MUNK SCHOOL CAPSTONE RESEARCH REPORT FOR ZIEMBA INSIGHTS

Global Critical Minerals Jurisdiction Policy Analysis

Comparative assessment of policy frameworks, capital deployment, and supply chain positioning across eight sovereign and six Canadian jurisdictions - as of March 2026.

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March 31, 2026

Introduction

Critical minerals have rapidly emerged as a defining strategic issue in today's global economy, driven by the dual imperatives of accelerating the energy transition and strengthening defense capabilities amid an increasingly volatile and uncertain geopolitical landscape. These materials are central inputs for clean energy technologies, from batteries to grid infrastructure, as well as for advanced military systems. All of which make their secure supply an increasingly national strategic matter. Against this backdrop, allied countries, including Canada, have elevated critical minerals to the level of strategic national interest, not only for their foundational role in shaping the next century's global economy, but also to counter China's dominance in the supply chain, reducing exposure to supply disruptions and price volatility. In doing so, countries are deploying an expanding suite of policies and public financing tools that are actively reshaping the market, shifting away from traditional models of comparative advantage toward a more interventionist paradigm characterized by subsidies, industrial policy, and supply chain security.

However, amid these high-level commitments, where governments have pledged hundreds of billions in capital, signed dozens of bilateral frameworks, and published competing national strategies, there remains a mismatch between the volume of announcements and the tangible development of projects and supply chains. The available public commentary on critical minerals consistently fails to distinguish between what governments have announced and what has actually reached the ground. It conflates policy envelopes with deployed capital, treats bilateral MOUs as equivalent to binding commercial commitments, and uses headline investment figures without accounting for the structural differences in capital quality across jurisdictions.

Therefore, this report seeks to provide a systematic, data-grounded assessment of where certain jurisdictions stand as of March 2026, what the data reveals about where the capital is flowing, whether genuine, new critical supply chains are being created, and most importantly, where current policy architectures are falling to move from announcement to actual materialization. To uncover this, the report has selected eight sovereign jurisdictions: Argentina, Australia, Canada, Chile, France, Germany, Japan, and the United States, and six Canadian provinces and one territory: British Columbia, Newfoundland and Labrador, the Northwest Territories, Ontario, Quebec, and Saskatchewan.

The eight sovereign jurisdictions were selected to consider different domestic geological, political, and economic contexts, representing a diverse full range of policy models currently in operation globally: demand-pull architectures (Japan, United States), endowment-led transition strategies (Australia, Canada, Chile), industrial champion models with no domestic mining (France, Germany), and pure liberalisation or rapid state-builder frameworks (Argentina, Saudi Arabia). Together they account for a significant portion of current government critical mineral capital deployment globally. Canada is a primary jurisdiction of focus for this report, hence 6 jurisdictions with significant mining sectors were chosen for analysis. Because provincial policy divergence within Canada is itself analytically significant, provinces with comparable geological endowment often produce dramatically different outcomes depending on the sophistication of their policy toolkit and whether they have a working thesis of value chain conversion.

Argentina

1. Overall Picture / Policy Landscape

1.1 The Strategic Logic

Argentina holds world-class lithium brine resources in its northern Lithium Triangle. It also possesses a large but still underdeveloped copper resource base in the Andes, particularly in San Juan province, alongside significant deposits of gold, silver, and potash. The Mining Investment Law (MIL, Law 24,196) has provided a functioning concession framework for over 30 years, and all 23 provinces have adhered to it.

What has historically suppressed investment is not the resource base but investor confidence. Eight sovereign defaults since independence, currency controls, inconsistent royalty and export duty regimes, and periodic nationalisation threats have kept actual investment well below what the geology would normally suggest. The Milei government's response is operationally aggressive: eliminate layers of state intervention, lock in fiscal conditions for 30 to 40 years, and signal through institutional design that policy commitments will hold across electoral cycles.

This approach has no public mining finance vehicle, no sovereign offtake, and no state equity participation at the federal level. It contrasts directly with Australia (which pairs fiscal certainty with sovereign capital deployment) and Chile (which pairs fiscal stability with state-led lithium partnership structures via CODELCO/SQM). Argentina's model is a pure supply-side liberalisation play, and its performance is almost entirely a function of whether private capital finds the economics viable.

1.2 The Federal Policy Architecture

Three federal instruments form the backbone of Argentina's critical minerals framework.

Mining Investment Law (Law 24,196, 1993). The 30-year cornerstone. Provides fiscal stability (tax freeze from feasibility study date), capital goods import duty exemptions, VAT deferral, accelerated depreciation, and an income tax deduction for environmental fund contributions. Establishes the 3% pithead royalty cap, a hard ceiling amended in 2024 (Law 27,743) to allow a 5% cap for post-RIGI projects in specific circumstances.

Incentive Regime for Large Investments / RIGI (Law 27,742, Title VII, 2024). Argentina's primary investment promotion regime. Provides a 25% flat income tax (vs. 35% standard), 7% dividend withholding declining to 3.5% after seven years, 0% import duties, 0% export duties after Year 2, unrestricted FX repatriation, accelerated depreciation, and unlimited loss carryforward. Operates through project-specific SPVs. Minimum investment: USD $200M (mining); USD $1B for the Long-Term Strategic Export Project (PEELP) tier, with a 30/40-year stability window. ICSID/ICC/PCA arbitration is available from Day 1 without exhausting domestic remedies.

Export Duty (Retenciones) Framework (Decree 793/2018). The 4.5% export duty on gold, copper, and lithium remains one of the most contested elements of Argentina’s mining regime. Companies with pre-2018 feasibility studies successfully challenged the measure, with Chamber I (March 2025) ruling that the decree violates the fiscal stability provisions of Law 24,196, marking a significant judicial precedent. For new projects, the RIGI framework provides a forward-looking resolution, eliminating export duties from Year 2 onward. However, the intervening period (2018–2025) has created a “litigation gap,” during which producing companies incurred material revenue losses.

1.3 The RIGI Architecture in Detail

The RIGI contains several features that distinguish it from comparable fiscal regimes:

Feature	Mechanism	Comparative Advantage
25% flat income tax	Applies to SPV; head office taxed normally	~28% reduction vs. 35% standard; better than MIL's 30-yr 35% freeze
0% export duty from Year 3	Replaces 4.5% retención permanently within 30-yr window	Eliminates core investor grievance; ~$22M/yr saving on a $500M revenue project

FX liberalisation	100% unrestricted repatriation for RIGI SPV	Eliminates Argentina's historic FX surrender requirement
Accelerated depreciation	Movables: 2yr; Infrastructure: 3yr; Mining rights: 5yr	Improves early-project cash flows in 10–15yr payback projects
Unlimited loss carry forward	No 5yr cap; perpetual within RIGI window	Critical for 5–10yr pre-production phases common in copper mega-projects
ICSID arbitration Day 1	No domestic remedy exhaustion required	Eliminates 5–10yr litigation delay before accessing international arbitration
PEELP tier (>$1B projects)	40-year window vs. 30yr standard	Designed for copper mega-projects (Vicuña $18B, El Pachón $9.5B, Taca Taca $3.6B)

1.4 The Provincial Layer

Argentina's federal structure means provincial governments are the primary concession-granting authorities and the first line of environmental permitting. The policy landscape varies significantly across provinces.

Jujuy: Requires an 8.5% mandatory equity stake via JEMSE (the provincial mining company) in all lithium projects. JEMSE borrows from project partners to fund its position, effectively a carried interest mechanism. It holds stakes in Olaroz (Allkem/Toyota) and Cauchari-Olaroz (EXAR/Ganfeng/Lithium Americas). Social licence risks persist around indigenous community conflicts in the Salinas Grandes region.

Catamarca: The most permissive major province for lithium. No mandatory state equity stake. Royalty revenues split 88% provincial / 12% municipal. Home to Fenix (Rio Tinto/formerly Arcadium), Hombre Muerto operations, and the MARA copper project.

San Juan: Home to the largest undeveloped copper projects in the Americas, Los Azules, Vicuña/Josemaría/Filo del Sol, El Pachón, and MARA. The provincial government uses an Infrastructure Compensation Program under which mining companies fund provincial infrastructure in exchange for expedited permits. San Juan accounts for more than 60% of RIGI copper project value.

Mendoza: Reversed a three-decade effective mining ban. The 2025 Royalties Law and Environmental Compensation Fund Bill passed in December 2025, the first new copper mine in Mendoza since 1997. The PSJ Cobre Mendocino project ($500M) is the inaugural investment. The legislation passed amid significant public protests.

La Rioja: The outlier. Attempted a Bolivian-style lithium nationalisation model, suspended existing concessions in 2022, and remains the only significant non-adhering RIGI province. Governor Quintela has blocked RIGI benefits, effectively quarantining La Rioja from the broader investment surge.

Salta: Home to Rincón (Rio Tinto, first RIGI mining approval), Taca Taca (First Quantum), and the Eramet Centenario-Ratones DLE plant (opened 2024, $850M). Generally permissive; no mandatory state lithium stake.

1.5 The International Agreements Network

Argentina's international framework is thinner than Australia's but strategically significant across several bilateral tracks.

United States: A 2024 MOU on Critical Minerals Cooperation was upgraded to a bilateral framework at the US Critical Minerals Ministerial in February 2026, one of 11 new bilateral frameworks announced. The framework explores price floor mechanisms and supply chain resilience, and positions Argentina within the FORGE

mechanism (successor to the Minerals Security Partnership). Strong Trump administration signals that Argentina is a priority partner in the Western Hemisphere.

European Union: The 2023 Strategic Partnership on Sustainable Raw Materials Value Chains makes Argentina the EU's top Latin American critical minerals MOU partner. The EU's projected 12x lithium demand increase by 2030 is the primary driver. Eramet's Centenario-Ratones DLE plant in Salta (2024) was a direct commercial outcome.

France: A 2025 MOU linked to Eramet's $850M investment exposure. France is the fifth-largest foreign investor in Argentina. The Orano uranium interest adds a secondary dimension to this still relatively recent agreement.

Germany: GIZ MinSus technical cooperation on lithium governance (2021), a capacity-building instrument focused on fiscal modelling, transfer pricing, and ESG standards across the lithium triangle provinces.

Chile: The 1997 Mining Integration Treaty (binding) is critical for copper mega-projects in San Juan that require Pacific port access (Josemaría/Filo del Sol/Vicuña). A project-by-project protocol framework manages cross-border permissions, customs, labour, and taxation.

Bilateral Investment Treaties (BITs): Argentina maintains approximately 50 BITs, with active treaties covering the US, Canada, UK, China, Germany, France, and Spain. RIGI largely supersedes these for qualifying projects by providing direct International Centre for Settlement of Investment Disputes (ICSID) access.

2. Program-by-Program Assessment

2.1 The RIGI — Overall Performance

The RIGI is Argentina's single dominant policy instrument. Every other element of the policy architecture is either subordinate to it, a predecessor to it, or a complement to it. Assessing the RIGI is, in practice, assessing Argentina's entire critical minerals industrial policy.

Pipeline metrics as of early 2026 are significant. The Rosario Stock Exchange reported RIGI applications totalling USD $33.9B, of which USD $15.7B (46.5%) had been approved across approximately 8 projects by late October 2025. Mining accounts for USD $21.95B (64.8%) of the total pipeline, with copper representing 73% of mining value and lithium approximately USD $4.67B. By March 2026, twelve RIGI mining projects had received approval, representing over USD $26B in committed investment. Mining has surpassed energy in total RIGI approval value.

Only one project has been rejected (valued at USD $273M), suggesting the approval process is functioning with reasonable throughput. The government has indicated it expects to extend the RIGI submission deadline (originally July 2026) by a year, given the depth of the copper project pipeline still in application preparation.

2.2 RIGI Mining Approvals — Project by Project

Rincón Lithium Project (Rio Tinto, Salta, USD $2.724B): The first mining RIGI approval, confirmed in May 2025 after a nine-month process, validating the entire framework. Rio Tinto acquired the Salar del Rincón asset for USD $825M in 2022 and chose DLE (Direct Lithium Extraction) technology, a lower-evaporation approach compared to traditional brine evaporation ponds. DLE at this scale (~3,000 tpa LCE in Phase 1, scaling to ~50,000 LCE/year) is novel globally. FX repatriation freedom was the decisive differentiator for Rio Tinto, whose CEO led the Argentina delegation in December 2025.

Hombre Muerto Oeste / VMOS (Galan Lithium / Lithium Argentina, Catamarca, USD $217M): The second mining RIGI approval demonstrates the framework's scalability to mid-size projects. Phase 1 targets 5,400 t/yr LCE. Its significance is partly normative: it showed that RIGI was not exclusively for mega-projects but accessible to junior and mid-tier developers.

Los Azules Copper Project (McEwen Copper / Rio Tinto / Stellantis / Nuton, San Juan, USD $2.672B): The most strategically significant RIGI approval for the copper supply chain. Los Azules is one of the largest undeveloped copper deposits in the Americas (36-year mine life). The investor base is notable: Stellantis invested USD $155M as an EV manufacturer seeking supply chain security, a demand-side anchor absent from Argentina's formal policy architecture. Nuton (Rio Tinto's hydrometallurgy venture) holds a stake for testing novel copper processing technology.

3. What Is Working / What Is Not Yet Working

What Is Working

The RIGI's FX liberalisation has resolved the single biggest historical barrier to large-scale mining investment in Argentina. Pre-RIGI, foreign investors were required to surrender a percentage of export proceeds to the central bank at the official exchange rate, creating an effective tax on production whose magnitude varied with the spread between official and parallel exchange rates. The RIGI's 100% repatriation right, locked in for 30 years within the SPV structure, eliminates this risk. Rio Tinto's CEO personally citing FX freedom as the decisive factor confirms that the instrument is addressing the right market failure.

The project pipeline is real and growing. USD $26B in approved mining projects across twelve RIGI approvals as of March 2026, with an estimated USD $33.9B in applications still being processed, represents a material reorientation of the global mining industry's attention toward Argentina. The copper project pipeline, dominated by San Juan, is particularly significant: it positions Argentina to become a major copper producer precisely when global electrification demand is expected to create a structural supply deficit in the 2030s.

The RIGI's legal architecture is more sophisticated than most comparable emerging market investment regimes. The combination of 30-year fiscal stability, project-specific SPVs, Day 1 ICSID access without domestic exhaustion, and explicit currency and arbitration guarantees addresses the full spectrum of investor concerns that have historically deterred large capital commitments in the country.

What Is Not Yet Working

The distinction between pipeline and production is critical and systematically understated in discussions of Argentina's progress. As of March 2026, Argentina has USD $26B+ in RIGI-approved mining projects but zero new commercial production from RIGI instruments. The first RIGI approval (Rincón, May 2025) had not broken ground on industrial-scale construction. Los Azules targets first production no earlier than the early 2030s. Vicuña and El Pachón are contingent on legislative and permitting processes that could take three to five years under optimistic assumptions. Argentina has successfully repositioned its investment narrative, but commercial production at scale is at least a decade away.

The sub-$200M project scale is structurally unserved. RIGI's USD $200M minimum investment threshold is explicitly designed for large-scale projects. Below that threshold, which covers the majority of Argentina's active exploration and early-development portfolio, no comparable federal instrument exists. The MIL provides baseline protections but not the enhanced fiscal package that larger projects receive through RIGI.

Provincial heterogeneity creates avoidable execution risk. Jujuy's mandatory 8.5% JEMSE equity stake has created friction in project timelines and complicates project finance structures by introducing a non-commercial counterparty. La Rioja's non-adherence to RIGI creates a jurisdiction within Argentina where the federal framework effectively does not apply. These provincial divergences are not resolvable through federal policy instruments.

4. Core Findings

4.1 The Model Is Architecturally Coherent but Structurally Dependent on Market Conditions

The RIGI is a well-designed supply-side liberalisation instrument. The combination of tax rate, FX freedom, import exemptions, and arbitration access represents a generous investment package. But it deploys no public capital, offers no sovereign offtake, and has no state industrial strategy beyond attracting private investment. This is ideologically consistent with the Milei framework but creates structural gaps where market incentives are insufficient, at the sub-$200M project scale, or in novel processing pathways where first-mover risk exceeds private capital's appetite.

4.2 The RIGI Is Working as a Signal but Has Not Yet Delivered Production

As of March 2026, Argentina has USD $26B+ in RIGI-approved mining projects. The only new lithium production that has come online since 2024 is from projects financed under pre-RIGI instruments (Caucharí-Olaroz, Centenario-Ratones). Argentina has successfully repositioned its investment narrative, but it is at least a decade from the production volumes its forecasts project.

4.3 The Glacier Law Is the Single Most Consequential Binary Risk

Of all the policy decisions tracked across this study, the Argentine Glacier Law reform vote in the Chamber of Deputies carries the highest consequence for the global copper supply chain. Vicuña ($18B) and El Pachón ($9.5B) alone represent more committed copper investment than most countries' entire mining pipelines. Together with MARA, they could make Argentina the world's third- or fourth-largest copper producer by the mid-2030s, at precisely the moment global copper demand for electrification is expected to create a structural supply deficit. If the Chamber fails to pass the reform, these projects face five-to-ten-year delays at minimum, the RIGI's value proposition for copper investors is materially damaged, and global copper supply security is weakened. The reform passed the Senate 40-31. The Chamber vote outcome was uncertain as of March 2026.

4.4 Argentina's Geopolitical Non-Alignment Is Both an Asset and a Liability

Argentina's refusal to screen foreign investment for nationality, maintaining an open door to Chinese capital alongside Western allies, has been commercially rational. Ganfeng's participation in Argentine lithium projects has provided financing and offtake that Western banks were unwilling to provide at equivalent cost. Shandong Gold's RIGI approval suggests the same logic applies in gold. But as the US deepens its bilateral framework and allied-nation investors increasingly impose ESG and national security standards inconsistent with Chinese state owned enterprise participation, Argentina will face growing pressure to choose sides. The February 2026 US Ministerial framework is the first institutionalised expression of this pressure. Maintaining engagement with both the US and China simultaneously, while seeking US EXIM Bank participation in large copper projects, will become progressively harder.

4.5 The Model's Durability Depends on Political Continuity

Australia's fiscal stability is backed by institutional consensus across multiple governments and sovereign capital deployment. Chile's lithium framework is embedded in constitutional arrangements and CODELCO's long-term position. Canada's investment promotion is implemented through arms-length crown corporations with multi-year mandates. Argentina's stability rests on a 30-year statutory guarantee, the RIGI's fiscal lock, that has never been tested across a change of government. Milei's November 2023 election created the policy environment. The next presidential election is in 2027. If a Peronist or centre-left government wins, the RIGI's constitutional status (it is statute law, not constitutional, and can be amended by simple majority) means that the guarantee is only as durable as the coalition that enacted it. Investors in the large copper projects, with 30-40 year mine lives, are making a bet not just on Argentine geology but on Argentine institutional stability across multiple electoral cycles.

Australia

1. Overall Picture / Policy Landscape

1.1 The Strategic Logic

Australia's critical minerals policy rests on a clearly articulated strategic premise: that the country's geological endowment, the largest per-capita reserve base of battery and energy transition minerals among allied nations, can be leveraged not merely as a commodity export story, but as a geopolitical asset capable of anchoring long-term supply chain relationships with democratic partners. This logic crystallised after China's 2021 export restriction threats, accelerated following Beijing's July 2023 gallium and germanium export bans, and reached a new level of urgency after China's April 2025 rare earth export suspension. Each Chinese escalation has functioned as a demand signal to Canberra, validating the investment case for a more interventionist industrial policy.

The resulting architecture is multi-layered and covers the full supply chain from exploration geoscience through to international trade facilitation. It is also explicitly federated: the federal government provides the financing, tax, and diplomatic scaffolding, while individual states have each developed complementary strategies focused on project approvals, royalty concessions, and downstream processing attraction.

1.2 The Federal Financing Stack

At the federal level, five principal financial instruments form an integrated capital stack.

Critical Minerals Facility (CMF) — Export Finance Australia: AUD $4B concessional and commercial sovereign lending facility for strategically significant projects unable to access private capital. Originally AUD $2B (2021), expanded to AUD $4B in October 2023. The CMF is the workhorse of the stack and has produced the largest individual sovereign commitments.

Northern Australia Infrastructure Facility (NAIF): Includes an AUD $500M earmark for critical minerals–enabling infrastructure within its broader mandate. Total NAIF commitments to relevant projects exceed this sub-allocation, with approximately AUD $655M already committed and a further AUD $900M+ pipeline under assessment.

National Reconstruction Fund (NRF): AUD $15B total fund with AUD $1B ring-fenced for value-add in resources and AUD $3B for renewables and low-emissions technologies. The NRF deploys debt, equity, and guarantees, the only instrument in the federal stack capable of taking equity positions in operating companies.

Critical Minerals Production Tax Incentive (CMPTI): AUD $7B commitment providing a 10% refundable tax credit on eligible direct processing and refining costs, available for up to 10 years per project between 2027-28 and 2039-40. Covers all 31 designated critical minerals and is available to both Australian and foreign entities.

Critical Minerals Strategic Reserve (CMSR): AUD $1.2B announced in the 2025-26 federal budget. Targets operational readiness in H2 2026. Deploys national offtake agreements and selective stockpiling of processed minerals, with price floor mechanisms under design.

1.3 Supporting Instruments

Beyond the core capital stack, Australia has deployed a set of supporting tools:

Program	Type	AUD Envelope	Key Function
Resourcing Australia's Prosperity	Geoscience/Grant	AUD $566M	Geological mapping; pre-competitive data; Landsat Next satellite

Critical Minerals Development Program	Grant	AUD $100M	Early/mid-stage project de-risking
Critical Minerals Productivity Initiative	Feasibility Co-funding	AUD $10M	Common-user infrastructure pre-feasibility
Int'l Partnerships in Critical Minerals (IPCM)	Grant	AUD $40M	Allied-nation supply chain co-investment
Critical Minerals R&D Hub (Geoscience AU/CSIRO)	R&D Grant	AUD $50.5M	Processing/refining technical challenges
Critical Metals for Critical Industries CRC	CRC Co-investment	AUD $53M	62-partner consortium; AUD $185M co-investment
Critical Minerals Trade Enhancement Initiative	Trade Facilitation	AUD $6M	Offtake and investment negotiation support
Major Projects Facilitation Agency (MPFA)	Regulatory	N/A	Navigation of federal approvals for projects >AUD $20M
Foreign Interference Capability Program	Pilot/Awareness	AUD $1M	CFIUS-equivalent coordination with US

1.4 The State Layer

Australia's federated structure means that state governments have developed parallel strategies that are in some cases highly complementary to federal instruments. The four most active states each bring distinct industrial geographies.

Western Australia (WA): The Battery and Critical Minerals Strategy 2024-2030 commits AUD $36.4M to accelerate project approvals and offers royalty concessions. WA is home to the Pilbara lithium belt (Pilbara Minerals, Liontown), the world's highest-grade rare earth deposit (Mount Weld/Lynas), and the Alcoa-Sojitz-JOGMEC gallium refinery. The state's resource endowment makes it the geographic anchor of Australian critical minerals output.

New South Wales: The Critical Minerals and High-Tech Metals Strategy 2024-2035 targets AUD $7.6B in capital investment and 7,300 jobs. Its flagship instrument, the Critical Minerals Royalty Deferral Scheme (from July 2025, AUD $250M total envelope), defers royalties for projects under AUD $5B market cap in their critical early production years.

Queensland: The Critical Minerals Strategy channels AUD $51M toward faster project approvals and downstream investment at Gladstone, with state-level support for the Alpha HPA high-purity alumina plant.

Northern Territory (NT): The NT strategy has focused on regulatory facilitation for the Arafura Nolans REE project, Australia's most advanced integrated ore-to-oxide rare earth mine and refinery, including infrastructure coordination for the remote Alice Springs logistics corridor.

1.5 The Bilateral Partnership Network

Australia has constructed a dense bilateral partnership web that functions as both a demand-side guarantee mechanism and a geopolitical risk hedge. As of March 2026, the network spans:

United States (most advanced): The October 2025 Framework for Securing Supply commits at least USD $1B in financing per country toward an AUD $8.5B pipeline. It coordinates investment screening, advances a gallium refinery (2026 production target), and links to AUKUS defence minerals. The US EXIM Bank has issued 7 letters of interest totalling AUD $2.2B and co-issued an AUD $600M facility with EFA to Tronox.

Canada (fastest-growing): Significant developments in four months (November 2025 to March 2026). The Carney visit Joint Statement (March 2026) commits IFM to an AUD $10B Canada investment over 10 years, launches a Mining Skills Exchange Pilot, aligns the CMSR with Canada's Critical Minerals Sovereign Fund, and formally enters Australia into the G7 Critical Minerals Production Alliance.

Japan (deepest commercial outcomes): The Japan-Australia Critical Minerals Partnership (2022) has produced the most tangible commercial results of any bilateral: Alcoa-Sojitz-JOGMEC gallium refinery, Pilbara Minerals-Sumitomo lithium hydroxide JV, and Ardea-Sumitomo-Mitsubishi nickel JV.

European Union (CRMA-linked): The 2024 Strategic Partnership on Sustainable Critical and Strategic Minerals positions Australia to meet CRMA strategic project standards. Australia represented more than 10% of the first 47 CRMA Strategic Projects. The 2025 EIB Declaration of Intent opens a direct EIB lending pathway.

South Korea: China's Ga/Ge export bans (July 2023) accelerated urgency given Korea's ~80% lithium hydroxide and >90% precursor cathode dependence on China. The EFA-KEXIM Co-financing MOU (2023) enables co-lending between sovereign lenders.

India: The Australia-India Critical Minerals Investment Partnership (CMIP, 2022) has identified 5 projects (2 lithium, 3 cobalt). The ECTA (December 2022) eliminated Indian tariffs on Australian lithium, cobalt, and manganese exports. The March 2026 Carney visit created a triangular Australia-Canada-India structure.

Multilateral (MSP + G7 Alliance): Australia is a founding member of the Minerals Security Partnership (2022) and formally entered the G7 Critical Minerals Production Alliance on March 5, 2026, becoming the first non-G7 member to join this capital mobilisation vehicle.

2. Program-by-Program Assessment

Critical Minerals Facility (CMF) — Export Finance Australia

The CMF is the single most powerful tool in Australia's critical minerals arsenal. Originally established at AUD $2B in 2021 and expanded to AUD $4B in October 2023, it functions as a sovereign debt backstop for projects unable to attract sufficient private capital, most commonly because they sit at an early commercial stage, face technology risk, or lack committed offtake. Its most consequential commitments are the AUD $1.65B sovereign loan to Iluka Resources for the Eneabba REE refinery and the multi-instrument package for the Nolans mine-to-oxide facility (AUD $565M in financing). These two commitments together represent more sovereign capital in rare earth processing than any other non-Chinese government has committed to date.

3. What Is Working / What Is Not Yet Working

What Is Working

The bilateral partnership network is Australia's strongest policy instrument. The Japan-Australia partnership has produced commercially executed outcomes: the Alcoa-Sojitz-JOGMEC gallium refinery, the Pilbara Minerals-Sumitomo lithium hydroxide JV, and the Ardea-Sumitomo-Mitsubishi nickel JV are all operational or in advanced development. The US-Australia framework has produced EXIM Bank letters of interest covering AUD $2.2B in Australian projects within weeks of signing. The Canada-Australia developments have moved from a ministerial meeting to a concrete joint statement with named capital commitments in four months. This is the fastest-moving diplomatic capital mobilisation mechanism in the study.

The CMF is deploying at meaningful scale. AUD $1.65B to Eneabba and the multi-instrument Nolans package demonstrate a genuine willingness to take sovereign-scale risk on projects that the private sector is unwilling to

finance alone. The NRF's equity capability, used in Liontown and Alpha HPA, fills the gap that Japan's JOGMEC fills elsewhere.

The CMPTI creates a durable supply-side demand signal for processing investments. By offering a 10% refundable tax credit on eligible processing costs over 10 years, it reduces the levelized cost of production for any qualifying facility and makes Australian processing investments more competitive against Chinese alternatives on a post-tax basis.

What Is Not Yet Working

The most consequential processing investments are not yet operational. The Eneabba REE refinery (AUD $1.65B CMF commitment) is scheduled to open in 2026 but has not yet produced commercial output. Nolans mine-to-oxide is similarly on the cusp of construction but not yet producing. Australia is committed to being a processing nation; it has not yet proved it.

The demand-side architecture is incomplete. The CMPTI creates no domestic demand pull, it reduces the cost of producing for export but does not guarantee offtake. Processing investments depend on allied-nation offtake through the bilateral partnership network, which is politically durable but not contractually binding at the scale required. Australia lacks Japan's Battery Industry Strategy equivalent: a domestic demand anchor that makes midstream processing commercially rational and independent of export market conditions.

4. Core Findings

4.1 The Bilateral Network Is the Most Distinctive Structural Innovation

No comparable jurisdiction has built an equivalently dense, commercially active bilateral partnership network. The key design feature is that Australia has moved beyond government-to-government MOUs to create joint institutional mechanisms. The CMSR-Canada Sovereign Fund alignment, the EFA-EXIM co-issuance facility, and the EFA-KEXIM co-financing MOU each enable sovereign lenders from multiple countries to co-finance individual projects. This multilateral blended finance model is more durable than bilateral frameworks because it creates distributed stakeholder interests that are harder to unwind politically.

4.2 Australia's Supply-Push Model Is Exposed to Commodity Cycles

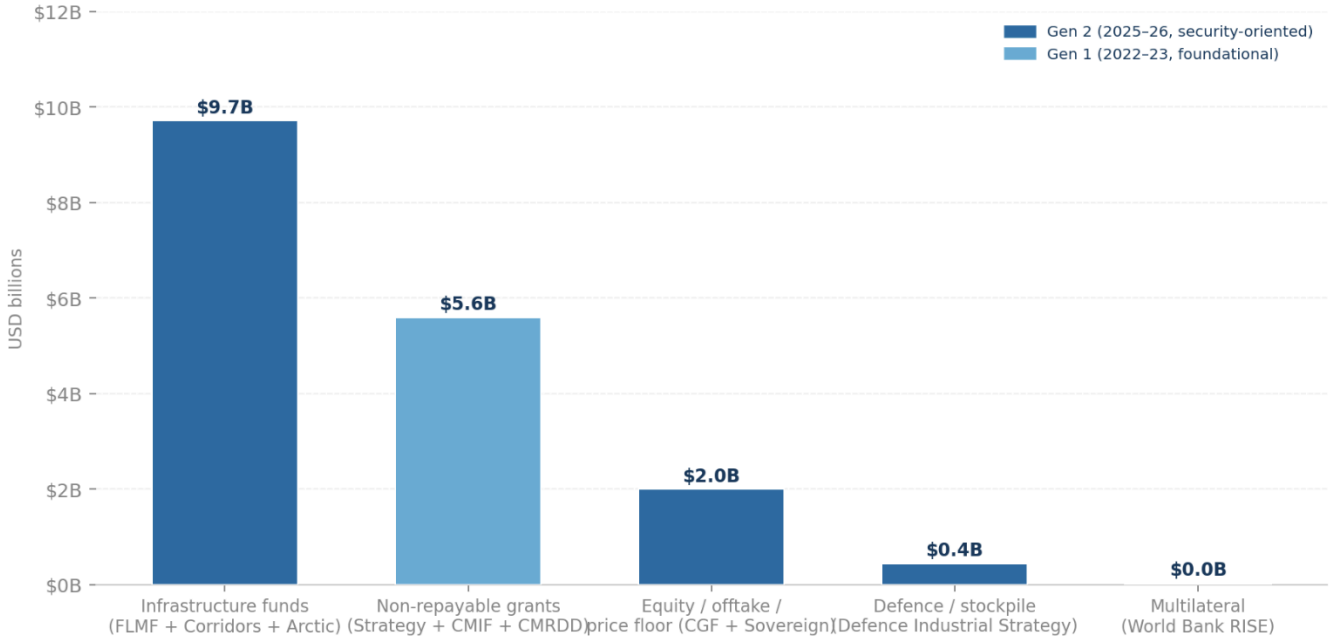
The lithium price collapse from USD $80K/tonne in 2022 to under $10K/tonne in early 2025 eroded the commercial rationale for multiple Australian lithium processing investments that had been structured assuming a sustained price environment. The CMPTI and CMF reduce cost of production but do not floor revenue. Without sovereign offtake agreements at sufficient scale, Australian processing investments remain exposed to the same commodity price cyclicality that has caused project delays and commercial failures in lithium across all jurisdictions. The CMSR, when operational, is designed to address this gap, but it has not yet been tested.

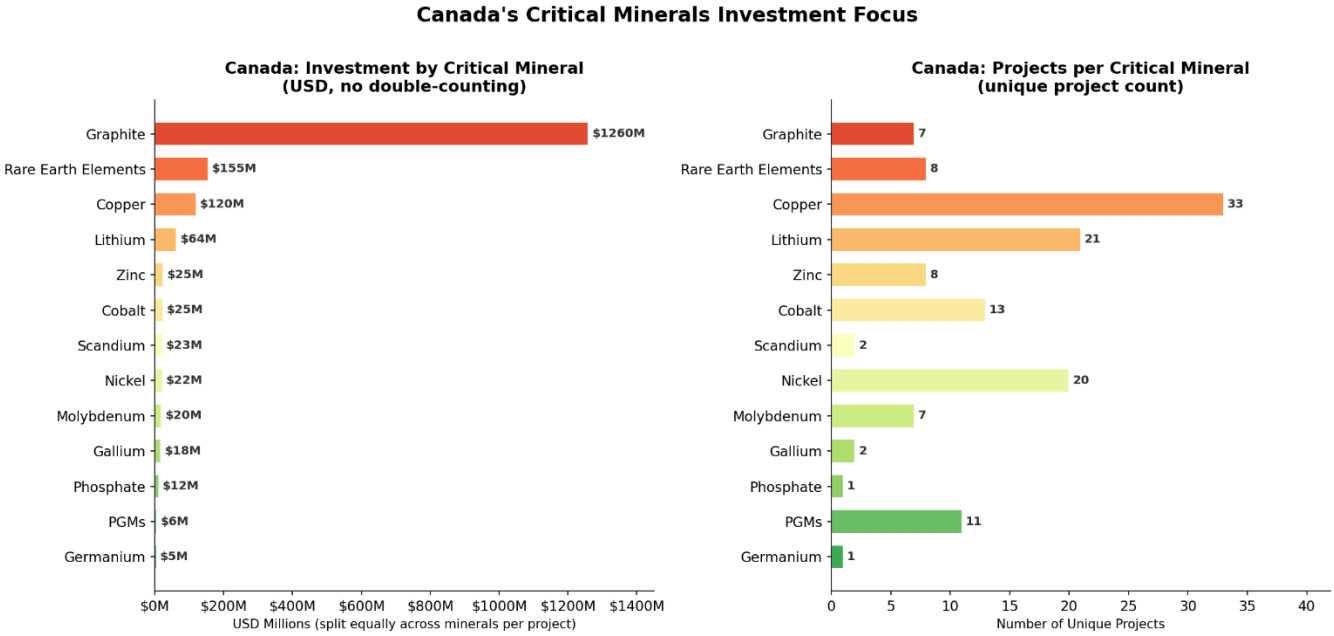
Canada — Federal

1. Overall Picture / Policy Landscape

Figure 7 | Instrument type evolution — grant-to-equity transition

Policy envelope by instrument category and generation (USD billions)





Investment split equally across all minerals per project. Each project counted once per mineral — no overlap. Mineral names standardized.

Canada's federal critical minerals strategy, launched in 2022 and significantly expanded through Budget 2025 and the Carney government's first months, deploys instruments across five supply chain functions. The first is enabling infrastructure, through the Critical Minerals Infrastructure Fund (CMIF) and its successor, the First and Last Mile Fund (FLMF). The second is commercial-stage de-risking, through the Canada Growth Fund (CGF), Export Development Canada (EDC), and the Canada Infrastructure Bank (CIB). The third is strategic market-making, through the Critical Minerals Sovereign Fund and the Critical Minerals Strategic Reserve alignment with Australia. The fourth is research, data, and technology, through the CMRDD program and the Critical Minerals Geoscience and Data (CMGD) initiative. The fifth is international and security-oriented tools, including the Global Partnerships Initiative (GPI), the Defence Industrial Strategy's critical minerals component, Defence Production Act designations, and Canada's leadership roles at the IEA and NATO.

Indigenous participation runs through all five categories as a cross-cutting design element. The CMIF includes a dedicated Indigenous Grants stream, with grants of up to $150,000 disbursed directly to First Nations and Métis organizations for capacity building, environmental guardian training, and community engagement. The explicit objective is enabling Indigenous communities to participate meaningfully in project development and regulatory processes, not simply to be consulted by proponents.

Geographically, the portfolio covers the full national territory, with funded projects in British Columbia, Ontario, Quebec, Saskatchewan, Alberta, the Northwest Territories, Yukon, Newfoundland and Labrador, and Manitoba. The concentration of activity in British Columbia and Ontario reflects those provinces' comparative advantage in copper, nickel, lithium, and graphite, while the emerging focus on northern and remote regions signals recognition that a significant share of Canada's undeveloped critical minerals endowment lies beyond existing infrastructure corridors.

2. Program-by-Program Assessment

Critical Minerals Infrastructure Fund (CMIF) / First and Last Mile Fund (FLMF)

The CMIF was the most operationally active program in the dataset, with over 30 funded or conditionally approved projects disbursing amounts ranging from under $110,000 to $75 million. Its logic is straightforward: many of Canada's most significant critical mineral deposits are stranded by the absence of roads, railways, power lines, or grid connections, and private developers cannot justify the capital cost of this enabling infrastructure given project-stage risk. The CMIF filled this gap by funding feasibility studies, environmental baselines, engineering designs, and in some cases actual construction of access roads and transmission lines.

The program's results are material at the project level. The Northwest B.C. Highway Corridor improvements ($75 million CAD) represent a systemic intervention benefiting multiple copper, molybdenum, nickel, cobalt, and zinc projects simultaneously. The Taltson Expansion in the Northwest Terrritories ($25 million) extends hydroelectric capacity into a region with multiple deposit types. The Yukon-British Columbia Grid Connect ($39.9 million) addresses a longstanding cross-jurisdictional infrastructure gap relevant to platinum group metals, tungsten, cobalt, and copper development. The FLMF, formally launched at PDAC in March 2026, absorbed the CMIF envelope and added $371.8 million in new Natural Resources Canada funding, bringing total infrastructure commitment to approximately $3.7 billion USD equivalent.

Canada Growth Fund (CGF)

Administered by PSP Investments with a $15 billion mandate, its critical minerals activity uses blended finance tools, equity, royalty investments, offtake agreements, and price floor mechanisms, to simultaneously provide capital and reduce offtake risk. The price floor mechanism is particularly significant: by guaranteeing a minimum price for a critical mineral over a multi-year period, the CGF reduces the revenue uncertainty that makes project financing difficult, without requiring the government to take operational control of the asset.

Documented deals include a $35.6 million equity investment in Nouveau Monde Graphite (plus an offtake and price floor), a $25 million royalty investment in Rio Tinto's scandium facility in Sorel-Tracy (plus an offtake, making it North America's sole commercial scandium supplier), a US$25 million equity investment in Cyclic Materials for rare earth recycling (announced at PDAC 2026), a commitment of up to US$85 million to the Thompson Nickel Complex, and $156 million to Foran Mining's McIlvenna Bay.

Export Development Canada (EDC)

EDC functions as the government's risk-tolerant lender of last resort for mining and processing projects, particularly where private lenders are deterred by technology risk, jurisdiction risk, or scale. Its most significant commitment is a letter of interest for up to US$500 million for Vianode's synthetic graphite facility in St. Thomas, Ontario, which, combined with a US$300 million German export credit guarantee and a CIB letter of interest, constitutes a multi-sovereign blended finance package of a type rarely assembled for a single facility. EDC is increasingly operating not just as a bilateral lender but as a co-financier within allied multilateral structures, stacking Canadian public capital with European export credit agencies and development finance institutions.

Canada Infrastructure Bank (CIB)

The CIB's critical minerals mandate was operationalized in June 2023 and significantly expanded through a $10 billion recapitalization in Budget 2025. Its co-financing role alongside EDC at Vianode and Strange Lake illustrates the model: the CIB takes infrastructure-adjacent exposure (transmission connections, processing plant support) while EDC takes the commercial project financing.

Global Partnerships Initiative (GPI)

The GPI is the primary vehicle through which Canada's critical minerals strategy is internationalized at the project level. Round 2 CMPA announcements in March 2026 reveal a consistent pattern: GPI contributions of $2.3 million to $36.5 million are paired with binding offtake agreements, technology MOUs, and co-investment commitments from allied-country firms. E3 Lithium's Clearwater DLE project received up to $36.5 million and brought in Axens (France), ABB (Switzerland), and Solvay (Belgium) as technology partners. Rio Tinto's gallium extraction R&D received up to $18.9 million alongside a collaboration with the Indium Corporation (United States). The GPI is functioning as a matchmaking and leverage tool: federal dollars unlock allied industrial partnerships that the government alone cannot create.

Tax Incentives: CTM ITC and CMETC

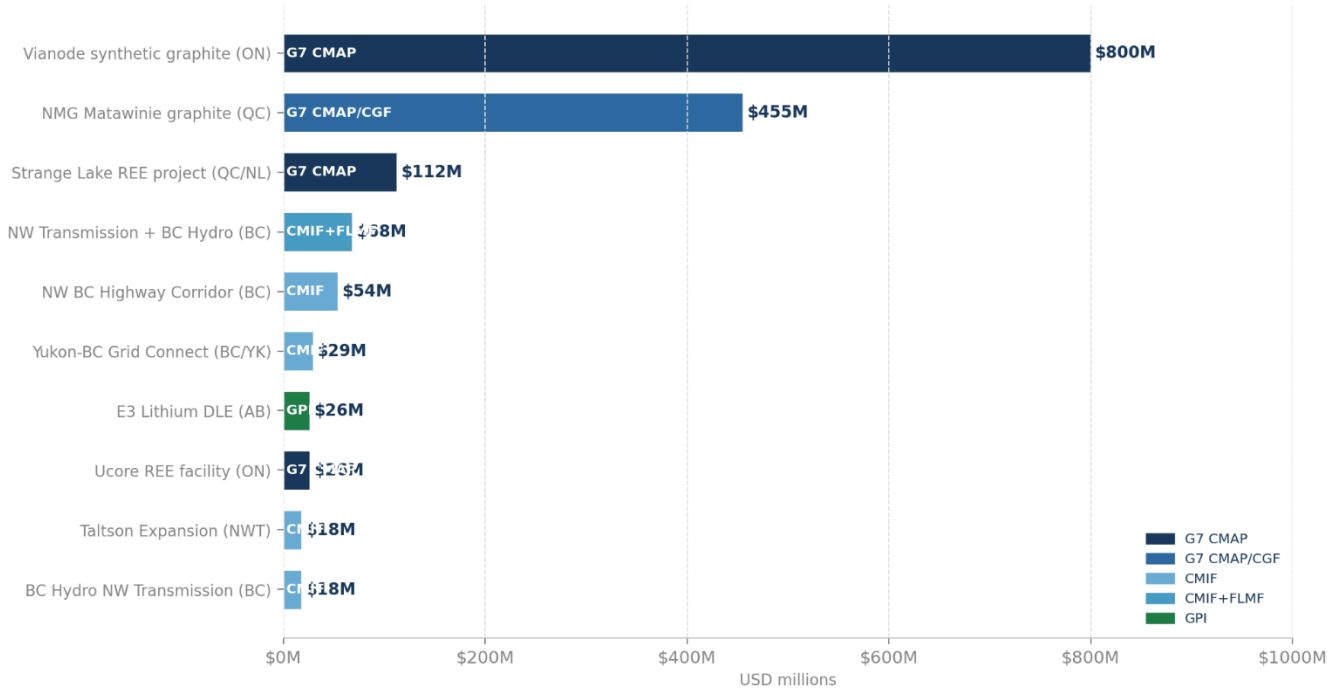
The 30% refundable Clean Technology Manufacturing ITC is the most powerful demand-side instrument in the fiscal toolkit. Its refundability is critical, it delivers the tax benefit as a cash payment to loss-making early-stage producers, not merely as an offset against profitable income, which most junior developers do not have. Budget 2025 expanded the eligible mineral list to include antimony, indium, gallium, germanium, and scandium, directly targeting minerals where allied supply chains have identified acute vulnerability. The CMETC, at 30% through the flow-through share regime, reduces effective exploration risk by socializing a portion of it with retail investors.

Defence Production Act and Defence Industrial Strategy

The October 2025 designation of graphite and scandium as national security priorities under the Defence Production Act authorized government stockpiling, offtake contracts, and supply guarantees. The February 2026 Defence Industrial Strategy added $443 million over five years for processing technology, allied co-investment in Canadian projects, and a national stockpiling mechanism. The significance is not primarily the dollar amount but the legal authority: Canada can now make supply guarantees to NATO defence industries backed by law, and can enter binding price and volume commitments with Canadian producers of designated minerals, creating a demand floor independent of commodity market cycles.

Figure 4 | Top 10 investments by dollar value

Colour indicates funding programme



3. What Is Working / What Is Not Yet Working

What Is Working

The infrastructure de-risking model is producing tangible results. The CMIF's track record demonstrates capital moving into the ground at a meaningful pace. The Northwest B.C. Corridor, Taltson, Yukon-BC Grid Connect, and the Ring of Fire access road cluster are all advancing regulatory and engineering processes that would otherwise be stalled. The FLMF's March 2026 launch with immediate project commitments signals institutional momentum rather than policy drift.

The blended finance architecture around CGF, EDC, and CIB is working at the level of deal structuring. The ability to stack equity, debt, offtake, price floor, and export credit instruments into a single transaction, as demonstrated at Vianode, NMG, Strange Lake, and Cyclic Materials, is sophisticated and represents genuine additionality: these transactions would likely not occur without the public finance component.

The allied co-investment model under the GPI is also delivering. The March 2026 CMPA Round 2 announcements show 30 new international partnerships mobilized alongside relatively modest federal contributions, with binding commercial commitments from firms in France, Germany, Belgium, Switzerland, Finland, Japan, South Korea, the United States, Italy, Estonia, and Denmark.

What Is Not Yet Working

Processing and refining capacity remains the most significant structural gap. Canada is still primarily a raw material exporter. The government has identified this gap and is funding demonstration and feasibility projects through the GPI and CMRDD, but the pipeline of projects at commercial scale in processing and refining is thin

relative to the upstream endowment. The gap between demonstration and commercial production in refining is where most projects historically stall, and Canada has not yet demonstrated a reliable mechanism for crossing it.

The Critical Minerals Sovereign Fund, announced in Budget 2025 at $2 billion over five years, had not officially launched as of March 2026. Energy Minister Hodgson confirmed at PDAC that the launch would occur in spring 2026. For a government that has correctly identified the need for strategic equity investment in Canadian critical minerals companies, a multi-month delay in launching the instrument designed to make those investments is a meaningful gap in the toolkit.

Regulatory timelines remain a source of friction. The Impact Assessment Agency's nominal deadlines are frequently extended, and multi-year assessment timelines for large mine developments remain longer than those in peer jurisdictions such as Australia. The "One Project, One Process" framework piloted in Ontario is a promising model for regulatory streamlining, but it is provincial rather than federal and has not yet been systematized nationally.

The "Mined in Canada" digital credential initiative, launched at RFI stage in February 2026, reflects an important recognition that traceability and ESG verification will be prerequisites for allied procurement, but it remains at the earliest stage of development. European battery regulation, the US Inflation Reduction Act's domestic content requirements, and proposed allied procurement policies all create demand for chain-of-custody documentation that Canada cannot yet systematically provide.

4. Core Findings

4.1 Completeness in Design Has Not Yet Translated to Completeness in Delivery

Canada has built a complete policy architecture, one that spans the full supply chain and deploys a more sophisticated range of instruments than most peer jurisdictions, but that completeness at the policy design level has not yet translated into completeness at the delivery level. The gap is most visible in midstream and downstream, where policy ambition is clear but operational proof points are limited.

4.2 The Allied Co-investment Model Is Canada's Distinctive Contribution

Canada's comparative advantage lies in its combination of political stability, ESG credibility, and a dense network of allied-nation relationships that have been converted into institutional co-investment mechanisms. The CGF's blended finance capability, the GPI's matchmaking function, and the EFA-EXIM-KEXIM co-financing arrangements represent a model that smaller allied nations cannot replicate and that larger ones have not systematized to the same degree. This is a genuine structural advantage, but it is a delivery vehicle in search of more pipeline.

France

1. Overall Picture / Policy Landscape

France's critical minerals strategy is built on established industrial champions rather than a greenfield national programme. The government deploys policy tools (i.e., France 2030 designation, CRMA strategic project status designations, BpiFrance co-investment, bilateral diplomatic frameworks) to support companies (i.e., Eramet, Orano, Solvay, Imerys, BRGM) that already have technical capabilities, international footprints, and industry relationships. This makes the model more durable than one dependent on a single new institution or programme, but also means it is bounded by what those companies are prepared to do commercially.

The CRMA-France 2030 layering is structurally coherent. The EU framework provides the political legitimacy and the binding targets; the national framework provides the financial instruments and the domestic permitting acceleration. Projects that qualify for both levels get meaningful advantages, faster permitting, access to public finance, EU strategic project status, while projects that qualify for neither still face the full set of legacy barriers. The risk is that the accelerated lane becomes crowded with a small number of high-profile projects while the broader pipeline remains thin and delayed.

Social acceptance is the binding constraint on domestic mining, and it is not solved by policy reform. The EMILI project, France's most strategically important domestic lithium project, required a 42-event public consultation process involving 3,600 participants, months of debate, and significant community conditions, despite having the highest possible level of political support. This structural feature will slow domestic extraction timelines regardless of regulatory reform or CRMA designation. The gap between France's processing ambitions (Solvay, Orano) and its extraction ambitions (EMILI, Ageli) reflects this asymmetry: brownfield processing expansions face far less social resistance than new mines.

2. Program-by-Program Assessment

Solvay La Rochelle REE Separation Facility: Commercial REE production for permanent magnets began in April 2025, making it the only significant non-Chinese REE separation facility in European operation at commercial scale. It is delivering against CRMA benchmarks in real time, the clearest operational success in France's portfolio.

Eramet Centenario-Ratones DLE Plant (Argentina): Operational and commercially proven since 2024. The plant validated DLE technology at scale, directly enabled the France-Argentina MOU, and provided the proof of concept for the domestic Ageli geothermal lithium project. It is the most consequential single French overseas minerals investment in recent years. No other country has a commercially operating DLE plant at equivalent scale.

Orano Georges Besse II Uranium Enrichment Expansion ($1.96B): Under construction with EIB financing in place, a clear strategic rationale, and no significant permitting or social acceptance obstacles. It remains on track.

EMILI Domestic Lithium Project: France's largest lithium project has cleared public consultation and holds all the right strategic designations, but the feasibility study is not due until early 2027, FID has not been taken, and the production start has already slipped from 2028 to an estimated 2030. Social acceptance remains the primary risk. EMILI is the centrepiece of France's domestic extraction ambition and has not yet been confirmed as a mine.

Ageli Geothermal Lithium Project (Eramet, Alsace): Contingent on an FID that has not been taken, on a technology that has been proven in Argentina but not yet in a European geothermal context, and on capex and commercial terms that have not been publicly disclosed.

BRGM Geological Inventory (5-year programme, launched February 2025): Will not produce actionable exploration targets in the near term. France's domestic mining pipeline beyond EMILI and Ageli is currently thin.

Ukraine Mineral Access Programme (BRGM + €200M aid fund): France's deployment of BRGM in Ukraine, combined with the €200M aid fund and the Trade Minister's Kyiv visit in February 2025, is a deliberate attempt to build a first-mover position in post-war reconstruction minerals access. Ukraine holds significant REE and critical mineral deposits in government-controlled territory. France is positioning itself, through geological data, institutional relationships, and financial instruments, to be the preferred European partner when reconstruction investment begins. This is a long-horizon play being executed with notable strategic patience.

3. What Is Working / What Is Not Yet Working

What Is Working

Solvay La Rochelle is France's clearest operational success: commercial REE production for permanent magnets is underway, making it the only significant non-Chinese REE separation facility in European operation. The institutional framework, DIRM, BRGM, France 2030 labelling, CRMA strategic project designation, is coherent and functional. France has the coordination architecture in place that many countries are still trying to build. The bilateral partnership network, with 15 partnerships and the integrated deployment of Eramet, Orano, Proparco, and BRGM, is generating real diplomatic and commercial relationships rather than just MOUs.

What Is Not Yet Working

EMILI is France's most important unproven bet. It has cleared public consultation and holds every strategic designation available, but the feasibility study is not complete, FID has not been taken, and the timeline has already slipped. Social acceptance remains the primary risk. Ageli is contingent on an FID that has not been taken and a technology that has not been proven at commercial scale in a European geothermal context. Beyond EMILI and Ageli, the domestic mining pipeline is very thin. The Mining Code reform has improved the regulatory environment in principle, but social acceptance, not procedure, is the real barrier for projects without exceptional political support.

4. Core Findings

France's model is best described as an industrial sovereignty framework built on established corporate champions. The CRMA-France 2030 layering is structurally elegant: the EU framework provides political legitimacy and binding targets; the national framework provides financial instruments and domestic permitting acceleration. Each reinforces the other. The Eramet DLE technology pathway is France's most distinctive global asset: Ageli is the domestic deployment of a globally significant technology, not just a French lithium project. If DLE becomes the dominant extraction technology for geothermal and salar brines, France holds a first-mover technology advantage that no other country controls at commercial scale. Ukraine is the most geopolitically interesting forward bet, a long-horizon play being executed with unusual strategic patience.

Germany

1. Overall Picture / Policy Landscape

Germany's investment portfolio clusters almost entirely around lithium and graphite, materials for EV batteries. This reflects the private sector pull of the German automotive OEM base (BMW, Volkswagen, Mercedes, Stellantis, Renault), for whom battery-grade lithium hydroxide at scale is the most acute short-term supply constraint. Germany has chosen to address its most critical industrial vulnerability first rather than distribute resources thinly across all critical minerals simultaneously.

Germany's tools (i.e., BMWK grants, Li4BAT, KfW Rohstofffonds) operate on a co-investment and reimbursement model tied to FID. Capital is committed only after a project has already secured private financing. This means Germany's instruments are effective at reducing the cost of capital for projects that have already cleared the private sector viability test, but they do not convert speculative or pre-feasibility projects into investment-ready ones. The KfW Rohstofffonds takes minority equity stakes (14% in Vulcan) after FID. The STARK Programme grants flow after construction commitments. Li4BAT disburses against eligible expenditure from October 2025, after projects reached FID in December 2025.

The CRMA creates an explicit published mineral hierarchy that Germany's instruments follow. The EU's two-tier classification, 17 strategic raw materials nested within 34 critical raw materials, formally distinguishes minerals by supply risk and strategic importance. KfW Rohstofffonds eligibility is explicitly gated to CRMA strategic materials. This means a uranium or potash project cannot access KfW equity, because uranium is a fuel and potash is not on the CRMA strategic list.

2. Program-by-Program Assessment

STARK Programme (BMWK), Structural Coal Region Transformation: Originally a post-coal transition fund, STARK has become one of the most active grant channels for critical minerals processing. Delivered €36M to AMG Lithium Bitterfeld (Europe's first operating battery-grade LiOH refinery) and €63.4M to cylib's Dormagen battery recycling facility. It is effective because it repurposes industrial land and workforce rather than building greenfield infrastructure, with lower political resistance and faster permitting.

AMG Lithium Bitterfeld: Opened September 18, 2024 as Europe's first industrial-scale battery-grade lithium hydroxide refinery. Producing at Module 1 capacity of 20,000 tpa, enough for approximately 500,000 EV batteries annually, with a five-module expansion planned to 100,000 tpa. STARK grant support produced a commercially operating facility rather than a perpetual pilot. This is the single most important factual contrast between Germany's and the United States' CM processing portfolios as of March 2026: Germany has a commercially operational battery-grade LiOH refinery; the US has none.

KfW Rohstofffonds: Takes minority equity stakes (i.e., 14% in Vulcan Lionheart) after FID. The equity-anchor model is more effective than a grant-only approach because it signals commercial confidence to private co-investors, reducing the blended cost of capital. Eligibility is gated to CRMA strategic materials, preventing the misallocation risk that broad-eligibility programs face.

Li4BAT (€204M federal + state grants to Vulcan Lionheart): A mineral-specific instrument. Eligibility is restricted to geothermal lithium extraction and processing infrastructure. It cannot fund graphite, rare earths, or cobalt projects. This level of specificity is closer to the US DoD DPA's project-by-project selection logic than to any broad envelope instrument.

CRMA Strategic Project Designation: Rock Tech Guben received designation in March 2025 and has continued construction through 2025 with CAPEX revised down 7% in October 2025, suggesting operational

decision-making is proceeding efficiently. The CRMA's 15-month processing permitting cap appears to be creating a more predictable regulatory environment for projects already in the pipeline.

3. What Is Working / What Is Not Yet Working

What Is Working

AMG Bitterfeld is the global proof of concept for battery-grade midstream processing at commercial scale. CRMA designation is working as a permitting instrument, with Rock Tech Guben continuing construction with no permitting delays cited as active blockers. The STARK programme demonstrates that targeted grant support in former coal regions can produce commercially operating facilities rather than perpetual pilots.

What Is Not Yet Working

The demand side remains entirely privatized and therefore fragile. Vulcan has automotive offtake negotiations (VW, Stellantis, Renault) without disclosed binding volumes; Rock Tech Guben has a Mercedes 10,000 tpa commitment covering only 42% of capacity; AMG Bitterfeld has customer qualification relationships without disclosed volumes. None of these reflects a government-backed offtake or a production incentive that floors revenue regardless of lithium spot price. The 2024–2025 lithium price collapse, battery-grade LiOH falling from over $80,000/tonne in 2022 to under $10,000/tonne by early 2025, directly weakened the business cases for all three midstream projects without any government instrument cushioning the impact. Rock Tech Guben's overall financing has not yet closed, and the lithium price environment is a cited factor.

4. Core Findings

Germany's strategy is a midstream-focused industrial policy: it has consciously deprioritized upstream extraction (Germany has essentially no commercially viable hard-rock mining at scale, with the exception of lithium in Saxony and the Upper Rhine Valley) in favour of processing, separation, and advanced manufacturing. Eight of the 13 policies cover midstream or downstream stages. Germany's strategy is to secure extraction internationally (bilateral partnerships, MSP, EU-US Critical Minerals Agreement) while investing domestically in processing. The CRMA-gated KfW eligibility prevents the misallocation risk that broader eligibility programs face. The central unresolved gap is the demand side: demand-side instruments (production tax credits, guaranteed offtake) need to accompany supply-side capital for midstream to be bankable commercially.

Japan

1. Overall Picture / Policy Landscape

Japan's critical minerals policy spans 21 programmes covering every stage of the supply chain, from overseas upstream exploration to domestic midstream processing, strategic stockpiling, urban mining recycling, downstream battery manufacturing, and a government-funded deep-sea domestic extraction programme. The architecture is not a collection of reactive grants; it is a self-reinforcing system where each layer protects and amplifies the others.

The central institution is JOGMEC, a sovereign investment agency combining equity investment (up to 75% of project costs), debt guarantees, technical assistance, and national stockpile management in a single body. Unlike Canada's CMIF or the provincial OJEP (grant programmes disbursing fixed amounts to many recipients), JOGMEC takes equity stakes and provides full lifecycle support across a 20+ year investment horizon. The 2021 amendment expanded its mandate to include smelting and carbon-neutral technologies.

Japan's capital deployment is dominated by large-scale instruments: GX Transition Bonds (¥3.67T actually issued), ESPA (~¥1T budget), and the Battery Industry Strategy (¥1T support pool). JOGMEC's project-specific investments directly target non-China supply chain nodes. Of 21 programmes, 8 have confirmed capital in market, 5 are committed and flowing, and 7 are coordination frameworks.

2. Program-by-Program Assessment

JOGMEC Global Portfolio (2004–2024, 100+ projects): Japan's primary CM instrument, with USD $600M–$1B+ in equity and debt guarantees deployed across 100+ overseas projects in 15 countries. The 2011 intervention to rescue Lynas, which now supplies 90% of Japan's Nd/Pr for EV magnets and has reduced China's share of Japan's REE imports from 85% (2009) to 58% (2020), is the most consequential single CM investment in the dataset, measured by strategic impact per dollar deployed.

National Rare Metal Stockpile (34 metals, 1983–present): A 60–180 day buffer stockpile running ~USD $670M+ cumulative. Has absorbed three major Chinese supply disruptions, 2010, 2023/24, and January 2025, without triggering economic crisis. The stockpile is what allows JOGMEC to make patient, long-duration upstream investments without supply security pressure forcing premature commercial decisions.

ESPA, Urban Mining and Processing Subsidies (2022): Up to 50% CAPEX/OPEX subsidy for domestic CM processing and EV battery recycling, from a ~USD $7B total budget with ~USD $1.5B allocated to CM. JX Metals, Sumitomo Metal Mining, and Mitsubishi Materials are all certified. Treats end-of-life EV batteries as a domestic ore body, reducing import dependency at the recycling stage without new overseas investment.

Battery Industry Strategy (2022, ¥1T support pool): ~USD $6.8B in grants and tax credits subsidising battery manufacturing capacity. Functions as the demand-pull mechanism for JOGMEC's upstream investments: government-backed offtake guarantees at the downstream stage make upstream mine investments commercially rational. Prime Planet Energy & Solutions (Toyota-Panasonic), Honda, and GS Yuasa are all expanding under it. This demand-pull architecture is Japan's most analytically distinctive policy design.

GX Economic Transition Bonds (Act No. 32, 2023): ¥3.67T (~USD $24.5B) actually issued in FY2023–25, the world's first sovereign transition bonds. Self-financing via mandatory GX-ETS from FY2026 and a carbon surcharge from FY2028. CM-linked share estimated at USD $3.7–$4.9B. This fiscal architecture does not depend on annual parliamentary appropriations.

JOGMEC–Lynas REE Investment (2011; 2023 heavy REE expansion): USD ~$384M total across two tranches. Lynas supplies 12% of global REE oxide and 90% of Japan's Nd/Pr for EV magnets. First Dy/Tb shipment arrived in October 2025. Private capital alone would not have kept Lynas solvent in 2011.

Caremag France Heavy REE Plant (Japan-France Declaration, May 2024): ~€110M committed (JOGMEC + Iwatani). Caremag's facility in Lacq, France will be the first non-Chinese Dy/Tb separation plant, with Japan securing ~20% of output. Dy and Tb are currently 100% China-sourced for Japan, Caremag is the direct fix. Operations targeted for 2026–27.

Deep-Sea SIP, Minamitorishima (2018–present): ¥56.4B+ (~USD $361M) spent or committed. The January 2026 Chikyu vessel test was the first attempt to extract REE-bearing mud from 6,000m depth. FY2025 supplementary budget added ¥16.4B targeting 2027 demonstration. Commercial target is ~2030. The deposit targets heavy REEs (Nd, Dy, Tb, Eu) and Co-rich crusts, precisely the materials subject to China's January 2025 export ban. No other jurisdiction treats deep-sea extraction as anything other than a research agenda.

JOGMEC–REAlloys MOU (North America, October 2024): JOGMEC's first formal engagement with a North American REE producer. Japan licenses REE separation and magnet-fabrication technology to REAlloys' vertically integrated chain, Saskatchewan mining to Saskatoon separation to Ohio magnets. Endorsed at the US-Japan Summit in October 2025. Financing under negotiation.

US–Japan CM Framework (October 27, 2025): The bilateral Rapid Response Group was activated in January 2026, within three months of signing. Joint JOGMEC + US DFC project financing is in development. It covers security, investment, stockpiling, and technology.

3. What Is Working / What Is Not Yet Working

What Is Working

JOGMEC's overseas portfolio has produced a consequential supply chain diversification outcome: Lynas is now the world's only major non-Chinese REE producer, supplying 90% of Japan's Nd/Pr. China's share of Japan's REE imports fell from 85% (2009) to 58% (2020), a directly attributable result of sustained state investment. The Rare Metal Stockpile has absorbed three major Chinese supply disruptions without triggering an economic crisis. The GX Transition Bonds provide a self-financing fiscal architecture that does not depend on annual parliamentary appropriations. The Vietnam REE Technology Transfer Center has operated for 12+ years, predating all Canadian provincial CM programs by over nine years.

What Is Not Yet Working

Caremag, the only planned non-Chinese Dy/Tb separation facility, is still under construction. Until it opens (targeted end-2026), Japan remains ~100% China-dependent for the heavy REEs critical to EV motors and defence magnets. The Canada–Japan MOC has catalysed C$14.7B+ in Japanese investment in Canadian CM and battery supply chains, but the largest single deal (Kami, C$245M) has DFS targeted end-2026 with SAMR clearance pending, but production is a decade away. Despite diversification efforts, China's share of Japan's REE imports crept back from 58% to 63% between 2020 and 2024, as market efficiency continuously pulls supply chains toward Chinese sources. Deep-sea mining remains commercially unproven at any scale.

4. Core Findings

4.1 The Build-Before-Crisis Model

Japan's most distinctive policy feature is its temporal logic: build supply chain infrastructure before crises arrive, then activate pre-positioned instruments when disruptions occur. The Rare Metal Security Strategy was codified

in July 2009, 14 months before China's October 2010 rare earth embargo, JOGMEC already had the authority and financing tools to support projects like Lynas. The Deep-Sea SIP was funded from 2018, with the Chikyu mission pre-announced in December 2025, ahead of China's January 2025 heavy REE export restrictions. The US-Japan framework was signed in October 2025, with a Rapid Response Group activated within three months when China escalated restrictions in January 2026. This model requires sustained institutional continuity across government transitions, a capacity that METI's institutional culture has consistently provided.

4.2 Demand-Pull Architecture Is Japan's Most Distinctive Design

Most CM programmes operate on a supply-push logic: they create financial subsidies for upstream or midstream, and wait for demand to materialise. Japan's Battery Industry Strategy operates on the inverse: government subsidises downstream battery manufacturing capacity first, creating a guaranteed demand signal that makes JOGMEC's upstream mine investments commercially rational. JOGMEC invests in Lynas because Toyota and Panasonic's factories will buy the magnets that require Lynas's neodymium. METI subsidises Caremag because Japan's defence sector and EV manufacturers will buy the dysprosium and terbium it separates. The supply chain logic runs from demand to supply, not the reverse.

4.3 Technology-for-Resources as Strategic Currency

Japan's REE separation and magnet-fabrication technology, built over 35 years of industrial investment, has become its primary strategic currency in CM diplomacy. The JOGMEC-REAlloys MOU, the Caremag joint venture, and the Vietnam REE Technology Transfer Center all follow the same model. Japan provides processing technology and patient co-investment capital; the partner provides upstream resources and a stable, non-Chinese jurisdiction. Japan's competitive advantage in CM policy is not geological endowment but technological capability accumulated over decades, a form of strategic capital that governments struggle to manufacture quickly.

Saudi Arabia

1. Overall Picture / Policy Landscape

Saudi Arabia's critical minerals model is supply-push, capital-intensive, and state-directed, with deliberate geopolitical neutrality as its defining characteristic. The government is building its critical minerals sector from near-zero at significant speed, using Vision 2030 political cover, PIF sovereign capital (via Manara Minerals), and a strategy of simultaneous engagement with both Western and Chinese partners to attract capital from both blocs. This dual-partner approach gives Saudi Arabia negotiating leverage that most other mineral-rich countries lack.

The geological survey investment was the right sequencing priority. The Saudi Geological Survey conducted airborne surveys across the full 600,000 km² of the Arabian Shield, expanding national geological database coverage from 1.7% in 2021 to 51% in 2024. As a direct result, the national mineral reserve estimate was upgraded from $1.3T (2016) to $2.5T (2024). Everything else in the framework, licensing reform, exploration incentives, investor attraction, depends on having credible geological data. The SGS programme is the infrastructure underpinning the entire strategy.

The gap between agreements and execution is the central risk. The Saudi model generates frameworks, MOUs, forums, and investment announcements with considerable speed. The harder test is whether the smelters get built on time, whether the REE refinery materialises, and whether the overseas equity pipeline moves beyond Vale. The next three to five years will determine whether Saudi Arabia becomes a genuine midstream mineral power or remains a well-capitalised upstream story with ambitious downstream aspirations.

2. Program-by-Program Assessment

Saudi Geological Survey, Geological Mapping Programme (2020): National geological database coverage expanded from 1.7% in 2021 to 51% in 2024. The national mineral reserve estimate was upgraded from $1.3T (2016) to $2.5T (2024). Cumulative exploration contracts reached $530M, with $300M spent in 2024 alone. Considered among the most consequential programmes in its framework because without geological data, neither the licensing reform nor the exploration incentives would function.

Nuthree Exploration Incubator / Mining Fund (2022): The SR685M ($182M) 2024 tranche reduces financial risk for early-stage exploration companies. Results are directionally positive: exploration spending surged 32% annually, licensed explorer count rose sharply, and 30 proposals were submitted for the largest-ever Saudi mining tender in 2024.

Comprehensive Mining Strategy / Vision 2030 Mining Pillar (2020): Strategic umbrella with a $100B investment mobilisation target by 2035. As of January 2025, ~USD$20B had already been committed. GDP contribution from mining is targeted to grow from USD$17B (2024) to USD$75B (2030). At this stage, the strategy is well-funded and structurally coherent, but the 2030 GDP target remains aspirational, and the processing infrastructure is still being built.

Global Supply Chain Resilience Initiative, Domestic Smelting (2024): A USD$9.3B commitment to copper and zinc smelters, the largest single disclosed domestic processing investment in the dataset. Saudi Arabia currently imports approximately 365,000 tonnes of copper per year, with demand projected to double by 2035. The Vedanta partnership covers copper; Zijin Mining covers zinc. Both are announced and under development, but not yet operational. This programme's success is entirely contingent on execution.

Manara Minerals, Vale Base Metals Stake (completed April 2024): Manara's $2.5B acquisition of a 10% stake in Vale Base Metals (VBM) is the clearest example of Saudi Arabia's overseas equity strategy producing a concrete result. The acquisition grants offtake rights to world-class nickel, copper, and cobalt supply from assets across

Brazil, Canada, and Indonesia. VBM's growth capex plan of USD$25–30B over the next decade means the strategic exposure will compound over time.

Future Minerals Forum (FMF, annual from 2022): FMF has grown into a primary global venue for minerals diplomacy, attracting 18,000+ attendees, 70+ ministers, and hundreds of CEOs. FMF 2025 produced 126 agreements and MOUs worth approximately USD$28.5B. The forum gives Saudi Arabia convening authority that is disproportionate to its current production levels.

US–Saudi Strategic Framework for Critical Minerals and REEs (2025): Signed during the Crown Prince's Washington visit in November 2025. The US DoD commitment of a 49% equity stake in a planned Saudi REE refinery is the first US state equity stake in a foreign REE refinery. The Ma'aden–MP Materials MOU (May 2025) covers the full value chain from mine to magnet. These agreements are signed and active, but the refinery is not yet built. Their current value lies in strategic signalling and locking in the bilateral relationship.

3. What Is Working / What Is Not Yet Working

What Is Working

The geological and regulatory foundation has been built with measurable effect. The jump from 1.7% to 51% database coverage in three years, the reserve estimate upgrade to USD$2.5T, and the growth from 6 to 226+ licensed explorers are verifiable outcomes, not targets. The Mining Investment Law reform and the SGS programme are delivering what they were designed to deliver. The Vale Base Metals acquisition is the one major overseas investment that is complete and operational. The Future Minerals Forum has become a genuine diplomatic asset ahead of schedule.

What Is Not Yet Working

The USD$9.3B domestic smelting programme is the most important unproven bet. The Vedanta and Zijin partnerships are announced but the smelters are not operational. The REE refinery and the US DoD equity arrangement are agreements on paper. The Jabal Sayid REE reserve figures (552,000T heavy REEs, 355,000T light REEs) are Ministry estimates, not independently audited to JORC or NI 43-101 standards. The African and South American overseas equity pipeline is largely still at the MOU and discussion stage, and the overseas strategy beyond Vale has not yet produced a second completed transaction.

4. Core Findings

Saudi Arabia's dual-partner strategy, with Indian and Chinese capital in the same smelter programme and US DoD equity alongside a BYD technology agreement, is a deliberate hedge that gives it leverage in negotiations with all parties. The Vision 2030 framework provided the political cover and long-time horizons that make sustained mining investment bureaucratically defensible. The central question is whether the country can close the gap between frameworks and execution: the geological survey is a genuine success; the smelters, the REE refinery, and the overseas pipeline beyond Vale have not yet been delivered.

United States

1. Policy Landscape

The US critical minerals policy architecture deploys four primary institutions, the Department of Defense, the Department of Energy, EXIM Bank, and the US International Development Finance Corporation, through a functional division of labour calibrated to specific market failures and supply chain stages. DoE concentrates on domestic technology readiness and commercial-scale deployment. DoD handles domestic strategic asset de-risking and concessional equity for close allies. EXIM operates allied-nation project lending. DFC manages access to critical minerals in frontier and developing countries. 74% of US programmes name specific minerals rather than operating under a generic "critical minerals" umbrella.

Policy innovation is a distinguishing feature of the US approach. Project Vault extends stockpiling logic from defence to industrial/commercial manufacturing, the first government-backed strategic reserve for industrial critical mineral users. The US-Ukraine Reconstruction Investment Fund (USURIF) establishes a joint fund capitalized with $75 million from each government, with Ukraine contributing 50% of state revenues from newly issued resource permits as an ongoing funding stream. This resource-linked capitalisation allows the US to assert influence over Ukraine's critical mineral architecture and anchor Western industrial supply chains in the country, something a conditional loan would not achieve.

The most significant structural constraint is the permitting regime. The US has deployed the most architecturally sophisticated and instrument-diverse critical minerals policy apparatus in this study, but it has paired this with a permitting system designed for a different era. The result is a pipeline of projects that cannot advance regardless of available financing because they cannot complete environmental review. Mine-to-production timelines in the US average 16-29 years. This is a system failure that additional funding programmes cannot fix.

2. Program-by-Program Assessment

Defense Production Act Title III: The most flexible and active domestic tool. DoD deploys grants, loans, purchase commitments, and equity to fill commercial financing gaps, including direct equity stakes in private companies, which no other federal programme does at scale. The MP Materials / Mountain Pass deployment ($400M equity + $150M loan → crowding in $2.25B private capital for a domestic REE-to-magnet facility in Texas) is the most consequential single critical minerals investment in US history.

DOE Battery Material Processing and Manufacturing Grants: Operationally mineral-specific in practice despite nominally referencing the USGS critical minerals list. Battery Materials Processing grants are scoped to battery supply chain minerals, lithium, cobalt, nickel, manganese, graphite. The Rare Earth Elements Demonstration Facility is restricted to REE processing from unconventional sources. This specificity concentrates capital where technical gaps are most acute.

Section 45X, Advanced Manufacturing Production Credit: The most market-efficient instrument in the US critical minerals toolkit because it rewards output rather than upfront investment. The incentive scales automatically with production without relying on government award cycles or project-by-project approvals. Its differentiated rates by mineral type and processing stage effectively prioritize the battery supply chain. Unlike grants or loans, 45X gives private investors a predictable, recurring revenue stream to underwrite against. The main limitation is the sunset provision: battery component credits phase out by 2033, shortening the investment horizon for projects with 10-15 year payback periods.

3. What Is Working / What Is Not Yet Working

What Is Working

The US has rapidly built a comprehensive legal and financial architecture, including 20+ bilateral agreements and a full toolkit of grants, loans, equity, tax credits, and offtake mechanisms. Upstream lithium development is advancing: Thacker Pass demonstrates that large-scale capital can be mobilized and construction progressed where geology and economics align. The DPA Title III is effective as a fast, flexible instrument, enabling direct, targeted investment without slow competitive processes. Section 45X is functioning as a strong market signal, providing scalable, production-linked incentives that crowd in private capital.

What Is Not Yet Working

The midstream processing gap remains the core structural weakness: the US lacks domestic capacity in rare earth separation, graphite processing, lithium refining, and critical minerals such as gallium and germanium, with China still dominating globally. Recycling and urban mining are largely undeveloped, with no operational systems comparable to Japan's ESPA. The permitting system is the most binding constraint, preventing projects from advancing regardless of available financing and undermining the effectiveness of the broader policy framework.

4. Core Findings

4.1 Policy Design Is More Coordinated Than Canada's

US agency coordination is stronger at the project level than Canada's. At Hermosa, DoE supports commercial scale while DoD addresses strategic risk, a clearly defined division that allows developers to engage both agencies without friction. Canada's federal funding requires inter-agency reviews, matching requirements, and separate assessments. The 45X credit avoids this entirely: it is automatically claimed based on production, making it the most reliable instrument in the dataset because it does not depend on bureaucratic coordination.

4.2 Midstream Remains the Structural Weakness

US processing and refining is the weakest link in the domestic supply chain, with only 20% of programmes rated as fully operational at that stage. There is no large-scale domestic REE separation in operation (Lynas Seadrift is still under construction), no commercial graphite processing for battery anodes, and no meaningful gallium or germanium refining. Lithium processing is the only relative bright spot, with Thacker Pass underway. China continues to dominate in REE processing and lithium refining, a position that has not meaningfully changed despite extensive US policy efforts since 2020.

Chile

1. Overall Picture / Policy Landscape

1.1 The Strategic Logic

Chile occupies a structurally distinct position among the jurisdictions in this study: the world's largest lithium reserves, approximately 25% of global mined copper production, and a policy architecture whose central logic is unlike any other in the comparison set. Chile's government does not invest in mining — it invests in control of mining, and then uses that control to capture rent from private operators. This "resource access" model is efficient in structure and fragile in commodity cycles.

The central mechanism is state-controlled resource access, CORFO leases, CEOL contracts, and state majority PPP requirements, deployed as the primary policy instrument. Private capital provides the investment; the state provides the resource and captures the rent. When lithium was at USD $80K/tonne in 2022, private capital accepted onerous state-majority terms, technology mandates, and revenue-sharing structures redirecting 70-85% of margins to the public purse. When lithium collapsed to USD $9K/tonne in 2025, BASF abandoned its cathode factory and Albemarle scaled back capex. The rent-capture architecture holds across price cycles, the JV structure guarantees a margin share regardless, but the private investment the state depends on for production growth is price-sensitive in ways that Chile's current policy toolkit cannot adequately address.

The Kast government, inaugurated March 11, 2026, represents Chile's most significant policy inflection since the 2023 National Lithium Strategy. Kast's market-liberal orientation signals a shift away from state-majority equity requirements toward private-led development under a reformed CEOL framework and deepened US alignment. Whether this represents a structural policy pivot or a political signal will be determined by three near-term indicators: whether the US binding MOU is signed and capitalised, whether CEOL reform legislation passes congress, and whether the Maricunga CEOL impasse is resolved or further delayed.

1.2 The Policy Architecture

Sixteen policy programmes span strategic PPP frameworks, CEOL contracts, fiscal instruments, regulatory reform, institutional bodies, and international agreements. The architecture's coverage is concentrated at the upstream and rent-capture ends of the value chain. Of Chile's 16 programmes, only one has confirmed public capital deployed, five are committed, two are conditional, three are coordination frameworks, and five are fiscal or governance instruments deploying no production investment. Midstream processing and downstream manufacturing, the stages that would transform Chile from a raw material exporter into a supply chain participant, are dominated by committed-but-fragile or gap categories. This asymmetry is Chile's defining structural challenge.

1.3 Capital Scale Overview

Capital scale is dominated by the Nova Andino Litio JV (USD $3-4B total capex through 2060) and Albemarle's private expansion (USD $1.5B). The only confirmed direct foreign government cash is the US EXIM USD $317M cobalt commitment to the C3 ChileanCobalt project. All other programme value flows through private capital attracted by preferential resource access terms, not through public capital deployment.

2. Program-by-Program Assessment

National Lithium Strategy, Nova Andino Litio SpA (Codelco + SQM, December 2025): The JV is operative, producing, and generating state revenues. Codelco's in-kind equity contribution (mining rights) required no

upfront public cash, the state captures approximately 70% of new Atacama lithium operating margins through 2030 and approximately 85% from 2031, through 2060. Cleared by 20+ regulatory bodies including China's SAMR. The JV has held up legally across the Boric-to-Kast political transition, which is the real test of its durability. This is a rent capture model, not capital deployment, and as a rent capture model, it is working. Target production is 300,000 t/yr LCE.

First CEOL, ENAMI + Rio Tinto (Salares Altoandinos, October 2025): A USD $425M initial commitment (Rio Tinto cash; ENAMI in-kind), with total capex projected at USD $2-3B and production targeted around 2032. The CEOL signed confirms Tier-1 interest in non-Atacama lithium development, and the DLE technology focus is the largest permitted lithium project outside the Atacama. Active risks include incomplete indigenous consultation processes and uncertainty around whether Kast's CEOL legislative reform agenda will alter existing contract terms. Capital is flowing to exploration; the commercial contribution is long-horizon.

CORFO Preferential Lithium Price Programme, Cathode Manufacturing (Molymet, Samsung SDI, POSCO): Approximately USD $754M in private cathode investment committed, using discounted lithium as the subsidy mechanism. BASF exited the programme when lithium prices collapsed from ~$80K/t to ~$9K/t, the defining case study of the model's commodity-cycle fragility. Molymet, Samsung SDI, and POSCO remain active; further price weakness could trigger additional withdrawals. The design logic is sound, using resource dominance as an industrial policy lever, but it requires demand-side support to be durable, which Chile has not built.

Albemarle Atacama Expansion Stage 3 (CORFO lease, 2043): Approximately USD $1.5B in private capex, with DLE deployment active but scaled back in 2024 following a ~$404M loss. Albemarle's CORFO lease shields it from NLS state-majority requirements. Water sustainability in the Atacama remains the primary operational constraint. The scale-back illustrates the direct transmission of commodity price cycles into production investment decisions under a model with no government buffer.

US EXIM, Chilean Cobalt Project (C3, La Cobaltera): USD $317M in US EXIM-backed debt, the largest direct foreign government CM investment in Chile in the dataset. Construction runs 2025-27; production is targeted for approximately 2028. Cobalt sits outside the NLS state-majority requirements that complicate lithium entry, making it the most accessible entry point for US strategic capital. This is, in practice, friend-shoring: securing cobalt supply independent of DRC/China supply chains.

Codelco Maricunga CEOL (indigenous consultation phase): Estimated USD $100-300M in exploration capex with no capital currently flowing and timelines slipping. Three compounding problems: Codelco purchased the Salar Blanco asset without completing indigenous consultation, creating a legal consent gap; three competing developer claims are active; and uncertainty around Kast's CEOL legislative reform introduces structural uncertainty over contract terms. The second-most strategically important lithium salt flat in Chile after the Atacama has zero capital flowing. This is Chile's highest-priority unresolved policy failure.

US–Chile Strategic Mineral Declaration (March 13, 2026), Binding MOU pending: Politically significant, signed on Day 2 of the Kast presidency, but not yet capitalised. Argentina, Peru, Paraguay, and Ecuador all have binding US MOUs from February 2025; Chile is behind. The binding MOU is the deliverable that matters: it unlocks DFC financing and Project Vault purchasing eligibility, potentially USD $465M-1B+ in US government-backed capital. The declaration's 15-day consultation timeline is the near-term variable to watch.

EU–Chile Association Framework Agreement + Raw Materials Partnership (2025): Legally advanced but commercially underperforming. The ITA is in force; BASF's cathode factory abandonment is the defining commercial outcome. The EU EIB has not committed capital to specific Chilean CM projects. Chile has a framework partner in the EU, not yet an investment partner. The EU-Chile partnership is the clearest example in the dataset of a bilateral framework that works on paper but cannot override commodity economics.

Mining Royalty Law (Law 21.566), 46.5% Hard Cap: A workable political compromise that has survived a change of government. The 46.5% effective rate cap gave Codelco, BHP, and Anglo American the investment certainty they needed while increasing the state's take from production. The one-third regional redistribution (USD

$130-330M/yr) addresses social licence through direct fiscal transfer to mining regions. The fact that it held across the Boric-to-Kast transition confirms it as durable policy, not a single-government instrument.

Framework Law for Sectoral Authorizations ("Ley Permiso", 2025): The most consequential structural reform for Chile's USD $105B investment backlog. A single mining project currently requires 500+ permits, permisología is the dominant non-geological barrier to project development. This law creates a centralised digital permitting platform targeting a 30-70% timeline reduction. Kast has made it a top legislative priority. Early results are not yet available, but the direction is bipartisan and the problem it addresses is well-evidenced.

MSP Partner; CPTPP; EITI Accession (October 2025): No direct capital, but material to investment conditions. Chile's EITI accession improves ESG credibility with allied-nation institutional investors. The C3 cobalt commitment is the first concrete MSP-linked commercial outcome. CPTPP membership deepens trade access with Japan, Australia, and Canada, all significant CM demand markets.

3. What Is Working / What Is Not Yet Working

What Is Working

The Nova Andino Litio JV is working on its own terms. The state captures 70-85% of Atacama lithium margins without a peso of upfront public cash, Codelco's in-kind equity contribution is the mechanism, and the JV has held legally across a change of government. As a rent-capture instrument, this is the most efficient structure in the Latin American comparison set.

The Mining Royalty Law has achieved durable political settlement. The 46.5% effective rate cap is working as designed: providing fiscal certainty to operators while increasing the state's share of production rents. Regional redistribution ($130-330M/yr) is flowing. That it survived the Boric-to-Kast transition without renegotiation confirms it as structural, not political.

The US EXIM commitment to C3 Chilean Cobalt (USD $317M) is the clearest case of direct foreign government capital entering Chilean critical minerals. Chile's cobalt sector, free of the NLS state-majority requirements that complicate lithium, is demonstrably the most accessible entry point for allied-nation strategic capital. Construction is underway; production is targeted for 2028.

The Ley Permiso framework, if implemented as designed, addresses the single most-cited non-geological barrier to Chilean mining investment. Reducing a 500+-permit process by 30-70% would accelerate the USD $105B investment pipeline materially.

What Is Not Yet Working

The downstream processing gap is Chile's deepest structural failure. Copper processing share has fallen from near-100% (cathodes) in the early 2000s to under 50% today, with the trajectory pointing toward 30% concentrate exports by 2030. For lithium, the gap is more acute: the country with the world's largest lithium reserves produces almost no cathode precursors, battery cells, or other value-added products at commercial scale. The CORFO preferential price programme is the only instrument addressing this gap, and BASF's exit illustrates the structural inadequacy of price preference as a substitute for demand-side industrial policy.

The Maricunga CEOL impasse has no resolution in sight. The second-most strategically important lithium salt flat in Chile, with zero capital flowing, three competing developer claims, incomplete indigenous consultation, and potential CEOL legislative reform adding further uncertainty, is the clearest evidence that the NLS framework cannot automatically unlock the non-Atacama frontier.

The US-Chile relationship has produced a declaration but not yet capital. Chile lags Argentina, Peru, Paraguay, and Ecuador in converting US bilateral engagement into binding MOUs with operational financing. Until the

binding MOU is signed, DFC financing and Project Vault eligibility remain inaccessible, and Chile's Kast-era geopolitical realignment remains a political signal rather than an investment instrument.

The EU partnership has not delivered commercial outcomes commensurate with its legal sophistication. BASF's cathode factory abandonment is the defining result of the AFA and Raw Materials Partnership to date. The EU EIB has not committed capital to specific Chilean projects. As the SWP Berlin assessment concluded in May 2025, industrial cooperation has fallen short of expectations.

4. Core Findings

4.1 Chile Is a "Resource Access" State, Not a "Capital Deployment" State

The most important analytical finding from Chile's CM policy is that the state's competitive advantage is geological, not financial. Chile does not deploy capital into mining, it deploys access to the world's largest lithium reserves and highest-grade copper deposits. The NLS, CEOL framework, and CORFO preferential price programme all work by making state-controlled resource access conditional on terms favourable to Chile: state majority equity, downstream investment requirements, DLE technology mandates, and revenue-sharing structures.

This model is efficient in structure but fragile in commodity cycles. The state's rent capture holds regardless of price, the JV structure guarantees a margin share, but the private investment that the state depends on for production growth is price-sensitive. Chile's policy architecture has not yet built the instruments that would make private investment in Chilean CM production durable across commodity cycles: guaranteed offtake, production subsidies, or co-investment in midstream infrastructure that shares both risk and reward with private capital. The Kast administration's market-liberal approach makes state-led downstream investment less likely, increasing dependence on the US DFC pipeline and private capital to fill this gap.

4.2 The Downstream Processing Gap Is the Defining Structural Challenge

Chile produces world-class raw materials and has not built a supply chain. Copper processing share is declining, from near-100% in the early 2000s to under 50% today, trending toward 30% by 2030. For lithium, the gap is even more acute: the country with the world's largest reserves produces almost no cathode precursors or battery-grade products at commercial scale. The CORFO preferential price programme is the only instrument targeting this, and its BASF failure illustrates that below-market input pricing is not sufficient when the fundamental demand signal is absent or pointing in the wrong direction.

Closing this gap requires instruments Chile has not yet deployed at scale: guaranteed downstream offtake analogous to Japan's Battery Industry Strategy, direct investment in midstream processing analogous to Japan's ESPA urban mining subsidies, or co-investment structures that share both upside and downside with private capital. Neither the Boric NLS nor the Kast market-liberal framework has built these instruments. The US DFC pipeline and allied-nation bilateral frameworks are the most plausible near-term vehicles, but they are conditional on the binding MOU being signed and the downstream investment case being made project by project.

4.3 Two Critical Variables: Maricunga and the US Binding MOU

For assessing Chile's policy trajectory, two outcomes in 2026-2027 are definitively diagnostic.

If the Maricunga CEOL is resolved, indigenous consultation completed, CEOL awarded, private partner committed, it validates the NLS's ability to develop the non-Atacama frontier and establishes a template for the remaining 25+ priority salt flats. If the impasse continues, it signals that the NLS framework cannot overcome the competing pressures of indigenous rights, Kast's CEOL reform agenda, and three-way developer claims, and that Chile's non-Atacama lithium frontier will remain aspirational through the 2020s.

If the US binding MOU is signed, it converts Chile's Kast-era geopolitical realignment into operational capital access, USD $465M-1B+ in US DFC financing and Project Vault purchasing eligibility. If it remains unsigned through H2 2026, Chile's US alignment stays symbolic while Argentina, Peru, and Ecuador deepen theirs with operational capital flows.

Both variables operate on the same timeline. 2026-2027 is the window in which Chile's Kast-era policy pivot either converts into capital flows or remains a geopolitical signal. This is the most important monitoring period in Chilean CM policy since the 2023 NLS announcement.

4.4 The Kast Pivot: Structural Change or Political Signal?

Three near-term indicators will determine the answer. First, whether the US binding MOU is signed and capital commitments are made, the operational test of US alignment. Second, whether Kast introduces and passes CEOL reform legislation, this requires overcoming a congressional minority position and may take two to three years even under a favourable political environment. Third, whether the Maricunga CEOL process is completed, restructured, or suspended, the test of whether Kast's reform agenda accelerates or disrupts existing NLS implementation. A positive outcome on all three within 12-18 months would constitute a structural pivot.

Canada — Provinces

British Columbia

1. Overall Picture / Policy Landscape

BC's critical minerals policy centres on geoscience and permitting reform but lacks a direct provincial capital or financing mechanism to fund extraction and processing incentives. Geoscience BC is a genuinely strong foundation: twenty years of systematic geological data generation, airborne geophysics, geochemistry, and core libraries lower exploration risk province-wide and are cited as a reason BC continues to attract junior exploration capital even without large direct grants. However, without a provincial processing fund or equivalent capital instrument, BC risks becoming primarily a discovery jurisdiction.

The province's April 2026 exploration permit guarantee (40–140 days) is a specific and measurable commitment, the most precise permitting timeline undertaking of any jurisdiction in the comparison set. The results of its implementation are yet to be seen, but it represents a significant legislative milestone. By contrast, the earlier Collaborative Impact Assessment Coordination Agreement, aimed at aligning federal and provincial permit standards and reducing duplication, has produced no improvement in project approval rates or processing times by the province's own reporting.

2. What Is Working / What Is Not Yet Working

What Is Working

Geoscience BC is the province's most substantive policy output: twenty years of systematic data generation that is publicly available and lowers the risk premium for private exploration capital entering the province.

What Is Not Yet Working

The most striking structural feature of BC's approach is the gap between strategic ambition and direct capital deployment. Five of BC's seven policy instruments are enabling mechanisms with no disclosed budget, the CM Strategy, the CM Office, the two coordination agreements, and the Regional Tables. Only Geoscience BC (CAD$71.7M over 20 years) and the permit guarantee ($3M) involve real money. Compare that to Ontario, which followed its own strategy document with a $500M processing fund within two years. BC has built a governance architecture but has not converted it into capital programmes.

Every BC instrument targets upstream exploration or permitting reform. There is no BC equivalent of Ontario's CAD$500M CMPF, Quebec's NMP processing programmes, or NL's CAD$20M IBDF. Without midstream capital instruments, BC risks being permanently locked into the extractive part of the value chain.

3. Core Findings

BC cannot create the matching contribution conditions that federal co-investment frameworks require until it builds provincial capital instruments. The Collaborative Impact Assessment Coordination Agreement has produced no improvement in processing times. The April 2026 permit time guarantee is an innovation, but permitting speed alone does not address the capital gap that is the primary barrier to moving BC's geological endowment up the value chain.

Newfoundland and Labrador

1. Overall Picture / Policy Landscape

Newfoundland and Labrador is home to Voisey's Bay (world-class nickel-cobalt-copper), 30% of Canada's iron ore production from Labrador West, and a geological endowment that its own Critical Minerals Plan describes as among Canada's most significant. The policy challenge is not identifying what NL has, it is converting that geological advantage into a sustainable supply chain contribution.

The framework's defining characteristic is that it is designed for an exploration-stage province rather than a supply chain province. The JEA exploration rebates, Labrador Geoscience Program, MIP prospector grants, and CM Strategy implementation funding are all correctly calibrated to the exploration stage. But the framework has no instruments for midstream processing or downstream manufacturing, the stages where value is created and retained. This structural gap is NL's defining policy challenge for the next decade.

2. Program-by-Program Assessment

JEA Program (3 streams, CAD$3.9M/yr combined): Three parallel funding streams (Provincial + ACOA-CMA + PCMA) totalling $3.9M/yr. The 2024-25 round funded 14 projects across 8 mineral categories including REEs, lithium, antimony, copper, and zinc. Project caps sit at $150K (NL island) and $225K (Labrador), with 40–75% rebate rates.

CM Strategy Implementation (CAD$2.6M → CAD$4.3M/yr): Provincial funding for the Critical Minerals Plan, split between geoscience ($3M/yr) and the PCMA stream ($1.3M). Budget grew from CAD$2.6M in FY2024-25 to CAD$4.3M in FY2025-26, a real year-over-year increase.

Labrador Geoscience Program (CAD$1.6M/yr): Funds high-resolution airborne surveys and geological mapping along the Labrador Critical Mineral Corridor. Primary targets are the Labrador Trough (iron ore, REEs) and the Nain Plutonic Suite (Ni, Cu, PGMs). AI and remote sensing are now deployed to lower exploration risk. Surveys were ongoing as of FY2025-26.

Kami Iron Mine Partnership, Champion Iron + Nippon Steel + Sojitz (C$245M FDI): NL's largest critical minerals foreign direct investment to date. Nippon Steel (C$120M) and Sojitz (C$78M) are taking a combined 49% equity stake in the Kami JV. Provincial contribution was regulatory fast-tracking and the 2024 high-purity iron ore CM designation, but no direct provincial cash contributions. DR-grade ore (>67.5% Fe) is a fit for Nippon Steel's hydrogen-based green steel pathway. A basic agreement was signed December 2024, with DFS expected end-2026.

Julienne Lake Iron Ore EOI (Crown asset, 867Mt deposit): Province issued an Expression of Interest for a Crown-owned iron ore deposit near Labrador City. No direct grant; the province retains all royalty and equity rights. The province's stated preference is for a developer who can integrate downstream processing and green steel supply chains. Altius Minerals and others have advanced to detailed proposal stage. This is NL's highest-leverage undeveloped policy instrument: the Crown owns the asset and can attach processing conditions, green steel supply chain requirements, and community benefit terms to the development award without spending a dollar of direct capital.

3. What Is Working / What Is Not Yet Working

What Is Working

The JEA is NL's most consistent policy-to-market mechanism: 14 projects confirmed across 8 mineral categories in 2024-25. Federal-provincial geoscience coordination is the most operationally effective policy area, the provincial program (C$1.6M/yr) and two NRCan CMGD projects (C$1M, PDAC 2026) are hitting the same Labrador geology with complementary methods. The Kami Partnership demonstrates the "policy framework as capital catalyst" model: C$245M in private Japanese capital secured without a dollar of direct provincial

expenditure, through regulatory fast-tracking, the 2024 high-purity iron ore critical minerals designation, and support for the Canada-Japan MOC bilateral framework.

What Is Not Yet Working

NL has no funded programme targeting CM midstream processing or refining. The value chain ends at mine output. There is no NL equivalent of Ontario's CMPF ($500M for processing), Japan's ESPA, or Chile's CORFO preferential price scheme. NL's total direct CM programme budget runs approximately C$30-35M/yr across all instruments, modest for a province with 30% of Canada's iron ore production, one of the world's largest nickel-cobalt deposits, and a 55-mineral CM list.

The Labrador West transmission capacity study is complete, but no capital decision has been made. Voisey's Bay is the only fully electrified CM operation in the province. Without expanded grid capacity, NL's green iron ore positioning is limited to Vale's single operation.

4. Core Findings

NL's Critical Minerals Plan is explicitly supply chain ambition, it speaks of maximizing value through supply chains, R&D, and workforce. The gap between the exploration-stage instruments currently deployed and the supply chain outcomes the plan envisions is structural and will not close through exploration funding alone. NL needs midstream processing instruments and downstream manufacturing incentives, but none currently exist. For a small province with a modest direct capital budget, the highest-leverage interventions are regulatory fast-tracking, bilateral diplomatic facilitation (as the Kami case demonstrates), and using Crown asset disposition conditions (Julienne Lake) to negotiate processing requirements from private developers without spending direct provincial capital.

Northwest Territories

1. Overall Picture / Policy Landscape

The NWT's approach is almost entirely upstream-focused. Both programmes (the Mining Incentive Programme and the Northwest Geological Survey) are designed to de-risk early-stage exploration, not build a value chain. Spending has stabilised at roughly C$1.5M/yr since 2021-22. The NWT is the only jurisdiction in the comparison set with no standalone critical minerals strategy document, its 2013 Mineral Development Strategy predates the energy transition entirely and does not mention battery metals, EV supply chains, or processing ambitions. This absence makes it structurally harder to attract federal co-investment, which increasingly flows to jurisdictions with aligned strategies.

2. Program-by-Program Assessment

Mining Incentive Program: Consistent uptake at close to the C$1.5M/yr envelope. Lithium-focused projects appeared from 2022-23; REE projects appear every year. However, gold captures 30% of all funds because the programme does not differentiate by commodity, there is no CM-specific stream to redirect funding toward battery metals. The C$240K per-company cap cannot fund a meaningful drill programme on its own.

Indigenous Capacity Building: Up to C$5K/project, C$10K/yr total, signalling underfunding relative to the scale of the consultation requirements for any advanced exploration in the territory.

Northwest Geological Survey: Up to C$7.5K/applicant in research grants funding university geoscience on REE, lithium, zinc, tungsten, and copper. Running since 2015, it builds the knowledge base that underpins private exploration without requiring significant territorial infrastructure.

3. What Is Working / What Is Not Yet Working

What Is Working

The MIP is operationally efficient, reflects consistent uptake with no years of underspending, while reaching both junior companies and individual prospectors. The NTGS university research grants build the geological knowledge base without requiring territorial infrastructure.

What Is Not Yet Working

Funding scale is the central issue: C$1.5M/yr is not competitive with what Ontario, BC, or NL are deploying. There is no critical-mineral prioritization within the MIP, gold, a non-CM, captures 30% of all funds. There is no downstream or midstream policy at all. The lapsing of the Assessment Work Credit in March 2025 makes this worse at exactly the wrong moment. The Indigenous Capacity Building envelope (C$10K/yr) doesn't alleviate project-risk exposure given the consultation requirements for any advanced exploration in the territory.

4. Core Findings

The NWT is the only jurisdiction in the comparison set with no standalone critical minerals strategy. The absence makes it structurally harder to attract federal co-investment, which increasingly flows to jurisdictions with aligned strategies, designated mineral lists, and multi-year funding frameworks that federal co-investment processes require as entry conditions. The MIP programme data is publicly disclosed at the recipient level, a higher level of transparency than BC's investment sheet, but zero of the 103 grants include tracking of whether funded exploration led to resource definition or further development.

Ontario

1. Overall Picture / Policy Landscape

Ontario's critical minerals policy framework covers the full supply chain on paper, from early-stage exploration through R&D, processing, refining, downstream manufacturing, and the enabling infrastructure required to unlock the Ring of Fire. By March 2026, fifteen distinct programmes have been identified spanning seven policy categories.

The central structural tension is the gap between announcement and deployment. The programmes that are working, OJEP, CMIF, NOHFC, winter roads, disburse modest amounts to many recipients through well-established mechanisms. The programme designed to disburse large amounts to transformative processing projects, the $500M CMPF, produced zero project-level recipients in the three months since its December 2025 launch. This asymmetry between small-grant effectiveness and large-grant non-deployment is Ontario's defining policy challenge.

2. Program-by-Program Assessment

OJEP, Ontario Junior Exploration Program (Intakes 1–6, 2021–2025): Ontario's most direct policy-to-market mechanism, with ~C$45M disbursed to 200+ junior mining companies across six intakes. Intake 5 covered 84 projects, 62 on critical minerals. The 2025 additions, a new prospectors stream and enhanced Indigenous Participation funding, show the programme is being refined as it runs.

CMIF (Intakes 1–6, ~$27M, 29+ R&D projects): Producing real R&D activity with named companies and documented outputs across four priority areas: deep exploration, mine waste, battery supply chain, and mining innovation. Its role is to de-risk early-stage technology, not fund commercialisation.

Ring of Fire Road Agreements (Webequie + Marten Falls, up to $79M): Both First Nations-led road agreements signed within six weeks in October/November 2025. Construction starts 2026; roads open 2030-31. The Ontario-Canada Cooperation Agreement (December 2025) eliminates duplicative federal review. A multi-decade impasse now has a defined construction timeline.

Greenstone Transmission Line (Hydro One designated; 50% FN equity; 2032): Power infrastructure for Ring of Fire mining is on a defined pathway. Hydro One designated in January 2026 and 6+ First Nations receive 50% equity ownership. In-service target 2032. Without this line, no industrial mining in the Ring of Fire is economically viable at scale.

Bill 5 and One Project, One Process (implemented October 20, 2025): Mine permitting reform targeting halved approval timelines through single-window approvals. The Ontario-Canada Cooperation Agreement (December 2025) eliminates federal-provincial EA duplication for Ring of Fire roads. No projects have yet completed the full 1P1P process, and its effectiveness is not yet empirically validated. Legal challenges from Treaty 9 First Nations over the Special Economic Zone duty-to-consult obligations remain unresolved.

CMPF, Critical Minerals Processing Fund (launched December 12, 2025): Ontario's largest CM programme at $500M, targeting processing and refining across EV/battery manufacturing, defence, and aerospace. It is administered by Invest Ontario. As of March 2026, zero project-level recipients have been publicly announced. How this fund deploys over 2026 is the single most important observable element in Ontario's entire CM policy landscape.

3. What Is Working / What Is Not Yet Working

What Is Working

OJEP is Ontario's most consistent and direct policy-to-market mechanism. The Ring of Fire road agreements represent the most significant institutional breakthrough for the region since it was identified as a priority: both First Nations-led agreements were signed within six weeks, construction starts in 2026, and a multi-decade impasse now has a defined timeline. The Greenstone Transmission Line designation puts power infrastructure for Ring of Fire mining on a defined pathway for the first time.

What Is Not Yet Working

The CMPF, at $500M, Ontario's largest-ever CM investment vehicle, had zero project recipients three months after launch. Electra Battery Materials' cobalt refinery has a non-binding C$17.5M provincial term sheet, and Frontier Lithium's Thunder Bay conversion facility has a federal SIF conditional approval (C$120M) but no signed provincial agreement as of March 2026. Despite decades of policy attention, there are no operational commercial mines in the Ring of Fire. The earliest realistic commercial production from the region is mid-2030s.

4. Core Findings

4.1 Supply-Push Without Demand Anchor

Ontario's entire CM policy framework operates on a supply-push logic: create financial subsidies for upstream exploration, R&D, and processing, and wait for downstream demand to materialise. This stands in direct contrast to Japan's Battery Industry Strategy, which subsidised downstream battery manufacturing capacity first, creating guaranteed offtake that justified upstream investment. Ontario has no equivalent demand anchor. The practical consequence: Ontario has 200+ exploration companies identifying critical mineral deposits, but no confirmed commercial pathway for those deposits to become processed battery materials. Frontier Lithium (unsigned) and Electra (non-binding) are the only two processing projects that could begin to create that pathway.

4.2 The $500M CMPF Is the Central Policy Variable

For researchers and policymakers assessing Ontario's CM strategy, the CMPF deployment record is the key observable. Its scale ($500M) is 5x larger than all currently disbursed CM programmes combined. It targets the exact supply chain gap Ontario most urgently needs to fill. Its operational status, with zero recipients three months post-launch, is the central unexplained fact in Ontario's CM policy landscape. Two interpretations are plausible: the absence of recipients reflects a genuine shortage of shovel-ready processing projects (in which

case the constraint is industrial, not policy); or the CMPF's terms, due diligence requirements, or administrative process are creating friction that delays agreements for otherwise viable projects. The 2026 deployment record will be crucial to monitor.

4.3 Ring of Fire Infrastructure Is on a Defined Timeline, Mines Are a Decade Away

The most significant change in Ontario's CM policy landscape between 2024 and 2026 is the conversion of Ring of Fire road access from an indefinite aspiration to a defined construction timeline. Both Webequie Supply Road (construction June 2026; opening November 2030) and Marten Falls Access Road (construction August 2026; opening November 2031) have signed Community Partnership Agreements. The Greenstone Transmission Line has a designated builder and a 2032 in-service target. But even with these agreements, commercial mines in the Ring of Fire will not be operational before the mid-2030s at the earliest. All policy instruments deployed in the 2025-2030 period are building the conditions for production that will materialise in the 2033-2040 window.

Québec

1. Overall Picture / Policy Landscape

Québec's approach to critical minerals is grounded in a clear comparative advantage argument. The province holds 28 designated critical and strategic minerals (CSMs), including lithium, graphite, cobalt, nickel, REEs, niobium, scandium, high-purity iron, copper, and vanadium. Its 94%-hydroelectric power grid gives it among the lowest-carbon and lowest-cost industrial electricity in North America, a decisive input-cost advantage for energy-intensive processing operations such as lithium hydroxide conversion, graphite purification, cathode active material (CAM) production, and aluminium smelting.

The policy logic is leverage the mineral endowment upstream, leverage hydropower competitiveness midstream, and leverage proximity to North American automotive manufacturing demand downstream. The resulting vision, Québec as a full-stack battery valley stretching from James Bay spodumene mines to Bécancour CAM plants to Montréal-area recycling facilities, is strategically coherent and has attracted serious institutional capital. It is also significantly more ambitious than what most subnational governments have attempted, creating execution complexity and coordination challenges at each stage of the chain.

Québec's critical minerals policy cannot be understood in isolation from the federal framework. The province operates its own suite of programmes while also being the primary beneficiary of federal critical minerals instruments, CMIF, CGF, SIF, and federal Impact Assessment decisions. Several of the most significant investments in the province's portfolio involve federal co-investment: GM-POSCO Ultium CAM plant in Bécancour (~C$147M federal, ~C$152M provincial partially forgiven), Nouveau Monde Graphite (CGF + provincial grants), and Rio Tinto's Sorel-Tracy scandium plant (federal offtake + C$25M CGF equity-like royalty).

Québec's 2020 designation of 22 critical and strategic minerals, expanded to 28 in January 2024, predated Canada's federal list by two years, establishing Québec as the policy leader within the Canadian federation on this file. The January 2024 expansion to include high-purity iron (linked to LFP battery cathode chemistry) and high-purity silica (a semiconductor and solar panel input) demonstrates strategic responsiveness to evolving market requirements.

1.2 The Program Suite at a Glance

Program / Tool	Type	Envelope (CAD)	Supply Chain Stage
Quebec Plan for Development of CSMs (2020-2025)	Overarching Strategy + Funding	$90M	Full chain

2025-2031 Strategy for Development of CSMs	Overarching Strategy + Funding	$88.1M	Full chain
Mineral Exploration Support Program (CSMs 2024-25)	Grant (up to $400K/project, 50%)	$1.7M/cycle	Exploration/Early development
Support for R&D, Extraction, Processing, Recycling	Grant (up to $500K/project, 70%)	$5.7M	Processing/Recycling/R&D
Support for Scaling Up Processing (NMP 7/8)	Grant (up to $1M or $10M, 33%)	Under renewal	Processing/Transformation
Scientific Research Network, CSMs	Research Grant (up to $4M/project, 70%)	$11M	Pre-competitive R&D
Mining Infrastructure Support Program	Infrastructure Grant (up to $1M, 50%)	$20.75M	Logistics/Access infrastructure
Société du Plan Nord Opportunity Budget	Northern Development Fund	$60M	Northern infrastructure/Community
SOQUEM	Equity/JV/Strategic Partnerships Fund	Varies per deal	Exploration/Resource delineation
Stratégie québécoise de la filière batterie (MEIE)	Battery Value Chain Strategy	Not separately quantified	Midstream/Downstream

2. Program-by-Program Assessment

Quebec Plan for the Development of Critical and Strategic Minerals (2020-2025): Canada's first subnational critical minerals strategy, set two years ahead of the federal government's own strategy. Its CA$90M envelope was structured around four orientations: geological knowledge, integrated sectoral value chains, sustainable economic transition, and public engagement. Documented results include identification of over 200 high-potential zones for copper and REEs, the Lithion project (95% lithium-ion battery constituent recovery), and a social licence framework with Indigenous communities, particularly the Cree Nation Government, critical to advancing projects in Eeyou Istchee territory. The plan's primary value was directional and institutional rather than capital deployment: it established the framework, the designated mineral list, and the cross-ministry coordination mechanisms.

SOQUEM, The State Exploration Vehicle: Québec's most distinctive policy instrument among Canadian provinces. As a state mining company with a mandate for strategic joint ventures and equity positions, SOQUEM functions as a risk-sharing mechanism enabling exploration programmes that private capital will not finance at full cost, particularly in remote northern territories. The investment portfolio spans six documented deals including the Kwyjibo REE project (50% equity stake with Focus Graphite, CA$7.2M, Manitou Lake), with the Kwyjibo project explicitly referencing "maintaining Québec ownership" of a REE asset as a policy objective. SOQUEM's model operates at the exploration stage and uses carried interest and option structures rather than equity or debt at scale, complementary to, rather than a substitute for, federal capital deployment in commercial-stage projects.

The Battery Value Chain Strategy (Filière Batterie): The policy anchor for Québec's most ambitious downstream aspiration. Key downstream investments include: Northvolt's C$7B battery and CAM gigafactory announcement (subsequently cancelled in 2024 due to Northvolt's bankruptcy), the GM-POSCO Ultium CAM cathode plant in Bécancour (C$600M Phase 1, Phase 2 indefinitely suspended as of October 2025), Volta Energy Solutions' copper foil factory in Granby (C$750M), and the Nemaska Lithium hydroxide processing plant (Bécancour). The Northvolt collapse removed the largest single downstream anchor, and the GM-POSCO Phase 2 suspension triggered by EV sales weakness and IRA uncertainty represents the most acute current challenge to the strategy's viability.

3. What Is Working / What Is Not Yet Working

What Is Working

Québec is Canada's most advanced provincial critical minerals jurisdiction by breadth of coverage and operational depth. The MESP is the highest-volume provincial exploration programme in the comparison set: 21 documented grants spanning 2021 to 2024 across the full critical mineral spectrum, with consistent project flow demonstrating programme continuity rather than episodic political cycles. SOQUEM provides a state exploration vehicle that no other Canadian province has deployed at equivalent scale. The Research Network programme funds pre-competitive consortia solving specific commercial barriers, the CONSOREM biogeochemistry project applying black spruce chemistry to CSM exploration in boreal terrain is a practical innovation embedded in Québec's specific ecological and geological context.

The 2025-2031 strategy's explicit goal of making Québec an international hub for critical and strategic minerals has been materially advanced by federal announcement linkages: Québec's lithium, graphite, scandium, and REE assets have been featured in federal announcements involving Japan, South Korea, Italy, Germany, and France as supply chain partners.

What Is Not Yet Working

The battery valley strategy has suffered two significant setbacks: Northvolt's bankruptcy (removing the largest single downstream anchor) and GM-POSCO Phase 2 suspension (the most acute current challenge to the strategy's downstream viability). Both reflect the IRA dependency risk, investments justified by North American content requirements for EV battery tax credits are exposed when US trade policy shifts. The federal-provincial layering creates governance complexity: several of the most significant investments involve federal commitments conditioned on milestones not yet achieved.

4. Core Findings

Québec published Canada's first subnational critical minerals strategy in 2020, two years before Ottawa's own strategy, and built the ministry coordination mechanisms, designated mineral lists, and multi-year funding frameworks that federal co-investment processes require as entry conditions. This institutional preparation could be the primary reason Québec has received more federal CM co-investment than any other province: federal co-investment flows to jurisdictions that have done the prior institutional work to receive it. The Northvolt collapse and GM-POSCO suspension illustrate the vulnerability of a battery valley strategy built on a single external demand assumption (IRA longevity). Québec's most resilient assets, hydropower cost advantage, existing processing facilities, SOQUEM exploration platform, are structural and not contingent on any single external variable. The battery valley narrative, by contrast, is.

Saskatchewan

1. Overall Picture / Policy Landscape

Saskatchewan's critical minerals policy framework is fiscally conservative and technically focused. The province has built a competitive investment environment for established commodities, uranium (second-largest producer globally), potash (world's largest exporter), and helium (North America's leading source), and is actively developing policy architecture for emerging ones: lithium, REEs, copper-zinc, and base metals. The framework is built around fiscal incentives rather than sovereign capital deployment, with the Saskatchewan Research Council (SRC) as the province's distinctive technology policy vehicle.

Fraser Institute rankings confirm Saskatchewan's investment attractiveness: top-three globally for multiple consecutive years. This reflects a measurable combination of geological prospectivity, regulatory clarity, royalty

competitiveness, infrastructure access, and institutional stability. In the global context of critical minerals competition, where Argentina's model depends on a single election cycle's durability, Australia's model depends on sovereign capital availability, and Québec's model depends on US IRA longevity, Saskatchewan's model depends on structural competitiveness built and validated over decades.

2. Program-by-Program Assessment

Critical Minerals Processing Investment Incentive (CMPII, 15% tax credit): Provides a 15% non-refundable tax credit on eligible capital expenditure for critical minerals processing facilities. First applications accepted through late 2024 and 2025. Documented approvals include Foran McIlvenna Bay (CMPII) and Arizona Lithium's Prairie Lithium Project (CA$21.6M). The CA$75M per-project cap limits its applicability to very large processing investments, and the 15% non-refundable credit rate is less generous for loss-making early-stage producers than Australia's CMPTI (10% refundable) or the US IRA's domestic content credits.

SRC Rare Earth Processing Facility (CA$71M provincial, CA$30M federal): Canada's first commercial rare earth element metals production. The SRC Facility has achieved North American-first REE metals production, developed in-house IP that creates lasting competitive differentiation, established tolling agreements with international clients, and secured the KOMIR MOU (South Korea's mineral investment agency), elevating Saskatchewan's geopolitical profile. Total public investment is CA$101M, less than the first tranche of Australia's Iluka Eneabba REE commitment (AUD $1.25B), yet the strategic output, proprietary technology, demonstrated production, international partnerships, is comparable in kind. For jurisdictions that cannot deploy sovereign lending at Australian scale, the SRC model offers a replicable template.

Saskatchewan Critical Minerals Investment Incentive (SCMII, CA$500M shared pool with CMPII): Companion to the CMPII, it launched in August 2024. Documented approvals include EMP Metals Project Aurora (CA$4.7M for DLE demonstration). The shared CA$500M pool has not yet been substantially deployed relative to its total envelope.

Lithium Royalty Framework (October 2025): Created a tiered royalty structure for lithium brine production calibrated to commodity price and production volume. The framework provides fiscal certainty to developers, a critical prerequisite for FID, but cannot address the underlying economics in a low-price environment.

KOMIR MOU (South Korea, January 2026: A provincial-level bilateral partnership signalling Saskatchewan's REE processing capability to allied supply chain planners, which in turn creates federal pressure to maintain and deepen investment flows into the province. Saskatchewan is using subnational diplomacy to create federal leverage indirectly, a more sophisticated strategy than simply applying for federal co-investment programmes, though slower and less reliable than Québec's model of being the most policy-aligned jurisdiction.

3. What Is Working / What Is Not Yet Working

What Is Working

Saskatchewan's policy architecture has delivered on its core commitments for established commodities. Uranium CA$2.6B sales (target exceeded by six years), potash record production, helium CA$500M+ industry investment, 15% exploration market share achieved by 2025 (2030 target), SRC North American REE metals first, these are documented results, not aspirational targets. Foran Mining's McIlvenna Bay copper-zinc project, with CMPII support and targeted first production mid-2026, demonstrates that the fiscal architecture is activating project investment in emerging commodities.

What Is Not Yet Working

Despite the October 2025 royalty framework, CMPII commitment to Arizona Lithium, and SCMII support for EMP Metals' Project Aurora, Saskatchewan has not achieved commercial-scale lithium production as of March 2026. Project Aurora is a demonstration plant, not commercial production. The global lithium price collapse (2023-2025) has been the primary obstacle: brine lithium economics are marginal at current prices even with

provincial incentives. Saskatchewan's brine resources require DLE technology at commercial scale, a technology not yet demonstrated at sufficient scale anywhere globally, adding technical risk on top of commodity price risk.

For potash, the world's largest industry in the province, there is no articulated value-addition strategy. Saskatchewan exports potash as commodity KCl or MOP; the vision of producing compound fertilisers or specialty crop nutrition products within the province remains unarticulated in policy. Similarly for uranium: the province hosts Cameco (the world's second-largest uranium producer) but has no policy architecture driving value chain integration from yellowcake to fuel rod.

4. Core Findings

4.1 The Incentive-Over-Capital Model Has Structural Limits

Saskatchewan's deliberate choice not to establish a sovereign mining finance vehicle, no equivalent of Australia's CA$4B CMF, no equivalent of Québec's SOQUEM at commercial stage, no provincial development bank lending to critical minerals projects, means the architecture has a structural gap at the commercial development financing stage. The CMPII and SCMII are fiscal incentives that reduce project costs after investment decisions are made; they cannot de-risk projects to the point of FID for projects where the commercial case is uncertain. The brine lithium sector is the most visible example: multiple well-advanced projects have provincial fiscal support but cannot proceed without either a commodity price recovery, a sovereign offtake agreement, or a strategic investor willing to absorb DLE technology risk. This is a conscious ideological choice, but it creates a segment of the critical minerals pipeline, projects too de-risked for venture capital but not commercially viable enough for project finance, that the current toolkit cannot reach.

4.2 The SRC Is a Template for Technology-Based Industrial Policy Without Sovereign Lending

The SRC Rare Earth Processing Facility is the most instructive model in the Canadian critical minerals policy landscape for what a provincial government can achieve without sovereign lending or equity co-investment. The province's CA$71M investment over five years in a public research institution has produced North American-first REE metals production, in-house IP that creates lasting competitive differentiation, tolling agreements with international clients, and allied-nation partnership signals (KOMIR MOU). For provinces or states that cannot deploy sovereign lending at Australian scale, the SRC model of public R&D institution investment as a technology platform for the private sector offers a replicable template.

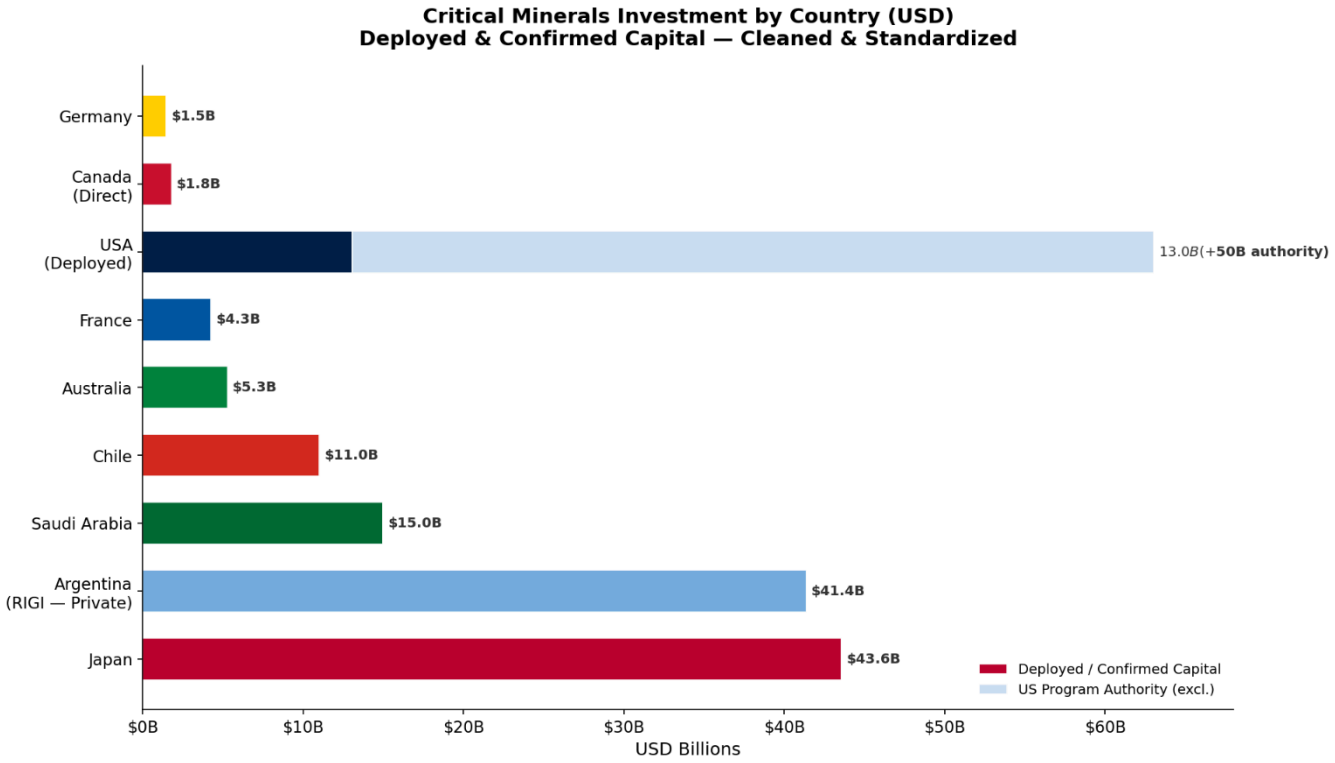
4.3 The Most Important Untapped Opportunity Is Inter-Provincial Supply Chain Architecture

The July 2025 Saskatchewan-Ontario-Alberta MOU and the January 2026 Western Mining Ministers Summit MOU point toward the most consequential opportunity in Saskatchewan's policy landscape: building a pan-Canadian supply chain architecture that links Saskatchewan's resources and processing capabilities with Ontario's manufacturing base, Alberta's energy infrastructure, and British Columbia's Pacific port access. Saskatchewan produces the uranium, potash, REEs, lithium, and base metals; Ontario and Québec host EV manufacturing and battery processing demand; Alberta and BC provide energy and export logistics. No provincial policy acting alone can optimise this system. Saskatchewan's role as a convener of western provincial mining ministers, rather than as a passive participant in Ottawa-led coordination, positions it to shape this architecture rather than merely react to it.

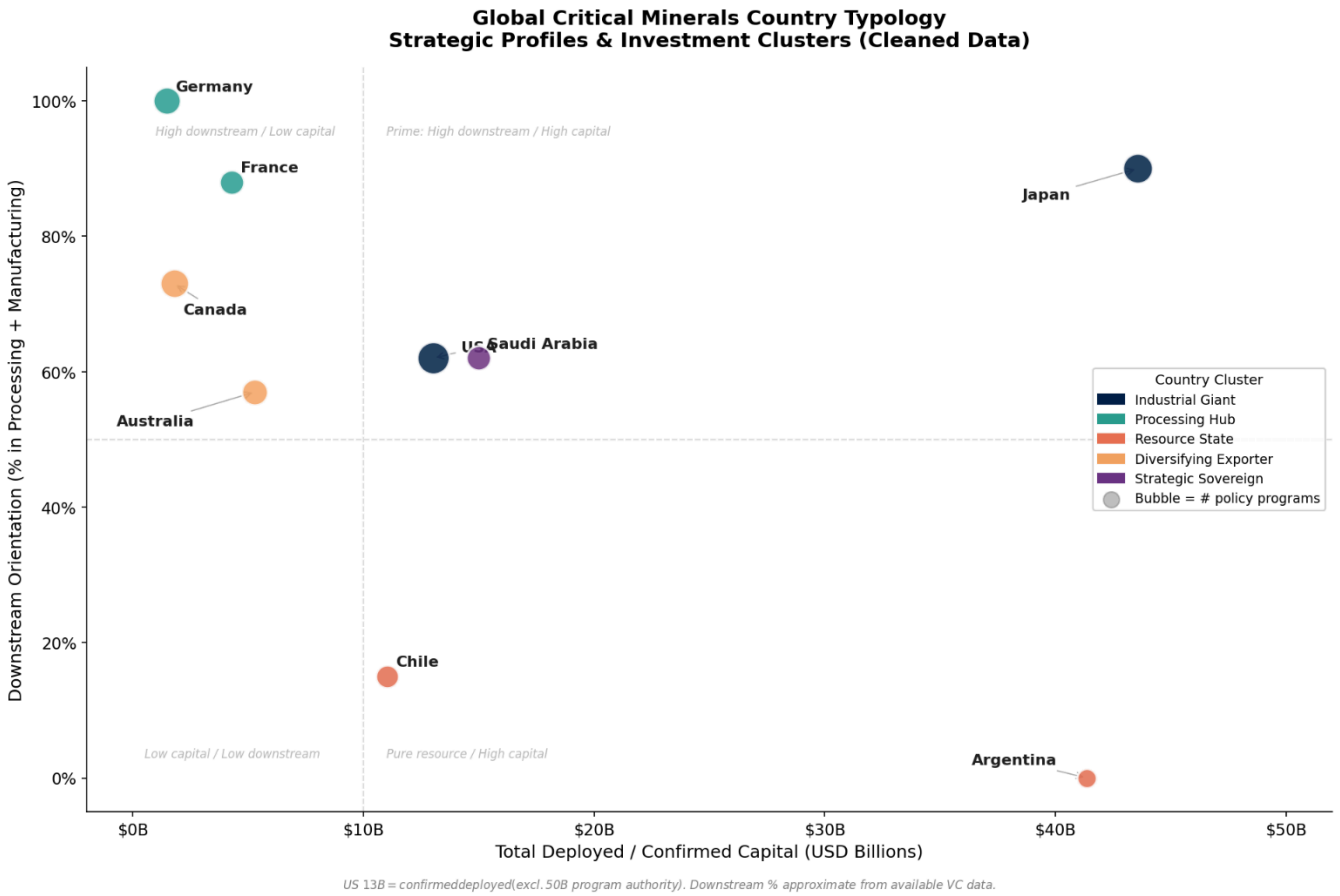
Comparative Analysis Across International Jurisdictions

The eight sovereign jurisdictions examined in this study, Australia, Argentina, Chile, France, Germany, Japan, Saudi Arabia, and the United States, represent the full range of approaches that governments have taken to secure critical minerals supply chains. They differ in geological endowment, institutional heritage, economic structure, geopolitical alignment, and industrial policy philosophy. This section identifies the key points of divergence and convergence, evaluates results to date, surfaces the most important gaps at country and cross-cutting levels, and draws lessons about the conditions under which different policy models succeed.

1. Differences Across Jurisdictions



US 40BDFClendingauthority + 10B EXIM reserve excluded from deployed total — these are program capacity, not confirmed CM spend.
Argentina = private CAPEX under RIGI incentive regime (zero public capital deployed). Australia AUD→USD at 0.65.
Bilateral agreement data available for Canada only; this does not imply other countries lack such agreements.



The Sovereign Capital Deployers: Japan and Australia

Japan and Australia represent the most activist deployment of public capital. Both operate sovereign financing vehicles, JOGMEC and Export Finance Australia's CMF plus the NRF, that take equity stakes, provide concessional debt, and in Japan's case manage a national stockpile system. Both pair capital deployment with a dense bilateral partnership architecture designed to convert supply chain relationships into durable, institutionalised commitments.

The philosophical foundation is identical: critical minerals are too strategically important to leave to market mechanisms alone. Markets underinvest in early-stage projects, underweight supply chain resilience against commodity price volatility, and fail to price in the geopolitical option value of domestic or allied-nation production. The key difference between Japan and Australia is in sequencing: Japan operates from the demand side inward, builds downstream battery and manufacturing capacity first, then uses that guaranteed demand signal to justify upstream mine investments. Australia operates from the supply side outward, funds processing capacity, then relies on the bilateral partnership network to generate the offtake that makes processing economics viable. Japan's demand-pull architecture is more self-reinforcing; Australia's supply-push model is more dependent on external market conditions.

The Pure Liberaliser: Argentina

Argentina under Milei represents the opposite philosophical pole: maximum fiscal hospitality with zero public capital deployment. The RIGI's 25% flat income tax, 30-40 year fiscal stability, 0% export duties from Year 3, and

full FX repatriation are a generous investment package, but the government deploys no sovereign lending, takes no equity positions, operates no state offtake agreements, and has explicitly divested from the battery value chain. De-risking is achieved entirely through regulatory certainty rather than capital injection.

The result is a high-variance model: Argentina has generated the largest critical minerals investment pipeline by dollar value of any jurisdiction in this study (USD $33.9B in RIGI applications), but it is also the most dependent on external commercial viability, lithium prices, copper commodity cycles, glacier law passage, that no amount of fiscal generosity can guarantee. When the market supports the economics, the RIGI is effective at attracting capital. When it does not, Argentina has no tools to bridge the gap.

The Resource Access State: Chile

Chile controls the world's most valuable mineral assets, the largest lithium reserves and 25% of global copper production, but does not invest public capital in mining in the way Australia or Japan does. Chile's instruments are about access: the National Lithium Strategy's CEOL framework, CORFO preferential pricing, and the NLS PPP structure work by making state-controlled resource access conditional on terms favourable to Chile. Private capital provides the investment; the state provides the resource and captures the rent. This model works when commodity prices are high and fails when they collapse, as BASF's cathode factory abandonment illustrated.

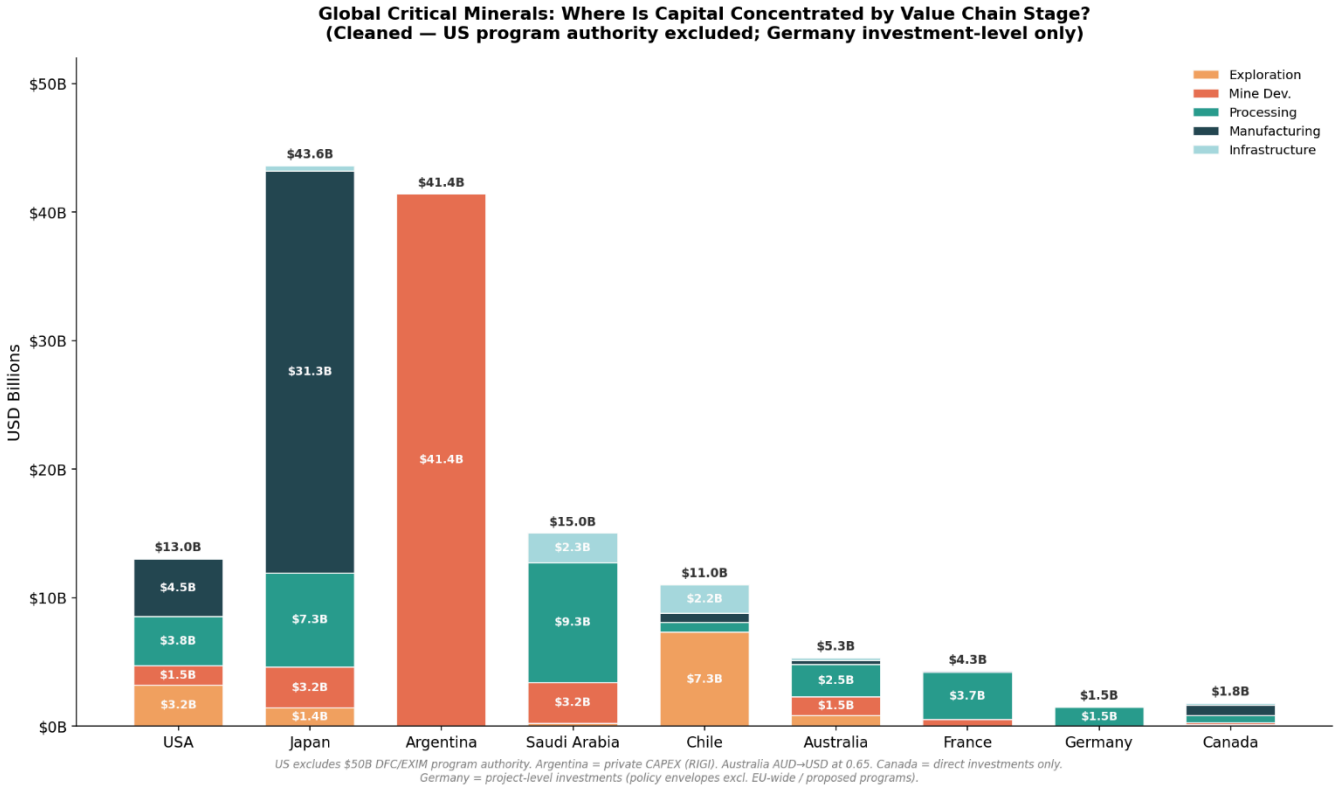
The Industrial Champions: France and Germany

France and Germany have no meaningful domestic mining and share a model rooted in their respective industrial champion ecosystems. France deploys policy tools such as France 2030 designations, CRMA strategic project status, and BpiFrance co-investment to support companies (i.e., Eramet, Orano, Solvay, Imerys, BRGM) that already have technical capabilities and international footprints. Germany does something structurally similar: KfW Rohstofffonds takes minority equity stakes in projects that have already achieved FID, while BMWK grants flow after construction commitments. Both operate on a co-investment model tied to private sector commitment, not a greenfield de-risking model. Both leverage the EU CRMA framework for permitting acceleration and EIB financing access. The distinction between the two is emphasis: France's model is more diplomatically expansive and focused on maintaining optionality across the full supply chain; Germany is narrower and more automotive-driven, its portfolio clustering almost entirely around lithium and graphite.

The Institutional Architect: United States

The United States has deployed the most instrument-diverse critical minerals policy apparatus of any jurisdiction in this study. Four primary institutions, DoD, DoE, EXIM Bank, and DFC, operate through a functional division of labour, each calibrated to a specific market failure and stage of the supply chain. 74% of US programmes name specific minerals rather than operating under a generic "critical minerals" umbrella. The MP Materials NdPr price floor, USURIF's resource-linked capitalisation, and Project Vault's extension of stockpiling logic to industrial users are genuine policy innovations with no equivalent elsewhere. Yet this architectural sophistication has been paired with a permitting regime designed for a different era: a pipeline of projects that cannot access financing because they cannot get through environmental review. This is a system failure that additional funding programmes cannot fix.

2. What Countries Are Actually Doing: Policy Coverage Across the Supply Chain

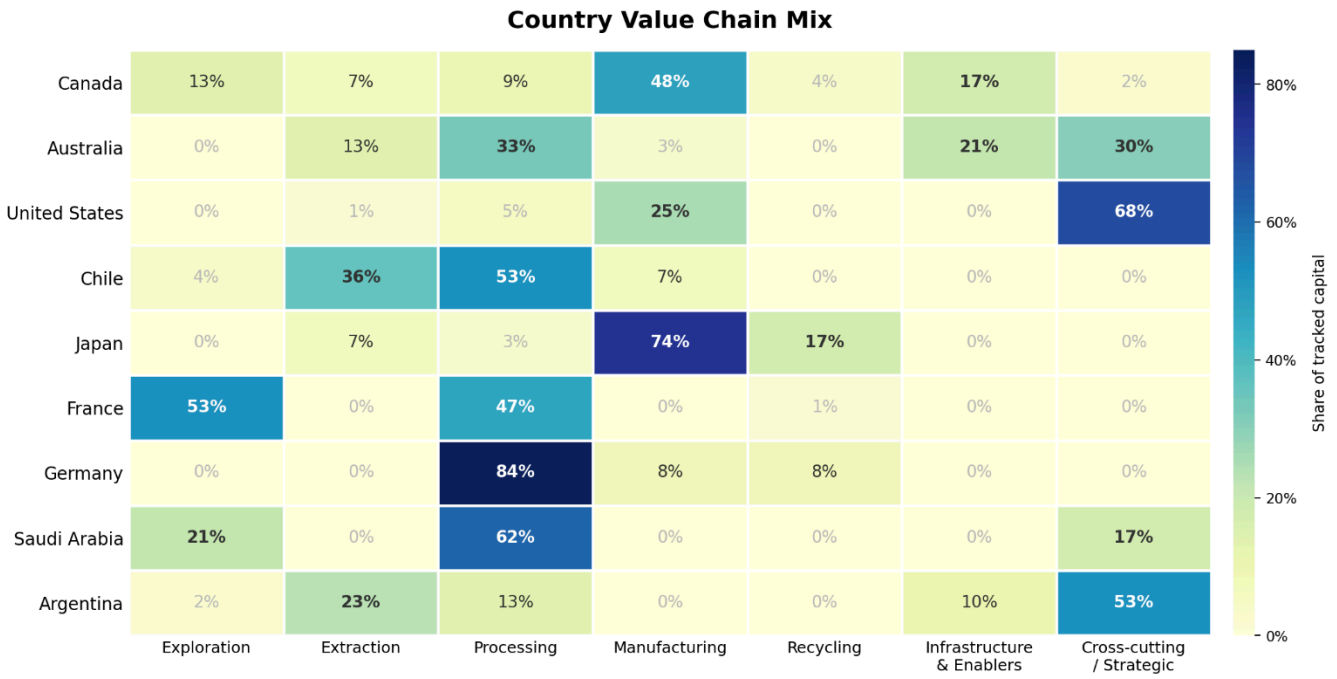


Upstream: Well-Served Across Jurisdictions

All eight jurisdictions deploy some form of upstream exploration support: geological mapping programmes, exploration grants or tax credits, or licensing reform. This is the least differentiated part of the landscape. Where jurisdictions diverge is in the quality and reach of their geoscience foundations. Japan's Earth Resource Map and Australia's Resourcing Australia's Prosperity programme ($566M over ten years, backed by Landsat Next satellite) are in a different league from Saudi Arabia's geological survey (three years old) or Germany's domestic geological data. The highest-return upstream investment any government makes is the one that reduces exploration risk for private capital, and this requires not just programme existence but decades of systematic data accumulation.

Midstream: The Critical Gap

The midstream processing story across all jurisdictions is the most important finding of this comparative analysis. The US rates only 20% "fully operational" for processing and refining. Australia's most consequential processing investment, the Eneabba REE refinery, is scheduled to open in 2026 but is not yet producing. Germany's AMG Bitterfeld battery-grade lithium hydroxide refinery, opened September 2024, is the only commercially operational example of battery-grade critical minerals processing among the G7 countries in this study. Japan's Caremag Dy/Tb separation facility will be the first non-Chinese heavy REE separation plant, targeted for end-2026. The midstream gap reflects the economic reality that midstream processing is capital-intensive, technically complex, commercially unproven at many stages of the supply chain, and exposed to commodity price volatility that makes project finance difficult to secure without some form of demand guarantee.



Demand-Side Architecture: The Most Underutilised Policy Tool

The demand-side gap is the most consistently underappreciated finding across all jurisdictions. Japan is the only country that has deliberately constructed a demand-pull architecture as the logical anchor for its supply chain investments: the Battery Industry Strategy subsidises downstream manufacturing capacity first, creating guaranteed demand that makes upstream and midstream investments commercially rational. The US IRA performed the same function until IRA uncertainty began undermining those signals in 2025. Australia's CMPTI is a supply-side subsidy searching for export markets rather than a demand-side anchor. Argentina's RIGI creates no domestic demand at all. Chile's CORFO preferential price programme, the only direct demand-side instrument in the Latin American cases, failed to retain BASF because below-market input pricing is not sufficient when the fundamental market signal is pointing in the wrong direction.

3. Cross-Cutting Findings

3.1 Bilateral Frameworks Are Proliferating, Commercial Outcomes Are Selective

Bilateral critical minerals frameworks have accelerated across all eight jurisdictions since 2023. The February 2026 US Critical Minerals Ministerial produced 11 new bilateral frameworks in a single event. The EU has signed strategic partnership MOUs with Argentina, Chile, Zambia, the DRC, Kazakhstan, and Canada. The important analytical question is whether bilateral frameworks are producing commercial outcomes or diplomatic optics. The most commercially productive bilaterals, Japan-Australia (Alcoa-Sojitz-JOGMEC gallium refinery, Pilbara Minerals-Sumitomo lithium hydroxide JV), US-Australia (EFA-EXIM $600M co-issuance to Tronox), share a common feature: a specific commercial project or technology transfer sits at the centre of the relationship. Bilateral frameworks without specific commercial anchors are generating diplomatic activity without commercial follow-through.

3.2 The DLE Technology Race

Direct Lithium Extraction (DLE) technology has emerged as a processing approach that, if it scales commercially, will fundamentally disrupt lithium supply chain geography by making extraction viable from sources that traditional evaporation pond technology cannot economically exploit. Three jurisdictions are at the frontier of

DLE deployment: Argentina (Eramet Centenario-Ratones, operational 2024; Rio Tinto Rincón, in development), France/Eramet (Ageli, deploying the same DLE technology in European geothermal brines), and Canada (EMP Metals Project Aurora, a SCMII-funded DLE demonstration plant in Saskatchewan). Eramet's commercial deployment in Argentina gives France a first-mover technology advantage in DLE, an industrially proven technology that no other country controls at commercial scale.

3.3 Social Licence Cannot Be Manufactured Through Policy Reform

Every jurisdiction confronts the social licence challenge in some form. France's EMILI project required a 42-event public consultation process involving 3,600 participants, despite having the highest possible level of political support and CRMA strategic project status. In Argentina, the glacier law reform passed the Senate 40-31 but faced protests in 35+ cities. The pattern across all jurisdictions is that regulatory acceleration, strategic project designation, and permitting streamlining all improve the process through which communities are consulted, but they do not change the underlying community acceptance of projects whose impacts are real and whose benefits are contested. The jurisdictions that have managed this most effectively have done so through decades of engagement, revenue-sharing agreements, and genuine incorporation of community interests into project design, not through regulatory fast-tracking. This creates a systematic bias in the critical minerals project portfolio toward lower-impact but also lower-strategic-value investments.

3.4 China's Export Restrictions as the Primary Demand Signal

The most powerful driver of critical minerals policy intensification across all jurisdictions has been China's escalating use of export restrictions as a geopolitical instrument. China's 2021 export restriction threats catalysed Australia's CMF expansion. China's July 2023 gallium and germanium export bans accelerated US, German, and Japanese policy responses. China's April 2025 rare earth export suspension triggered a cascade of bilateral framework agreements, stockpile activation decisions, and accelerated processing plant timelines across four jurisdictions simultaneously. The pattern means that the global critical minerals policy architecture is fundamentally reactive: jurisdictions are building the supply chain they should have built a decade ago, in response to supply shocks they could have anticipated but chose not to plan for at sufficient scale. Japan is the only jurisdiction in the study that has partially broken this pattern, by building policy infrastructure before crises arrive.

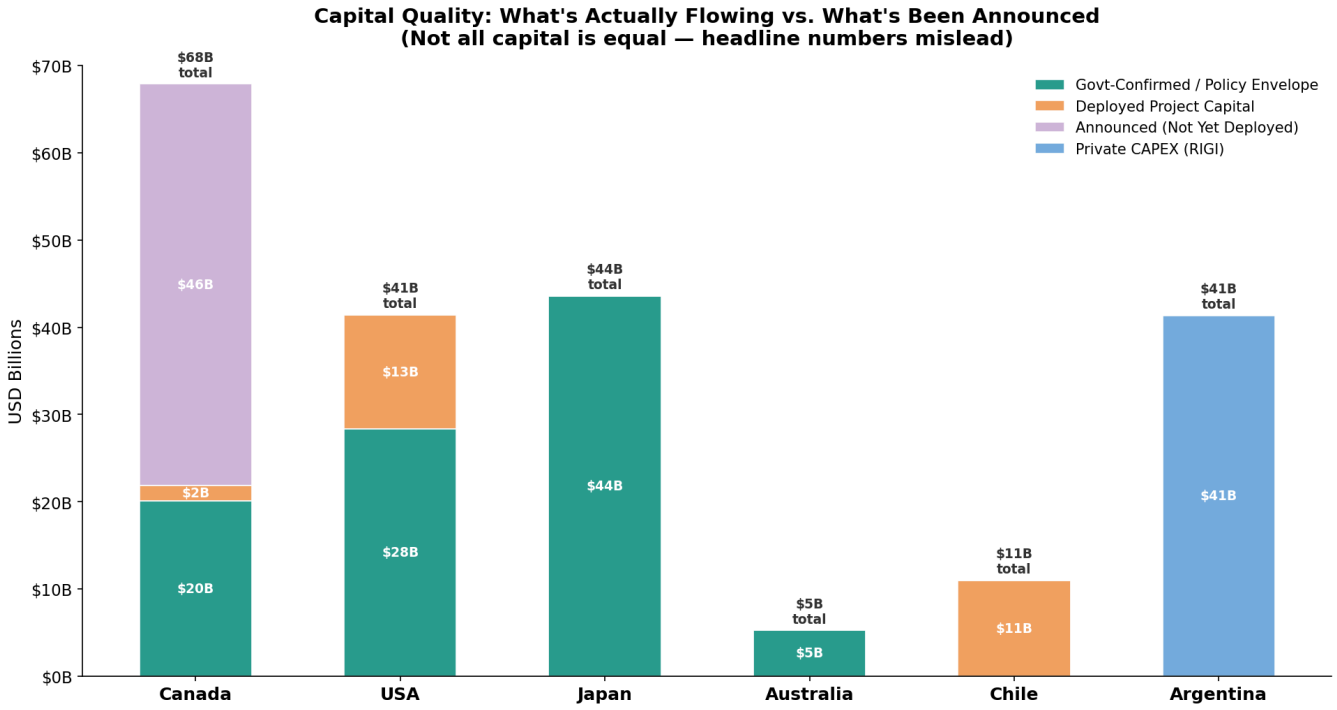
3.5 Capital is Upstream-Heavy Across All Jurisdictions

Capital and policy instruments cluster at the exploration and mine development stages across all ten jurisdictions. Germany, with 8 of 13 policies targeting midstream or downstream and the only commercially operational battery-grade LiOH refinery in Europe, is the exception. The US has zero operational domestic rare earth separation, zero commercial graphite processing for battery anodes, and no lithium chemical refining at scale. Canada's $500M Ontario CMPF processing fund had no announced recipients after three months of operation. Processing and refining is simultaneously the most capital-intensive, the most strategically critical, and the most chronically undercapitalized stage of the value chain globally.

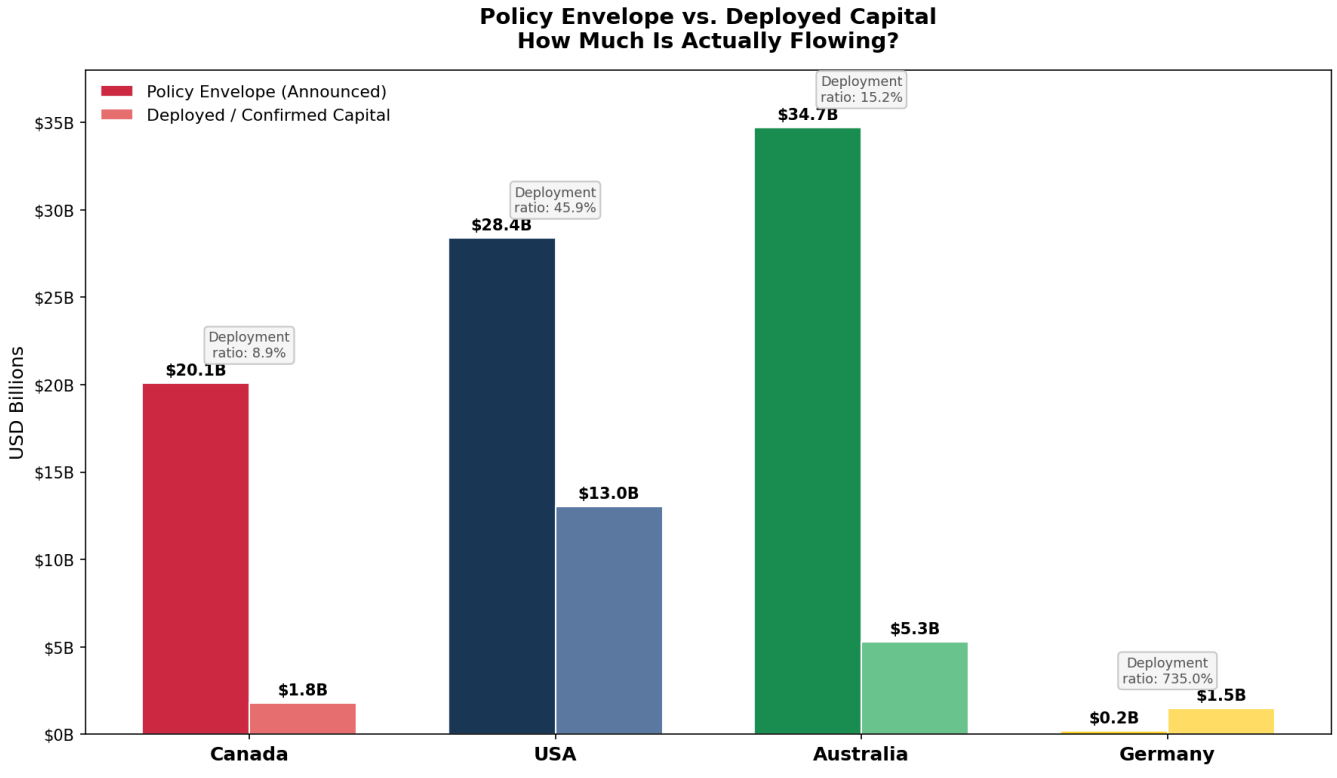
3.6 Public Capital Is Now a Prerequisite for Midstream Bankability

Every commercially significant midstream project in the dataset has public capital in the stack. Vulcan Energy Lionheart ($2B total): KfW equity (14%), EIB loan (€250M), federal Li4BAT grant (€204M), two state governments. Japan's Caremag heavy REE plant (€216M total): JOGMEC at €110M. Australia's Nolans REE project (AUD $895M): CMF sovereign loan, NRF equity consideration, NAIF co-lending, US EXIM letter of interest, Export Development Canada. Rock Tech Guben has a Mercedes 10,000 tpa anchor offtake covering 42% of capacity, and still has not fully financed. A private capital-only approach to midstream CM investment will systematically lose deals to blended stacks. The question for market entrants is which government programmes they can access or co-invest alongside.

3.7 Announced Capital Vastly Overstates Near-Term Production



Confirmed = government-deployed or firm policy envelope. Deployed = confirmed project grants/equity.
Private CAPEX (Argentina) = RIGI private commitments — zero public capital. US program authority ($50B DFC/EXIM) excluded from all totals shown here.



Germany policy = specific domestic programs only ($200M); EU-wide CRMA ($26B) and proposed Deutschlandfonds ($34.6B) excluded.
US deployed = confirmed project capital; US program authority ($50B DFC/EXIM) excluded. Canada bilateral data only.

Argentina's RIGI dataset makes this starkest: USD $41.4B in tracked project capex against zero new commercial production as of March 2026. The first RIGI-approved mining project (Rincón, $2.7B) had not broken ground on

industrial construction. The copper projects that would make Argentina a top-four global producer, Vicuña ($18B), El Pachón ($9.5B), MARA ($4B), target production no earlier than the early 2030s. Canada's 128 Major Projects Inventory entries show 104 planned against only 24 under construction. The lesson: treat announced pipelines as a leading indicator of future opportunity, not current supply.

3.8 Lithium Is Over-Targeted; REEs, Graphite, and Copper Are the Strategic Gaps

Canada has 16 federal lithium projects. Germany has 7 of 10 tracked investments in lithium. Australia's CMF committed $789M+ to lithium. Argentina's near-term RIGI pipeline is lithium-dominated. All of this happened as lithium prices fell from $80K/t in 2022 to ~$9K/t by early 2025, collapsing the commercial rationale for multiple projects. Meanwhile, REE separation outside China is represented by exactly two commercially operational facilities globally, Lynas Malaysia and Solvay La Rochelle. Graphite for battery anodes is almost entirely processed in China with no commercially operational Western alternative at scale. Copper, where Argentina's RIGI pipeline totals $37.8B in committed capex, is essential for electrification but has attracted far less public capital than lithium. These are not crowded markets. They are structural gaps that governments are willing to heavily subsidize.

4. Country-Level and Cross-Cutting Gaps (excl. Canada)

Jurisdiction	Primary Structural Gap	Description
Australia	Demand-side architecture	The CMPTI creates no domestic demand pull. Processing investments depend entirely on allied-nation offtake through the bilateral partnership network, politically durable but not contractually binding at the scale required.
Argentina	Capital de-risking for commercial-stage projects	No sovereign lending vehicle exists between regulatory approval and FID. Projects that are commercially marginal at current commodity prices have no public capital bridge. The glacier law outcome is a binary legislative risk with no policy fallback.
Chile	Downstream processing instruments	The state captures rent from production but has not built instruments (sovereign offtake, production subsidies, co-investment in midstream) that would make private downstream investment durable across commodity cycles.
France	Domestic extraction pipeline depth	Beyond EMILI and Ageli, the domestic mining pipeline is very thin. France's processing ambitions (Solvay, Orano) are stronger than its extraction ambitions, and social acceptance remains the binding constraint on new mines.
Germany	Domestic resource supply security	Germany has consciously deprioritised upstream extraction but has not yet secured contractually binding long-term offtake for its domestic processing facilities from non-Chinese upstream suppliers.
Japan	Heavy REE midstream gap	Caremag is the only planned non-Chinese Dy/Tb separation facility; until it opens (targeted end-2026), Japan remains ~100% China-dependent for the heavy REEs critical to EV motors and defence magnets.
Saudi Arabia	Execution gap between agreements and operational assets	The $9.3B domestic smelting programme and the overseas equity pipeline beyond Vale are at the announced and MOU stage, not yet operational.
United States	Permitting regime	Mine-to-production timelines average 16-29 years. The most sophisticated financing system in the dataset has been paired with a permitting regime that prevents projects from advancing regardless of available capital.

5. Entry Opportunity Map by Value Chain Position

5.1 Exploration and Geoscience

Canada has 100 active exploration projects and 194 advanced-stage assets across provinces. The NWT Mining Incentive Programme disburses $1.5M/yr across 127+ prospectors. CMETC, OJEP, and BC/SK provincial credits create a dense small-grant ecosystem. Entry is viable as a specialty explorer in underexplored geographies (NWT, Yukon, Labrador Corridor) or in under-targeted minerals (REEs, graphite, antimony). Generic lithium or copper exploration in well-mapped terranes faces intense competition for quality ground.

5.2 Mine Development and Project Finance

Canada's 128 Major Projects Inventory entries (104 planned) represent a decade-long development backlog. The average timeline from advanced project to first production in Canada is 7-12 years. Opportunities exist for: (1) project finance advisors who can navigate the CGF/EDC/CIB blended stack; (2) Indigenous engagement specialists given the 30+ CMIF Indigenous grants disbursed; (3) engineering and permitting firms with environmental assessment expertise. Argentina's RIGI offers an alternative for clients with higher risk appetite, faster approval, but binary legal and geological risk.

5.3 Processing and Refining

Highest strategic value, highest public subsidy, lowest private competition, reflecting a prime entry window. Germany's AMG Bitterfeld is Europe's only operational battery-grade LiOH refinery. Solvay La Rochelle is one of two non-Chinese commercial REE separation facilities globally. Canada's Ontario CMPF ($500M) has zero recipients. Québec's 17 existing processing facilities represent the best-positioned midstream industrial base in Canada but remain underutilised for CM applications. The window to anchor a first-mover processing position, with substantial government co-investment, is open now and will close as competing projects reach FID. Technology differentiation (DLE, urban mining, geothermal brine extraction) improves both subsidy eligibility and permitting speed.

5.4 Manufacturing and Downstream

Viable only with committed demand or government offtake. Ontario's EV battery manufacturing cluster (Honda, Stellantis-LGES, VW PowerCo) is Canada's downstream anchor. Japan's Battery Industry Strategy ($6.8B government pool) subsidised Toyota, Panasonic, and Honda gigafactory capacity before upstream supply was secured, creating guaranteed demand that pulled JOGMEC's upstream investments forward. Clients entering downstream without an equivalent anchor commitment face the bankability gap that has delayed Rock Tech Guben's financing. The viable entry: (1) component manufacturing tied to a named OEM offtake; (2) battery recycling (cylib's Dormagen facility in Germany, 60,000 tpa LFP recycling, 2027 target, is the proof of concept); or (3) technology licensing into manufacturer supply chains.

5.5 Jurisdiction Signals for Market Entrants

Canada: Most complete policy architecture of any jurisdiction. Blended finance (CGF + EDC + CIB + allied ECAs) is sophisticated and additive. The CMPA/GPI bilateral network is unmatched for mobilizing allied co-investment quickly. Risks include the $500M CMPF with zero recipients, the Sovereign Fund not yet launched, and 7-12 year permitting timelines signal persistent execution friction. Best entry: processing/refining projects that can access multiple public instruments simultaneously, particularly in Québec (17 existing facilities, low greenfield risk) or Ontario (anchor EV demand).

United States: Largest demand signal globally, but permitting remains the structural ceiling. Section 45X production tax credit is the most powerful demand-side instrument in the dataset, production-linked, scalable, and not dependent on government award cycles. DFC has deployed USD$41.2B in tracked CM capital. DoD DPA Title III moves fast and directly. The ceiling: US permitting was designed for a different era. Clients should target

processing/refining (where 45X applies immediately to production) or allied-nation supply backed by US EXIM LOIs.

Australia: Most complete supply-side architecture; processing transition real but fragile. AUD $8.1B in tracked sovereign investment. The bilateral network with US, Japan, Korea, Canada, and EU is generating commercial deals. Risk includes the fact that processing transition is commodity-price-sensitive. Clients should model for a sustained low-price environment, not the 2022 peak.

Germany: The midstream template with demand-side fragility as the lesson. AMG Bitterfeld is the global proof of concept for battery-grade midstream at scale. KfW's equity-anchor model (14% in Vulcan Lionheart) is more effective than Canada's grant-heavy approach. The warning: Rock Tech Guben's financing has not closed because Mercedes' 10,000 tpa offtake covers only 42% of capacity, the 58% gap is the bankability problem. Demand-side instruments need to accompany supply-side capital for midstream to work commercially.

Japan: The strategic template; not an entry market but the model to replicate. JOGMEC's USD$1B+ cumulative deployment across 100+ projects, the 34-mineral national stockpile (60-180 day buffer), ¥3.67T in GX Transition Bonds, and the demand-pull Battery Industry Strategy ($6.8B) represent a supply chain architecture no peer has matched. Japan is the model for how patient, integrated, demand-anchored supply chain investment works.

5.6 Principal Risks for Market Entrants

Commodity Price Swings (Critical): BASF abandoned its Chilean cathode plant when lithium fell to $9K/t. Rock Tech Guben's financing has not closed in a $9K/t environment. Germany's three midstream projects have no government production floor. Clients must model projects at $7-10K/t lithium, not the 2022 peak. Argentina's copper pipeline is more insulated (copper demand is structural) but the 2030s production timeline creates macro exposure.

Policy Stability (Critical): Chile's Kast government is reviewing the Boric-era NLS state-equity model. Argentina's RIGI provides 30-40 year stability windows precisely because eight sovereign defaults have made investors sceptical of any Argentine government's commitments. Canada's late-2025 policy acceleration reflects a government under external pressure, the instruments may outlast the political conditions that created them, or they may not.

Argentina, Legislative Uncertainty (High): Vicuña (USD$18B) and El Pachón (USD$9.5B) are contingent on glacier law legislation that had not passed as of March 2026. A negative outcome would delay these projects five to ten years and cascade through the global copper supply chain at precisely the moment electrification demand is creating a structural deficit.

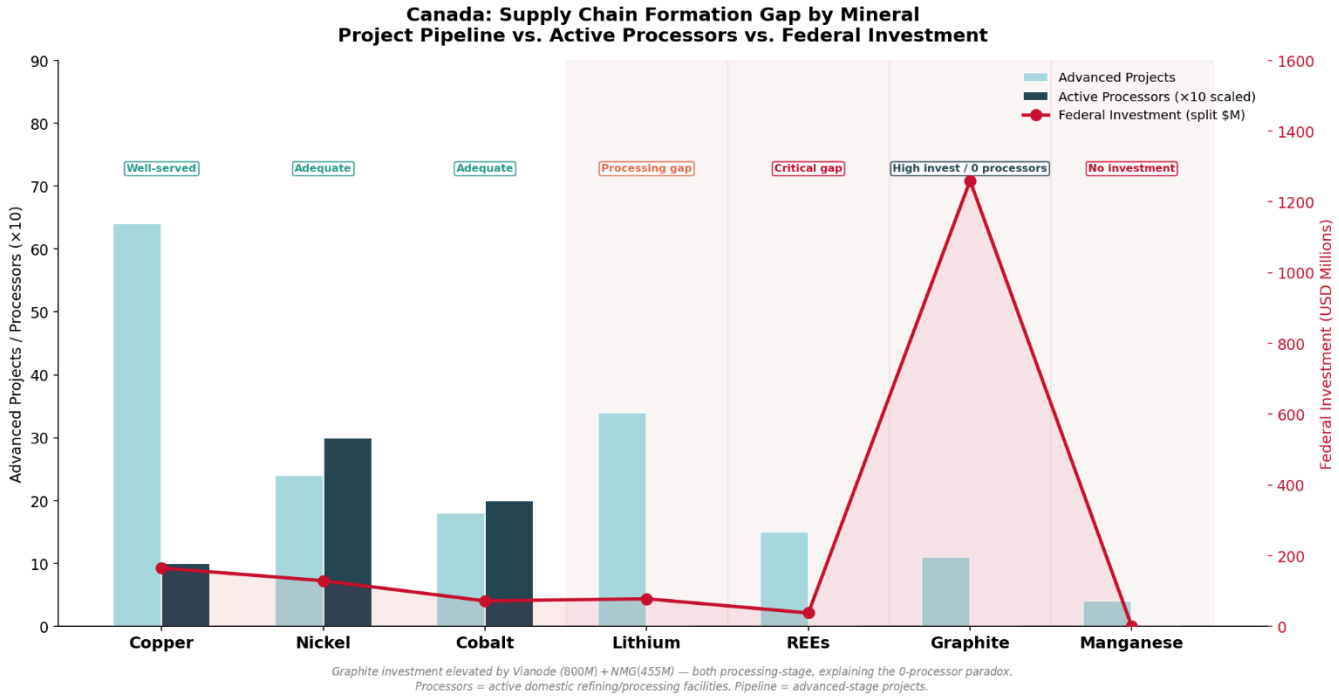
Allied US Dependency (High): Australia, Canada, and Japan have all organised significant portions of their supply chain strategies around the assumption that US demand-side policy (IRA, 45X, EXIM SCRI) will remain durable. The US-China REE pause agreement (October 2025, one-year term) illustrates how quickly the strategic framing can shift.

Canadian Implementation Lag (Moderate): Ontario CMPF: $500M fund, zero recipients after three months. Canada Sovereign Fund: announced 2025, not launched as of PDAC 2026. Frontier Lithium Thunder Bay: $120M federal conditional approval, no signed provincial agreement. Canadian policy announcements consistently lead commercial deployment by 12-24 months. Clients should build this lag into financial models.

Canada Provincial Comparative Analysis

The six Canadian provinces and territories examined in this study, British Columbia, Newfoundland and Labrador, Northwest Territories, Ontario, Québec, and Saskatchewan, represent substantially different approaches to critical minerals policy. Three dimensions cut across all six: their thesis on supply chain positioning, their use of direct capital instruments versus fiscal incentives, and their ability to leverage federal co-investment. Patterns across these three dimensions reveal more about what drives provincial performance than any single policy instrument.

Supply Chain Positioning



The provinces that perform well share a defined thesis of where they want to sit in the global critical minerals supply chain, with policy instruments that operationalise that ambition at multiple stages simultaneously. Québec's logic is hydropower cost advantage combined with mineral endowment resulting in clusters like the battery valley. Saskatchewan's logic is fiscal competitiveness paired with SRC technology platform which catalyzed REE processing. Ontario's logic is Ring of Fire opportunities, processing funding, and battery manufacturing incentives that create a full-chain but not yet developed ecosystem. Each connects geological endowment to a specific supply chain position through a specific set of policy mechanisms.

The provinces that underperform share a different characteristic: they have resource endowments but no proof of conversion. BC has exceptional geology and two decades of systematic geoscience but no articulated thesis of how BC specifically participates in the supply chain beyond discovery. NL has Voisey's Bay, Labrador iron ore, and the Julienne Lake Crown asset but has not yet operationalised a position of midstream value retention. The NWT has mineral potential but insufficient policy architecture to pursue it at all.

Capital Instruments Versus Fiscal Incentives

The most consequential difference across the six jurisdictions is between those that deploy direct capital instruments (Québec: SOQUEM; Ontario: CMPF, OJEP; Saskatchewan: SRC) and those that rely primarily on enabling mechanisms with no capital attached (BC: CM Office, Regional Tables, coordination agreements; NWT: MIP grants). Direct capital instruments can de-risk projects to the point of FID. Enabling mechanisms struggle to. BC's five no-budget instruments could explain its structural inability to attract the federal co-investment that Québec and Ontario access through their capital programmes.

Federal Leverage

Federal leverage is a function of provincial preparation, not provincial entitlement. The provinces that receive the most federal co-investment have done three things: articulated a clear strategy with designated minerals and measurable targets (making federal co-investment legible); built provincial capital instruments that federal funds can match (making co-investment structurally possible); and developed the administrative capacity to manage complex federal agreements (making co-investment operationally viable). Québec does all three. Ontario does the first and third, and is building the second. Saskatchewan does the first and partially the second, with a distinctive allied-nation diplomacy dimension via subnational bilateral partnerships (KOMIR MOU). NL does the first and is developing the third. BC and NWT do none of the three for capital instruments.

The Quebec-NWT contrast illustrates the mechanism most clearly. Québec published Canada's first subnational critical minerals strategy in 2020, two years before Ottawa's own strategy, and built the ministry coordination mechanisms, designated mineral lists, and multi-year funding frameworks that federal co-investment processes require as entry conditions. The NWT has none of these. Federal co-investment flows to jurisdictions that have done the prior institutional work to receive it. This is not about strategy documents alone; it is about whether a jurisdiction has built the processing and administrative infrastructure to absorb complex cost-sharing agreements, manage federal approval timelines, and coordinate across multiple federal departments simultaneously.

Ontario's federal leverage is proactive, initiating and pursuing specific outcomes (the Ontario-Canada Cooperation Agreement restructuring the Ring of Fire EA process, the SIF conditional approval for Frontier Lithium, the US DoD commitment to Electra through trilateral engagement). NL's federal leverage is participatory, engaging with a federal framework that exists independent of NL's own strategic priorities (the Canada-NL Regional Energy and Resource Table).

The Temporal Dimension

Québec's battery valley strategy was designed in 2020 and was well ahead of federal and peer-province thinking at the time. It is now experiencing the vulnerability of a strategy built on a demand assumption that has weakened (IRA dependence, Northvolt bankruptcy, GM-POSCO Phase 2 suspension). Saskatchewan's incentive model was well-calibrated to established commodities and is now testing its applicability to emerging ones. Ontario's comprehensive framework is still ahead of its deployment record.

The provinces most at risk in the medium term are those whose strategies are dependent on a single external condition holding, such as Quebec’s dependence on external policies (i.e., US’ IRA). The most resilient policy architectures are those, like Saskatchewan's for established commodities, that have multiple pathways to success and are not contingent on any single external variable. Building that resilience, across multiple minerals, multiple supply chain stages, and multiple demand destinations, is the next-order challenge for every province in this analysis.

Conclusion

The critical minerals policy landscape has undergone a fundamental structural shift in the three years since China's July 2023 export restrictions on gallium and germanium catalyzed a coordinated response among allied nations. Across eight sovereign jurisdictions and six Canadian provinces, this study documents not merely an intensification of investment in a strategically important sector, but a more consequential transition: the now widespread institutional recognition that critical minerals supply chains cannot be secured through market mechanisms alone, and that the state must act as investor, guarantor, and architect of the industrial conditions necessary to mobilize private capital at the required scale and within the necessary time frame.

The findings across jurisdictions are less encouraging than the headline investment figures suggest. The gap between announced project pipelines and operational production is the single most important insight to emerge from this study. Argentina has USD 26 billion in RIGI-approved mining projects, yet as of March 2026, none has generated new commercial production. In Canada, Ontario's Critical Minerals Processing Fund had announced no recipients three months after its C$500 million launch. In Australia, the country's most consequential processing investment, the Eneabba rare earth refinery, is scheduled to open in 2026 but has not yet reached commercial-scale production. The United States deploys more capital through more institutions than any other jurisdiction in this study, yet it still has no domestic rare earth separation capacity, no commercial graphite processing for battery anodes, and no lithium chemical refining at scale.

1. What the Analysis Reveals

The eight sovereign jurisdictions examined in this study represent five distinct policy models, each reflecting a different approach to converting geological endowment or industrial capacity into broader critical mineral value and supply chains.

Japan and Australia are the two main sovereign capital deployers: both operate state financing vehicles that take equity positions, provide concessional debt, and pair capital deployment with bilateral partnership networks that translate geopolitical relationships into commercial commitments. Japan's demand-pull architecture, which subsidizes downstream manufacturing capacity first and then justifies upstream investment through guaranteed offtake contrasts with Australia's supply-push model, which depends on allied partners to generate the demand necessary to make processing economics viable. When that allied demand signal weakens, as uncertainty surrounding the IRA demonstrated in 2025, Australia's processing investments become exposed in ways that Japan's do not. Argentina represents the pure liberalizer: maximum fiscal incentives with no public capital deployment. The RIGI's thirty-year stability window, full FX repatriation, and Day 1 international arbitration access address the correct market failures for a jurisdiction with Argentina's institutional history. The model works when market conditions support project economics and has no limited instruments when they do not.

Chile is a resource-access state: the government does not invest directly into mining companies, but instead makes state-controlled resource access conditional on terms favourable to Chile. This is efficient for a resource-dominant state, but it creates a structural dependence on private capital, whose willingness to invest fluctuates with commodity prices.

France and Germany represent the industrial-champion model: both deploy policy instruments to support companies that already possess technical capabilities and international footprints, rather than creating new industrial actors from scratch.

The United States has deployed the most institutionally diverse policy apparatus of any jurisdiction in the study, combining genuinely innovative instruments, albeit with a permitting regime designed for a different era. The most sophisticated government financing system in the dataset has thus been paired with mine-to-production timelines averaging 16 to 29 years.

2. The Canadian Provincial Dimension

The provincial analysis reveals a pattern that mirrors the sovereign cases: performance is determined not solely by the size of a province's mineral endowment, but by whether it has a coherent approach to supply chain positioning and the policy instruments needed to operationalize that position across multiple stages simultaneously. Québec has spearheaded North America's first rare earth metals production and a 15 percent share of national exploration spending, achieved five years ahead of target. Ontario has the most comprehensive framework in English Canada, but the fact that its C$500 million Critical Minerals Processing Fund had no announced recipients three months after launch illustrates the gap between policy ambition and implementation that could undermine the province's supply chain trajectory.

British Columbia and the Northwest Territories illustrate that geological endowment without a capital instrument is commercially insufficient. British Columbia has built a governance architecture without a financing architecture. The Northwest Territories has built neither. Federal co-investment, the mechanism through which smaller provinces and territories can amplify limited capital budgets, flows to jurisdictions that have completed the prior institutional groundwork needed to receive it. This includes publishing strategies with designated minerals and measurable targets, establishing provincial capital instruments that federal funds can match, and developing the administrative capacity to manage complex, multi-department cost-sharing agreements. The contrast between Québec and the Northwest Territories, for example, makes this reality visible.

3. The Cross-Cutting Risks

Three risks cut across all jurisdictions, regardless of policy model, and warrant explicit forward-looking attention.

The gap between announced investment and operational production is systematic: Argentina's RIGI pipeline, Canada's Major Projects Inventory, Australia's CMF commitments, and Germany's set of midstream projects all demonstrate that committed capital is not equivalent to operationalization. Announced pipelines are a leading indicator of future supply chain contribution, but not of current production capacity. Clients and policymakers who treat the two as equivalent will consistently overestimate near-term supply security.

Lithium is structurally over-targeted, while rare earth elements, graphite, and copper represent the strategic gaps: Multiple jurisdictions have concentrated public capital in lithium precisely as lithium prices collapsed from US$80,000 per tonne in 2022 to approximately US$9,000 per tonne by early 2025. Meanwhile, rare earth separation outside China is commercially operational at exactly two facilities globally: Lynas Malaysia and Solvay La Rochelle. Graphite processing for battery anodes has no Western commercial-scale alternative. Copper, which Argentina's RIGI pipeline addresses at scale, is essential to electrification and traditional industries but has received far less sovereign capital than lithium. These structural gaps persist despite high subsidy eligibility and more limited private competition.

Policy architectures built on external variables are fragile: Québec's battery valley strategy was architecturally coherent and ahead of its time, but it is now under stress because it was built on the assumption that US IRA-driven EV manufacturing demand would grow at projected rates. Australia's processing transition depends on allied bilateral offtake arrangements that are diplomatically durable but not contractually binding at the scale required. Argentina's copper pipeline depends (for now) on glacier-law legislation that, as of March 2026, had not passed the lower house. More resilient architectures, such as Saskatchewan's for established commodities and Japan's across the supply chain, are those with multiple pathways to commercial viability and are not contingent on any single external variable holding.

4. The Decade Ahead

The global critical minerals policy architecture is undergoing its most consequential reorientation since the energy transition became a mainstream industrial policy priority. The escalation of China's export restrictions, on gallium and germanium in 2023, and on rare earths in 2025, has transformed what was once a long-term structural concern into an immediate supply chain management challenge for governments across the allied world. That urgency has generated investment commitments at a scale and speed that no purely market-driven process would have produced.

What these commitments have not yet produced is the processing and refining capacity that determines whether raw material exports are converted into full domestic or allied value chains. The period between current investment commitments and first production, ranging from five years for advanced projects to fifteen+ years for greenfield mega-projects, is the window in which the competitive structure of the allied critical minerals supply chain will be determined. The jurisdictions that use this period to establish first-mover positions in processing, supported by blended public-private financing stacks, demand-side anchors, and bilateral off-take relationships, will shape the supply chain architecture on which the next decade of manufacturing capacity will depend.

The central analytical takeaway is that policy ambition and industrial delivery are often misaligned, and the distance between them varies enormously across jurisdictions. Policy decisions that account for domestic realities, international partnerships, and geopolitical uncertainty must be prioritized by decision makers. But this is easier said than done, particularly in the context of supply chain security and recent onshoring trends. Whether allied nations cooperate to leverage comparative advantages or individually pursue full domestic value chain developments remains to be seen. The crucial point for governments will be to mitigate the commitment to delivery gap, while remaining cognizant of limited fiscal and bureaucratic capacity, as well as changing market and geopolitical dynamics.