Critical Minerals and Energy – Part 1

What are Critical Minerals?

Relevance for future Energy and Electricity Production

"Mineral Security" and SDGs

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Critical Minerals – History - US

WW1 - August 1917, Congress passed the Lever Act empowering the President to issue orders to stimulate and conserve the production and control the distribution of fuels necessary to the war effort. U.S. DEPARTMENT OF ENERGY Critical Materials Strategy

December 2011

Strategic and Critical Nonfuel Minerals: Problems and Policy Alternatives Congressional Budget Office August 1983

4 strategic minerals Cr, PGM, Mn – South Africa Co – Zaire (*now DRC*)



16 elements assessed for "criticality" in wind turbines, EVs, PV cells, lighting

Peal Deal Deal

Press release | 3 September 2020 | Brussels

Commission announces actions to make Europe's raw materials supply more secure and sustainable

Home > Strategy > Priorities 2019-2024 > A European Green Deal

A European Green Deal

Striving to be the first climate-neutral co

A Foresight Study

for the Future:

Global electricity generation



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Metals in Green Energy



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"The Role of Critical Minerals in Clean Energy Transitions", IEA World Energy Outlook Special Report, May 2021

Increase in demand for metals

Growth in demand for selected minerals from clean energy technologies in 2040 relative to 2020 levels



(meet Paris Agreement goals)

Supply Chain (Mining and Refining)

Share of global mining and refining production by country, 2022 %



SOURCE: US Geological Survey (2023), Mineral Commodity Summaries; IEA (2021), The role of critical minerals in clean energy transitions; BNEF (2022), Localising clean energy supply chains comes at a cost.

"Material and Resource Requirements for the Energy Transition", Energy Transitions Commission, June 2023

Critical Minerals - Definition

Natural substance that provides essential properties for a technology or product

Vital to green energy, and low-CO2 technology – ELECTRIFY EVERYTHING

Difficult to substitute

Not recycled, or recycled at low levels

At risk of supply constraints – political instability, monopoly

Are by-products, and not always feasible to extract

Critical to somebody else

"Criticality" varies between countries, government departments, and different industries

Canada's Critical Minerals List

Aluminum Graphite Antimony Helium **Bismuth** Indium Cesium Lithium Chromium Magnesium Cobalt Manganese Molybdenum Copper Fluorspar **Nickel** Gallium Niobium Germanium Platinum group metals

Potash Scandium Tantalum Tellurium Tin Titanium Tungsten Uranium Vanadium Zinc

Essential to Canada's Economic Security

Required for Canada's transition to a low-carbon economy

A Sustainable Source of Critical **Minerals for our Partners**



ww.nrcan.gc.ca/our-natural-resources/minerals-mining/critical-minerals/

Global Critical Minerals List

Aluminum Antimony **Bismuth** Cesium Chromium [•] Cobalt Copper Fluorspar Gallium **Germanium** Graphite Helium Indium Lithium Magnesium Manganese EU ★ US

2008

2010

Molybdenum Nickel Niobium PGM Potash REE **Scandium** Tantalum Tellurium Tin Titanium Tungsten Uranium Vanadium Zinc UK Japan Australia 2012 2005 2013



The Canadian Critical Minerals Strategy

FROM EXPLORATION TO RECYCLING: Powering the Green and Digital Economy for Canada and the World

Canadă



Securing the Future Saskatchewan's Critical Minerals Strategy

saskatchewan.ca

Saskatchewan





Saskatchewan Advantage

Varied geology – Precambrian Shield in N, younger sedimentary rocks in the S

23 of the 31 Canadian Critical Minerals

- North U, Cu, Zn, Ni, REE, etc
- South potash, He, Li, etc

Fraser Institute - 3rd in world for mining investment attractiveness (after Nevada, Western Australia)

Comprehensive public geoscience data

Oil and gas drilling expertise

Saskatchewan Geological Survey

Human-centred perspective

Natural resources in the UN Sustainable Development Goals relates to their fair and affordable access for development, with reference in the goals and targets to food security, energy security and water security

But access to minerals for development has so far predominantly been framed through the lens of "criticality"

Critical minerals refer to metallic and non-metallic elements that are essential for the economic and national security of states, especially advanced manufacturing and technology, and that are at risk of supply chain disruption or, by some measures, have environmental impacts associated with extraction

Critical minerals as a conceptual frame helps states and businesses to plan for their economic development BUT...

Human-centred perspective

Compare with food security - the availability of basic foodstuffs,

 existing "when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life."

Mineral security to exist "when all people have sufficient and affordable access to the minerals necessary for human development, including for shelter, mobility, communication, energy and sustenance."

The lack of access to the minerals necessary for development contributes to and is a consequence of poverty. nature sustainability



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