
Canada's Developing Battery Industry & The Geopolitics Surrounding it

Oct 29 2024

Moe Kabbara

Vice President, The Transition Accelerator



Supply Chain Scale-Up: The Make-or-Break Factor for Net Zero

 **14x**


Battery Supply

Annual lithium ion battery supply needs to be approximately 15 TWh by 2040

 **10x**


Lithium Supply

Annual lithium supply needs to be 10x higher in 2040 than today

 **2.5x**

Nickel Supply

Annual nickel supply needs to be 2.5x higher in 2040 than today (Battery demand to rise 12.8x)

 **3.5x**

Cobalt Supply

Annual cobalt supply needs to be around 3.5x higher in 2040 than today

7.5x

Battery-Grade Manganese

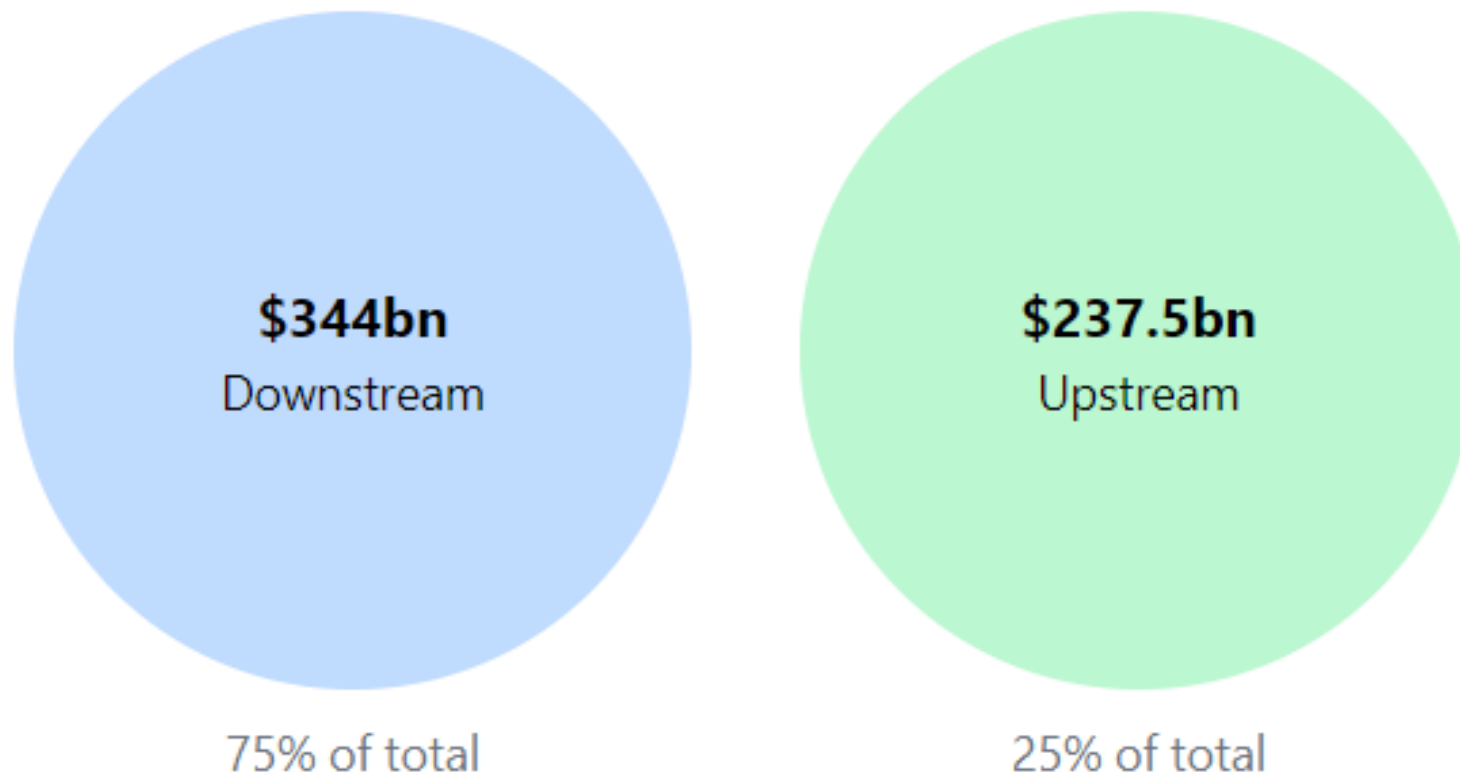
Annual battery-grade manganese supply needs to be around 7.5x higher in 2040 than today

8x

Graphite

Annual graphite supply needs to be around 8x higher in 2040 than today

\$582B Needed by 2030: Breaking Down the Investment Challenge



GigaGrowth – The Impact of the IRA

North America



+39.6%

YoY Growth Rate

China



+15.0%

YoY Growth Rate

Europe



+12.2%

YoY Growth Rate

Asia (excl. China)



+10.5%

YoY Growth Rate

IRA Impact Highlights

2.6×

Faster than China's Growth

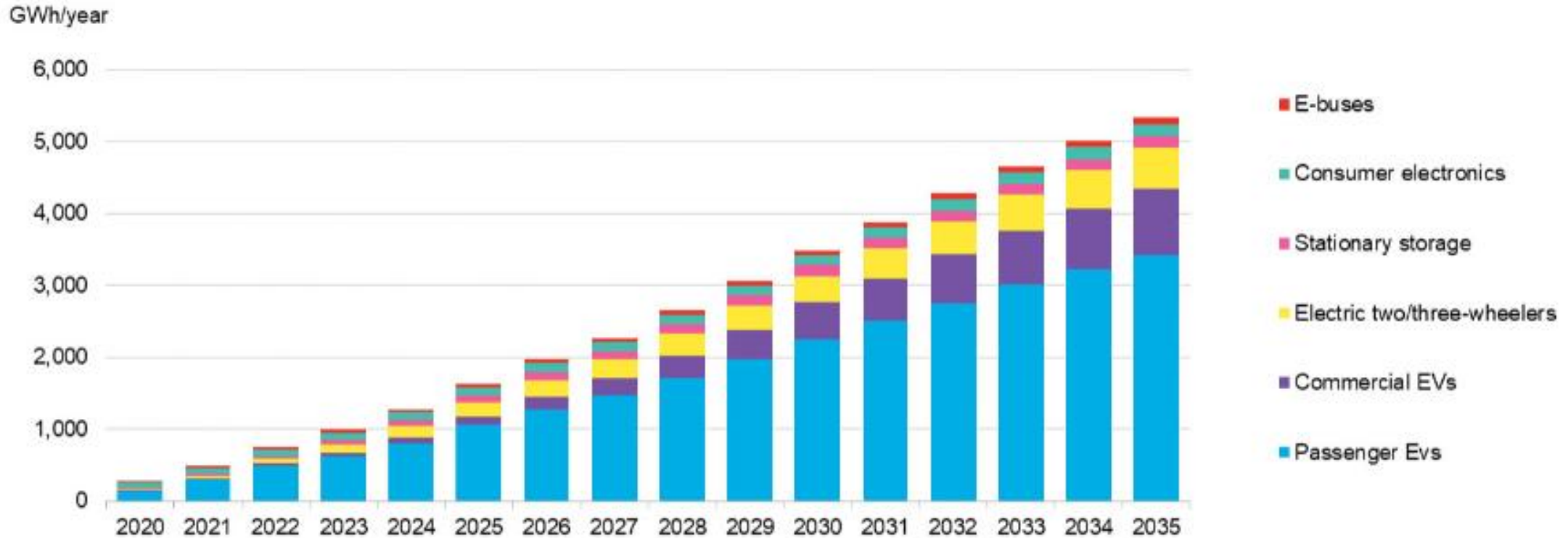
102

Plant Announcements in
2022

2022

IRA Announcement

Market Growth



Strategic Importance of Regional Supply Chains

Market Growth

6x

Expected demand increase by 2030

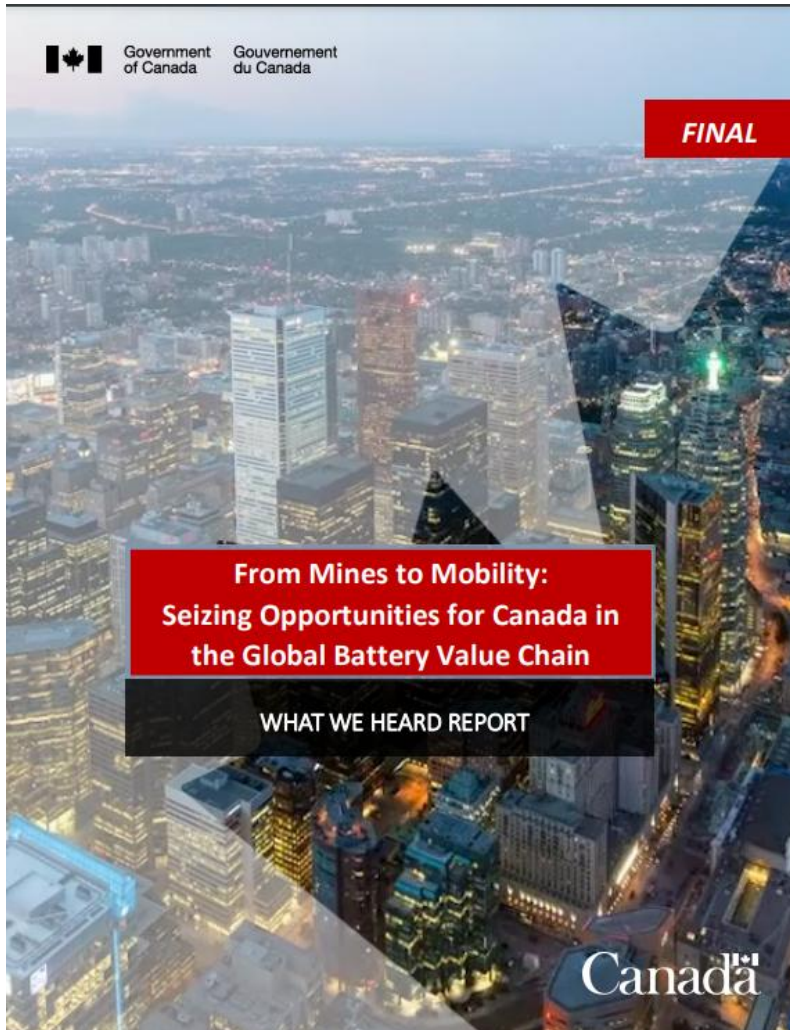
Supply Chain Vulnerabilities

- Critical mineral processing heavily concentrated
- Long lead times for new capacity (3-7 years)
- Structural deficits expected by late 2020s
- Limited regional processing capability

Regional Supply Chain Benefits

- Reduced geopolitical risk exposure
- Shorter supply chains, lower logistics costs
- Better environmental & labor standards
- IRA incentives for local production

Canada & Batteries



Why Canada?

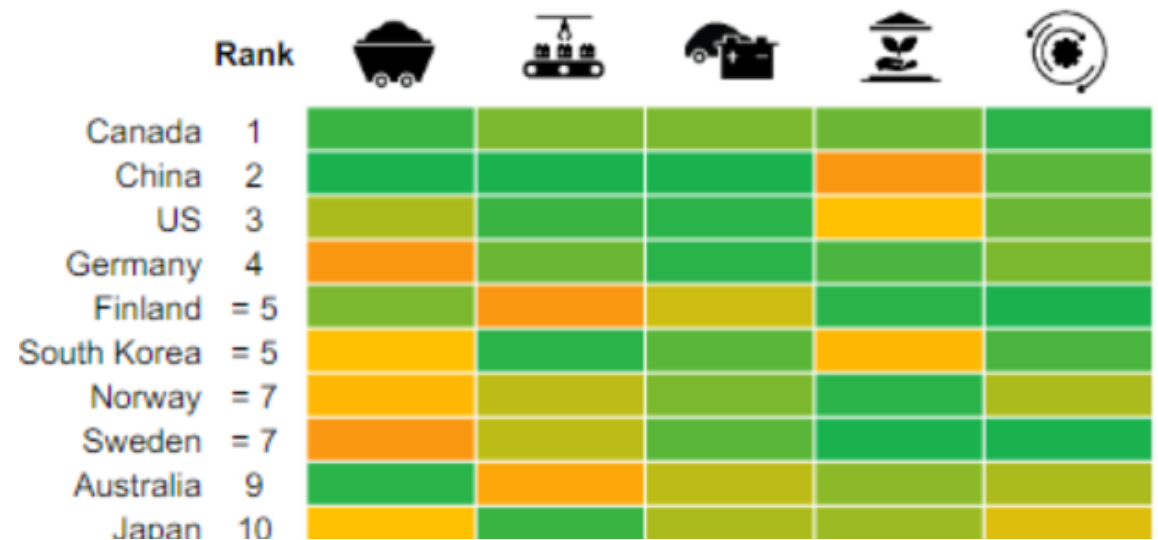
Untapped Potential

Advantage in raw materials supply, with plans for long-term growth in battery metals markets.

Access to a growing North American market

Ranked 2nd in the world in industry, infrastructure, and innovation, driven by leading trade, policy, and investment performance

BNEF Lithium-ion battery supply chain ranking



Canada's Strategic Position in the Battery Race

Critical Minerals Advantage

- Rich deposits of lithium, nickel, cobalt
- Established mining infrastructure
- Ethical sourcing guarantee

Clean Energy Leadership

- 82% non-emitting electricity
- Low carbon advantage for manufacturing
- Growing renewable capacity

Strategic Location

- Integrated auto sector with US
- IRA advantages for allies
- Access to growing NA market

Innovation Ecosystem

- 40+ years of battery innovation
- Leading research institutions
- Ranked 2nd globally in innovation

A Firm Foundation

A growing list of

- Automakers
- Parts Manufacturers
- Battery Manufacturers
- Mining Companies
- Start-ups

Batteries

B.C.'s Nano One buys \$10.25-million cathode active material facility in Quebec, inks deal with BASF for battery development

Automakers

Fiat Chrysler and Unifor announce \$1.5-billion investment to build EVs in Windsor

Automakers

GM's new electric delivery vans will be made in Canada

Automakers

Tesla Canada sets up plant in Markham, Ont., to produce battery-making equipment for its gigafactories

Northvolt reaches deal with Quebec and Ottawa to build a \$7-billion battery cell factory

Automakers

Ontario, federal governments confirm \$518 million in support for GM Canada's \$2.3-billion factory retooling

first large-scale EV battery cell manufacturing plant

Britishvolt reveals plans for 60GWh Canadian battery cell factory, cathode and anode production and R&D centre

Batteries

Umicore to build \$1.5-billion electric vehicle battery materials factory in Ontario

Batteries

Stellantis, LG Energy Solution bringing \$5-billion battery factory to Windsor

Automakers

VW, Mercedes sign MOUs with Canada to secure battery minerals supply, hint at more value-added news to come

Automakers

Updated: Ford and Unifor agree on \$2-billion plan to build five EV models in Oakville

Automakers

GM's BrightDrop announces second electric delivery van to be manufactured in Canada

Automakers

Demers and Lion Electric unveil state-of-the-art electric ambulance

Automakers

Magna International to expand Ontario operations to make battery enclosures for Ford F-150 Lightning

Automakers

Ontario, federal governments confirm \$518 million in support for GM Canada's \$2.3-billion factory retooling

Batteries

Quebec project to be North America's first lithium spodumene producer after \$98-million restart

Batteries, Exclusive

GM, Posco to build \$500-million Canadian cathode active material factory in Quebec to supply Ultium battery factories



Charting a Path to Success



2035 Vision

Canada is a global leader in:

- **Clean, innovative battery technology**
- **Canada is a hub for sustainable battery production in North America**





The Battery Technological Frontier

Where is the Puck Going?

Innovation Drivers



Innovation Metrics



Targets



Enabling Technology





12 Innovation Drivers – Snapshot

Market

- Vehicle Range
- Space efficiency
- Charging Convenience
- Climate Adaptability
- Longevity/Durability
- Affordability
- Safety

Environmental

- Eco-Friendly Materials
- Recyclability
- Carbon footprint
- Second life Adaptability

Geopolitical

- Reduction in the Use of Conflict Minerals



Market Drivers

Drivers	Applications	Innovation Metric
Range	Transportation	Energy Density (Wh/kg)
Space efficiency	Electronics/Storage	
Charging Convenience	Transportation/Electronics/	Charging Time (minutes to full charge)
Climate Adaptability	All Markets	Low temp performance (operational efficiency at low temperatures)
Longevity/Durability	All Markets	Cycle life (number of charge/discharge cycles with <20% fade)
Affordability	All Markets	Cost per kWh
Safety	All Markets	Incident Rate



Innovation Metrics – Energy Density

Metric	Goals
Energy Density (Wh/kg)	Varies by application: EVs (>350), Consumer Electronics (600-700), Energy Storage (200-250)
Enabling Technologies	
Battery Chemistry	<ul style="list-style-type: none">• Solid-State Batteries• Lithium-Sulfur (Li-S) Batteries• Metal-Air Batteries
Improved Process	<ul style="list-style-type: none">• Advanced Electrode Materials: Using materials like silicon or graphene in electrode• Nanotechnology: The application of nanostructures in battery electrodes• Enhanced Electrolyte Formulations
Battery Management System	<ul style="list-style-type: none">• Advanced Charging Algorithms• Thermal Management

50 actions across 5 actions area

2024-2026	2026-2030	2030-2035	Goal(s)
-----------	-----------	-----------	---------





Key Findings

Untapped Potential: Canada has significant strengths in raw materials and research capabilities within the battery supply chain.

Current Gaps: Challenges exist in scaling up innovative firms, providing continuous financial support, and retaining high-value assets within Canada.

Strategic Coordination: A coordinated approach involving government, industry, and academia is essential for success.



Next Steps: Establishing a National Battery Alliance

The immediate priority is to establish the National Battery Alliance, a central coordinating body **essential for implementing this roadmap**. This alliance will unite key players from government, industry, and academia to drive the realization of our vision.

Strategic Coordination: Align efforts across the battery value chain.

Policy Advocacy: Champion supportive policies and regulations. » **Innovation Catalyst:** Foster collaboration in research and development.

Skills Development: Coordinate training and education initiatives.

Investment Attraction: Promote Canada as a destination for battery investments.

International Partnerships: Facilitate global collaborations and knowledge exchange.