Critical metals

Ecological, economic and geopolitical challenges

Guillaume Pitron October 6th, 2023



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28 Sep 2023 IEA Critical Minerals & Clean Energy Summit

International Energy Agency













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



No Greentech without IT systems management

The materials in your phone

FAIRPHONE



Share of global metal production used in digital tech



Metals, "the next oil"



"Lithium and rare earths will soon be more important than oil and gas."

Ursula von der Leyen (2022)

"Critical minerals provide the building blocks for many modern technologies and are essential to our national security and economic prosperity."

(White House, 2022)



Environmental issues are becoming critical







Chuquicamata, the largest openpit copper mine in the world.

Environmental issues, increasingly being apprehended



Scopes: a comprehensive approach to pollution perimeters

SCOPE 1 : Direct GHG emissions

A mine truck consumes up to 100 liters of fuel per hour

CCC

Environmental issues, increasingly being apprehended



Where does the electricity needed to refine metals come from?

Environmental issues, increasingly being apprehended



"Coal-made" electricity for running desalinization plants



Clean technologies require dirty metals

Renewable energies feature non renewable resources

The resources of a more sustainable world <mark>Impair</mark> <mark>circular economy models</mark>

There is no such thing as "dematerialised" technologies

Outsourced pollution



Source: RMG Consulting 2021

Materials going critical



Source : European Commission

China moving down the value chain



« China wants to make the most of the minerals and metals added value for the sake of its own industries. » (Chen Zhanheng, China Rare Earth Industry Association)



30% of world installed capacity





80% of world production



87% of world production

China moving down the value chain





Western countries in the critical metals race





Review of vulnerabilities in critical material supply chains

2023 CRITICAL RAW MATERIALS

Aluminium/bauxite	Coking coal
Antimony	Feldspar
Arsenic	Fluorspar
Baryte	Gallium
Beryllium	Germanium
Bismuth	Hafnium
Boron/borate	Helium
Cobalt	HREE

Lithium LREE Magnesium Manganese Natural graphite Niobium PGM Phosphate rock Copper

Phosphorus Scandium Silicon metal Strontium Tantalum Titanium metal Tungsten Vanadium Nickel

Source : European Commission

Western countries in the critical metals race





Review of vulnerabilities in critical material supply chains



Mining diplomacy

Geopolitics of energy transition

« The Spice. Must. Flow. » (Elon Musk, Twitter, 2018)





MINING REVENUES TAXATION

"We have made enough concessions." A high-ranking Congolese official (2018)



MINES NATIONALISATION

"Lithium, which both foreign corporations and governments lust after, will belong to Mexico."

López Obrador, President of Mexico (2023)

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ADDED VALUE RETENTION

"The goal is to retain a significant proportion of the value chain of these future and other critical minerals in our country"

Samuel A Jinapor, Minister for Lands and Natural Resources (2023)

Western countries in the critical metals race





Review of vulnerabilities in critical material supply chains



Mining diplomacy







EUROPEAN CRITICAL RAW MATERIALS ACT

March 2023

The EU is aiming to ensure a secure and sustainable supply of critical raw materials for Europe's industry.

HOW?

Through concerted internal and external action: strengthening domestic supply chains as well as reinforcing international engagement to develop win-win partnerships with third countries.

CRITICAL RAW MATERIALS

Critical Raw Materials are at the beginning of many industrial supply chains and their global demand is increasing: The demand of critical raw materials will increase in the next years:





Rare earths are key components of permanent magnets used in wind turbines motors

Silicon is used for semiconductors





EU demand for rare earth metals, used in wind turbines and electric vehicles set to rise 5 to 6 times by 2030 (6 to 7 times by 2050)



Europe could become a mining power



Projects are being studied...

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What about ocean mining?











Polymetallic sulphides / vents



Western countries in the critical metals race





Review of vulnerabilities in critical material supply chains



Investing in gigafactories and magnet facilities





Spain multiplying gigafactory projects



Part of the Battchain consortium

Version 1. Last update: 15/04/2021

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Review of vulnerabilities in critical material supply chains

Mining diplomacy



Investing in gigafactories and magnet facilities



Strategic stockpiling



> Minerals critical for the US defence industry

> Reconstitution of a « National defence stockpile »

> Some critical minerals (cobalt, rare earth) cannot be sold

> Other actions: reviews of criticalities, MSP, IRA...

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Research for new materials







> Sodium-ion

> Lithium-sulphur





> Lithium-iron-phosphate

> Food Waste

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Strategic stockpiling



Research for new materials

Circular Economy



CO2 footprint per ton of primary metal production (mining and refining)



Launch of

THE CIRCULARITY GAP REPORT 2023

Deloitte CIRCLE ECONOMY

"Rising material extraction has shrunk global circularity: from 9.1% in 2018, to 8.6% 2020, and now 7.2% in 2023. This leaves a huge Circularity Gap: the globe almost exclusively relies on new (virgin) materials."



Solution 1

Artificially increase the value of secondary materials

Solution # 1: artificially increase the value of secondary materials



AT A GLANCE Plenary – March I 2022



A new EU regulatory framework for batteries

Batteries are critical to the EU's clean energy transition. In December 2020, the European Commission tabled a proposal to modernise the regulatory framework for batteries and secure the sustainability and competitiveness of EU battery value chains. The proposed new rules cover batteries' full lifecycle, from design to disposal. During its March I plenary session, Parliament is expected to debate and vote on the report on the proposal adopted by the Committee on the Environment, Public Health and Food Safety (ENVI). This would then become Parliament's position for trilogue negotiations with the Council.

 \rightarrow In 2031, 85 % of lead, 16 % of cobalt, 6 % of lithium and 6 % of nickel contained in batteries shall come from recycling.

 \rightarrow In 2036: 85% of lead, 26 % of cobalt, 15 % of nickel and 12 % of lithium.







Solution 2

Value secondary materials with new narratives

What will be more valuable tomorrow



Reputation Privacy Strategic Foresight Autonomy

Thank you



V CONGRESO NACIONAL DE GESTIÓN DE RESIDUOS DE APARATOS ELÉCTRICOS Y ELECTRÓNICOS V CONGRÉS NACIONAL DE GESTIÓ DE RESIDUS D'APARELLS ELÈCTRICS I ELECTRÒNICS





