Sourced Economics

Critical Raw Material Demand Outlook for Low-Carbon Technologies

A Comprehensive Framework | Prepared by Sourced Economics

Solving supply bottlenecks is crucial in the transition to low-carbon production methods.

High Volatility in Demand: Demand for low-carbon technologies, such as EVs, rose exponentially in the early 2020s and has since been noisy. Greater flexibility and, ultimately, increases in the production capacities for materials like lithium and cobalt are required.

Geopolitical and Logistical Vulnerabilities: Raw materials supply chains face significant risks arising from geopolitical tensions, trade conflicts, and natural disasters. Key nations like China, Japan, and South Korea, which dominate downstream battery chemical and cell manufacturing, are particularly vulnerable to supply disruptions due to regional instabilities.

Market Failures and Regulatory Barriers: Structural impediments in resource sectors can obstruct responses to demand fluctuations. These barriers include prolonged development periods for new mining projects, strict environmental regulations, and financial limitations that stall expansions and new ventures.

The research literature to-date has yet to crack the case on this topic.

Transparency and Consistency Lapses

Many models lack clarity and consistency, complicating strategic decision-making.

Material Focus Limitations

Overemphasis on specific materials like lithium and cobalt overlooks broader supply chain interdependencies.

Co-Production Oversights

Models frequently fail to fully consider the dependencies in the supply of by-product materials.

Geographic Detail Shortfalls

Global studies often miss regional specifics, while regional studies might ignore global market interconnections.

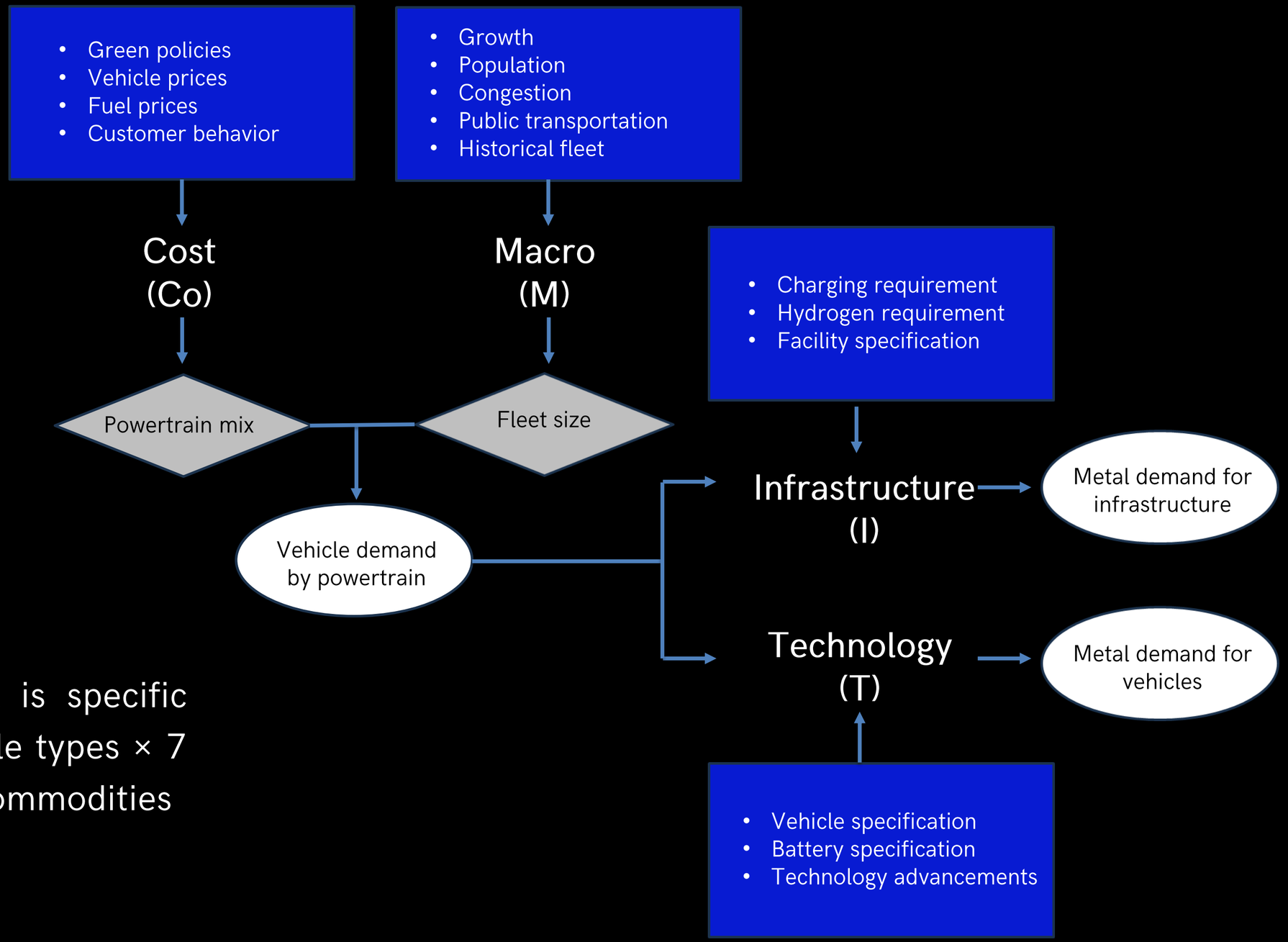
Competing Financial Resources

Studies sometimes ignores how financial competition across mining markets affects critical material availability.

Data and Scenario Limitations

Frequently does not disclose critical data and over-relies upon inflexible policy scenarios, leading to inaccurate forecasts.

The CoMIT Framework is the gold standard in this area.

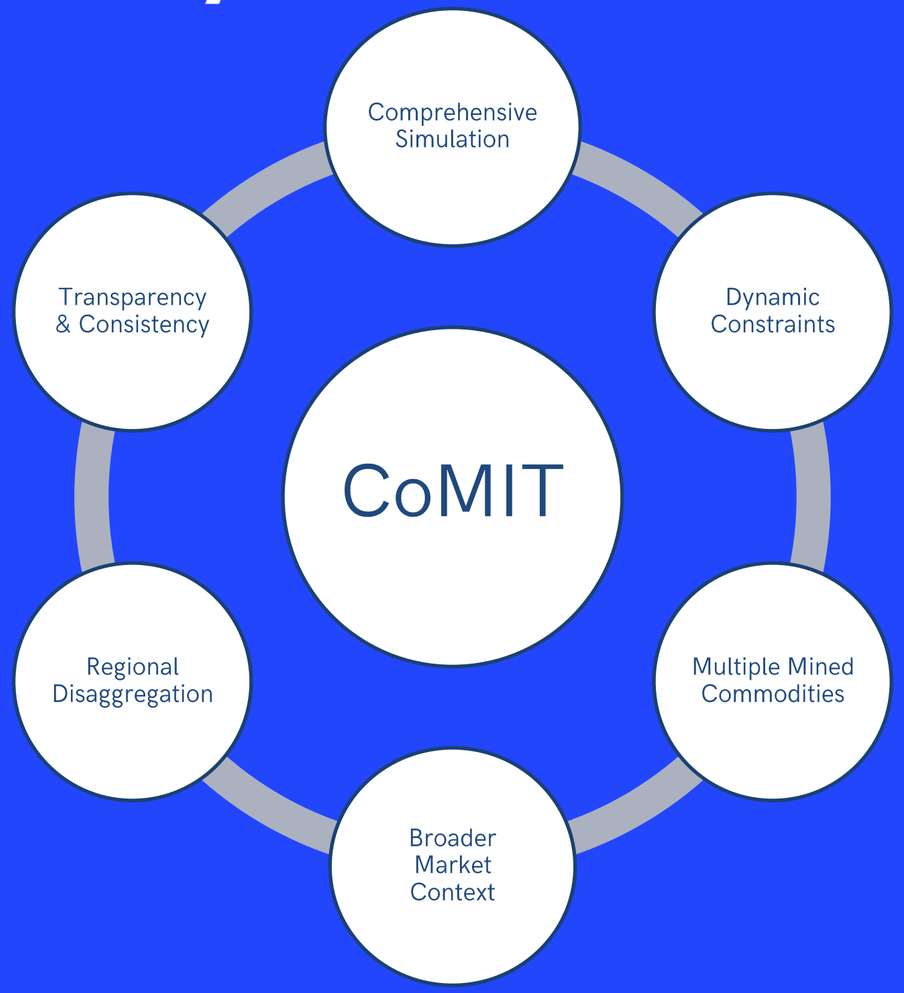


- The analytic framework is specific for 10 regions × 3 vehicle types × 7 powertrains × 8 mined commodities

The power of the CoMIT Framework stems from its comprehensiveness and dynamism.

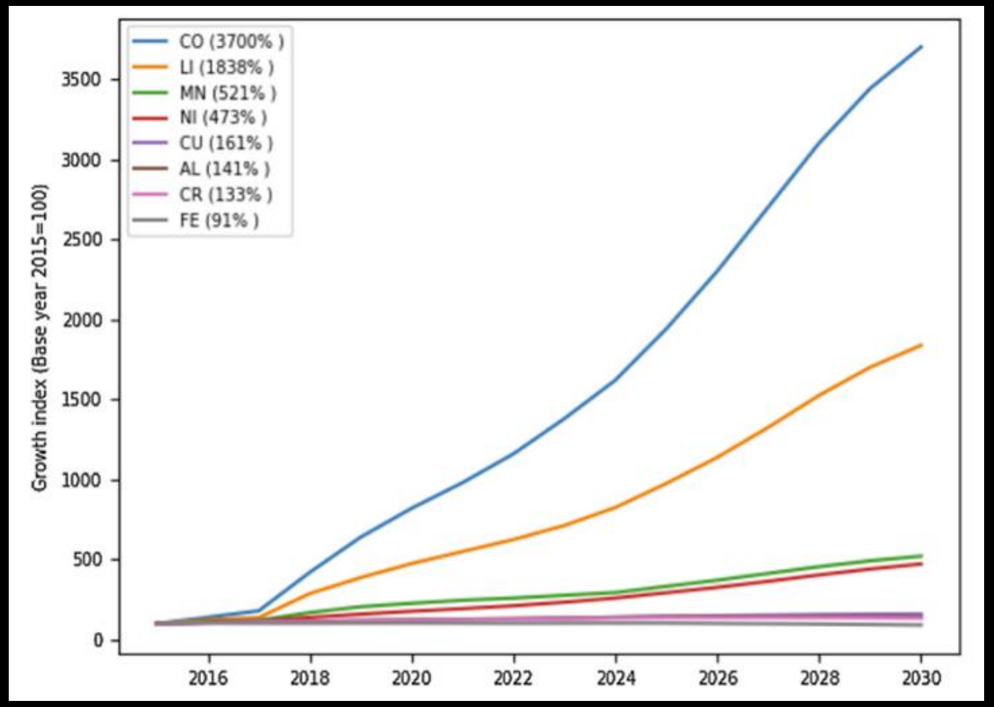
The strength of the CoMIT model lies in its ability to integrate a wide array of dynamic factors, from macroeconomic conditions to specific technological changes, making these results not only more reliable but also highly reflective to changing market conditions.

The adaptability of the CoMIT framework ensures that these estimates can be easily updated or customized according to the specific focus of analysis and evolving industry needs. This flexibility enhances its utility for stakeholders across various sectors by providing tailored insights that inform strategic decisions in the dynamic landscape of e-mobility and raw material markets.



Sample Result: Projected metal demand by 2030.

The Results of the Technology Module:

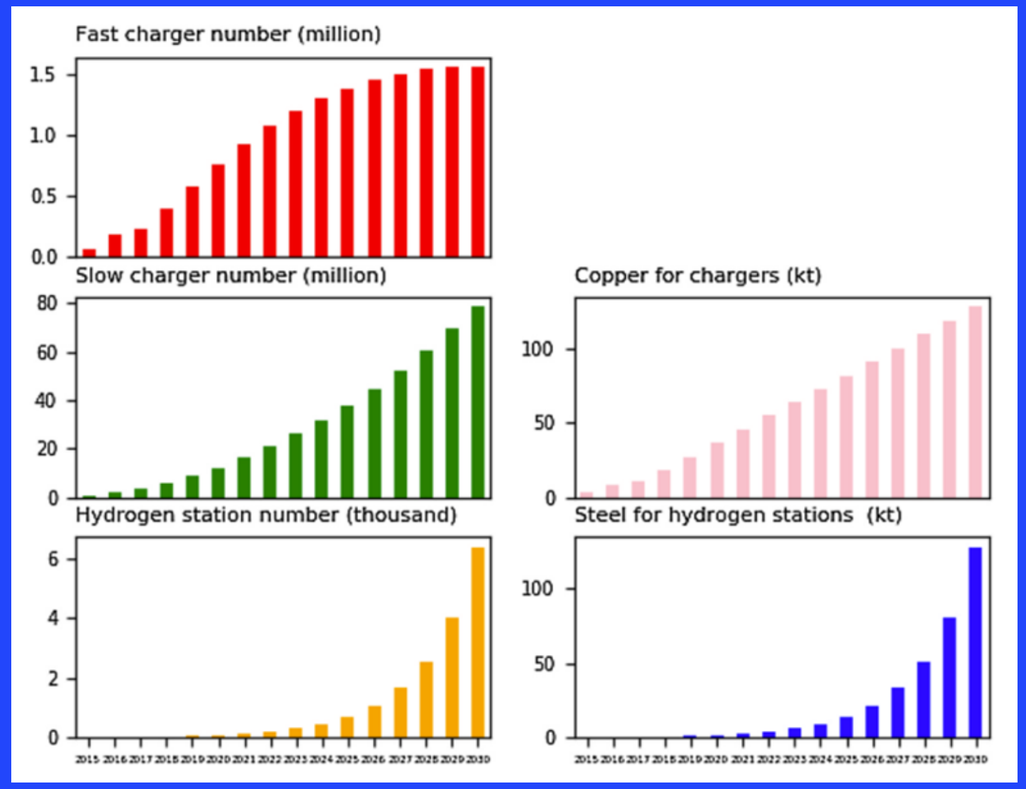


- **Steel**: 106.7 mt, decreasing by 9% despite vehicle sales increasing by 27.4%.
- **Aluminum**: 17.4 mt, increasing by 41% due to trends toward lighter vehicles.
- **Copper**: 3.3 mt, rising by over 50%, crucial for electric vehicle components.
- **Lithium**: 147 kt, expected to increase up to 18x.
- **Cobalt**: 185 kt, a 37-fold increase, with projections ranging from 91 kt (New Policies Scenario) to 263 kt (EV30@30 Scenario).
- **Manganese and Nickel**: Fivefold increase, essential for EV batteries.

Sample Result: Implied infrastructure demand for electric vehicles.

The Results of the Infrastructure Module:

- Rapid growth in charging infrastructure will be required to support a successful mass market roll out of EVs.
- Vehicle sales in 2030 translates into demand for approximately 78.5 million slow chargers, 167 million fast chargers and 6.4 thousand hydrogen stations.
- This level of infrastructure buildout implies a further annual demand of nearly 128.4 kt of copper.



The CoMIT offers broad applicability and customized forecasts for scenarios across detailed segments.

Sensitivity Analysis:

- Discount rate uncertainty
- Economic growth uncertainty
- Electrification of LDVs in China
- The role of technical progress

Variable	Segment	Robust Check
Fleet Size	LDVs	
	HDVs	
	BUS	
Annual Sales	ICE_P, ICE_D	√
	PHEV, HEV	√
	BEV, FCEV, PFCEV	√
Electrification Rates	North America	
	BRZ, CHN, CIS, IND, SEA, WTO…	
Metal Demand	Li, MN, NI	√
	CU, FE	√
	AL, CO, CR	√
Production and Reserves	2015-2030	√
Infrastructure Requirements	Chargers (fast vs. slow)	
	Hydrogen Station	

Applications and Insights

Volatile though net increasing demand for metals like lithium, cobalt, nickel, and aluminum, crucial for EV batteries and lightweight vehicle structures, presents both challenges and opportunities. This shift is especially important in markets such as lithium and cobalt, where even small demand increases have historically had large production and policy impacts. These industries face significant supply risks due to the geographic concentration of resources and general economic volatility, particularly for by-product metals like cobalt.

To remain competitive and in-line with sustainability targets, resource industries should prioritize investments in advanced recycling technologies and sustainable mining practices. Additionally, the strategic importance of securing stable and robust supply chains is crucial, especially in regions with high production concentration such as China.

Thank you!

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