Critical Minerals: Canada's Role In The Future Of Energy

Critical minerals play a vital role in producing advanced technologies, renewable energy systems, and defense applications. Strategic manufacturing relies on critical minerals such as lithium, cobalt, nickel, copper, graphite, manganese, and rare earth elements like dysprosium and neodymium.[1] Many of these are sourced from a limited number of geographic locations, particularly for high-quality deposits, making them "strategic minerals" due to the risk of supply chain disruption. Examples typically cited include the lithium reserves[2] in Australia and Chile or the cobalt resources available in the Democratic Republic of Congo.[3] Evolving uncertainty in global trade and rising geopolitical tensions are creating a volatile environment, demanding a reassessment of how these vital resources are sourced, processed, and utilized.

Below are a few of the questions that we have received in recent weeks regarding critical minerals in the context of the power sector and our initial responses on what is a rapidly evolving situation.

What are the most important critical minerals in Canada and where are they

found?

Although Canada does not hold a global monopoly on any specific mineral, it is recognized as a global leader in critical minerals production, including potash (found in Saskatchewan – primarily used as a fertilizer driving the agricultural revolution), niobium (found in Quebec – essential for steel alloys and MRI magnets), and uranium (found in Saskatchewan – used for nuclear energy and medical isotopes, replacing previous imports from Russia), along with other critical minerals.[4]

Currently, no single country holds an absolute monopoly over any specific mineral resource, whether critical, rare or otherwise. However, there are notable strategic constraints, transportation challenges, supply bottlenecks, and, more commonly, concentrated areas of processing and production capabilities. The best example is the near monopoly position which China holds with respect to the processing of the "G minerals" those being: gallium, germanium, rare earths, and graphite – which are all critical to the technology sector.[5]

Canada, one of the few democratic nations with extensive mineral reserves, holds 34 of the minerals now considered crucial for the global energy transition. This includes the minerals listed in the Critical Minerals Report by Natural Resources Canada, published in March 2021, and updated in 2024 (see **Table 1**).[6]

• Aluminum	• High-purity iron ore	• Scandium
• Antimony	• Indium	• Silicon metal
• Bismuth	• Lithium	• Tantalum
• Cesium	• Magnesium	• Tellurium
• Chromium	• Manganese	• Tin
• Cobalt	• Molybdenum	• Titanium

• Copper	• Nickel	• Tungsten
• Fluorspar	• Niobium	• Uranium
• Gallium	• Phosphorus	• Vanadium
• Germanium	• Platinum group metals	• Zinc
• Graphite	• Potash	
• Helium	• Rare earth elements	

Table 1: Minerals included in the Critical Minerals Report by Natural Resources Canada.

According to the recent House Natural Resources Committee Report on Critical Minerals, Canada is the only country in the Western Hemisphere with all the minerals and metals needed to produce advanced batteries for electric vehicles.[7]

It should be emphasized that the term ‘”critical minerals” is probably a misnomer. In a majority of cases there are industrial substitutes and alternative supply sources for virtually every industrial input. However, our consistent advice both to government agencies and to manufacturers is to seek diversity of supply for all production inputs and to nourish redundant capabilities among multiple suppliers in different geographic regions. This was a lesson learned this after the automotive supply chain disruptions caused by the Fukushima earthquake, and again during the COVID-19 pandemic. In the age of just-in-time manufacturing and paper-thin margins, diversification is easier said than done, but the concentration of supply for any industrial input does present a risk which, it could be argued, is not always properly priced into public markets.

See further observations from the November 2024 Ditchley Conference here.

What are critical minerals used for?

The use of critical minerals varies by industry. In the context of U.S. manufacturing, Canada's oil and gas resources can be considered critical, alongside uranium, forest products, freshwater resources, and low-GHG electricity sources.

In the context of advanced manufacturing, the most relevant examples are the "G minerals" mentioned above. These are essential for a wide range of applications, including semiconductors, fiber optics, solar cells, specialized glass, lighting, and catalytic converters. Without these minerals, alternative solutions would need to be developed for industrial applications, and some products might become unavailable. In Canada, a key example is niobium whereby approximately 90% of the global niobium supply comes from just three mines—two in Brazil and one in Canada.[8]

Another key example is lanthanum, which enhances the vivid color of iPhone screens.[9] Since 2022, lanthanum has been mined at the Nechalacho Mine in the Northwest Territories. More significantly, as of September 2024, it has been processed at the Saskatchewan Research Council's Rare Earth Processing Facility in Saskatoon.[10]

The strategic importance of these Canadian minerals to the United States

The United States already has full and unrestricted access to Canadian resources through the world's longest undefended border. This access is facilitated by a well-established, cost-competitive supply chain network that has been extensively tested, remains inherently stable, and is highly reliable.

The advent of government tariffs, taxes or non-tariff supply

chain barriers on either side of the border is likely to distort markets and, potentially, make critical industries in both countries less competitive over the longer term. Additionally, this may also add significant regulatory and administrative burden to trade. In the short term, these changes are likely to brutally disrupt existing supply networks and relationships, throttle early-stage critical mineral mining and processing plant investments that are already underway in Canada and the U.S. and force Canadian suppliers to look to markets outside of North America for customers, driving up costs across virtually every single industry and reducing the inherent power of the North American economy.

Footnotes

1. Canada, Minister of Energy and Natural Resources, *Canadian Critical Minerals Strategy Annual Report 2024* (2024) Online:<https://www.canada.ca…>

2. A *reserve* tells us how much known and assessed mineral deposits can be mined economically with current technologies and market conditions. See Our World in Data, "Which countries have the critical minerals needed for the energy transition?" (2024). Online:<https://ourworldindata.org/…>

3. TD Canada Trust, *U.S. Trade Vulnerabilities in Critical Minerals: Pressure Points Amid Rising Tensions* (2024). Online:<https://economics.td.com/us-trade-critical-minerals>

4. Government of Canada, *The Canadian Critical Minerals Strategy* (2024). Online:<https://www.canada.ca…>

5. *Ibid.*

6. Government of Canada, *Critical Minerals in Canada* (2024). Online:<https://www.canada.ca…>

7. Government of Canada, Canada's critical mineral rich regions (2024). Online:<https://www.canada.ca…>

8. Nobium Canda, *Who Mines Nobium?* (2023).

Online:<https://niobiumcanada.com/who-mines-niobium>

9. Natural Resources Canada, *Rare Earth Elements Facts* (2024). Online:<https://natural-resources.canada.ca…>

10. Government of Canada, *The Canadian Critical Minerals Strategy* (2024). Online:<https://www.canada.ca…>

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The content of this article is intended to provide a general guide to the subject matter. Specialist advice should be sought about your specific circumstances.

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