

January 31, 2023

To:

The Honourable Jonathan Wilkinson, P.C., M.P.  
Minister of Energy and Natural Resources  
580 Booth Street, 21st Floor, Room: C7-1  
Ottawa, Ontario  
K1A 0E4

[Sent via email]

Dear Minister Wilkinson,

As executive representatives from proudly Canadian silver mining companies, and international silver miners that operate within Canada, we strongly recommend the recognition of silver as a critical mineral for Canada.

Silver mining in Canada has a rich history dating back to the early 19th century. The discovery of silver deposits in places like Cobalt, Ontario, and the famous Kootenay region in British Columbia sparked a silver rush, attracting prospectors and miners in search of fortune. The Cobalt camp became one of the world's largest silver producers in the early 1900s. Over the decades, technological advancements and new discoveries in regions like the Yukon and Newfoundland further fueled the industry's growth. However, the latter half of the 20th century saw a decline in silver mining activities due to economic factors and declining ore grades.

In recent years, there has been a resurgence in interest and exploration, driven by the increasing demand for silver in various industries, including electronics and renewable energy. Today, Canada remains a significant player in the global silver mining industry, with ongoing commitments to sustainably and responsibly operate mines while tapping into our vast silver resources. In 2022, NRCan [estimates](#) that nearly \$300 Million of silver was produced by Canada, mostly originating from Ontario, British Columbia, Quebec, and Manitoba.

In part due to the modern uses of silver, France has identified silver as a critical mineral in a [2021 assessment](#), reporting their findings of silver as a mineral of [medium criticality](#) to the IEA. Canada's consideration of silver as a critical mineral would be in alignment with the [Canada-France Bilateral Dialogue on Critical Minerals](#), and would further position Canada to be a supplier of choice for critical silver with our strategic allies.

### **Presenting the Case for Silver as a Critical Mineral**

On December 11, 2023, NRCan opened a public commentary period for proposed updates to Canada's Critical Minerals list and methodology. According to the draft methodology, a critical mineral must satisfy one of the following three criteria:

1. Is essential to Canada's economic or national security.
2. Is required for our national transition to a sustainable low-carbon and digital economy.
3. Contributes to Canada serving as a sustainable and strategic source of critical minerals for its international allies.

In addition, critical minerals must satisfy both of the following criteria:

4. The mineral’s supply is threatened.
5. The mineral has a reasonable likelihood of being produced in Canada.

While we believe that an effective argument can be made that silver meets all of the first three criteria, the most striking argument for silver as a critical mineral falls under the scope of Criterion 2 and its requirement as an input to the clean energy transition. As such, this letter speaks primarily to silver’s merits as an enabler of the low-carbon and digital future.

*Criterion 2: Required for our national transition to a sustainable low-carbon and digital economy.*

Silver is identified as the best electrical conductor, the best metallic thermal conductor, and the best reflective material. These qualities make silver an essential and irreplaceable component for many industrial and technological applications.

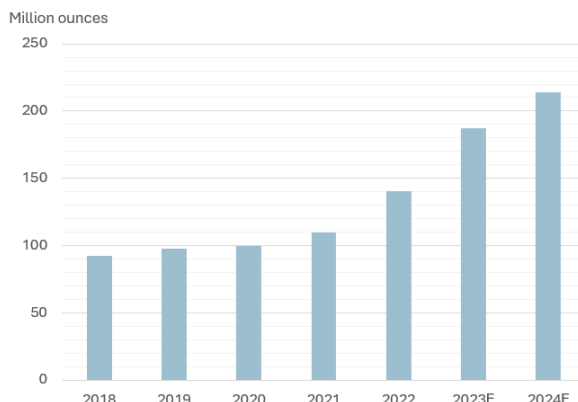
Notably, global organizations have recognized silver is an essential component in low carbon technologies:

- [The World Bank](#) has identified silver as an essential component of photovoltaic, concentrated solar, and nuclear energy systems.
- [The OECD](#) has identified silver as essential for fuel cells and photovoltaic cells.
- [The IEA](#) notes that silver is essential to the most widely used type of photovoltaic cell.
- [The IRENA](#) has identified silver as a critical mineral for the low-carbon energy transition.

All the above agencies are noted in the Canadian Critical Minerals Strategy as “key multilateral organizations.” Given Canada’s stated support of these forums to strengthen the linkage between critical minerals and the energy transition, we specifically note their opinions on silver as a critical mineral. The demand for silver in technologies has led to increasing industrial demand in recent years. In 2023, global silver demand was estimated to be 1,167 Million ounces (Moz), of which 576.4 Moz (50%) was industrial use. The fastest-growing industrial use of silver is photovoltaics, which demanded 161.1 Moz in 2023, 14% of the global silver demand.

Solar Energy: Silver is a critical component of both photovoltaic (PV) cells and concentrated solar power, which leverage silver’s unrivaled conductivity and reflectivity, respectively. Its unmatched conductivity benefits PV cells with silver’s utilization in electrodes for the most prevalent cell types. On average, generating 1 gigawatt of solar power capacity through PV requires 685,000 ounces of silver. The growing adoption of extensive solar power facilities is significantly boosting the demand for silver, a trend that will persist as countries strive to fulfill their renewable energy commitments.

**Global PV Demand for Silver**



Source: The Silver Institute

**Nuclear Energy:** Silver is a common component of nuclear reactors, incorporated into rod cluster control assemblies (RCCAs), which control the rate of nuclear fission within the core of a reactor. Control rods composed of an alloy that is 80% silver, 15% indium and 5% cadmium (Ag-In-Cd) is the preferred control rod composition for pressurized water reactors (PWRs), the most common commercial nuclear reactor type. In 2017 PWRs accounted for 64% of operational reactors and 84% of those under construction [according to CRU](#).

With Canada joining dozens of other countries at COP28 [to commit](#) to tripling nuclear energy capacity by 2050, the demand for silver in nuclear applications is likely to increase as these commitments are met. A recent study by S&P estimates 56,000 oz of silver needed per GW of nuclear energy added. With current global capacity at [413 GW](#), this added 826 GW equates to an additional demand of more than 23 million oz of silver.

**Electric Vehicles:** Silver's unsurpassed electrical conductivity positions it as a fundamental element in various electrical applications, including serving as a contact in every electrical switch. This unique quality extends its indispensability to electric vehicles (EVs). Within battery EVs, silver takes on a crucial role in electric contacts and connectors across the battery management system, motor controllers, and power electronics. In plug-in hybrid EVs, silver is not only utilized in these components but also in powertrain elements like connectors, relays, and switches, ensuring a seamless transition between electric and combustion modes of power. Similarly, fuel cell EVs and hybrid EVs rely on silver for their electrical and battery components, with specific usage variations based on individual designs.

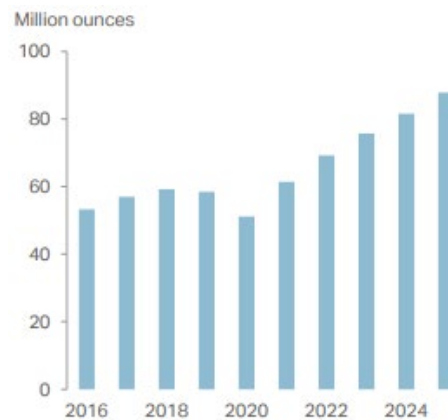
As fleets are increasingly moving toward electrification, the global demand for silver in the automotive industry is expected to increase. With Canada [mandating](#) all new vehicles sold to be zero-emission vehicles by 2035, an increase from 20% in 2026, the demand for silver for this use will be felt domestically.

**Average Demand for Silver in EVs**

EV Type	Silver per Vehicle (g)
Battery Electric Vehicle	25 – 50
Plug-in Hybrid Electric Vehicle	20 – 40
Hybrid Electric Vehicle	18 – 34
Fuel Cell Electric Vehicle	25 – 40

Source: S&P

**Global Automotive Demand for Silver**



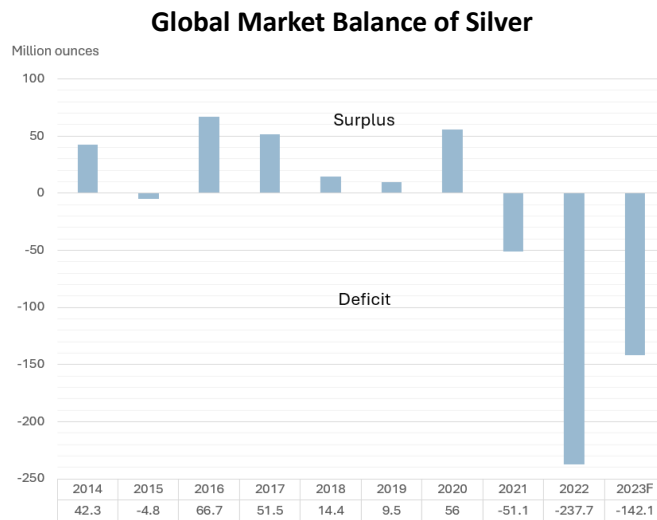
Sources: Metals Focus and The Silver Institute

*Criterion 4: The mineral's supply is threatened.*

It's our understanding that this criterion is the primary reason that silver has been excluded as a critical mineral in the past. From information sessions and conversations with Natural Resources Canada staff, we believe there is a sizable misconception of the above-ground availability of silver in the marketplace. Researchers from around the globe have raised the alarm that silver is a potential bottleneck in the transition

to a low-carbon economy due to supply limitations, disruptions to supply chains, competition for other uses, and increased demand. The academic consensus is that silver merits attention as a critical mineral. Unfortunately, the reputation of silver as a readily available, budget-friendly precious metal has led to misconceptions that have to date blocked policy alignment with this academic consensus.

We’re already witnessing the tightening of silver supply. There was a 237.7 Moz (6.74 kton) silver deficit in 2022, believed to be the largest deficit on record. Importantly, the combined 2021 and 2022 deficits more than offset the cumulative surpluses of the previous 11 years. There was a 142.1 Moz (4.03 kton) deficit projected for 2023, highlighting the ongoing disparity between mine production and silver demand. Given the increasing demand for silver in numerous high-tech and electrified applications and mine production not projected to meet the increased demand, the below depicted market deficit will continue unless additional production opportunities are identified.



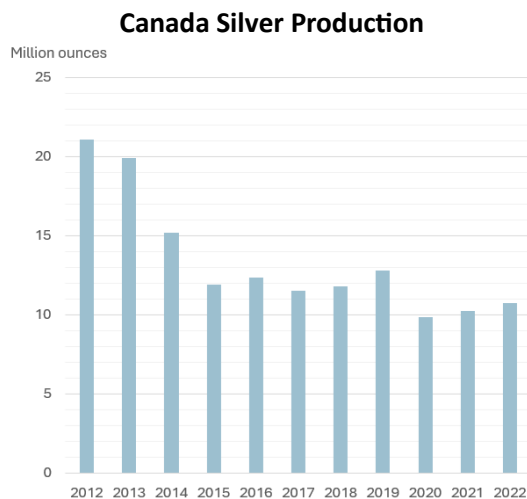
Source: The Silver Institute

As mentioned, academic researchers have highlighted the severity of silver supply as a critical limitation to future low-carbon scenarios. In 2016, [Grandell](#) found that of 14 key minerals and metals examined, silver posed the most critical market limitation to the energy transition. In 2019, [Lo Piano](#) indicated that the pace of expansion of silver mining is a limiting factor to PV rates of deployment. In 2023, [Hallam](#) indicated that by 2025 85-98% of silver reserves will be needed for PV applications exclusively, not considering other demands for silver. And finally, a 2023 [Energy Transitions Commission report](#) found that consideration of both energy production and EV demands lead to a projected silver demand of 190% of global silver reserves by 2050.

Beyond supply/demand imbalances, the geopolitical sources of silver merit consideration. The Carnegie Endowment for International Peace reviewed silver in [its examination](#) on the geopolitical stability of sources of materials essential to low-carbon technologies, with a focus on the USA’s ability to secure silver. In light of the [Canada-US Joint Action Plan on Critical Minerals Collaboration](#), this work is highly relevant. Key takeaways include an 8.5% silver deficit if countries without free-trade agreements with the USA are excluded, and a 56.5% deficit if countries with fragile democracies are excluded. Ultimately, the authors identified seven minerals with significant reserve risks in an energy transition: cobalt, graphite, lithium, nickel, silver, tellurium, and tin. All but silver are currently recognized on Canada’s critical minerals list.

*Criteria 5: The mineral has a reasonable likelihood of being produced in Canada.*

Canada produces silver as a by-product of other mining activities, namely copper, zinc, nickel, lead, and gold primary mines. [As of 2022](#), Canada is the 13<sup>th</sup> largest producer of silver in the world. Canada is also the USA's [second largest](#) source of silver, providing 21% of the country's silver imports. However, silver production has declined over the past decade. Key reasons for the reduction in mine production include declining ore grades, which occurs as silver-rich veins are mined out, leaving less-rich material for production. To replenish reserves of viable mined resources, additional exploration is needed to identify new ore bodies. This illustrates the need for concerted silver exploration and development to support Canada's ability to continue supplying critical silver to the world.



Source: Statistics Canada

We thank you for the opportunity to comment on the proposed updates to Canada's critical minerals list and methodology. We trust that the information provided herein, as well as within detailed feedback that we are providing directly to Natural Resources Canada, demonstrates the importance of silver to our clean energy future and the increasing supply risks that the world faces.

We look forward to your consideration of silver as a critical mineral and welcome the opportunity to discuss our recommendation with you at your earliest convenience. If you have any questions or would like to discuss further, please contact Jillian Lennartz, Director of ESG Reporting at First Majestic Silver Corp. ([jlennartz@firstmajestic.com](mailto:jlennartz@firstmajestic.com)).

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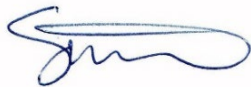
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<sup>i</sup> Digitally signed January 31, 2024