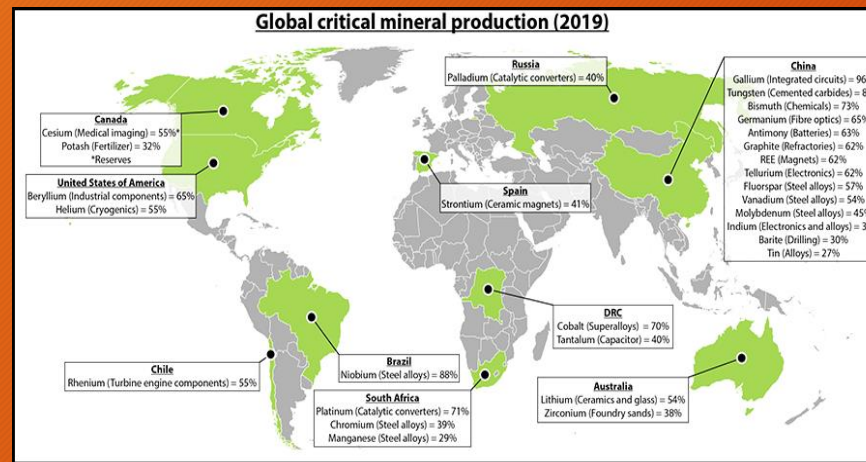


RD. CONGO

- The world's first carbon sink
- Minerals: Cobalt, tin, lithium, niobium, Copper, Nickel, tungsten and tantalum...manganese



RD. CONGO

- 110 MILLION OF POPULATION
- 2,345,409 km²
- HDI (2021) Decrease 0.479[6]
- low · 179th
- the Congo rainforest, the second-largest rain forest in the world after the Amazon rainforest

THE CONGO AND THE GLOBAL TRANSITION TO GREEN



I. TRANSITION

AT THE HEART OF CLIMATE MITIGATION AND ADAPTATION

- ❑ WHAT IT IS?
- ❑ WHAT IS THE PROBLEM?
- ❑ OPPORTUNITIES & CHALLENGES



GLOBAL WARMING AND CLIMATE CHANGE HAVE LED TO THREE REFLECTIONS ON TRANSITIONS:

1. THE ENERGY TRANSITION
2. THE ECOLOGICAL TRANSITION
3. THE SOCIETAL TRANSITION



TRANSITIONING TO

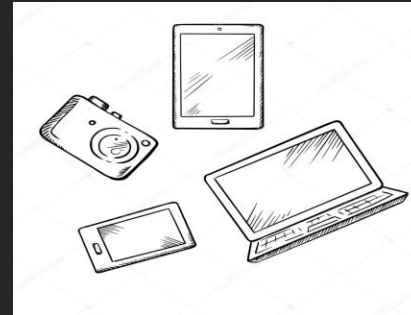
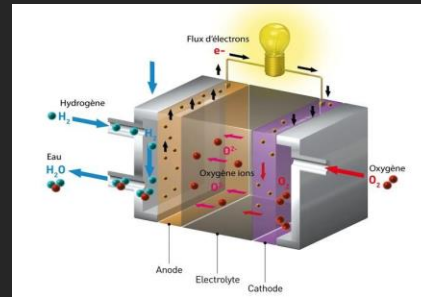


RAISES TWO ISSUES:

1. SOCIOTECHNICAL TRANSITIONS
2. SUSTAINABLE TRANSITIONS

THE JUST TRANSITION REFERS
TO THIS DOUBLE CHALLENGE

II. HOW DO THESE CHALLENGES RELATED TO SOCIO-TECHNICAL AND SUSTAINABLE TRANSITIONS EMERGE?



THE ROLE,
IMPORTANCE,
AND CHALLENGES
OF GREEN, CLEAN AND STRATEGIC
TECHNOLOGIES
IN THE TRANSITION



MINING IN GREEN, CLEAN AND STRATEGIC TECHNOLOGIES AND SECTORS



UNDERSTANDING THE GLOBAL VALUE CHAINS OF THE TRANSITION AND THE PLACE OF THE CONGO


CRITICAL AND TRANSITION MINERALS

Very high	LREEs HREEs
High	Magnesium Niobium Germanium Borates Scandium
Moderate	Strontium Cobalt PGMs Natural graphite
Low	Indium Vanadium Lithium Tungsten Titanium Gallium, Hafnium Silicon metal
Very low	Manganese Chromium Zirconium Tellurium Nickel, Copper


STRATEGIC TECHNOLOGIES

Batteries 


Fuel cells 

Wind 


Traction Motors 

PV 


Robotics 

Drones 

3D Printing 

ICT 

STRATEGIC SECTORS

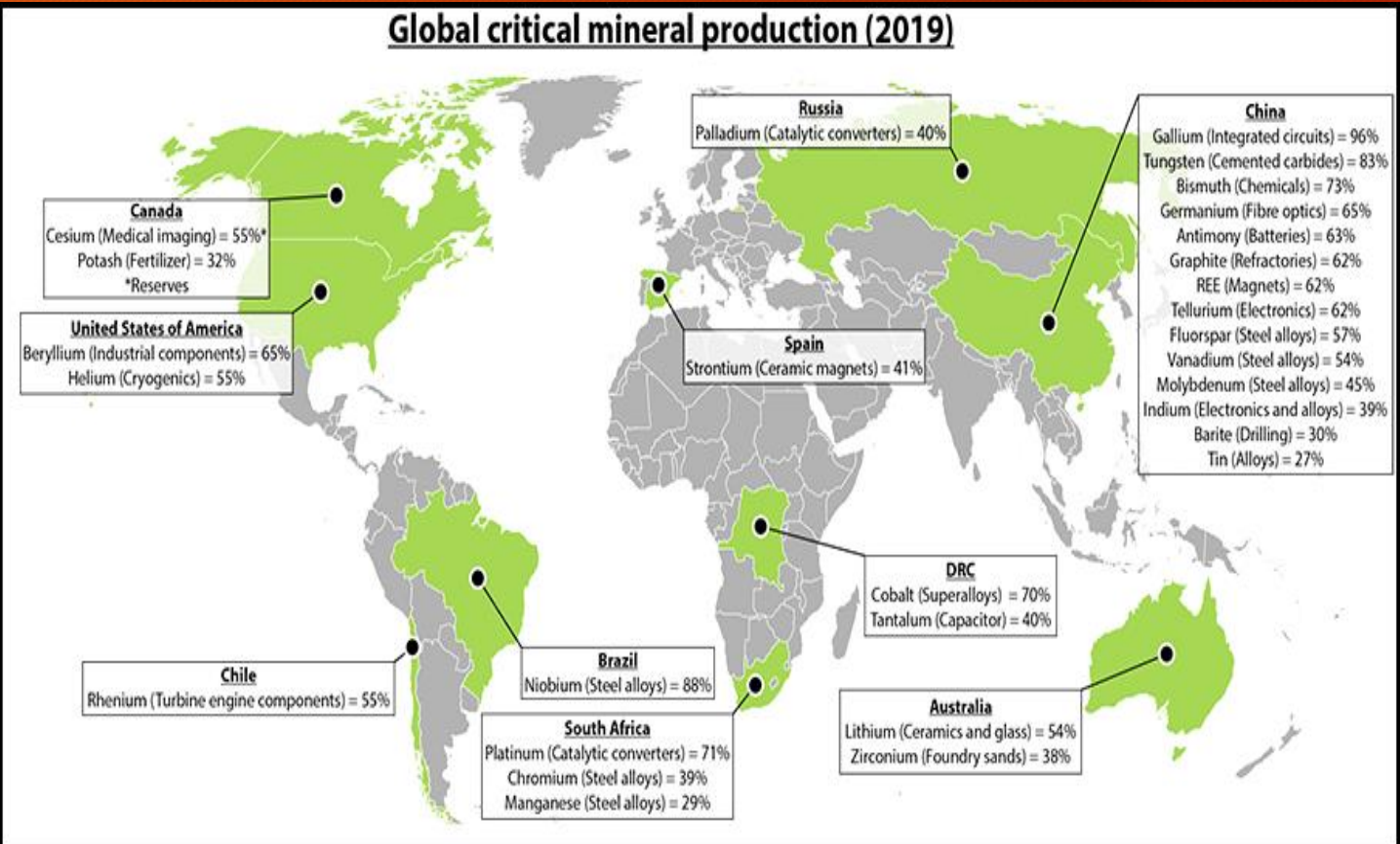
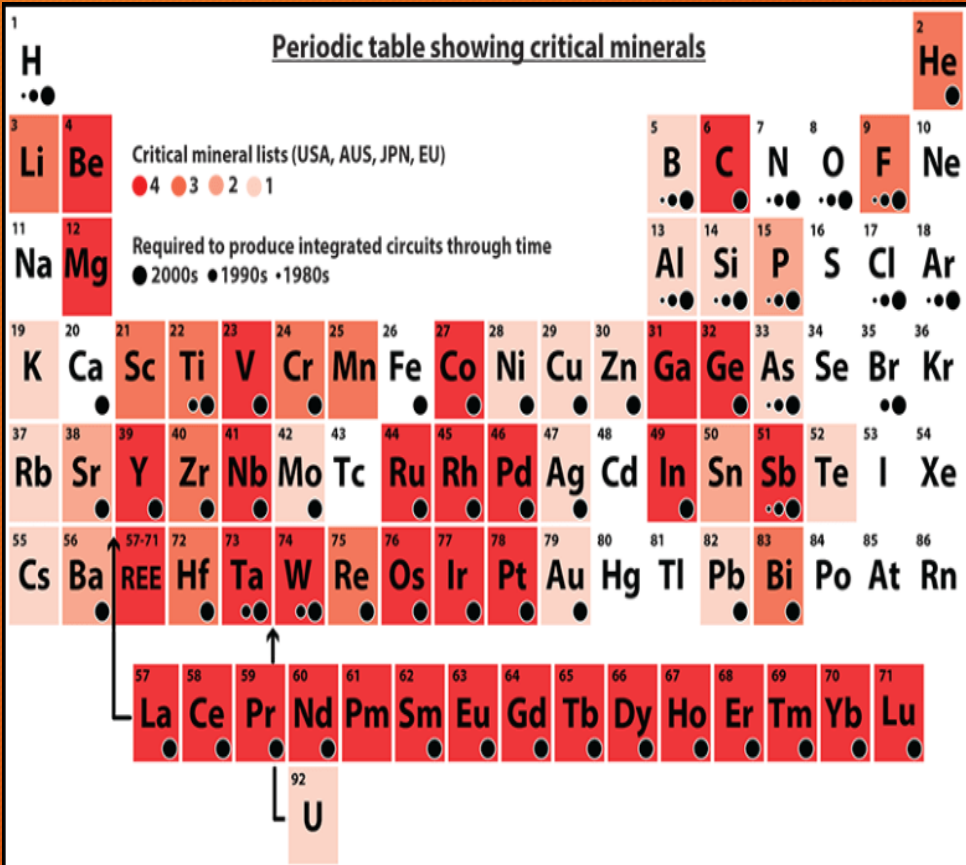
Renewables 

e-mobility 

Defence & Space 

HOW DO WE PRODUCE GREEN TECHNOLOGIES?

WHERE DO STRATEGIC MINERALS COME FROM?



Credit: Emsbo, P., Lawley, C., and Czarnota, Karol. (2021), Geological surveys unite to improve critical mineral security, *Eos*, 102

CONGO'S POSITION AND ROLE IN THE PRODUCTION OF CRITICAL MINERALS

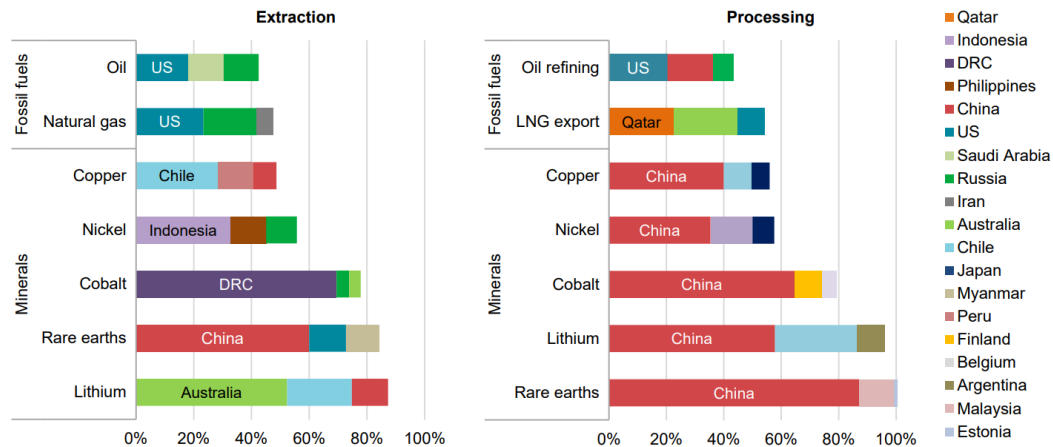
République Démocratique du Congo
Nouveau Découpage Administratif des Provinces



CONGO'S POSITION AND ROLE IN THE PRODUCTION OF CRITICAL MINERALS

Production of many energy transition minerals today is more geographically concentrated than that of oil or natural gas

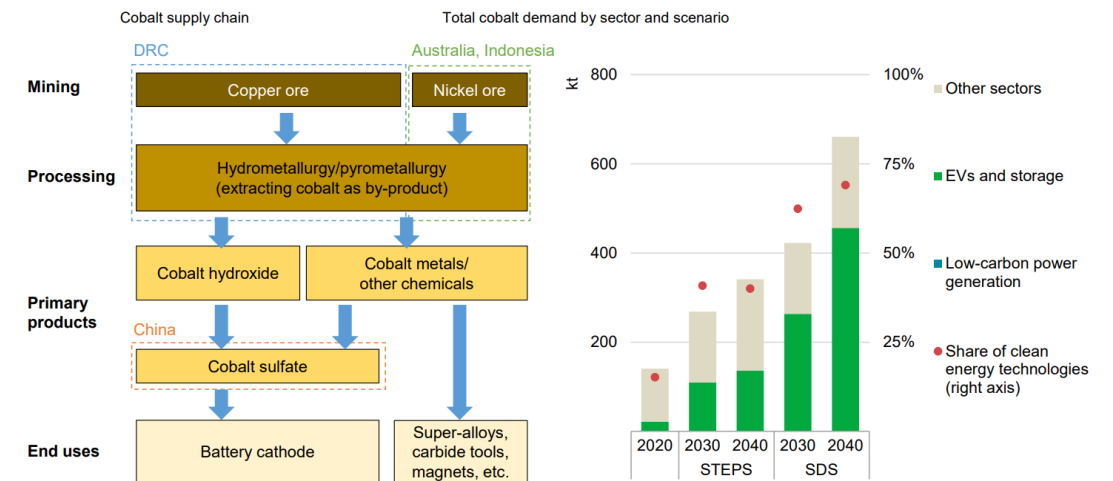
Share of top three producing countries in production of selected minerals and fossil fuels, 2019



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Notes: LNG = liquefied natural gas; US = United States. The values for copper processing are for refining operations. Sources: IEA (2020a); USGS (2021), World Bureau of Metal Statistics (2020); Adamas Intelligence (2020).

Cobalt: From resource to consumer



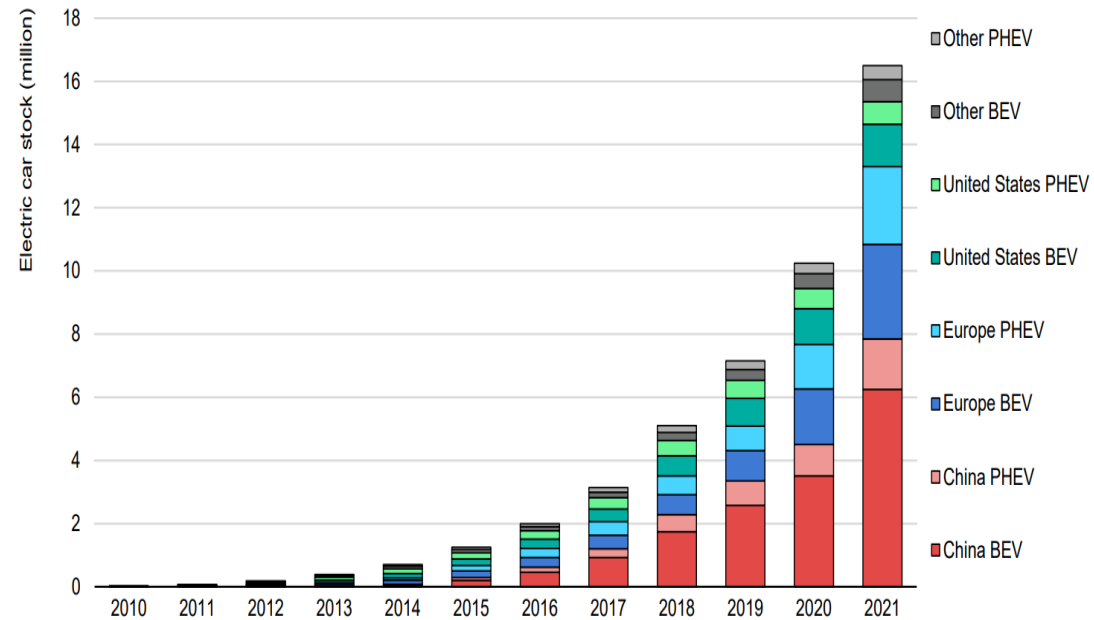
Note: There are mines that produce cobalt as a primary product, but volumes are smaller than those produced as a by-product.

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ELECTRIC VEHICLES AND BATTERIES MINERAL DEMAND

Over 16.5 million electric cars were on the road in 2021, a tripling in just three years

Global electric car stock, 2010-2021



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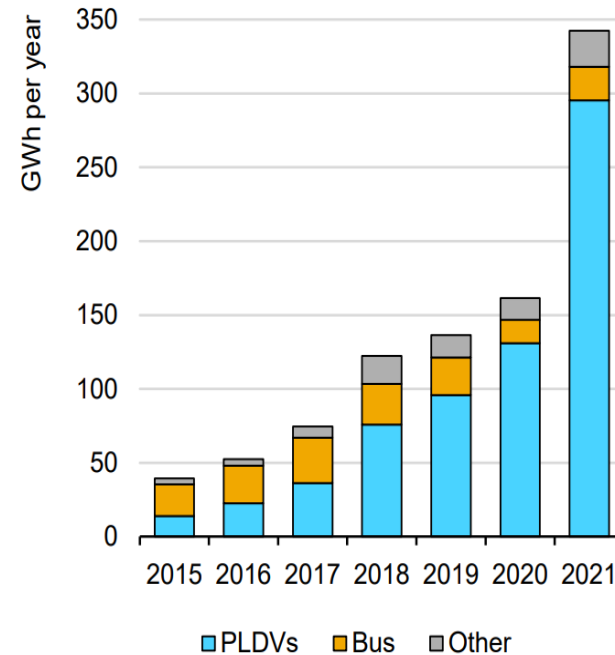
Notes: BEV = battery electric vehicle; PHEV = plug-in hybrid electric vehicle. Electric car stock in this figure refers to passenger light-duty vehicles.

"Other" includes Australia, Brazil, Canada, Chile, India, Japan, Korea, Malaysia, Mexico, New Zealand, South Africa and Thailand. Europe in this figure includes the EU27, Norway, Iceland, Switzerland and United Kingdom.

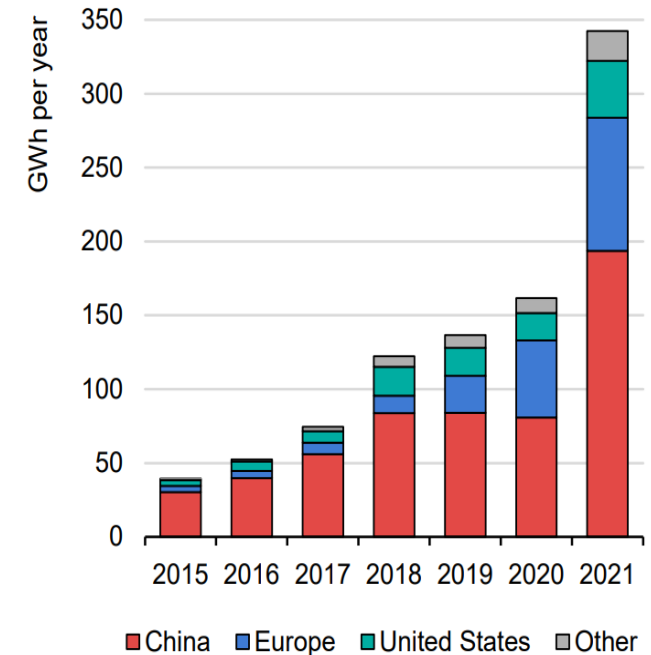
Sources: IEA analysis based on country submissions, complemented by [ACEA](#); [CAAM](#); [EAFO](#); [EV Volumes](#); [Marklines](#).

Global battery demand doubled in 2021, driven by electric car sales in China

Battery demand by mode, 2015-2021



Battery demand by region, 2015-2021



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Notes: GWh = gigawatt-hours; PLDVs = passenger light-duty vehicles; other includes medium- and heavy-duty trucks and two/three-wheelers. This analysis does not include conventional hybrid vehicles.

Sources: IEA analysis based on [EV Volumes](#).

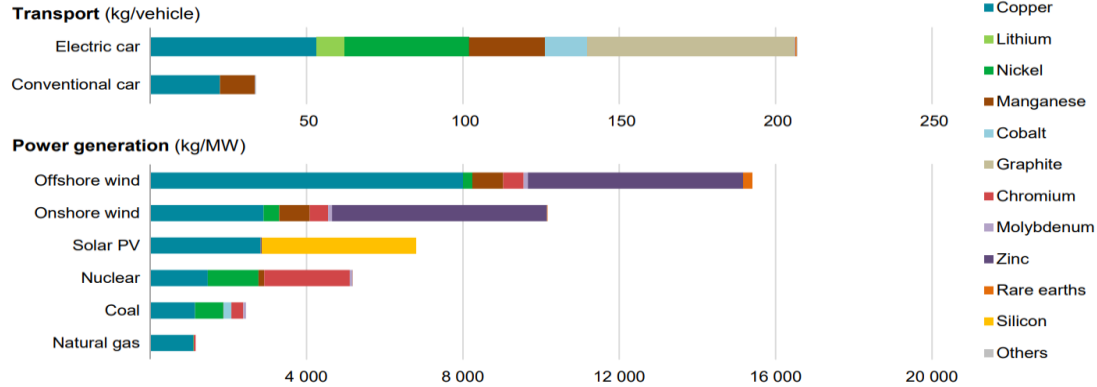
MINERALS AND DEMANDS IN TRANSITION TECHNOLOGIES: IMPACTS ON CONGO

The Role of Critical Minerals in Clean Energy Transitions

Executive summary

The rapid deployment of clean energy technologies as part of energy transitions implies a significant increase in demand for minerals

Minerals used in selected clean energy technologies

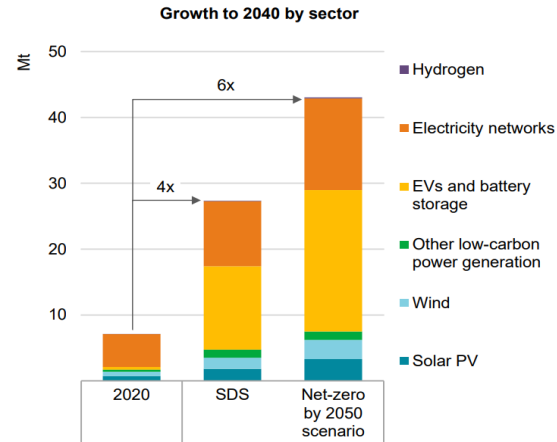


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Notes: kg = kilogramme; MW = megawatt. Steel and aluminium not included. See Chapter 1 and Annex for details on the assumptions and methodologies.

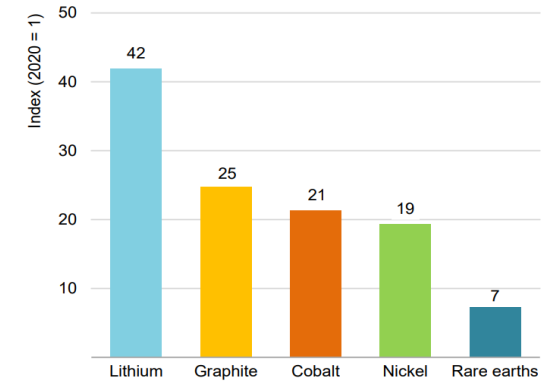
Mineral demand for clean energy technologies would rise by at least four times by 2040 to meet climate goals, with particularly high growth for EV-related minerals

Mineral demand for clean energy technologies by scenario



Notes: Mt = million tonnes. Includes all minerals in the scope of this report, but does not include steel and aluminium. See Annex for a full list of minerals.

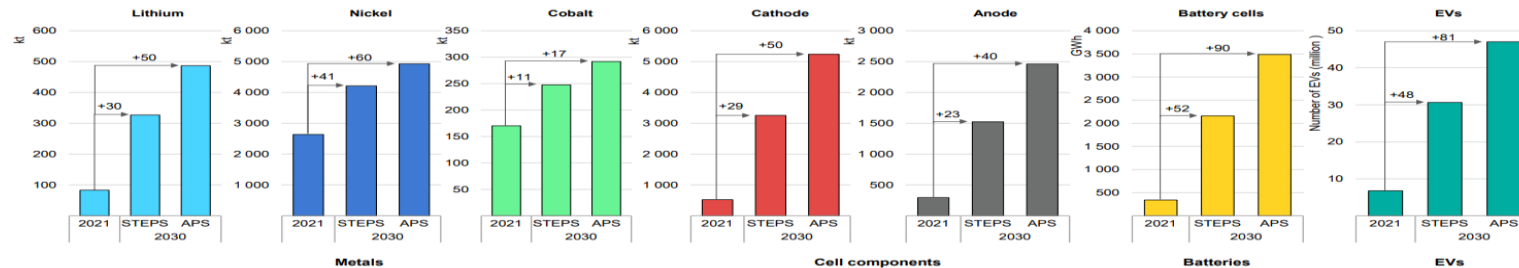
Growth of selected minerals in the SDS, 2040 relative to 2020



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All elements of EV battery supply chains expand significantly to meet projected demand

Number of mines to produce required levels of metals, anode/cathode production plants, battery gigafactories and EV plants required to meet projected demand in 2030 relative to 2021



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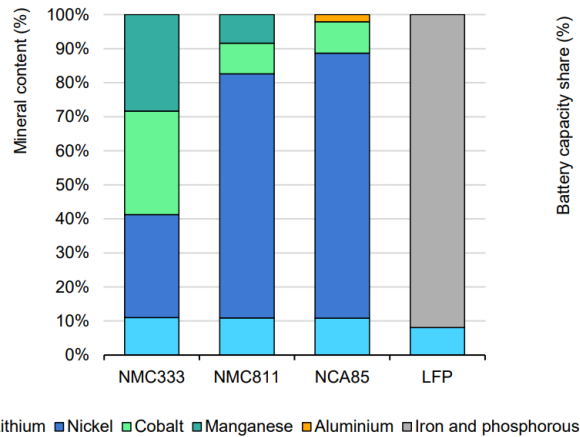
Notes: STEPS = Stated Policies Scenario; APS = Announced Pledges Scenario. Number of additional mines/plants/factories required to meet projected demand from the 2021 demand level is shown by the arrows. Projected demand is annual. Metal demand is total demand including EV and non-EV demand. Assumes the average annual production capacities: lithium mine - 8 kt; nickel mine - 38 kt; cobalt mine - 7 kt; cathode plant - 94 kt; anode plant - 54 kt; battery gigafactory - 35 GWh; and EV production plant - 0.5 million vehicles. Nickel demand does not distinguish between Class 1 and Class 2 nickel.

Sources: IEA analysis based on [S&P Global](#); [Bloomberg NEF](#); [Benchmark Mineral Intelligence](#).

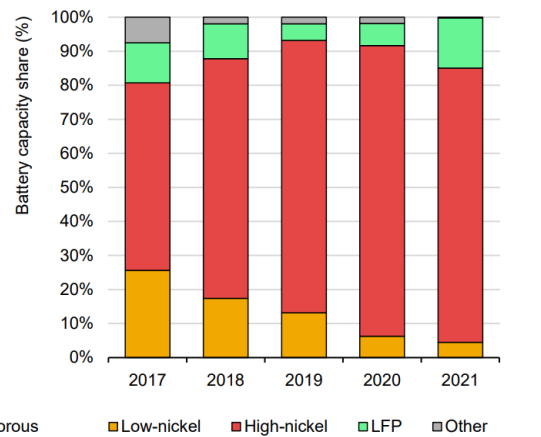
BATTERY CHEMISTRIES, ANODE AND CATHODE MATERIAL DEMAND: CONVENTIONAL AND NON-CONVENTIONAL BATTERIES

High-nickel cathode battery chemistries remain dominant though lithium iron phosphate is making a comeback

Mineral composition of different battery cathodes



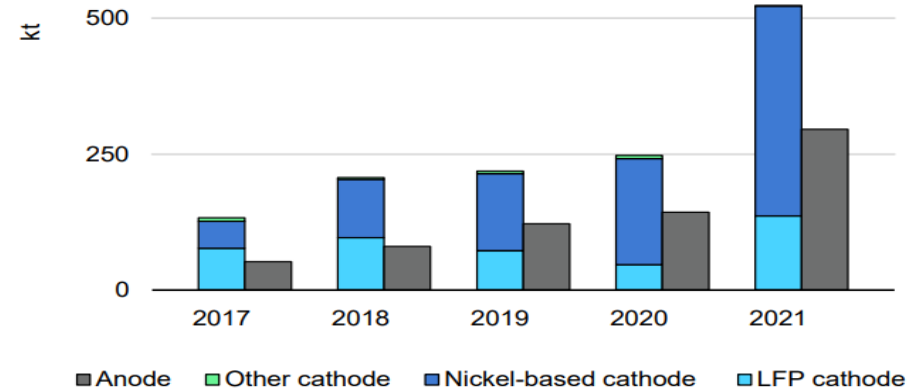
LDV EV cathode sales share, 2017-2021



Notes: LDV = light-duty vehicle; LFP = lithium iron phosphate; NMC = lithium nickel manganese cobalt oxide; NCA = lithium nickel cobalt aluminium oxide. Low-nickel includes: NMC333. High-nickel includes: NMC532, NMC622, NMC721, NMC811, NCA and NMCA. Cathode sales share is based on capacity. Sources: IEA analysis based on [EV Volumes](#).

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Battery cathode and anode material demand

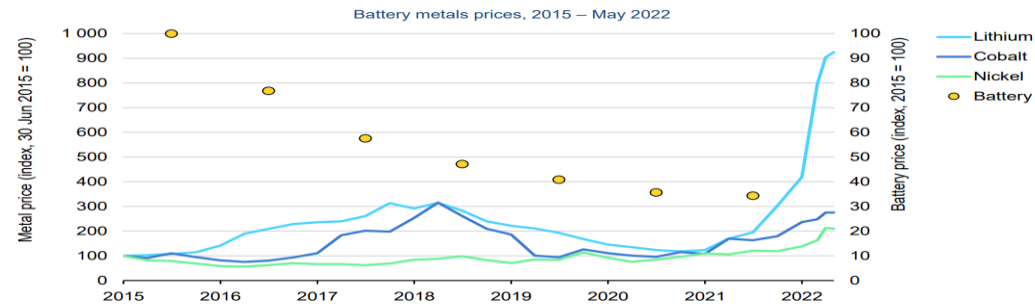


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Notes: kt = kilotonnes; LFP = lithium iron phosphate. Nickel-based cathode includes: lithium nickel manganese cobalt oxide NMC333, NMC532, NMC622, NMC721, NMC811; lithium nickel cobalt aluminium oxide (NCA) and lithium nickel manganese cobalt aluminium oxide (NMCA).

Sources: IEA analysis based on [EV Volumes](#).

Battery metal prices increased dramatically in early 2022, posing a significant challenge to the EV industry



Sources: IEA analysis based on [S&P Global](#).

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III. UNDERSTANDING THE IMPACTS OF GLOBAL VALUE CHAINS OF TRANSITION TECHNOLOGIES IN THE DRC

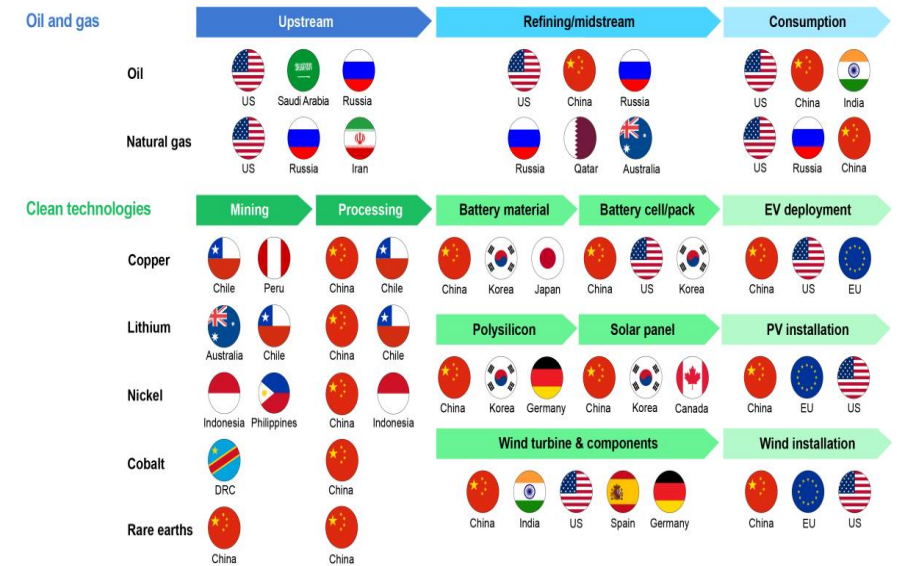
Exploitation of mineral resources gives rise to a variety of environmental and social implications that must be carefully managed to ensure reliable supplies

Selected environmental and social challenges related to energy transition minerals

Areas of risks		Description
Environment	Climate change	<ul style="list-style-type: none"> With higher greenhouse gas emission intensities than bulk metals, production of energy transition minerals can be a significant source of emissions as demand rises Changing patterns of demand and types of resource targeted for development pose upward pressure
	Land use	<ul style="list-style-type: none"> Mining brings major changes in land cover that can have adverse impacts on biodiversity Changes in land use can result in the displacement of communities and the loss of habitats that are home to endangered species
	Water management	<ul style="list-style-type: none"> Mining and mineral processing require large volumes of water for their operations and pose contamination risks through acid mine drainage, wastewater discharge and the disposal of tailings Water scarcity is a major barrier to the development of mineral resources: around half of global lithium and copper production are concentrated in areas of high water stress
	Waste	<ul style="list-style-type: none"> Declining ore quality can lead to a major increase in mining waste (e.g. tailings, waste rocks); tailings dam failure can cause large-scale environmental disasters (e.g. Brumadinho dam collapse in Brazil) Mining and mineral processing generate hazardous waste (e.g. heavy metals, radioactive material)
Social	Governance	<ul style="list-style-type: none"> Mineral revenues in resource-rich countries have not always been used to support economic and industrial growth and are often diverted to finance armed conflict or for private gain Corruption and bribery pose major liability risks for companies
	Health and safety	<ul style="list-style-type: none"> Workers face poor working conditions and workplace hazards (e.g. accidents, exposure to toxic chemicals) Workers at artisanal and small-scale mine (ASM) sites often work in unstable underground mines without access to safety equipment
	Human rights	<ul style="list-style-type: none"> Mineral exploitation may lead to adverse impacts on the local population such as child or forced labour (e.g. children have been found to be present at about 30% of cobalt ASM sites in the DRC) Changes in the community associated with mining may also have an unequal impact on women

The transition to a clean energy system brings new energy trade patterns, countries and geopolitical considerations into play

Indicative supply chains of oil and gas and selected clean energy technologies



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Notes: DRC = Democratic Republic of the Congo; EU = European Union; US = United States; Russia = Russian Federation; China = People's Republic of China. Largest producers and consumers are noted in each case to provide an indication, rather than a complete account.

III. 1. MINING COMPANIES IN THE CONGO

IMPACTS ON THE PEOPLE, THE SOCIETY, ENVIRONMENT, GOVERNANCE

OPEN-PIT MINE



COBALT CONCENTRATE PLANT



MINING COMPANIES IMPACTS/ ENVIRONMENTAL IMPACTS



- Water energy nexus management; soil pollution
- Decarbonization; air pollution
 - biodiversity ; GREEN PRODUCTION

MINING COMPANIES IMPACTS/ SOCIAL IMPACTS



- LOCAL COMMUNITY IMPACT
- RELOCATION
- TRANSPARENCY
- CONFLICT MINERALS

III 2. ARTISANAL MINING



ARTISANAL MINING IMPACTS

I. VULNERABLE WOMEN AND SAFTY PROBLEMS



ARTISANAL MINING IMPACTS

II. CHILD LABOUR



400 thousand children have no access to education in the mining areas of Lualaba Province. They are in the mines to work and support their poor families.

ARTISANAL MINING IMPACTS

II. CHILD LABOUR



Children working with cobalt and copper



WOMEN WORK WASHING COBALT AND COPPER ORES



Going underground in a 100m shaft to manually extract cobalt and copper for our phones and tablets



ARTISANAL MINING IMPACTS

CONFLICT MINERALS



More than 10 million Congolese have died as a result of wars and conflicts over the exploitation of the minerals that have powered our phones and tablets for the past 20 years.

My God, my God, why have you abandoned me? (Mt 27, 45-47; Ps 22,1)



SIGNS OF HOPE

- ADVOCACY AND NETWORK FOR :
- DUE DILIGENCES
- COMPLIANCES

ON MINING SUPPLY CHAIN AND VALUE OF CLEAN TECHNOLOGIES

ARRUPE CENTER-CIJ
ALTERNATIVE MINING PROJECT
ALTERNATIVE ECONOMY PROJECT

DUE DILIGENCE AND COMPLIANCES.

THE CONGO, THE LABORATORY OF ALL INTERNATIONAL INITIATIVES

FIVE-STEP PROCESS: CLASSIC APPROACH

Establishment of sound management systems (policies)

Identification and assessment of supply chain risks

Designing and implementing appropriate strategies to address the identified risks

Independent audits

Accountability of the due diligence exercise through transparent reporting

DUE DILIGENCE AND COMPLIANCES.

THE CONGO, THE LABORATORY OF ALL INTERNATIONAL INITIATIVES

- DUE DILIGENCE AND COMPLIANCES.
- VOLUNTARY OR MANDATORY?

- PROLIFERATION OF CERTIFICATION AND TRACEABILITY MEASURES AND INITIATIVES OF DUE DILIGENCE AND ESG
- NEED FOR HARMONIZATION OF INITIATIVES
- LITTLE IMPACT ON THE GROUND LEVEL IN THE DRC
- BLEACHING OF MINERALS
- GREENWASHING

DUE DILIGENCE AND COMPLIANCES.

THE CONGO, THE LABORATORY OF ALL INTERNATIONAL INITIATIVES

- **VOLUNTARY OR MANDATORY?**

TO ENSURE THE EFFECTIVENESS OF ESG AND COMPLIANCE, A COMPROMISE MUST BE FOUND BETWEEN THE VOLUNTARY AND THE MANDATORY.

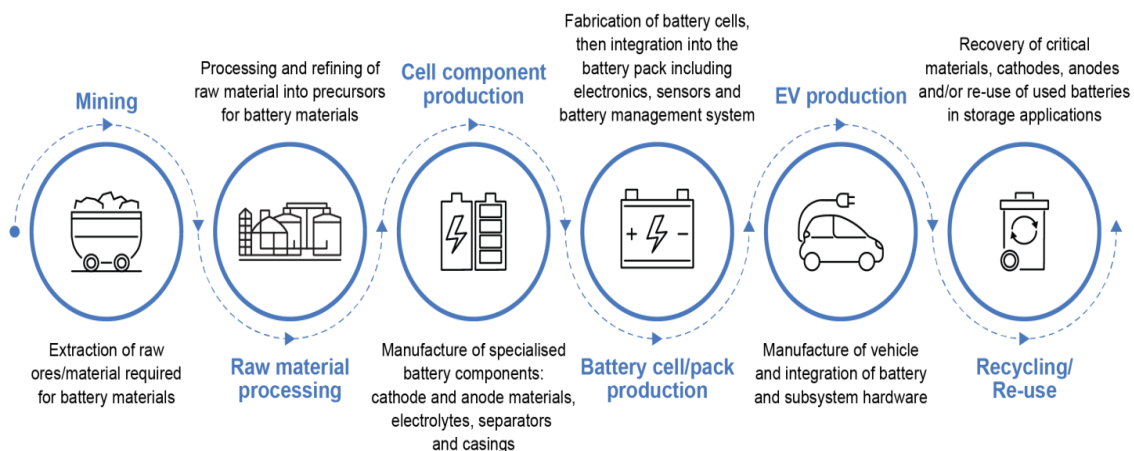
ACCESS TO JUSTICE FOR THE WEAKEST AND MOST VULNERABLE VICTIMS OF THE TRANSITION IS A MAJOR REFLECTION FOR A JUST TRANSITION

IN THIS WAY, THE GAINS AND LOSSES OF THE TRANSITION CAN BE SHARED IN A CIRCULAR WAY ACROSS ALL VALUE CHAINS FROM UPSTREAM MINING TO DOWNSTREAM TECHNOLOGY.

ANOTHER TRANSITION IS NEEDED: THE CIRCULAR TRANSITION FOR ALL VALUE CHAINS OF TRANSITION AND BATTERY TECHNOLOGIES

Making batteries for EVs requires several stages

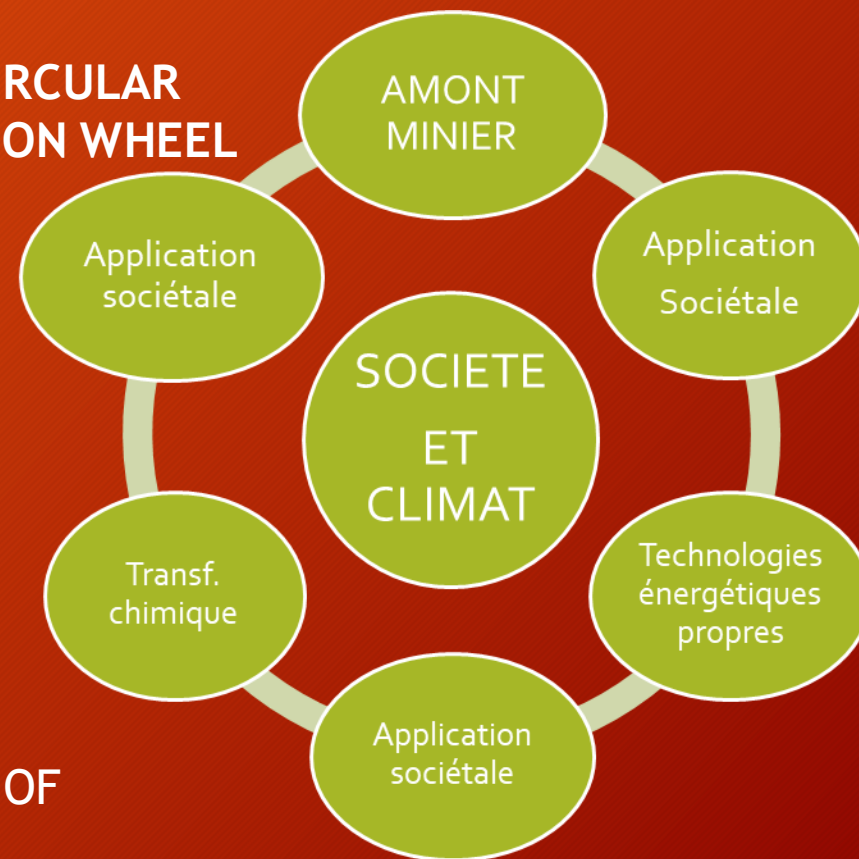
EV battery supply chain



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BUILDING A CIRCULAR TRANSITION

THE CIRCULAR TRANSITION WHEEL



THIS REQUIRES A SOCIAL TRANSITION IN OUR MODES OF PRODUCTION, CONSUMPTION AND LIVING.

GOVERNING THE TRANSITION IS LIKE GOVERNING THE CACOPHONY

- A MAXIMUM OF MANDATORY RULES IS DESIRABLE IN TERMS OF ESG AND COMPLIANCES FOR ALL VALUE CHAINS OF TRANSITION TECHNOLOGIES

THANK YOU

