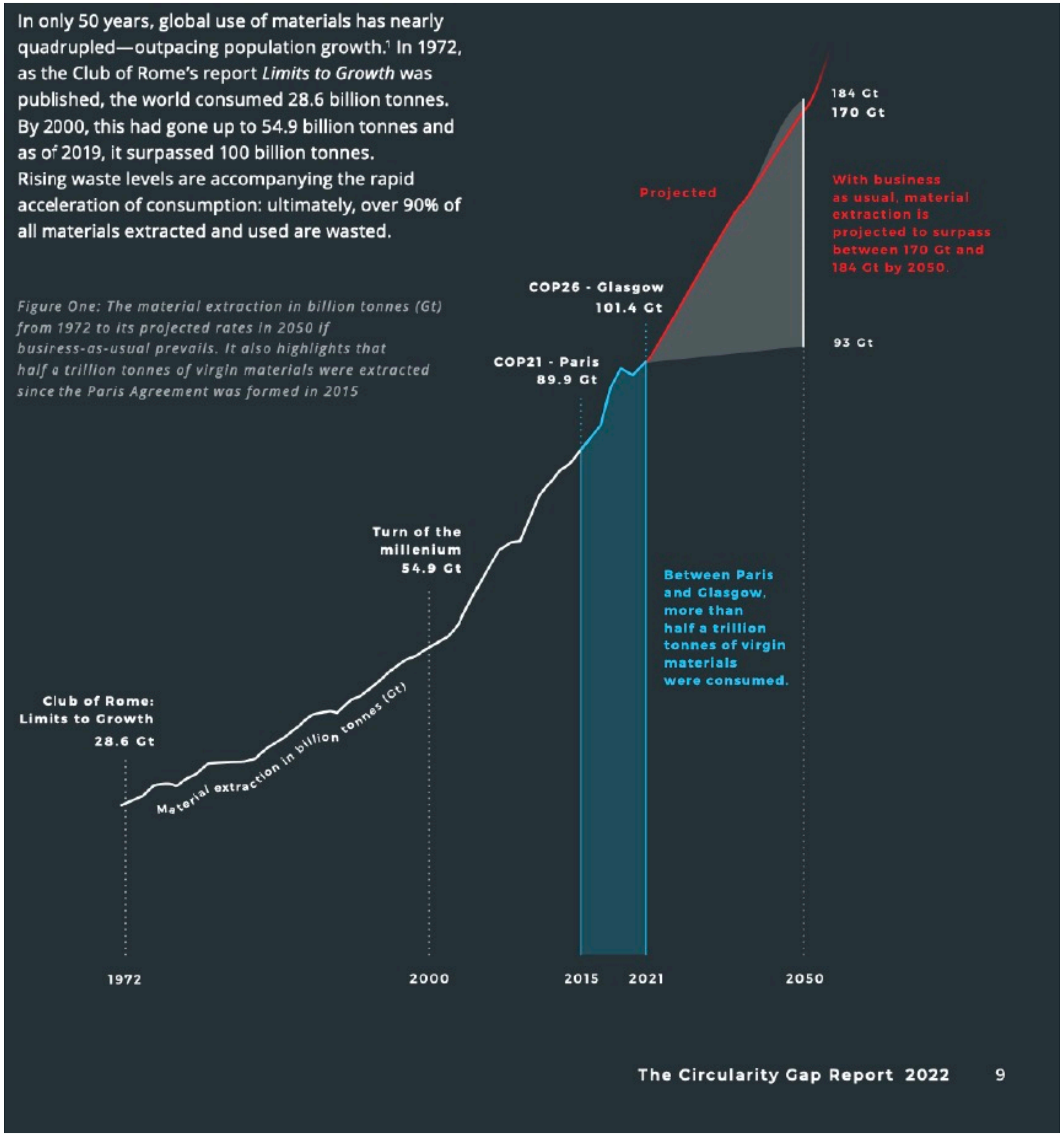
the Circular Economy



In only 50 years, global use of materials has nearly quadrupled—outpacing population growth.[1] In 1972, as the Club of Rome's report *Limits to Growth* was published, the world consumed 28.6 billion tonnes. By 2000, this had gone up to 54.9 billion tonnes and as of 2019, it surpassed 100 billion tonnes. Rising waste levels are accompanying the rapid acceleration of consumption: ultimately, over 90% of all materials extracted and used are wasted.

Figure One: The material extraction in billion tonnes (Gt) from 1972 to its projected rates in 2050 if business-as-usual prevails. It also highlights that half a trillion tonnes of virgin materials were extracted since the Paris Agreement was formed in 2015

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L'impronta globale delle risorse

The Circularity Gap Report 2022

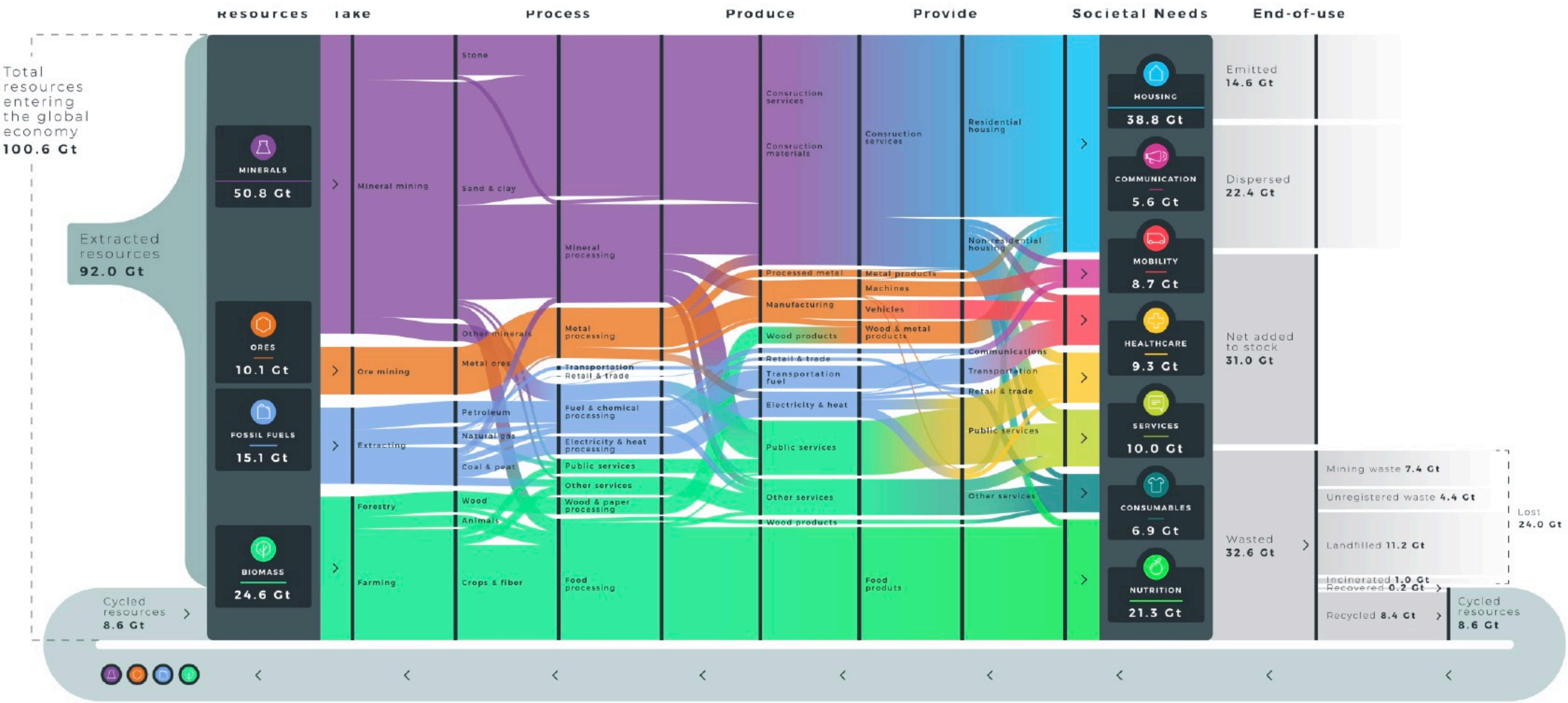

Figure Two: Visualising how our global resource footprint meets our key societal needs—and that the global economy is only 8.6% circular

RECOVERED
- Waste-to-Energy more than 65% efficient
- Biogasification
- Component recovery

RECYCLED
- Recycling/Reclamation
- Backfilling
- Composting
- Regeneration

The Circularity Gap Report 2022 23

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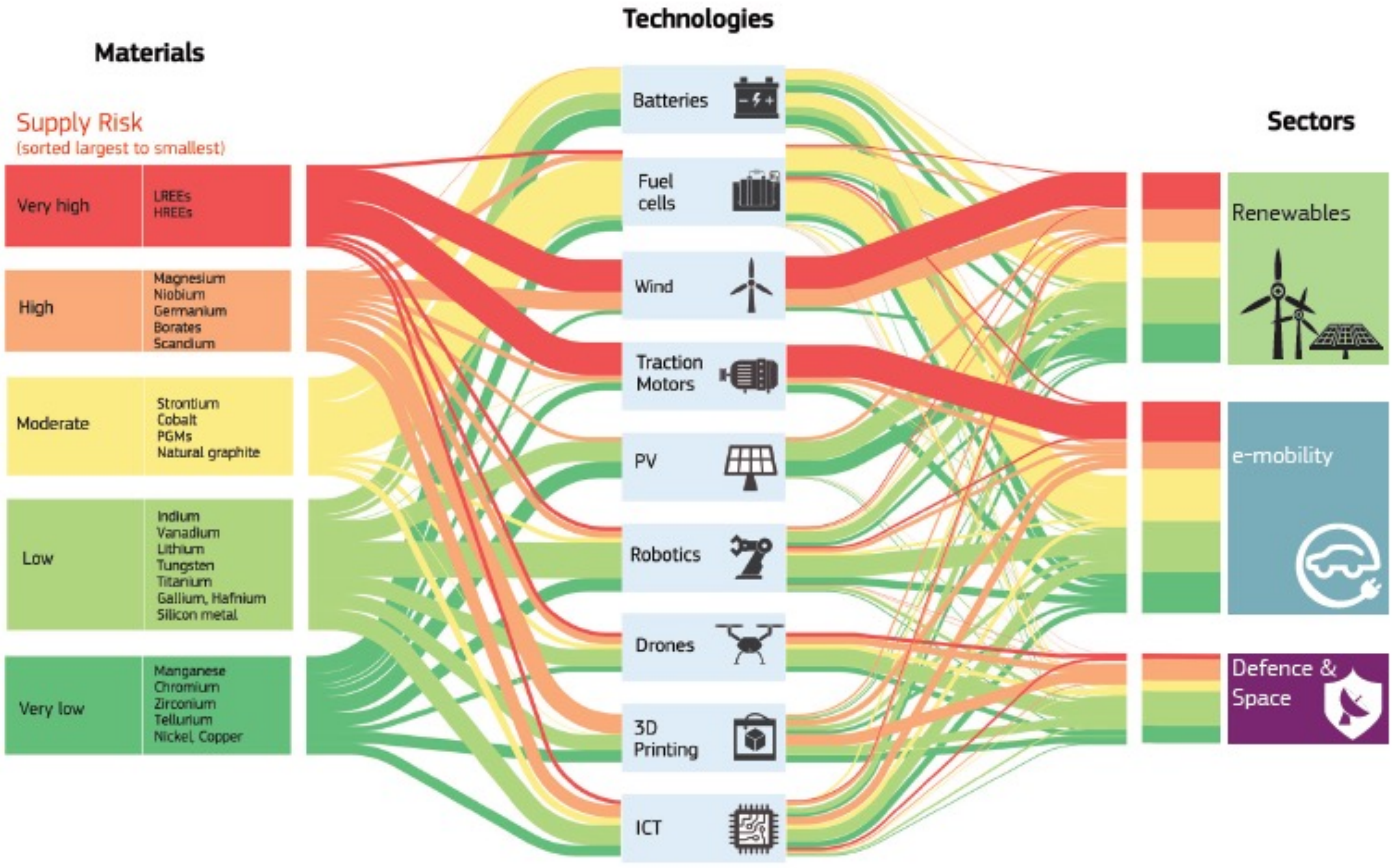
Esigenze nei settori strategici di Materie Prime Critiche



Fonte: Critical Raw Materials for Strategic Technologies and Sectors in the EU. A Foresight Study, Commissione Europea e JRC (2020).

Principali produttori di MPC per la transizione energetica

Metabolic Report 2021

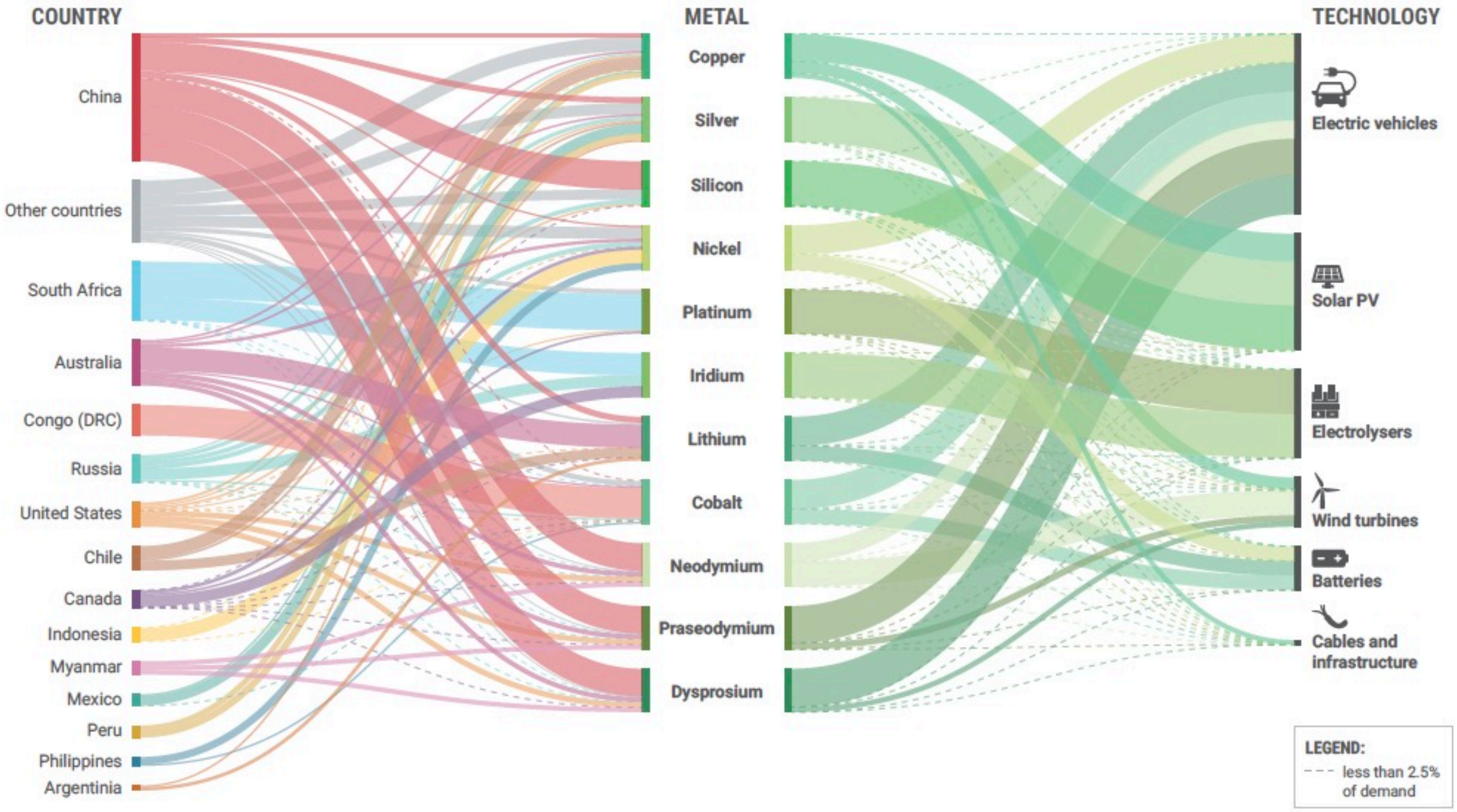
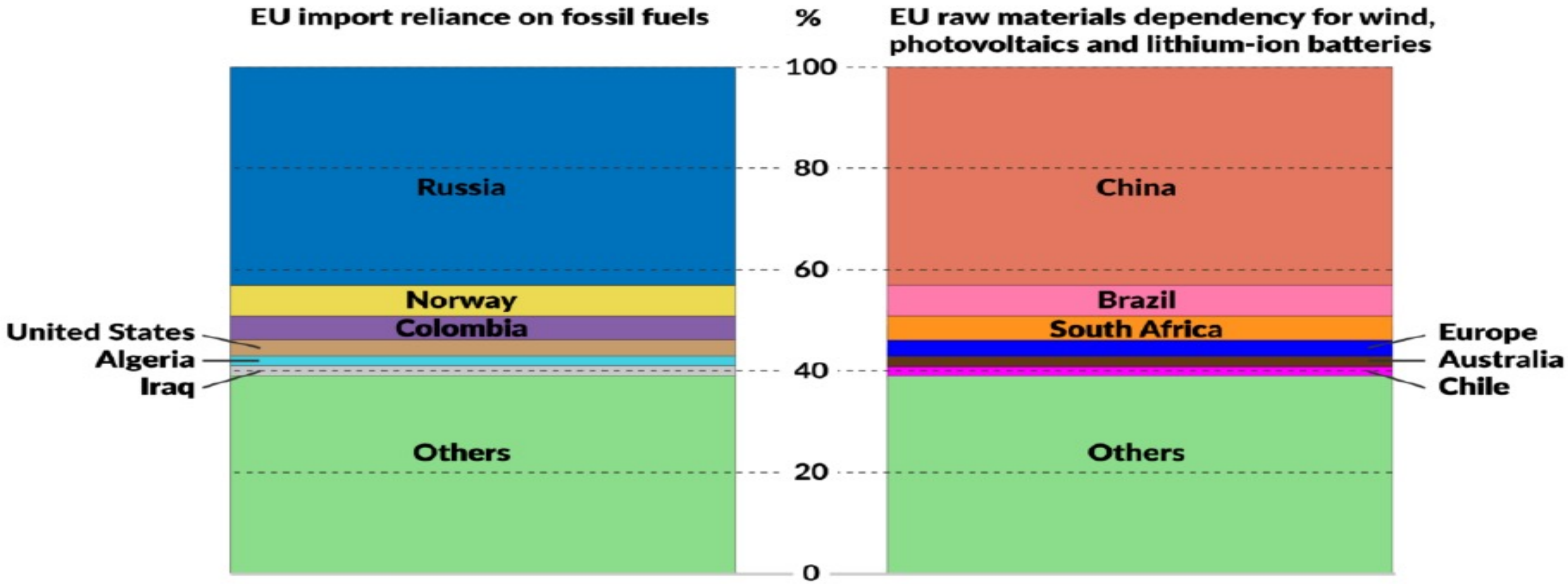


Figure 14 Extraction of critical metals needed for a sustainable energy system.

Critical raw materials: Assessing EU vulnerabilities



Even if it reduces its dependence on fossil fuel imports, Europe could soon find itself geopolitically vulnerable to cutoffs of CRMs. © macpixxel for GIS

Frank Umbach - EU strategies for critical raw materials could fall short - GIS Reports

Aumento della domanda al 2050 di MPC necessarie alla transizione energetica in Olanda - Metabolic Report 2021

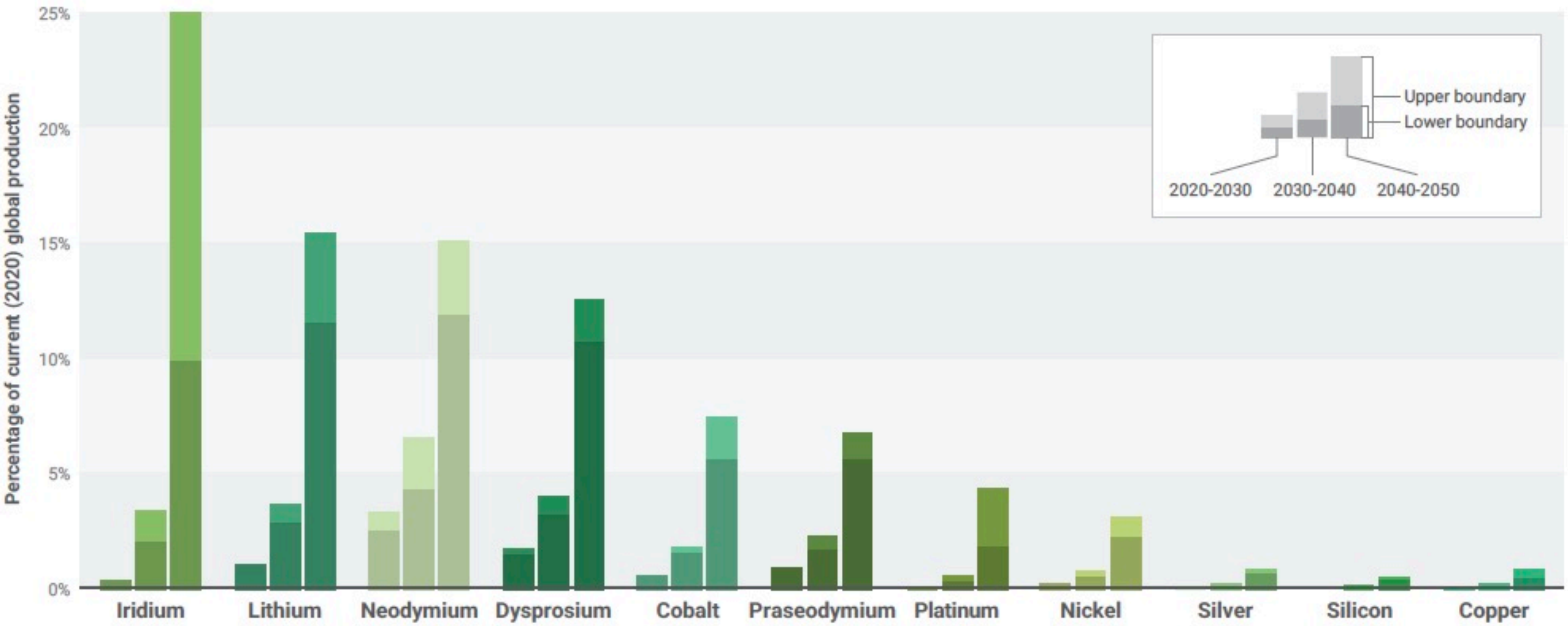


Figure 13 Expected annual demand for a number of critical metals as a percentage of current global production, for the periods 2020 to 2030, 2030 to 2040, and 2040 to 2050.

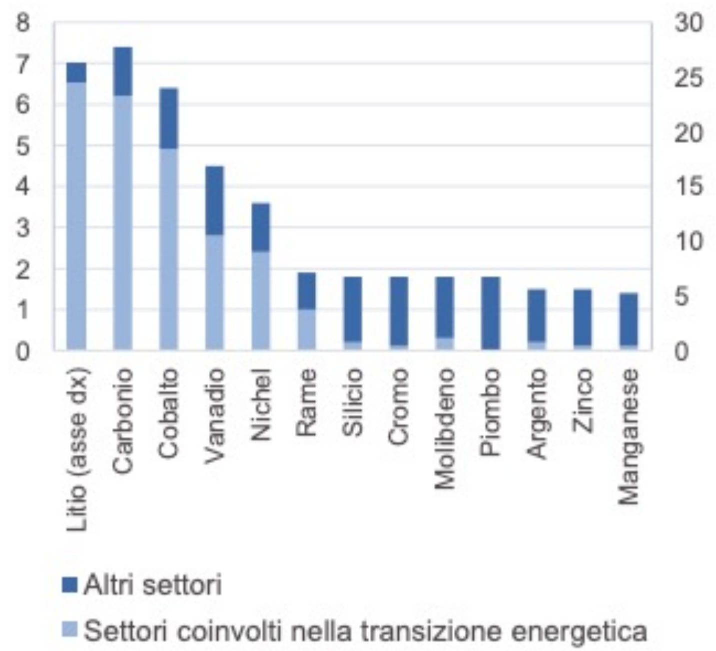
The GDP of the Netherlands is about 1.0% of the global GDP — BNP 1.0%

Dutch final energy consumption is about 0.5% of global energy consumption — 0.5%

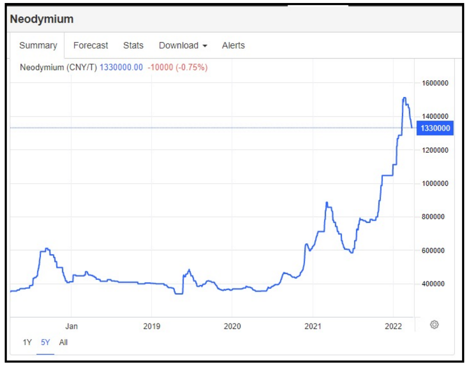
The Dutch population is about 0.2% of the global population — 0.2%

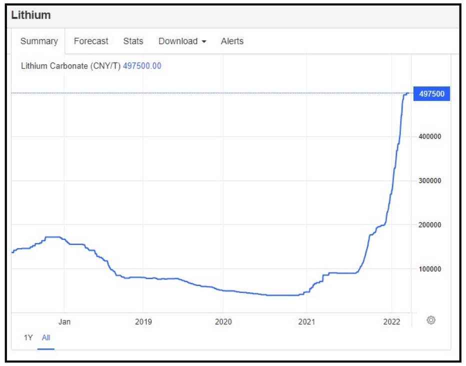
Andamento domanda e prezzi materie prime non energetiche

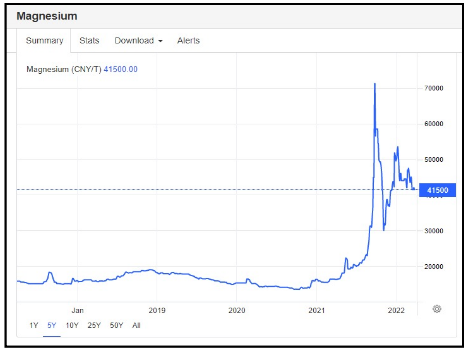
Graf. 3 Domanda di metalli critici per la transizione green (Rapporto tra i livelli medi di consumo di ciascun metallo nel 2030 vs 2010)

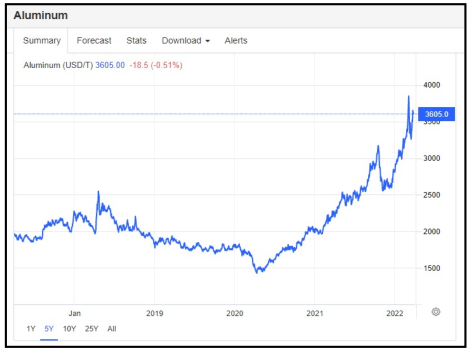


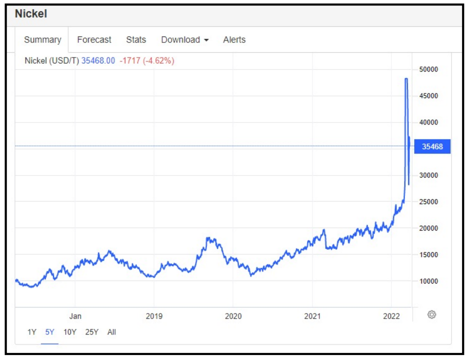
Fonte: Elaborazione CDP Think Tank su dati U.S. Energy Information Administration (EIA), ottobre 2021.







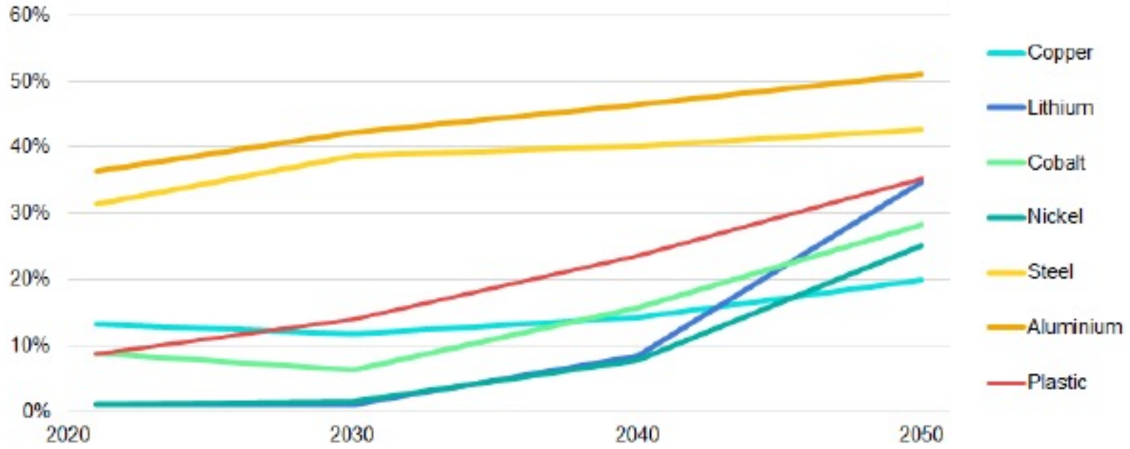




Fonte: Tradingeconomics.com

Aumento nel tempo dell'utilizzo di MPC secondarie nelle tecnologie energetiche - Energy technologies perspectives IEA 2023

Figure 3.5 Share of secondary production in the global supply of selected materials in the NZE Scenario



Note: For steel, the share of scrap in total metal inputs is used, including internal and manufacturing scrap. For aluminium, internal scrap is excluded in line with the reporting convention of the industry. Values for nickel and cobalt do not include their eventual recycling as part of metal alloys such as stainless steel. For plastic, the combined production of all plastic types is used.

Sources: IEA analysis based on USGS (2022); IEA (2021); Aluminium Association (2021).

The share of secondary production increases strongly in the NZE Scenario, particularly for critical materials after 2030 as the first wave of clean energy technologies reaches the end of their life.

Recycled nickel requires only about 25% of the energy requirements of primary Class I nickel (Argonne Laboratory, 2022), while secondary aluminium production emits 96% less CO2 than primary production (Eurometaux, 2022)

Increasing recycling rates of lithium enables mining capacity to be expanded eightfold from 2021 to 2050, rather than 13-fold were recycling rates to remain constant, reducing required investment in lithium mining by USD 12 billion

Le città come miniere a cielo aperto

Potenziali di riduzione di MPC necessarie alla transizione energetica in Olanda - Metabolic Report 2021

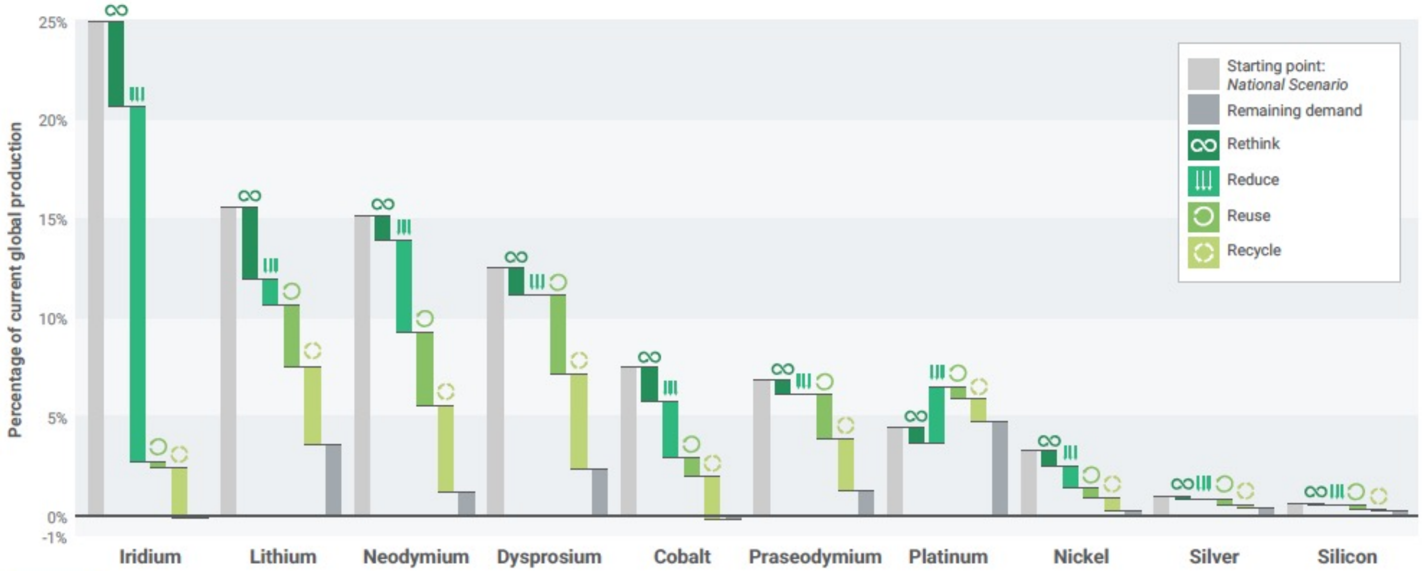


Figure 17 Potential effect of the combination of the four circular strategies on the annual metal demand (period: 2040 to 2050) for the ten metals with the highest relative demand.

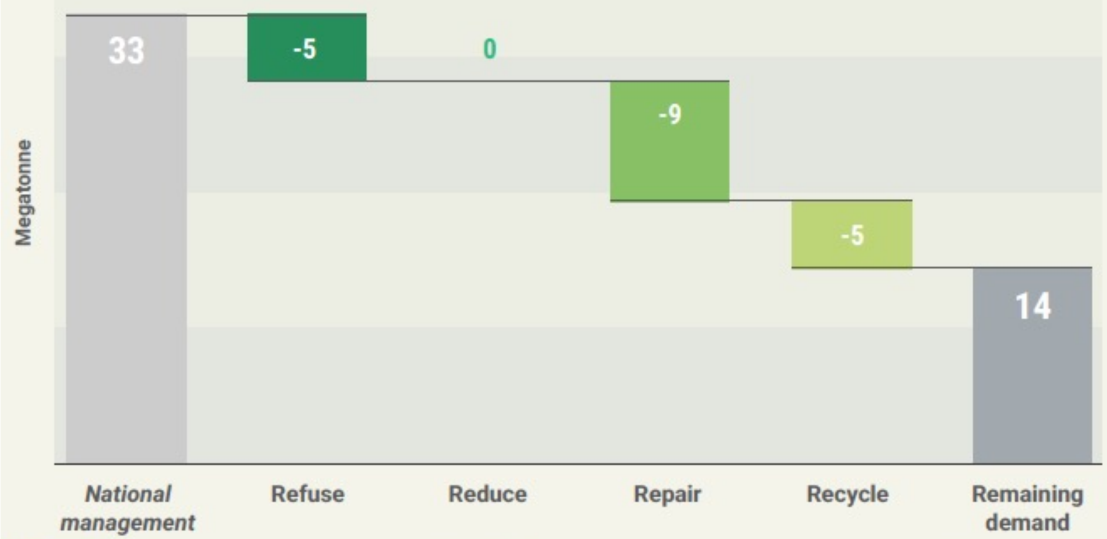
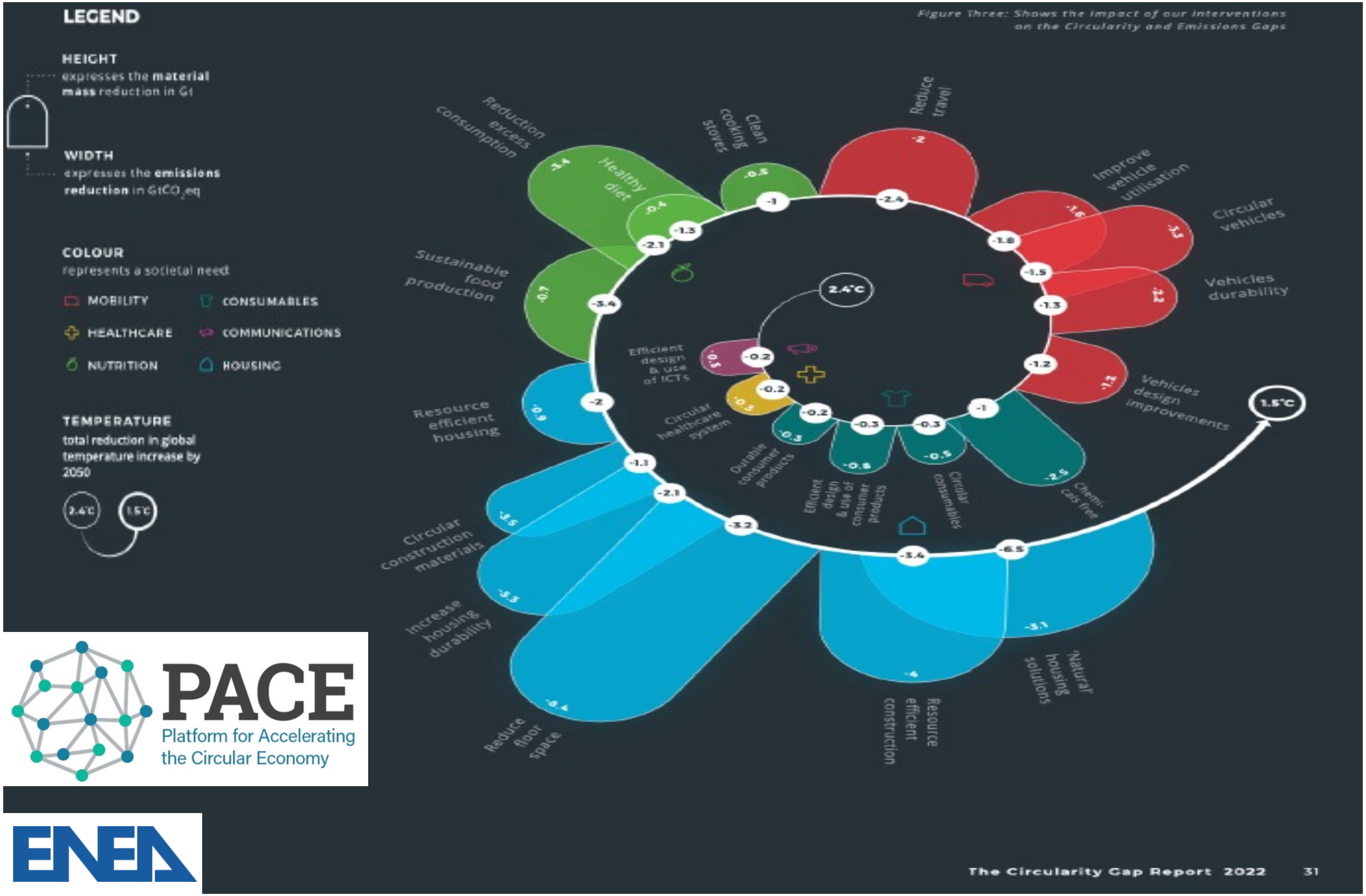


Figure 22 Reduction of the various circular strategies in comparison to the total amount of raw materials needed between 2030 and 2050 for the components included in this study.

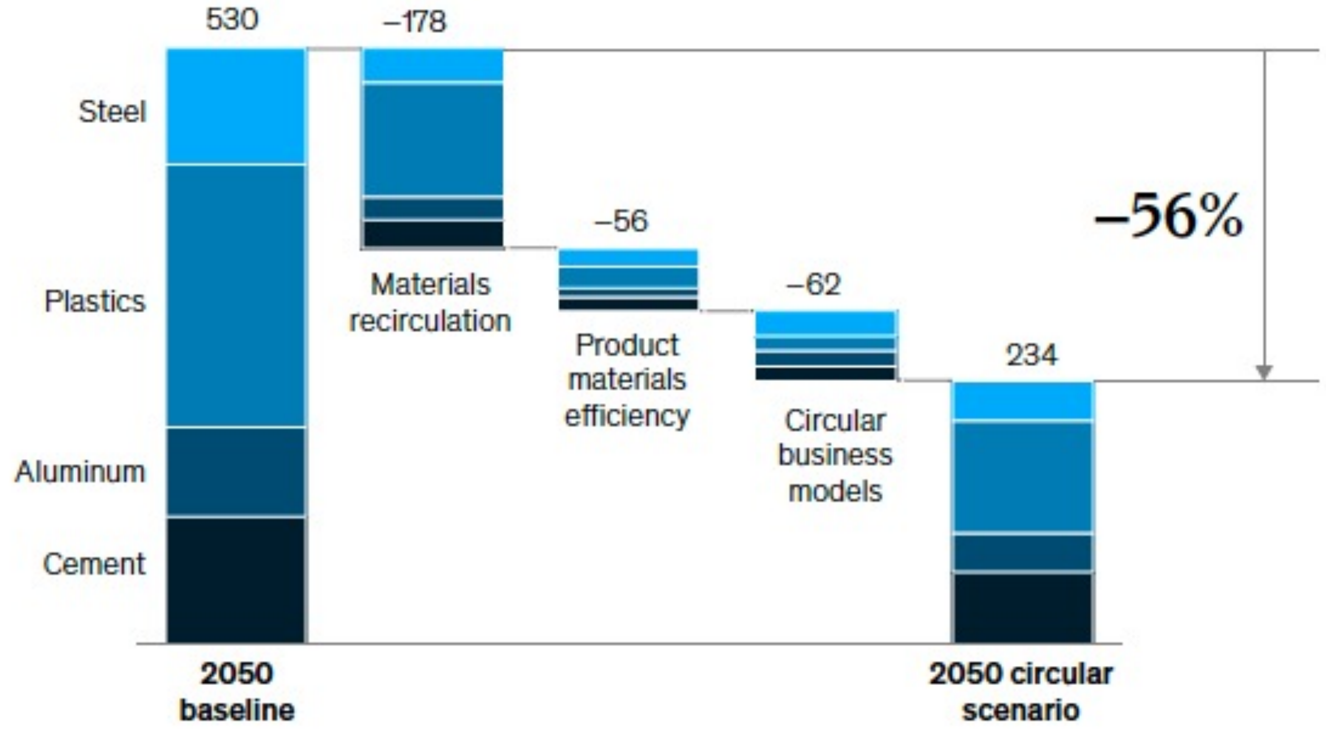
Potenziali di riduzione di emissioni e quantità di materia utilizzata nei vari settori - The Circularity Gap Report 2022



La Transizione circolare a supporto della decarbonizzazione europea - McKinsey 2022

Circular opportunities in Europe can cut 2050 emissions from steel, plastics, aluminum, and cement by 56 percent.

EU emissions reductions potential from a more circular economy by 2050, million metric tons of CO_2 per year



Source: Material Economics

McKinsey & Company

Each year in Europe, €78 billion of materials value is lost in the use of steel, plastics, and aluminum.

Transizione Circolare indispensabile per il raggiungimento degli obiettivi 2050 - The Circularity Gap Report 2021

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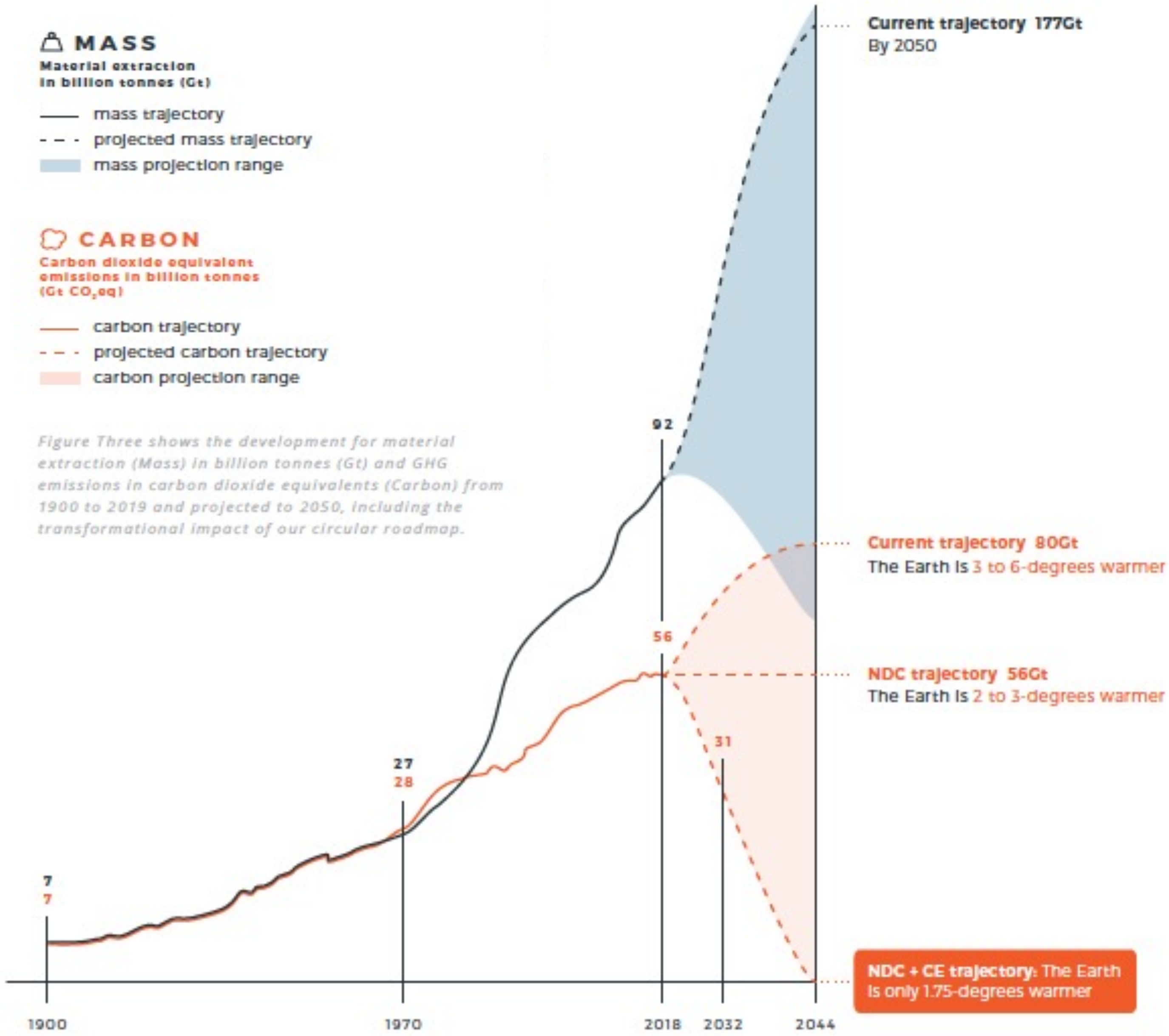

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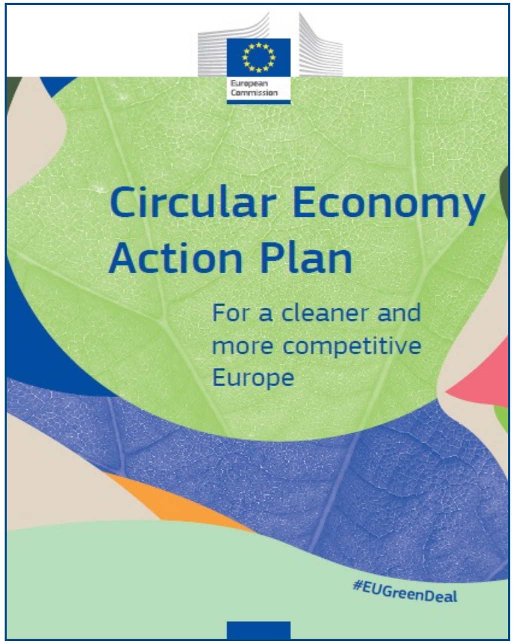
Iniziative Europee



- EIT RawMaterials - 2016
- European Battery Alliance (EBA) - 2017
- European Raw Materials Alliance (ERMA) - 2020
- **Piano d'Azione Europeo sulle Materie Prime Critiche – 2020**
- Importante Progetto di Interesse Comune Europeo (IPCEI) sulle batterie – 2021
- **Critical Raw Materials Act – 14 Marzo 2023**

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Iniziative Italiane

Tavolo Tecnico nazionale sulle materie prime critiche

Coordinamento MIMIT – MASE

Organizzazioni partecipanti:
ENEA, ISPRA, ISTAT, CNR, RSE, ASI, CRIET, SEEDS, CINIGEO, GREEN, Confindustria, Assorisorse, Assofermet, Assomarmomacchine, ANEPLA, AITEC, UNIRIMA, ANCE, CNCRAEE. CNCPA, COBAT, ERION, EIT Raw materials

GdL1 – Analisi dei fabbisogni
(coordinamento: Confindustria)

GdL2 – Mining
(coordinamento: ISPRA)

GdL3 – Ecodesign ed ecoprogettazione
(coordinamento: ENEA)

GdL4 – Urban mining
(coordinamento: ENEA)

Approccio per filiera

- Agrifood
- Apparecchiature elettriche ed elettroniche
- Costruzione e demolizione
- Tessile, abbigliamento e moda
- Mobilità elettrica

Iniziative Italiane
La transizione circolare nel PNRR: Luci ed ombre

- Strategia Nazionale per l’Economia Circolare
  - Mancano adeguati investimenti per dare strumenti e gambe alla Strategia stessa

- Necessari obiettivi più ambiziosi sia dal punto di vista quantitativo, degli investimenti allocati, che dal punto di vista qualitativo, delle azioni da implementare.
  - Investire nella transizione circolare soltanto l’1% del totale delle risorse può farci perdere un’occasione unica
  - Declinare la linea di azione sull’economia circolare quasi esclusivamente come ciclo dei rifiuti è un errore strategico e culturale
    - Azioni di economia circolare sui cicli produttivi, sui modelli di consumo, sui territori e le aree urbane sarebbero fondamentali sia dal punto di vista della transizione circolare che della decarbonizzazione
  - Sarebbe fondamentale strumenti e iniziative a supporto delle PMI per imboccare significativamente la strada della transizione circolare.

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