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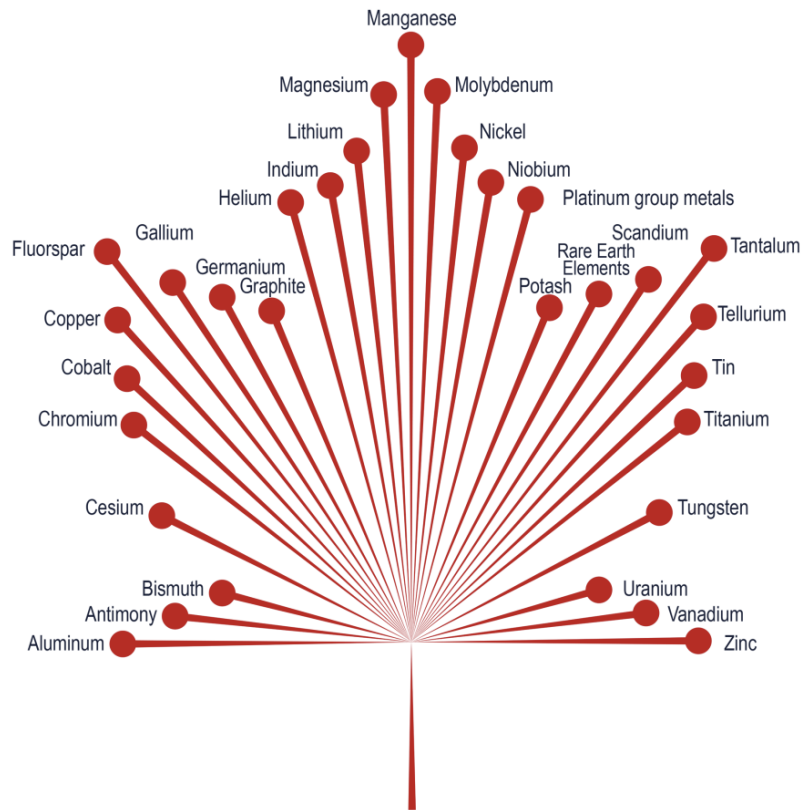
## **Canada's Role in the Global Political Economy of Critical Minerals: A Critical Approach to Geopolitics, Resource-making, and Statecraft**

**Cecily F. M. Wells**

### **Abstract:**

Access to critical minerals is increasingly a point of discussion and action with respect to low-carbon energy transitions and national security priorities (IRENA 2024). This research critically investigates how Canada is positioning itself within an evolving global political economy as a preferred partner and choice supplier of critical minerals through provincial, territorial, and federal strategies. I employ conceptual understandings of resource-making, constituted by discursive and representational techniques (Li 2014), alongside state-making, wherein practices of knowledge production and statecraft enact and render the state coherent (Zhou 2022). Using a methodological approach which combines document analyses and interviews with expert stakeholders, the research identifies intersecting discourses of criticality, urgency, potentiality, security, and responsibility which shape resource becoming and state-making processes (Valdivia et al. 2022). Situated at the productive intersection of critical resource geographies and critical geopolitics, I demonstrate the value of examining Canadian critical mineral strategies through a 'more-than-mining approach'. Rather than just extraction making possible minerals' 'work in the world', certain resources are constructed as 'critical', valuable, and useful through spatio-temporally specific appraisals. A second facet of the framing is its illumination of alternatives along supply chains. Through critical analyses of domestic and extra-territorial initiatives of statecraft, I argue that different ways of knowing and interacting with resources can be made possible. Significant contributions are therefore made by delineating the intersections of derisking and Indigenous communities' economic participation in critical mineral projects, and resource diplomacy activities where bilateral partnerships support innovations to develop circular economies for critical mineral supply chains. I thus extend the value of critical approaches to statecraft, geological and economic potential, and discourses of security and responsibility as geopolitical concerns which shape how Canada positions itself as a "global supplier of choice" and a "leading mining nation" (NRCan 2022; Mines Canada 2020).

**Canada's Role in the Global Political Economy of Critical Minerals: A Critical Approach to Geopolitics, Resource-making, and Statecraft**



Source: Natural Resources Canada (2021).

Cecily F. M. Wells

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## **List of Abbreviations**

**AB:** Alberta

**BC FNEMC:** British Columbia First Nations Energy and Mining Council

**BC:** British Columbia

**BGS:** British Geological Survey

**CIRNAC:** Crown-Indigenous Relations and Northern Affairs Canada

**CMA UK:** Critical Minerals Association United Kingdom

**CMCE:** Critical Minerals Centre of Excellence (Natural Resources Canada)

**CMMP:** Canadian Minerals and Metals Plan

**CSM:** Critical and Strategic Minerals

**FDI:** Foreign Direct Investment

**FTS:** Flow-Through Shares

**GAC:** Global Affairs Canada

**GSC:** Geoscience Canada

**IAS:** Investment Attraction Strategy (Government of Saskatchewan)

**ICA:** Investment Canada Act

**IEA:** International Energy Agency

**IQ:** Investissement Québec

**IRENA:** International Renewable Energy Agency

**MAC:** Mining Association of Canada

**MB:** Manitoba

**MRNF:** Ministère des Ressources naturelles et des Forêts

**NL:** Newfoundland and Labrador

**NRC:** National Research Council of Canada

**NRCan:** Natural Resources Canada

**NS:** Nova Scotia

**NU:** Nunavut

**NWT:** Northwest Territories

**ON:** Ontario

**PDAC:** Prospectors and Developers Association of Canada (Convention)

**PEI:** Prince Edward Island

**QC:** Québec

**QPDCSM:** Québec Plan for the Development of Critical and Strategic Minerals

**REEs:** Rare Earth Elements

**SIIFC:** Saskatchewan Indigenous Investment Finance Corporation

**SK:** Saskatchewan

**SOQUÉM:** Société Québécoise d'Exploration Minière

**SRC:** Saskatchewan Research Council

**US:** United States of America

**YT:** (The) Yukon



### **Statement of Copyright**

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## **1 Introduction**

This research investigates Canada's evolving role in the global political economy of critical minerals. It investigates how critical minerals 'become' resources, gaining significance through their appraisal and construction as valuable and accessible features of Canadian geology by federal, provincial, and territorial strategies and aligned policies. In turn, it considers how Canadian state space is scripted as an investible assemblage with reference to derisking investments and supply chains, and driving innovation. To illustrate the latter, the research focuses on evolving bilateral partnerships between Canada and the UK, offering a novel geopolitical contribution to an emerging research agenda on statecraft, resources, and circular economies in clean energy transitions. Located at the productive intersection of critical resource geographies and critical geopolitics, the thesis is anchored in a conceptual framework of 'resource-making' and 'state-making' and contributes to a growing body of geographical scholarship within this integrative space.

The thesis demonstrates that approaches to develop domestic critical minerals supply chains in Canada constitute a 'more-than-mining story' in a two-fold sense. Firstly, I argue that mining – from prospecting to commercially viable extraction – is in fact made possible through the way in which critical minerals and the land in which they are held are assembled as investible resources. Secondly, I highlight the importance of focusing beyond the mining of these minerals and towards strategic approaches to develop and enhance midstream and downstream processes. This reflects Canadian jurisdictions' intentions to develop comprehensive supply chains for low-carbon technologies through approaches of derisking and strategic partnerships especially oriented towards research and development (R&D) and circular economies (NRCan 2022b). The vision of integrating circularity into value chains connects with notions of future security and sustainability of supply which sit alongside responsibility and its underpinning by environmental, social, and governance (ESG) and Indigenous (ESGI) standards and values (Statistics Canada 2023: 15). Thinking empirically and conceptually across the Canadian case in this way serves to illuminate the sets of discourses, practices, and relations shaping how Canada positions itself within the evolving international political economy of critical minerals. More widely, it explores how the acceleration of critical mineral development takes place alongside attendance to socio-economic and environmental concerns. This is significant where minerals are in part deemed 'critical' for their role in socio-economically and environmentally 'just' low-carbon energy transitions (Sovacool et al. 2020; UN News 2023).

My enquiry comes at a developmental moment in the evolving geopolitical and geoeconomic landscape of the global political economy of those critical raw materials (CRMs) considered integral to – and subject to increasing anticipated demand for – clean energy transitions (IRENA 2023a, 2024; World Bank 2020). In this context, significant emphasis is placed on developing renewable energy production and reaching net-zero or negative emissions scenarios in ways that are both just and sustainable (UNEP 2024). As a “fuel” for these transition visions, critical minerals are deemed vital components in the renewable energy technologies central to such transitions, from hybrid and electric vehicles (EVs) to solar photovoltaics (PVs) and wind turbines (IEA 2021). With this and national defence concerns in mind, multiple western states have published critical mineral strategies as responses to concerns around supply security and mineral production levels to meet forecasted demand (e.g. European Commission (EC) 2023; Australia Gov. 2023; UK Gov. 2023). This trajectory connects to geopolitical concerns which promote the localisation and diversification of supply chains to achieve “reduce[d] dependence on potential adversaries” and “greater strategic autonomy” (IRENA 2024: 49). This manifests in strategic visions of on- or re-shoring, near-shoring, and friend-shoring critical mineral supply chains. Canada is a nation engaging in ‘on-shoring’ to meet domestic demand as well as positioning itself as “a global supplier of choice” for those jurisdictions undertaking ‘friend-shoring’ policies (NRCan 2022b: 2).

Speaking to this contemporary geopolitical moment, my study is proximate to international relations (IR) and conventional geopolitics literatures. Kalantzakos’ work across these disciplines considers the creation of “hotspots of contention” (2019: 1) and a “scramble” and “race” (2020: 7) within critical mineral supply chains, which I problematise in Chapter 4. Similarly, Pitron’s (2022: 146) book on the “rare metals race” touches on critical minerals strategies and interdependencies with reference to countries’ overlapping mineral lists. His discussion is empirically grounded on inter-state comparisons, particularly relative to Chinese dominance in supply chains, the reliance of western countries on China as a result of this dominance, and the threat of the potential deployment of this “geopolitical weapon against the west” (ibid.). While such approaches have value in drawing attention to concentrations and dependencies along supply chains, a critical perspective is valuable for problematising and demonstrating alternative ways of thinking about these taken-for-granted assessments of and rhetoric around geopolitical relations, their consequences, and the responses that derive from these framings. Parts of my analysis therefore apply a critical conceptualisation of resource

nationalism to consider its state-making effect through a specific set of discursive practices (Childs 2016). By problematising the discursive effect of rhetoric and specific practices on territory, state power, and national identity (Huber 2019), critical resource nationalism is differentiated from political science uses of the concept as a reference to actions including increased state control of resources via nationalisation (Bremmer & Johnston 2009).

Applying a critical lens to offer a rethinking of some of these ideas from the political and economic sciences, my research extends approaches in critical resource geographies and critical geopolitics. In so doing, I seek to deepen understandings of how certain framings, discourses, and practices are shaping current and future dynamics of the global political economy around critical minerals. I respond to an established body of work which examines how resources, societies, and the state are co-constituted (Watts & Peluso 2013; Bridge 2014; Huber 2019). A central conceptual grounding is therefore “how things become resources” (i.e. resource-making) and then the “work that these resources do in the world” (i.e. state-making) (Valdivia et al. 2021: 3). In conversation with this core literature, my analytical approach is informed by that developed by Li (2014), Bruun (2018), Fry and Murphy (2021), amongst others, where they draw insights from the intersections between discourses, scientific practices, and techniques of calculation and visualisation. Taking this further, I bring in critical geopolitical concepts of scripting state space, nation branding, and resource diplomacy where these help to unpack how discourses and practices of statecraft can influence the spatialisation and imagination of resource spaces and futures (Müller 2013; Browning & de Oliveira 2017; Alderman & Eggeling 2024). Situated at this junction, my research and its empirical focus contribute to a growing body of literature which delineates how resources and resource ‘worlds’ are constructed through critical mineral strategies together with the future pathways for resource economies and state geo-power they may preclude or occlude.

Canada offers a relevant set of empirics on which to focus such investigation. There is an existing critical literature which is focused on Canada’s resource history as an extractive state (e.g. Bélanger 2017; Peyton & Keeling 2017; Stanley 2016). For resource- and state-making perspectives, Bélanger’s (2017: 415) reading of Canada’s resource history strikes upon useful understandings of the country’s foreign policy as both “mining *in* Canada” and “mining *for* Canada”. Furthermore, Braun’s (2000: 38) work on the production of resources as vertical territory in late-18<sup>th</sup> century Canada is significant for its use of Canadian empirics and conceptualisation of “seeing geologically” as a way of rendering land and the ‘things’ held

within it legible to the state as statistically and economically significant resources. This connects with Scott's (1998) problematisation of how such mechanisms of classifying and abstracting space facilitate new modes of state governmentality over people *and* resources. By thinking across multiple scales of Canadian critical mineral strategies, including the evolving bilateral partnership with the UK, my thesis offers a set of empirics from the past five years which adds to these and other studies examining Canada from a resource perspective. I also build on recent literatures focused on Australia's approach to critical minerals on which I draw heavily from an analytical-conceptual standing (Hine et al. 2023; Ferguson et al. 2023).

The thesis is structured across six further chapters. Firstly, the following Section 1.1 develops the aims and objectives of the study, while Chapter 2 details its theoretical and conceptual foundations. Chapter 3 outlines the research design with a discussion of case selection, empirical framing, data collection and analysis, and a reflection on methodological challenges. Chapters 4-6 constitute the body of the thesis' analysis and discussion and are structured to reflect the research questions (outlined in Section 1.1) and the progression of analytical enquiry. Chapter 4 begins by considering resource-making as a constitutive aspect of critical mineral strategies and how the minerals on which they focus 'become' critical and rendered legible, known, accessible, and investible as resources. Chapter 5 then builds on these foundations to understand how these resources are enrolled in state-making practices. This particularly unpacks the role of certain forms of knowledge production in making new frontiers of resource activity known and actionable, and how practices of derisking investment support this through the production of investibility. Chapter 6 deepens this discussion by focusing on practices of statecraft where they impact cross-border elements of supply chains. The chapter unfolds by firstly considering discourses of security employed in efforts to derisk supply chains before turning to elements of evolving strategic partnerships. This includes engaging with practices around nation branding and investment attraction before focusing on how circularity is being integrated into value chains through bilateral partnerships with the UK and UK-based actors. Chapter 7 reflects on the core arguments and contributions of the research for theory and policy, considers the study's limitations, suggests further avenues of enquiry.

### **1.1 Aims, Objectives, and Research Questions**

The overarching aim of this research is to understand how Canada is positioning itself within the evolving international political economy of CRMs through the conceptual and analytical use of resource- and state-making perspectives. Focused on critical mineral strategies

alongside aligned plans and policies, I examine how certain mineral opportunities ‘become’ resources and Canadian state space is geopolitically scripted as investible resources. Oriented towards efforts to increase clean energy technologies while reducing mineral dependencies through supply chain diversification and controlling against perceived risks, these strategic approaches constitute political as much as economic goals (Antweiler 2024). Strategy documents are therefore empirically central to my research and its contribution to understanding the role of critical mineral strategies in mobilising resources and positioning the state in specific ways (Ibid.). My research therefore makes contributions to a growing research agenda examining the uptick of recent years in the development and enactment of critical mineral strategies (e.g. Hine et al. 2023; Vivoda 2023; Ferguson et al. 2023), and understanding which mineral resources are emerging as objects of significance, for whom, where, and when (Kama 2019) and in relation to what “networks of power and expertise” (Koch 2022: 95).

Reflecting this political-economic specificity of critical mineral appraisals, a further objective of the thesis is to problematise the spatio-temporal differences which shape that which constitutes a ‘resource’ of strategic concern. For instance, the Task and Finish Group’s (2023) report to the UK government refers to critical raw materials (CRMs). Québec, rather, differentiates critical from strategic minerals, respectively, as those mineral resources that are “important for understanding our current economy”, and those which are “going to be important to implement government plans” (Participant 11; QC 2020b). Therefore, while I refer to ‘critical minerals’ throughout this thesis, it is a central objective of my research to deconstruct the various discourses and practices which intersect to appraise and mobilise certain minerals as ‘critical’ and as ‘resources’ (Valdivia et al. 2022). Second-order contributions pertain to exploring emergent on- and friend-shoring practices in mineral supply chains (Vivoda 2023; Riofrancos 2022) and the unfolding global critical minerals political economy where trust, transparency, and sustainability are increasingly central (ICMM 2023).

With these aims and objectives in mind, my research responds to the following questions:

How are ‘critical’ minerals in Canada rendered valuable and accessible resources?

How are investibility and the state co-constituted through practices of de-risking?

What influence do Canada-UK bilateral partnerships have on the scripting of Canadian space as investible resources?

## **2 Literature Review**

At the intersection of critical resource geography and critical geopolitics literatures, this research is built upon a two-fold conceptual framework anchored in resource-making and state-making approaches. It seeks to illuminate how, when, for whom, and to what effect Canadian space is being scripted as investible resources through federal and sub-national critical mineral strategies and evolving bilateral partnerships (Koch & Perreault 2019; Watts & Peluso 2013). To outline the research's theoretical and conceptual background, this chapter reviews literatures which ground resource-making and state-making perspectives, and connects these to nested concepts including scaling and geopolitical scripts.

### **2.1 Resource-making**

Resource-making highlights historico-geographical contingencies whereby 'resources' are a product of politics, economics, and culture, not just the physical world (Bridge 2009; Furlong & Norman 2015). Chapter 4 reproduces a set of arguments from this body of literature, beginning with a consideration of the deployment of 'criticality' – a discourse through which certain minerals are rendered valuable and visible as resources (Valdivia et al. 2022). I specifically approach 'criticality' as connected with other discourses and practices focusing particularly on relationalities and temporalities of resource-making alongside inscriptive devices and techniques of picturing and 'placing' potential (Fry & Murphy 2021; Kneas 2020) These central conceptual and analytical approaches are developed through this section.

For critical minerals, ascriptions of 'criticality' can derive from material aspects – availability and access – as well as political-economic contexts such as supply risk, low-carbon economies, and ESG responsibilities (Schellens & Gisladottir 2018). 'Criticality' is approached as discourse (Machacek 2017) and as such constitutes a fundamental step in the resource-making of certain Canadian minerals. This contingent nature of criticality invites questions around how and for whom "resources matter", which in turn demands examination of practices and framings which render resources and their effects possible in the world – resource-becoming (Valdivia et al. 2022: 8). Indeed, critical minerals lists are regularly revised, with the Canadian federal government in June 2024 releasing updated criteria for mineral criticality and adding three minerals (high-purity iron, silicon metal, and phosphorous) to its original list from 2021 (NRCan 2024b). With this in mind, I note Machacek's (2017) suggestion that discourse, as it works through 'criticality' assessments and variously scaled resource strategies can influence the meanings of political issues and the roles of certain actors and institutions. In this

sense, to construct a resource as ‘critical’ has an impact on the overarching vision which is considered possible and desirable with respect to the resource futures of which ‘critical’ minerals are considered drivers.

### **2.1.1 Assembling resources: discourses, representations, and inscription devices**

To unpack the role of discursive and representational techniques in resource-becoming is to focus on conceptualisations of resource assemblages. Discourses, technologies, materialities, and relations are understood to be co-constitutive elements of assemblages which underpin analyses of how, by whom, and to what effect minerals and mineral-endowed spaces ‘become’ and are made visible and investible as ‘resources’ (Li 2014; Valdivia et al. 2022). Resource-making literature examines how processes of “enrolling, aligning, smoothing, authoring, and managing” work to stabilise the assemblage of land as an investible resource (Müller & Schuur 2016: 220). Li’s (2014) approach offers a productive conceptualisation here of how discourses intersect with inscription and statistical picturing devices to illuminate how ‘natural’ resources are in fact calculated and categorised to render them “knowable and exploitable” (Kama 2019: 334; Himley 2021). That is, cultural work is done to assemble a resource as available for some purposes and interests to the exclusion of others (Li 2014). Li’s work itself speaks to Richardson & Weszkalnys’ (2014: 6-7) discussion of “resource materialities” which offers a foundational conceptualisation of assemblages as arrangements of “physical stuff, extractive infrastructures, calculative devices, discourses [...], the nation and the corporation”. In this understanding, the concept of materialities invites reflection on how the material aspects of resources impact everyday life.

A key example of inscription which my discussion considers is informed by conceptualisations of how “temporalities” of resource-making operate through discursive framings in addition to the materialities of certain minerals as “ways of assembling the resources” (Kama 2021: 64; Weszkalnys 2023). This informs my analysis of how notions of ‘criticality’ intersect with other discourses, such as that of urgency, to demonstrate the entanglement of temporality with processes of resource-becoming (Bridge 2017). As such, while it is important to consider the material qualities and geological potential of a critical mineral resource, temporalities and other relationalities are important facets of criticality assessments and thus appraisals of value and utility as resources. Examples of temporalities which can “make” and “unmake” resources here include the urgency of their demand as well as the lead times between exploration and mining to processing a commodity and putting it on the market (Kama 2021: 61). This poses



questions including: “under what conditions and with what consequences do people find something to be a resource”; what temporal concepts or narratives are derived from thinking of “things as resources”; and, how are particular understandings of the past, present, and future shaped by the “making and imagining of resources” (Ferry & Limbert 2008: 4). Subject to my analysis is therefore how Canadian appraisals of criticality are shaped by material, relational, and temporal elements within a process of resource-making through specific discursive and calculative techniques (Bakker & Bridge 2006). This informs an understanding of the co-constitution of discourses, practices, and representations in assembling resources (Li 2014).

### ***2.1.2 Quantifying and ‘placing’ resource potential***

Discourses of potentiality constitute further elements of resource-making. These build on the role of inscription devices through the use of scientific assessments, statistical picturings, and placings of mineral potential. I consider potentiality both in geological terms, in relation to mineral type, abundance, quality, and location, as well as from an economic viewpoint with respect to investibility and potential returns from investments and the market. I approach these as two ‘moments’ of resource-making.

Richardson and Weszkalnys (2014: 5) consider how “potentiality” is linked with the material, social, and historical environments in which resources are “constituted”. Through this conceptualisation, the assembling of resources is connected to the notions, calculations, and mobilisations of potentiality through rhetoric, graphs, and maps which “conjure” geological and economic potential as a means of producing desirable, valuable, and accessible resources in state space (Fry & Murphy 2021: 6). This framing of potentiality highlights the speculative power of inscription (Section 2.1.1) and statistical picturing techniques as “spectacles of resource abundance” and “promises of economic and political prosperity proffered by resource-producing nations” (Kneas 2017: 847; Tsing 2004). In this way, calculations and representations constitute speculative suggestions of geological and economic potential which, in turn, seek to affect a “mining boosterism” as a turning point for critical mineral supply chain development (Kneas 2017: 846). These techniques together work to reimagine the subsurface in specific ways – in relation to selected discourses, relational framings, and visions of resource futures – and thereby bring certain minerals into being as resources: objects of political and economic calculation.

A further facet to these speculative practices is their mobilisation of a productive possibility underpinned by uncertainty (Kuchler & Bridge 2023). Extending Tsing's (2004) conceptualisation of how anticipatory techniques of assessing and presenting potential underpin speculative economic futures, a focus on uncertainty foregrounds the deployment and effect of "impotentiality" (Kneas 2020: 269). Significant here is the at once productive yet precarious impact of such uncertainty on projections of potentiality. Bridging across resource- and state-making analyses focused on geoscientific assessments and cartographic placings of potential, there is a significance of that which is left, or presented as, "empty" (Hine et al. 2023: 243). In turn, a notion of emptiness can constitute anticipatory articulations of geological and economic potential, such as "underexplored" yet "prospective" spaces in-between 'known' mineral occurrences (Hickin et al. 2023: 4). Moreover, as Kneas (2020) observes, significant efforts by junior mining exploration firms seek to counteract the risk and probability of not locating commercially viable deposits through their rhetorical and geospatial 'placings' of potential (Section 2.3). However, while unknowns can be productive of speculative possibility as a simultaneous "negat[ion] of uncertainty and assert[ion] of possibilities about futures tied to subsurface resources" (Fry & Murphy 2021: 2), these projections can also be destabilised by uncertainties. For example, recognising observations about the market volatility of critical minerals (Antweiler 2024), I consider how this may contribute to the fragility of projections of economic potential (Section 4.2). This critique is preceded by, and offers a counterpoint to, discussion of the use of relational and temporal framings with respect to external jurisdictions' critical mineral demands, such as their current lists and forecasted demands. That is, while "making [a] resource worthy of continued exploitation" is dependent on "creating visions of possible futures through resource speculations" (Fry & Murphy 2021: 2; Weszkalnys 2015), such "conjured" speculations (Tsing 2000: 118) and an "[economic] language of probability ... and possibility" (Braun 2000: 25) to bring minerals into being as geologic reserves and material resources, and thus investible entities, do not constitute a foregone conclusion nor a stable process (Fry & Murphy 2021: 3). Rather, resources can be subject to processes of "making" *and* "unmaking" where current and future risks operate and, indeed, can be conjured themselves to drive certain narratives or visions of resource futures, such as those centred on particular state-private capital investment relations (Ibid.: 9; Kama 2020; Gabor 2023).

Mineral potentiality is not just conjured through quantifications and visualisations via statistical picturings to shape processes of resource becoming and the constitution of an

assemblage of investible resources. Also significant is how potential is ‘placed’ within rhetoric, space, and in relation to certain economic opportunities (Hine et al. 2023). This invites examination of “the physical and discursive ‘placing’ of resources” to demonstrate how certain actors “[put] resources into the subsoil” through narratives and representational rhetoric around the geological and economic potential of certain mineral opportunities (Kneas 2020: 277). This conceptualisation therefore considers how rhetoric and representation, particularly through cartographies, influence the scripting of space. It connects with the effects of inscription and statistical picturing devices to show how projections, calculations, and visualisations of subterranean mineral potential – or lack thereof – are put to work in sustaining certain political economic projects and visions of the state (Kuchler & Bridge 2023). Analytically useful for my examination of potentiality and resource becoming is Kneas’s (2020) observation of efforts to strategically co-locate resources with certain infrastructures or economic ‘opportunities’ more widely. This extends the conceptualisation of potential as ‘placed’ relationally within certain discursive rhetoric. It also signifies a bridge between resource- and state-making processes as the ‘placing’ of potential in space is also significant for a process of scaling resources to the territorial extent of the state. However, as I consider in Section 5.1, the ‘placing’ of potential within rhetoric and space can obscure or exclude other resource lives, such as those of Indigenous communities – indeed, the framing of unknown, empty space as discoverable potential for the state is anchored on such practices (Hine et al. 2023: 243). I consider the conceptual literature around this further in Section 2.2, specifically with consideration to the impact of geological knowledge production on state-making processes.

It is through projections and ‘placing’ that constructive logics aim to generate investment and exploration opportunities around certain minerals. This particularly takes place through practices of “speculation” and “anticipatory” orientations which seek to create and maintain certain possible futures, anchored around notions of resource potential (Ibid.: 2; Fry & Murphy 2021). Imagining the possibilities of resource extraction in this way, and to the potential exclusion of alternative visions (Sax & Tubb 2021; Zalik 2010), is to render certain resources as “actionable in the present” by invoking anticipated future value through “pre-emptive calculative practices” (Kuchler & Bridge 2023: 4; Frynas & Buur 2020). This discussion of the role of speculative practices, as they underpin projections and placings of potential, links to broader concerns around the multiple, intersecting discourses and techniques of calculation and representation which permeate narratives around and approaches to critical minerals.

They exert influence on “resource imaginaries” and the “imagined futures of resource use” which are articulated through critical mineral strategies (Sax & Tubb 2021: 3).

The analytical orientation towards the resource-making role of potentiality also informs my research on state-making. I particularly consider Zhou’s (2022: 7) work on symbolic state-making and its results in terms of differentiating “what is articulated and what manifests materially”. Here, potentiality contributes to a set of conceptual ideas around how the state coheres around certain discourses and practices which position resources as valuable and exploitable within the territorial extent of the state. I link this spatial scripting to how new spaces – frontiers – have become targets of mineral exploration and exploitation where discourses of potential, but also the productive possibilities generated through notions of emptiness and the unknown, intersect with geological assessments and representations (Peyton & Keeling 2017; Bruun 2018). Taking this approach allows me to connect moments of resource-making, in this instance projections and placings of resource potentiality – with efforts of state building that involve geoscientific knowledge production and statecraft.

## **2.2 State-making**

There is a productive intersection between resource- and state-making perspectives which I explore through the initial stages of Chapter 5. Indeed, critical resource geography literature considers these to be mutually constitutive processes which shape a resource-state nexus (Bridge 2014; Valdivia et al. 2022). Taking Bruun’s (2018) understanding that minerals are “rendered legible” through scientific techniques and practices used for mineral prospecting, I stress the utility of this conceptual bridge for analysing the state-making effect alongside discursive and cartographic modes of representation. State-building is therefore approached with an understanding that the state’s power and ‘effect’ are co-constituted by discourses and maps through practices of mineral prospecting and knowledge production and modes of representation which constitute them and are specific to certain political and economic contexts (Ibid.; Koch 2022). This perspective speaks to critical geopolitics research which observes that inscriptions “manifest geopolitical ideas” alongside “technologies [which make] territories calculable” (Müller 2012). Ultimately, a focus on state-making and resources considers how certain minerals and the lands in which they occur are “brought into the political realm of the state” (Bruun 2018: 29; Bridge & Frederiksen 2012). As I take the state to be an “unbounded terrain of powers and techniques, an ensemble of discourses, rules, and practices” (Harris 2012: 26), the resource-state nexus approach speaks to how the state is

rendered coherent and acquires 'effect' through (re-)orderings of socio-natural environments and spatial imaginaries (Bridge 2014; Mitchell 1991). Importantly, my analysis approaches the state as "one scale among many" to understand how it is geographically and temporally specific, and both an "object" and "effect", without reifying it as the predominant scale of analysis. (Koch 2015: 30). Indeed, my research's turn to domestic and international scales of statecraft, particularly through strategic partnerships, foregrounds an understanding that imaginative geographies unfold and have influence at a range of spatial scales (Ibid.). With this conceptual background, the following sub-sections trace the underpinning literature of my research's engagement with mechanisms of geological knowledge production, resource nationalism discourses, and modes of statecraft as they influence processes of state-making. Before doing so, however, I outline my theoretical engagement with the concept of the 'state'.

A foundational understanding of what the state is and how it comes to be and be known is provided by Painter's (2006: 761) observation that the state emerges as an "imagined collective actor" through narrative and discourse, such as the "telling of stories of statehood and the production of narrative accounts of state power". In this way, a notion of "stateness" refers to how states, and their historical and geographical associations, can be read in relation to how the state is "understood, experienced, and constituted through everyday spaces, practices, and narrations" (Koch 2018: 27). This is reiterated in Koch's (2022: 8) observation that "[a] state can't be made real by cartographers alone"; it is "fashioned in people's imaginations, and built into a palpable, material presence". This conceptualisation can be connected to Scott's (1998) argument that efforts by the state to simplify, categorise, calculate, and homogenise space, and that which is contained within it, constitutes an exercise of spatialised authority which reifies the state. Resources and the state are therefore produced through intersecting practices and discourses which influence how they are understood and operate in the world (Valdivia et al. 2021). The following section extends this way of understanding the constitution of the state.

### ***2.2.1 Constituting and enacting the state: the resource-state nexus and a geopolitics of differentiation***

The resource-state nexus unveils the material and ideological co-production and territorialisation of the state and its resources as a basis for state power (Huber 2019; Le Billon 2013). For Bridge (2014: 120), this occurs through "technopolitical" processes whereby resources are employed to define the territory and consolidate the nation-state's administrative capacity. This perspective seeks to understand how the state articulates itself

and its authority through claims around critical mineral resources, e.g. discourses of potentiality, security, urgency, and responsibility. Another way of understanding this is presented through Frederiksen's (2013) discussion which seeks to make visible how the conjuring of resources in specific ways can be generative of state power where the latter is underpinned by knowledge production, such as cartographic representations of prospecting data (Bruun 2018). Similarly, by examining the interconnections between geological knowledge production, resource nationalism, and state territorialisation, Marston (2019: 1) demonstrates how the subterranean is produced as "vertical state territory". Here, the subsoil is rendered a "rationalised realm of the state" through scientific techniques of calculating and representing geological potential (Ibid.). Resources are thereby rendered politically and economically legible as a means to enrol them in state-making projects. By extension, examining how processes of state-making unfold in this way also invites understandings that "resource-making shapes socioecological relations around which 'the state' coheres" (Valdivia et al. 2022: 8; Braun 2000). This is to stress that the constructed nature of the state and its 'effect' and power are connected to the ways in which resources 'become' through techniques of calculability and legibility (Mitchell 1991; Valdivia et al. 2022).

One site of state-making takes place through rendering new frontiers for critical minerals activities knowable and actionable to the state (Himley 2021). This involves constructing land and its minerals as legible resources in geo-economic terms through geoscientific and cartographic techniques (Braun 2000). It is in this way that geologists have a role in the "process of state building" with respect to the use of geological knowledge in mobilising specific understandings of minerals' value towards the consolidation of state power (Elden 2013). For instance, cartographic presentations of geological potential operate as vectors through which claims and control over state can shift between actors, such as by overriding Indigenous territorial land claims and livelihoods in favour of state geo-power (Marston 2019). Linking these ideas to the scripting of Canadian space, I note Peyton and Keeling's (2017: 119) discussion of maps as technologies which position Canada as an "empty-yet-full resource space" and a country whose "economic, social, and political organisation is determined by [the] spatial distribution of extractive activities". Similarly, Bélanger (2017: 341) examines how "the representational media of knowledge" of images, charts, inventories etc. help form a "visible empire" centred on Canada's mining history. This connects representational techniques to the state's deployment of territory as an international lever alongside statistical

assessments of Canada's "development ... into a modern industrial state" and continued nation-building on a foundation of (subsurface) resources (Ibid.: 395). At the intersection of state-making and resource nationalism, it is observed that elites and state planners harness national resources and landscapes to promote an image of a modern state, albeit ambiguous and locally defined. This is explored further in Section 2.2.2's concerns with resource nationalism and geoscientific knowledge production as aspects of state-making. Before doing so, however, I consider the role of a geopolitics of differentiation in relation to the state 'effect'.

An important point at which discursive and representational practices of assembling investible resources intersect with state-making is the articulation of a geopolitics of difference. This refers to the way in which geoscientific knowledge and representations of critical mineral potential are positioned relationally to other, external opportunities. Himley (2021: 1) demonstrates this analytical orientation through an examination of how dynamics of "geopolitical differentiation" and "ontological de-differentiation" – alongside scientific knowledge practices – played a role in rendering knowable and desirable Peru's mineral resources. It is therefore useful to reflect on questions around the role of differentiation for Canadian critical mineral strategies as the state works to position itself as a global "trusted and reliable supplier of responsibly sourced mineral and metal products" (NRCan 2022b: 33). I particularly consider the wider implications of this critical strand of resource geography and geopolitical literature to understand how the identification, depiction, and enrolment of critical minerals advances certain geopolitical interests and agendas of the state within a broader, international geopolitical economy (O'Lear 2016). This is to connect the 'making' of subsoil resources with modes of producing "vertical" or "volumetric" territory in service of the state (Himley 2020: 74; Braun 2000). It is at this point of intersection that I turn attention to resource nationalism as an element of state-making to further develop a conceptual and analytical approach focused on the scripting of Canadian space as investible resources through derisking and international investment interests and partnerships.

### ***2.2.2 Resource nationalism, geoscientific knowledge production, and the constitution of vertical state territory***

Resource nationalism has been a much-referenced concept in IR and political science literatures. However, its exploration in critical geographies is more recent and offers to reframe questions around the state's coherence and 'effect' over a delimited, yet abstract, space – the nation's territory containing people and resources (Mitchell 1991; Koch 2013; Huber 2018).

Resource nationalism, conceptualised as a discourse through a critical lens, is understood to manifest as a “state-resource relation” and thereby constitute a form of state-making (Childs 2016: 539). Another way of viewing this is that resources figure centrally in “imaginative geographies of the nation”, and so the way in which they are represented and rendered significant has important implications for shaping the resource futures envisioned by the state (Laing 2020: 28; Perreault & Valdivia 2010; Pellegrini 2018). Such understandings invite an analytical approach that unpacks “geopolitical discourse[s] about sovereignty, the state, and territory” alongside the value and significance ascribed to resources (Koch & Perreault 2019: 612). In such understandings, discourses are considered “narratives and representations”, including in combination with action and structure, and have a central role in shaping “geopolitical articulation[s]” of resource nationalism vis-à-vis the state-building deployment of geographical imaginations and identity (Bouzarovski & Bassin 2011: 4; Koch 2022).

Resource nationalism policies and discourses are articulated through shifting languages of control and national identity which legitimise and scale resource claims to the territorial extent of the ‘state’ (Childs 2016). Here, Bouzarovski and Bassin (2011: 9) find that discursive texts and practices accompany political actions to reflect materialities and “geographical imaginations” linked to resource nationalism. For example, they demonstrate how Putin’s “energy superpower” discourse enrolls energy resources in state efforts to reshape the balance of power at national and international scales (Ibid.: 6). This is demonstrative of a broader conceptual link between state-making efforts and discourses mobilised within a resource nationalism vision. Here, sovereignty over resources and national identity is understood to intersect with other resource narratives, such as security and urgency, to constitute the political economy of resources in new ways. For example, recent, related work in critical political science literature has highlighted how emergent lithium extraction frontiers in Québec illustrate the centrality of such industries to a region’s identity, economy, and politics (Kingsbury & Wilkinson 2023). Indeed, foregrounding a resource nationalist discourse which brings resources into the realm of the state and state identity, the Mining Act of Québec states that “mining has helped forge [Québec’s] identity and should continue to be a source of pride” (Ibid.: 1). I link this to recent critical geographical approaches to resource nationalism which interrogate who is bounding the nation in such visions, who is defining the benefit of resources and their extraction and for whom, and who is deciding where and within what timeframe any benefits ought to materialise (Marston 2019). This framing moves resource nationalism beyond



more conventional engagements with the concept as an objective fact or geopolitical phenomena – such as the state’s involvement in domestic resource activities through protectionism. Rather, it attends critically to resource nationalism’s uneven, fluctuating nature and the multiple actors and scales which articulate it (Ibid.: 3; Andreasson 2015).

Resource nationalism can be utilised further to draw attention to the production of vertical state territory and the enactment – or mobilisation – of the substrata as (potentially) resource abundant (Marston 2019; Braun 2000). Extending Section 2.1’s discussion of scientific, infographic, and cartographic assessments and presentations of potential, a resource nationalism focus points to the impact of geoscientific knowledge production on how resources are enrolled by and for the state (Ibid.). This can result in a consolidation of the state’s geo-power over the territorial, or spatial, extent of the state (Huber 2018). That is, geoscientific knowledge constitutes a way in which resources and the land in which they are contained become knowable and thereby controllable to the state (Scott 1998). Moreover, the presentation of geological knowledge scales resources to the territorial extent of the state. In these ways, a resource nationalist discourse focused on domestic opportunities contributes to a mobilisation of resources in the “construction of the modern territorial state” (Huber 2018: 556). This is to contribute to a growing literature on non-human nature’s use values and their role in the state’s project of accumulation and territoriality (Parenti 2015).

However, this enrolment of resources in constituting the state can also obscure other ways of knowing and relating to resources and resource lands. This is arguably an important effect for resource- and state-making purposes as notions of emptiness, particularly of populations seeking to claim sovereignty over certain spaces (Stanley 2016), can be just as significant as locating resource abundance (Peyton & Keeling 2017; Marston 2019). A further element of this is where the discursive notion of a resource nation can involve or elide engagement with multiple voices across different scales within the state (Childs 2016). This is part of the broader impacts of resource mapping strategies as they aim to “produce the ‘body’ of the nation” and constitute a legitimising basis for the territorial and institutional dimensions of authority embodied by the state (Bridge 2014: 1-2). The obfuscation of alternative understandings and relations with resource spaces can therefore be unpacked by drawing attention to the construction of vertical state territory through resource nationalism and geological knowledge production lenses. Specifically, this focus enables an examination of what or who is excluded from mapping geological knowledge and invites consideration of counter-mapping practices

(Avila et al. 2021). My research therefore considers alternative understandings by multiply scaled actors which may otherwise be obscured or neglected by state-focused analyses through resource nationalism lenses (Marston 2019; Himley 2021).

Finally, I consider resource nationalism's approach to discursive and representational resource-state constructions through cartographic constructions and mobilisations of vertical state territory (Braun 2000). Here, I find useful Foucault's understanding that techniques of power intersect with knowledge and space as they operate through maps as discourse (Foucault 1991; Li 2014). This expands approaches to resource nationalism as an "ensemble of material practices and symbolic understandings through which resources are enrolled in constructions of nationalism and the nation" (Perreault 2020: 236). This points to the combined roles of presenting geological knowledge through cartographic practices and the symbolisms which work alongside these through discourses of the state's resource potential and differentiation (Himley 2014; Marston 2019). The 'critical' aspect of these orientations also foregrounds political economic and cultural political processes and their influence on senses of national belonging in resource-importing and -exporting states (Koch & Perreault 2019). As discussed in the previous paragraph, my research considers such questions in relation to those elements of the Canadian critical minerals resource 'story' that are obscured or excluded. Together, these resource nationalism and resource-state nexus considerations in relation to knowledge production, presentation, and obfuscation support my research's examination of how government policy and discourse mobilise mineral resources in co-constituting the state. I trace how this takes place across scales to constitute and maintain statehood and influence the production of territorially- and state-defined societies (Zhou 2022). A related concern is Riofrancos' (2022) conceptualisation of a security-sustainability nexus which considers how these two issues, or discourses, permeate the state's languages and practices around critical minerals. My discussion in Section 6.1 particularly extends this idea in relation to mechanisms of statecraft and scripting state space.

### ***2.2.3 Investibility and practices of diplomatic and economic statecraft***

My research draws on conceptualisations of mechanisms of statecraft as a further influence on processes of state-making. Following analyses of economic initiatives of statecraft through critical mineral strategies by Ferguson et al. (2023), I consider statecraft and domestic and extra-territorial or international levels. I connect this with my conceptual and analytical use of resource diplomacy as a form of diplomatic statecraft, such as nation branding (see Section

2.3's expanded discussion of this nested concept and spatial scripting) and knowledge-sharing focuses of international partnerships (Alderman & Eggeling 2024). As such, I build on existing critical geopolitical work examining resource diplomacy in the context of Africa-China relations focused on developmentalism (Power & Mohan 2010; Power et al. 2012). To understand how investibility is produced – a core concern of my research's focus on the geopolitical scripting of resource spaces – I adopt a statecraft-focused analysis to illuminate a two-fold derisking approach (investment derisking and 'securing' supply chains) and extra-territorial orientations to investment attraction and innovating circular economies through strategic partnerships.

Connecting state-making with practices of statecraft, I draw on a critical microfinance framing of critical mineral expansions through Gabor's (2023: 4-5) definition of the "de-risking state" and its role in the "production of investibility". This conceptualisation has emerged from recent research around financialisation, derisking investment, and generating "investibility" in the context of green industrial transformations and low-carbon transitions (Gabor 2021; Franz & McNelly 2023). A focus on investibility also links to a growing research agenda in development geographies which has considered the notion of "rendering (Development) investible" (Taggart & Power 2024: 2). Incorporating these ideas of derisking and producing investibility into my analysis lends specificity to languages and practices articulating investment climates as the state seeks to incentivise and facilitate investments from certain actors. Intersecting with such calculations of and approaches towards risk (and derisking) is Li's (2014: 600) understanding of how investment managers seek to raise capital through similar devices to economic initiatives of statecraft, particularly approaches that involve discourses and inscriptions in assembling investible resources. In this way, the approaches of critical resource geography connect with this young critical green finance literature and its examination of how private and public actors' engagement in de-risking strategies for green investments are taking place in part through modes of statecraft (de los Reyes 2022; Elsner et al. 2022). I therefore bring derisking as a concept and objective of specific modes of statecraft into my interrogation of how critical minerals are employed in rendering the state coherent.

Gabor (2023) frames practices of derisking along similar lines to Ferguson et al. (2023) by understanding domestic initiatives of economic statecraft to include policies such as tax credits, loans, and other means of incentivising investment. Specifically, Gabor (2021: 434) takes de-risking tools to include financial instruments such as public subsidies, tax incentives, loan guarantees, direct grants, and flow-through shares (see also Stanley 2016). In this way,

Gabor's approach to the derisking state and understanding of its practices and logics of statecraft complements Ferguson et al.'s (2023) consideration of how the Australian state, through its critical mineral strategy, has sought to derisk new projects through domestic initiatives of statecraft. In this way, I expand the literature peripheries of my research by connecting critical resource geography and critical geopolitical literatures to those of statecraft-focused geoeconomics and critical microfinance. I also extend Gabor's (2023) research on how public and private capital relations are shifting in the context of green industrial energy transitions and the role of economic statecraft in these processes. While I focus on Canadian critical mineral strategies, particularly the use of flow-through shares (FTS) and provincial-level programmes in Québec and Saskatchewan, Gabor has focused a derisking analysis and critique of global South developmentalism on the evolving green hydrogen economy (Gabor & Sylla 2023).

While I discuss investment derisking and statecraft in relation to a discourse of responsibility, or a 'responsibilisation' of investment (see Section 5.2), I also focus on efforts to derisk critical mineral supply chains from the perspective of security. Here, I focus on practices and policies of securitisation around supply chains and investments into them as a means to 'derisk' supply both for Canada and its allies. This is particularly significant where Canadian strategies articulate discourses of security in relation to strategic adversaries or "non-like-minded countries" (NRCan 2022b: 1; Vivoda et al. 2024), and where Canadian supply chains are differentiated as safe, reliable, and secure (Himley 2021). I refer here to "logics of securitisation" and their role in enrolling certain resources as focuses and tools of statecraft (Bridge 2015: 330). Securitisation is conceptualised as a "set of acts and practices" and underpinned by a performative language of security and influential knowledge practices (e.g. assessments, definitions, visualisations) which constitute certain relations, particularly shaping political-ecological relations between the state and resources (Ibid.). The effects of logics and practices of securitisation through statecraft is thus to enclose and thereby dispossess some actors or jurisdictions of access to opportunities in the name of 'security' (Hildyard et al. 2012). I examine these logics in the context of Canadian two-fold efforts to securitise foreign investments into critical mineral supply chains *and* by extension boost the security of supply for allied consumers. That is, my discussion critically analyses how investments into supply chains are being securitised through a framing of derisking as underpinned by visions of energy, economic, and national security and the development of

supply chain diversification (Zhou 2022). This builds on Sovacool et al.'s (2023) discussion of the use of existing and prospective security risks as diplomatic negotiating tools and as objectives for establishing capacity or control in the geopolitical context surrounding low-carbon transitions and visions of resource futures.

Reflecting on the progression of my analysis towards cross-border elements of supply chains in Section 6.1, the final two sections of Chapter 6 consider the intersection of diplomatic and economic initiatives of statecraft through investment attraction and strategic partnerships, specifically evolving bilateral engagements between Canada, sub-federal Canadian jurisdictions, and the UK. Here, I analyse relations through the lens of resource diplomacy, conceptualised in critical geopolitical literatures as an object of diplomatic statecraft which works alongside economic initiatives (Power & Mohan 2010). In doing so, I contribute to Alderman and Eggeling's (2024) notion of nation branding as diplomatic statecraft and further Ferguson et al.'s (2023) economic statecraft-focused analysis of the Australian critical mineral strategies' use of partnerships.

Diplomatic initiatives of statecraft can enhance the production of investibility where they work alongside the objectives of economic instruments. One key example of this is nation branding, a critical geopolitics concept which analytically combines focuses on practices of diplomatic statecraft with effects of (geo-)spatial scripting (Alderman & Eggeling 2024; Browning & de Oliveira 2017). Such orientations conceptualise that national vision documents can be used to script state space as they "mobilise discourses of the nation", its "symbolic value", and "narrate distinction and difference" to shape relations and experiences for citizens and consumers with respect to resources (Saifer 2020: 562). For example, I consider where and how such nation-focused discourses intersect with practices and discourses around security and responsibility as aspects of the Canadian critical minerals opportunity, as is conceptualised through a geopolitics of differentiation (Himley 2021). For instance, in the context of derisking the highly speculative nature of financing mineral exploration in the Canadian context of junior mining exploration firms, Majury (2014) observes the significance of practices and languages. In particular, the author highlights the role of disclosure of "information considered material to the valuation of shares" (Ibid.: 545). This foregrounds a diplomatic statecraft facet of awareness raising around elements of responsibility and reliability to support financial instruments of statecraft, as I examine through examples of strategic approaches to investment attraction.

Furthermore, by bringing in an understanding of resource diplomacy, I am able to draw out collaborative and cooperative elements of statecraft which crystallise around efforts around building trust, innovation, and knowledge-sharing into relations over critical minerals supply chains. Breslin and Nesadurai (2023: 928) foreground the role of tools of economic diplomacy as states aim to reduce vulnerability and increase their and others' perceived security. Such diplomacy is understood to complement economic statecraft, defined as "the use of economic means to gain foreign policy outcomes in line with a state's strategic objectives" (Ibid.). The authors thus contend that modes of economic and diplomatic statecraft have developed beyond being a means of getting other states to alter their behaviour and management of security externalities. Rather, they have also become a way of attaining "(geo)strategic considerations and objectives" (Ibid.: 929; Weiss & Thurbon 2021), placing greater emphasis on cooperative forms of statecraft (Müller et al. 2023). By examining practices of international collaboration through instances of diplomatic and economic statecraft, my research unpacks Canada's repositioning as a resource economy around critical minerals within a broader evolution of geopolitical economic diplomacy with respect to strategies around friend-shoring critical mineral supply chains (Vivoda et al. 2024; Riofrancos 2022). I highlight how extra-territorial activities of statecraft are able to focus diplomatic and economic initiatives towards investment attraction as well as R&D for circular economy innovation – a key site around which Canada-UK relations are evolving.

### **2.3 Nested concepts: inscription and statistical picturing, scaling, and spatial scripts**

The previous two sections have drawn attention to a number of concepts which are nested with the broader resource-making and state-making perspectives. Firstly, I expand Section 2.1's consideration of the conceptual and analytical uses of inscription and statistical picturing devices. These demonstrate how discourses intersect with certain practices of calculation and visualisation to render legible resources and the land in which they are contained (Li 2014). The devices – or vectors – of rhetoric, calculation, and visualisation shape processes of resource becoming and assembling investibility. Certain discourses and spatio-temporal framings inscribe contingent significance, utility, and value to resources, while maps and infographics signify potential (Valdivia et al. 2022; Fry & Murphy 2021). Through specific modes of representation, therefore, inscription and statistical picturing devices influence the constitution of resources and the worlds in which they are deemed valuable and useful (Valdivia et al. 2021). They do so by offering certain "ways of seeing, counting, classifying, and

rendering some things visible”, although at the potential occlusion of alternative ways of knowing (as discussed in Sections 2.1.2 and 2.2.2) (Li 2014: 594).

In conceptualising the use of statistical picturing in the context of resource assemblages, Li (2014) expands on Demeritt (2001). The latter’s research considers the use of cartographic and statistical techniques to enumerate forest resources by conceptualising and demonstrating the analytic of the statistical picturing device. In unpacking the “statistical picturing” of US forests, Demeritt shows how materials can be brought into view through the use of graphical and statistical techniques (Ibid.: 437). Specifically, where these make forests legible as homogenous, calculable units, statistical picturing makes possible specific ways of seeing, knowing, and controlling materials as resources through a certain “productive power” (Ibid.). This influences resource-making as certain minerals are assembled through these quantitative and representational practices, as well as state-making because resources and resource spaces become legible to the state in new ways (Scott 1998). This relates particularly to the way in which data is arranged “on the page” (Demeritt 2001: 438). Statistical picturing thus becomes more than a “scatter of ... dots on [a] page” because it also has an effect on how land and resources can be viewed, understood, and deployed by the state (Ibid.).

Linking statistical picturing to the role of inscription devices, I note Demeritt’s (2001) observation of how a sense of urgency can be imparted through the ways in which graphics and statistics rendered the United States’ (US) forests visible to the public as a unified, quantifiable entity. In this way, discursive framings work to inscribe resources within certain narratives around resource concerns and futures, doing so alongside statistical picturings. Inscription and statistical picturing devices are therefore useful conceptual and analytical tools to trace how materials ‘become’ resources through being rendered legible, valuable, and accessible, and thereby co-constitute the resource “assemblage” and influence notions of investibility (Li 2014: 600). Together, then, particular modes of inscriptive, quantitative, and representational techniques underpin visions of certain materials as underutilised, ‘critical’, and ready-to-be-had resources for certain objectives, such as the clean energy transition.

A conceptual focus on scaling refers to the employment of scale as a “discursive framing device” by resource developments and activities (Huber & Emel 2009: 371). Where resource strategies are articulated at certain spatial scales, critical resource geography literature has identified a scale-making effect which is tied to ideas of locality or globality alongside images of resource states or regions (Tsing 2004). For instance, Avila et al. (2021) observe that maps

mobilise discourses through strategies with regulatory and cartographic components of scaling. I explore this alongside the effects of geoscientific knowledge production to consider the state building implications of how resources are scaled to the territorial extent of the state. Connecting discussions around scale-making to notions of potentiality and speculative practices, Tsing's (2004: 84) conceptualisation of the "economy of appearances" presents the idea that countries, regions, and companies dramatise their "potential as places for investment". Focusing more specifically on scale in resource governance, it is understood that mobilising resource potential takes place through a scale-making project which drives specific imaginations of the space of states or regions. An example of this is Tsing's (2004: 92-4) reference to a Canadian imagination of the "combined frontier of investment and mining" and a conjured scale of the global which she links to a sense of investing for national pride and in "Canadian national dreams". In addition, concurrent scale-making projects that conjure scales of the state and sub-national jurisdictions can have a mutual strengthening effect upon each other's ability to "remake the world" (Ibid.: 8). This points to the significance of a pan-Canadian approach across efforts in investment attraction and strategic partnerships, and also highlights where more independent approaches are undertaken by jurisdictions, such as in the production and representation of geoscientific knowledge (Mines Canada 2021). In relation to this, concepts of scale and scale-making are also considered in the critical geopolitics literature which has considered scales of the nation-state as beyond just a relationship between state and nation, and domestic resource extraction (Marston 2019). In this way, critical resource nationalism approaches (see Section 2.2.2) emphasise a multi-scalar, multi-dimensional, and multi-actor perspective to examine core concepts of natural resources, territory, and nationalism (Koch & Perreault 2019). Bringing these understandings to a resource geography lens is useful to examine the Canadian case. Specifically, this pertains to its complexity given the multiple scales at which critical mineral strategies are devised (Mines Canada 2019) and towards which they are oriented – such as international strategic partnerships – and the discourses they invoke to influence state-making processes.

A final nested concept of my research is that of geopolitical scripting, or writing, of (global) space (O Tuathail 1994). This draws together analyses around resource-making and state-making to consider how Canadian space becomes known and actionable in relation to an investible resource assemblage and Canada is positioned as a derisked, preferred partner in the international political economy. This builds on understandings of geopolitics itself as a



“series of ‘writings’, as rules and practices which construct a particular view of the world” wherein discourse works to delineate space through a ‘scripting’ of issues, roles, and actors (Popke 1994: 257). In the methodological approach of my research laid out in Chapter 3, spatial scripting is conceptualised as a discursive practice of “geopolitical storytelling” about certain “places, peoples, and dramas” (O Tuathail & Agnew 1992: 192). Through this lens, multiple scales of spatial entities can be considered scripted through dichotomies of differentiation – for instance as known and unknown, “developed or underdeveloped [...], friendly or hostile” (Popke 1994: 258). This approach to spatial scripting informs my conceptual and empirical focus on government-produced ‘vision’ documents. I build on critical geopolitical conceptualisations of nation-branding as a way to script, frame, and thereby construct geopolitical relations and the political regimes to which they are linked (Alderman & Eggeling 2024). As a form of diplomatic statecraft, nation branding complements my analysis of the spatial scripting enacted through a geopolitics of differentiation (Himley 2021). For instance, Himley (2014) considers the invocation of a “*país minero*” discourse as a means of mobilising resource opportunities of the Peruvian underground. In the Canadian critical minerals case, I therefore consider how geospatial scripting of investible resource space and a preferred partner takes place through notions of resource quality, sustainability, responsibility, and security which are discursively deployed by such mechanisms of statecraft as nation branding.

Importantly, critical geopolitical analyses of the geopolitical scripting of space, such as through national visions (Alderman & Eggeling 2024) and articulations of difference (Himley 2021), are brought into conversation with critical resource geography discussions of tools of inscription, calculation, and visualisation. This pertains to the role of abstraction in articulating and asserting state control (Scott 1998), and the impacts of domestic and extra-territorial initiatives of statecraft in shaping how the state represents itself to and engages with external partners. Thus, situated at the productive intersection of critical geopolitics and critical resource geographies, my research draws on these conceptual and analytical discussions to delineate the processes of assembling resources, scripting state space, and mechanisms of statecraft explored through this literature review. I thus aim to unpack how narratives and relations around the state, society, and the international community connect with the discursive, representational, and statecraft practices at play in projects of resource becoming and state-making. Insights are thus made regarding how and what specific resource and state futures are made present, acted on, and worked towards through Canadian critical mineral strategies.

### **3 Research Design**

#### **3.1 Framing and case selection**

The research's case selection followed a series of empirical and scalar decisions around project framing. When I began this study, I identified an initial empirical focus on the six 'critical' minerals prioritised in the *Canadian Critical Minerals Strategy*: cobalt, copper, graphite, lithium, nickel, and REEs (NRCan 2022b). This priority status is linked to their "represent[ing] the greatest opportunity" for fuelling domestic supply chains and being "the focus of most investment" (Ibid.: 42-3). Documents such as Newfoundland and Labrador's (NL 2023) *Critical Minerals Plan* and British Columbia's critical minerals 'Atlas' (Hickin et al. 2023) refer to this prioritisation. However, as my research progressed, I reflected that although there can be methodological utility in redeploying this prioritisation as an empirical framing, it should itself be the subject of critical analysis. This is because the prioritisation is itself a strategic decision and thus subject to those discourses and practices problematised by my research's examination of how strategic decisions shape the production and scripting of investible resources and state space. Furthermore, discussions with participants from a number of provincial governments suggested that the federal prioritisation is not definitively considered impactful for jurisdictions' different prioritisations and approaches (Participant 11; Participant 6). This is not to assert no impact at all: as indicated by the strategies mentioned above, there is perhaps a symbolic impact for signifying Canadian priorities and commitments. However, it does highlight provincial and territorial control of natural resources within their jurisdictions and that strategies are based on respective priorities. Attending to these similarities and dissimilarities was significant to my analysis and therefore informed my decision to undertake a more general, collectivised empirical approach to Canadian critical minerals strategies.

A second facet of the case selection was the mineral strategies themselves and contending with their multi-scalar orientations. It was important that the empirical framing allowed for relevant responses to the research questions with respect to understanding how "discursive and strategic opportunities or challenges" work through resource- and state-making activities, while also attending to the complexity introduced by multiply scaled actors and visions (Kingsbury & Wilkinson 2023: 2). This concern reflects how mineral opportunities are presented and negotiated differently across Canada's multiple scales of mining jurisdictions, and the consequences of this for how resources and the state are articulated in aligned or competing ways. However, a practicality restricting the jurisdictions reflected in the empirics was

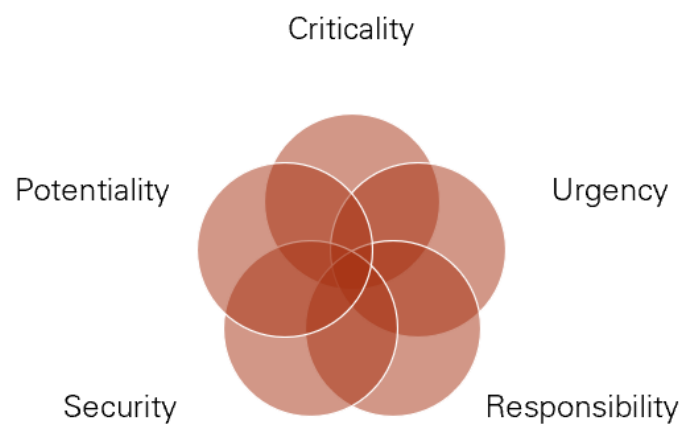
capturing the depth and nuance found in document and interview data through a pan-Canadian approach. I was therefore selective in my use of empirics and predominantly drew on examples from the federal strategy, Québec, and Saskatchewan – those jurisdictions most heavily represented by research participants (Table 3.1). This is particularly evident in the thesis' later discussions around derisking practices and bilateral partnerships as information attained from strategy documents and news releases were complemented by contextual data from participants with whom I was able to secure meetings. This said, examples from Ontario, Nova Scotia, and others are included, albeit to a lesser extent in the latter sections where I prioritise depth over breadth to ensure clarity in my empirical and conceptual contributions around statecraft, circularity, and collaboration. Despite this unevenness, my research has maintained an empirical focus which reflects and unpacks the multi-scalar alignments, engagements, and potential competitions taking place as jurisdictions are situated in differing regional politics with varying international approaches, though united by long histories of mining-related activities (Peyton & Keeling 2017; Bélanger 2017).

A final reflection on case selection pertains to the bilateral partnership focus of the research. My choice to focus on Canada's and Canadian jurisdictions' evolving partnerships with the UK sought to reflect that, following the announcement of a *Dialogue* to strengthen collaboration at the Prospectors and Developers Association of Canada Convention (PDAC) in March 2023, the Canada-UK relationship offers useful examples of economic and diplomatic statecraft (Goddard et al. 2019). This is particularly significant where I seek to build upon existing research in critical geographical disciplines on the critical mineral strategies of medium-sized economies, such as Australia and Canada. These have either not extended to international focuses (Hine et al. 2023) or have not examined specific, bilateral strategic partnerships (Ferguson et al. 2023; Vivoda 2023). The UK is also Canada's second-largest minerals trade partner, constituting 8% of Canada's mineral trade after the US' 52% as the principal destination for Canadian mineral commodities (NRCan 2023b).

### **3.2 Methods of data collection and analysis**

The methodology of data collection and analysis employed in this research drew closely on that of critical resource geographies and critical geopolitics as I employed a mixed-methods approach of textual and visual data complemented with expert interviews (Koch 2013; Hughes 2007; Neumann 2002). Data collection involved semi-structured interviews, held online with government and some industry stakeholders, and grey literature, predominantly jurisdictions'

critical mineral strategy documents, related policies, and news articles. Analysing these data, I cut across my research’s two-fold conceptual framework of resource- and state-making. Firstly, examining a variety of documents garnered insights into how various articulations of mineral ‘critical’ and resource potential work alongside contingent appraisals of use and value in processes of resource-making (Bridge 2009; Fry & Murphy 2021). I then considered how these assembled resources are enrolled in the production of ‘investibility’ alongside other discourses and practices of statecraft within a wider project of state-building (Zhou 2022; Marston 2019; Alderman & Eggeling 2024). Thus, responding to the research questions outlined in Section 1.1, my analysis focused on identifying discourses and representations deployed through Canadian critical mineral strategies alongside connected policies and news releases and articles.



*Figure 3.1: Graphic illustrating the intersection of the five discourses underpinning the analytical discussion, and which were employed in the coding of strategy and policy documents and transcripts. Author’s own.*

Centred around five intersecting discourses (Fig. 3.1), my analysis employed emic and etic coding derived from literature and collected data. Emic codes are those drawn from key concerns in existing literature, such as notions of ‘potentiality’ (Weszkalnys 2015; Fry & Murphy 2021) and Hine et al.’s (2023) reference to ‘urgency’. Complementing this, the visions and narratives running through document and interview data informed etic codes (Fetterman 2008). Coding was therefore devised for analyses and interpretation to respond to the research questions outlined in Section 1.1, such as where discourses of criticality and urgency, alongside projections and placings of potentiality, are understood to influence resource ‘becoming’. Importantly, discourses of responsibility and security were employed to illuminate where resource-making bridges across to processes of state-making, particularly around practices of statecraft focused on derisking, nation branding, and innovation. Appendix 1 offers an extended, more detailed version of the central five thematic codes used in my analysis, outlining sub-codes (some of which overlap) and four additional codes to those pictured above: collaboration; innovation; international; and collaboration.

### **3.2.1 Document analysis of text- and visual-based discourses**

Document and discourse analyses of textual and visual materials were used to identify and unpack thematic patterns across critical mineral strategies and their articulation by variously scaled stakeholders (Frey 2018; Coffey 2014). I have considered textuality and visuality together for they offer insights into the role of strategies as vehicles of discourses vis-à-vis wider conceptualisations of geopolitical scriptings of space, articulations of geo-power, and the production of investible resources and resource spaces (Alderman & Eggeling 2024; Li 2014; O Tuathail 1996). In this conceptual and theoretical framing of my research, strategic vision documents were analytically useful given their roles as vectors of “geopolitical storytelling” (O Tuathail & Agnew 1992: 192; Browning & de Oliveira 2017), complementing their use in empirical studies proximate to this thesis’ grounding (e.g. Hine et al. 2023; Ferguson et al. 2023). To therefore problematise their constitution by certain political and economic framings, critical minerals strategies published by federal, provincial, and territorial governments in Canada were the predominant sources of textual and visual data (Antweiler 2024), though not all jurisdictions have released such policy documents (see Table 4.1: 46-47). In addition to these, I have also considered aligned strategies such as for battery and EV manufacturing, investment attraction, and Indigenous recommendations. Most documents used as data and included in my analysis are publicly available online. However, where documents were not available online, the Appendices include digital versions of those obtained at conferences (Resourcing Tomorrow, Nov. 2023; PDAC, March 2024).

My analysis has sought to approach textual and visual documents in a way that illuminates how discursive, quantitative, and representational techniques shape processes of resource- and state-making (Li 2014; Valdivia et al. 2022). In addition to this critical resource geography framing, my analytical approach was informed by a critical geopolitical understanding of discourses as “plays of power which assert a particular understanding through the construction of knowledge” (Popke 1994: 257). In this sense, discourse analysis was concerned with the ways in which language works to create meaning and value insofar as discourses operate as “rules and procedures by which we interpret and give meaning to the world around us” (Ibid.; Foucault 1972). Tying this into critical resource geography literatures, informative orientations were found in Kama’s (2021) attention to how discourses, such as urgency, operate as temporalities shaping resource ‘becoming’. Taking this to a state-making approach, Zhou’s (2022: 3) empirical and methodological approach helped structure an

analysis of the co-constitution of resources and the state through representational and linguistic techniques that (re-)produce systems of knowing and meaning in a “symbolic” practice of organising state space. Overall, my analysis has combined critical geopolitical concerns of spatial scripts with analytical techniques from critical resource geography, particularly Li’s (2014) focus on how discourses work alongside and through inscription devices and statistical picturings. This delineates how practices of making, circulating, consuming, and disposing of resources can influence what types of world are “made” (Valdivia et al. 2021: 6).

Document and discourse analyses of texts were particularly integral to the state-making analyses of Chapters 5 and 6. Here, the empirical focus was in large part the discourses mobilised through strategic discussions around certain policies and actions of economic and diplomatic statecraft (Ferguson et al. 2023), though notable exceptions include the cartographic focus of Section 5.1 (Marston 2019; Bruun 2018). It also speaks to the ‘state’ focus in critical geopolitical analyses around resources (Koch 2022). In critical geopolitics more broadly, texts have long been an empirical focus of document and discourse analyses, particularly through a deconstructive lens unpacking how the languages constituting texts intersect with geopolitical contexts and visions (Dodds et al. 2022). That is, texts are evidence from which to “read global politics” and can be “productive of the political world” where “discourse connects texts to politics” (Müller 2013: 49). Within my analytical approach, I sought to unpack this in relation to discourses and framings that underpin strategy documents. This involved analysing texts using the concept of scripts which reflect the “directions and manner in which foreign policy leaders perform geopolitics in public” and thereby how discourses are articulated and performed such that they are ‘scripted’ onto space (O Tuathail 2002: 619; Müller 2013). Linking this to critical resource geography approaches, I employed Li’s (2014) conceptualisation of inscriptive devices where these work with discourses to assemble resources and state space in specific ways. Incorporating the intersection of texts, discourses, and scripts into my analysis in this way enabled me to extend the methodological link between deconstructing discourses and symbolic-linguistic representations as ways in which state space is (re)produced as sites of investible resource potential (Dittmer 2018; Li 2014).

A further way in which text-based discourses were analysed considered the rhetorical work done through texts to examine what is made knowable or is excluded as texts work to structure and organise specific issues and seek to persuade the reader of an authoritative position of understanding (Rapley 2007). One such example considered in my analysis is a geopolitics of

differentiation wherein I focused on the rhetorical and discursive framings designed to position the state and its resources towards specific future visions (Himley 2021). This was to unpack how Canada articulates and employs competitive advantages to construct and position resource abundance and extractive opportunities alongside claims of environmental and socio-economic sustainability. Here, I also examined practices of statecraft and their underpinning discourses to extend existing political and economic science and critical geopolitical research on statecraft and how the state is an effect of certain discourses (Ferguson et al. 2023; Kuus 2017). Text-based analysis thus enabled me to identify and unpack the discursive framings of particular modes of statecraft taking place at domestic and extra-territorial levels, though this was strongly complemented by interview data. Textual mediums are not, however, the sole vehicles through which discourses are relayed. As Li's (2014) analytical use of inscription and statistical picturing demonstrates, visualisations are also an effective discursive medium on their own and in combination with texts.

My analysis also examined visualisations to consider their simultaneous involvement in resource- and state-making processes. Here, Häkli (1998: 336) offers a useful understanding of where the visual sits in relation to discourses: "visualising devices and techniques", including maps, statistics, regional surveys etc., have become "the infrastructural foundation for governmental technologies of power". In this sense, they act as structures which enable the construction of geographical discourses (Dodds & Sidaway 1994). In this vein, resource-making was analysed through articulations and representations of certain discourses, framings, and data about critical minerals, particularly notions and placings 'potentiality' (Richardson & Weszkalnys 2014). State-making was analysed where the coherence of the state as an actor and effect was constituted through practices of geoscientific knowledge production and statecraft (Marston 2019). For both resource- and state-making analyses, I have drawn on analytical tools of inscription and statistical picturing devices alongside visual and rhetorical 'placings' of resource potential (Li 2014; Kneas 2020; Fry & Murphy 2021). In Chapter 4, for instance, such an analytical approach enabled a critical exploration of the intersection of quantifications, visualisations, and discourses by Canadian critical mineral strategies and implications for the assembling of investible resources. Such techniques were also applied to delineating the co-constitution of resources and the state because the visualisations generated through geoscientific knowledge production enrol resources into specific relations of state control over resource spaces (Watts & Peluso 2013). Ultimately, from an analytical

standpoint, visual representations, alongside political discourses, were approached as vectors for the expression of the state and discourses of resource nationalism (Marston 2019). This reflects how the latter can invoke a politics of differentiation and highlight specific claims about resources and the territories in which are held (Koch & Perreault 2019: 612).

To demonstrate where visualisations intersect with other techniques to constitute resource- and state-making effects, my analytical approach has also drawn closely Bruun's (2018) critical assessment of the technologies of assessing mineral potentiality. As a form of geological knowledge production, I brought Bruun's approach into conversation with conceptualisations of the state-making implications of producing and communicating geoscientific knowledge (Elden 2013). This move emphasised the state-making significance of where "seeing geologically" (Braun 2000: 38) and cartographic representations combine to enact how the state 'sees' and thus mobilises the subterranean as "vertical territory" and "state territory" (Marston 2019: 3). My analysis extended such an analytical approach to consider also that which can be obscured through the selective nature of visualisations. I thus drew on Peyton and Keeling's (2017: 118) consideration of maps as visual representations which can be problematised for their role in constructing certain visions of Canadian resource spaces "empty-yet-full" as an actionable frontier for resource activities. Adopting this approach, I have contended that visualisations foreground specific ways of knowing and interacting with Canadian resources and the land in which they are contained at the potential expense of alternative uses and users of these same spaces. Linking back to where visual-based analyses are complemented by those which are text-based, Chapters 5 and 6 continued the state-making focus, but took forward the geopolitics of differentiation to focus on documents detailing policies and practices of derisking, nation branding, and visions and mechanisms of statecraft. Also significant for these latter analytical discussions was the detail and nuance offered by interview data.

### ***3.2.2 Interviews with expert stakeholders***

Interview participants were selected through a purposive sampling strategy as I sought representation from government departments across domestic and international scales as well as some industry representation from the UK (Teddlie & Yu 2007). This ensured that I obtained diversity and depth of insights with participants representing a range of relevant organisations and scales of activity, from domestic focuses to representing Canadian and respective provincial interests abroad (Table 3.1) (Knott et al. 2022). Sampling was



opportunistic because recruitment took place using publicly available contact information on department websites (e.g. Participants 2-5 & 12) and meeting in-person with participants or their colleagues at conferences (e.g. Participants 1 & 6-11). Conferences were attended in Nov. 2023 at the Critical Mineral Alliance UK's (CMA UK) annual conference and Resourcing Tomorrow, and later at PDAC in March 2024. This affected the overall make-up of participants as I was able to secure more conversations with NRCan, Québec, and Saskatchewan than with other jurisdictions. While this impacted the range of participants interviewed, it was reflective of the economic significance for Canada of these jurisdictions' mineral and mining sub-sectors in the Canadian natural resources context (Statistics Canada 2024) and facilitated a feasible empirical scope for a project of this size. A pilot research conversation took place online in mid-January 2024 with Participant 1 while all other interviews took place online between February and June 2024. Online interviews were the most feasible option because many participants were in Canada at the time. A final reflection is that two interviews took place with multiple participants – e.g. Participants 3-5 for NRCan and Participants 10 and 11 for Québec. I recognise that there could be limitations to this approach, for instance not allowing more extended discussions with individuals (Knott et al. 2022). However, in the context of participants having different departmental files, I found these group discussions to be effective and justified because a wider variety of topics could be discussed from different angles without undermining detail and nuance (Ibid.).

Semi-structured interviews with experts from government and industry were used to explore the visions, challenges, and opportunities of enacting Canadian critical mineral strategies. My approach followed Koch's (2013) use of formal interviewing to consider both elite and popular geopolitical discourses around resources and national and external political economic environments. Interviewees' perspectives could then be used to complement document analysis (Dittmer 2018). Semi-structured interviews were an appropriate selection as they allowed me to elicit information and nuance around a variety of topics specific to each participant and enabled conversations to evolve with participants introducing topics unanticipated by the researcher and allowing for follow-up questions (Bryman 1988; Crang & Cook 2007). A combination of closed and open questions was used to build rapport and facilitate detailed answers from participants (Longhurst 2016; Flick 2018). For instance, I began interviews with questions around participants' roles and responsibilities to develop rapport and contextualise participants' perspectives and actions later in the interviews (Liu 2018). This also

involved ensuring that language used when contacting and speaking with expert interviewees was not overly academic, such as conceptual terminology of the social sciences (Ibid.). For instance, I employed terminologies aligned with the critical mineral concerns and strategies that were the topic of discussion. However, I reflected here on the possibility of reifying certain languages and discourses in doing so. I thus ensured that my questions involved unpacking some of these terminologies to check for potential pre- or mis-conceptions underpinned by my use of terminologies (Knott et al. 2022). An example of this was my discussion with Participant 6 wherein I sought explanations for how Saskatchewan understood notions of ‘safety’, ‘risk’, and ‘derisking’ in the context of its provincial critical minerals strategy.

**Table 3.1: Participant aliases and institutions.**

|                |  |
|----------------|--|
| Participant 1  | Resource Becoming  |
| Participant 2  | Regional Geoscience, British Geological Survey                                       |
| Participant 3  | Critical Minerals Centre of Excellence, Natural Resources Canada                     |
| Participant 4  | International Affairs (bilateral relations), Natural Resources Canada                |
| Participant 5  | Critical Minerals Centre of Excellence, Natural Resources Canada (Montréal, Canada)  |
| Participant 6  | Ministry of Energy & Resources, Government of Saskatchewan                           |
| Participant 7  | Ontario Ministry of Economic Development, Canada House, London                       |
| Participant 8  | Critical Minerals Alliance UK  |
| Participant 9  | Canadian Critical Minerals & Materials Alliance                                      |
| Participant 10 | Minerals Policy, Ministry of Natural Resources & Forests, Gouvernement du Québec     |
| Participant 11 | Strategic Advisor, Ministry of Natural Resources and Forests, Gouvernement du Québec |
| Participant 12 | Saskatchewan Trade and Investment Office (London, UK)                                |

Audio-recordings and transcripts were made for emic/etic coding (see Fig. 3.1 and Appendix 1) so that analysis could pinpoint themes and new information in relation to key topics, such as mineral circularity and statecraft (Fetterman 2008). Bringing this into analysis and discussion, interview data was used to add nuance and context to textual and visual analyses, and thus complement interpretations of the discourses, practices, and framings of strategy documents (Koch 2013; Alderman & Eggeling 2024). A further use was to provide new information and detail with respect to practices of statecraft, particularly where economic initiatives and actions of

resource diplomacy constitute elements of evolving strategic partnerships. This was particularly important for building an analytical discussion around the Canada-UK bilateral partnership with stakeholders directly involved in developing and enacting such statecraft, and especially where focus turned to circular economies and driving innovation and trust.

The research was governed by an ethical review process. All interview data was collected, stored, and analysed in line with an approved Data Management Plan. Free, prior, and informed consent was obtained prior to the start of the interview with information and debrief sheets also provided (Longhurst 2016). Furthermore, given the potential identifiability of participants due to their positions in government departments and industry, anonymity and confidentiality were ensured by assigning aliases and limiting the inclusion of identifying data (Israel 2015).

### **3.3 Challenges and limitations**

The multi-scalar nature of Canada's resource economy presented a research challenge as provinces and territories have sub-national jurisdiction over natural resources alongside a federal-level strategy and list. For instance, Québec became a "first mover" in Canada when it launched its *Québec Plan for the Development of Critical and Strategic Minerals (QPDCSM) 2020-2025* (Participant 11). Furthermore, sub-national jurisdictions seek to attract international mining and investment interests, as indicated by Saskatchewan's recent UK visit (CMIA 2023) and other delegations, e.g. Québec, Ontario, and The Yukon, attending the 2023 Resourcing Tomorrow conference in London. By comparison, the *Canadian Minerals and Metals Plan (CMMP)* presents a pan-Canadian, nation-centred vision and approach in naming "Canada [the] leading mining nation" and recommending that provinces and territories "[work] together for Canada's mining future" (Mines Canada 2020: 1). However, at the *CMMP*'s release, it was not signed by the provinces of Ontario and Saskatchewan, though commitments were made to continue collaborating with federal government to drive forward the mining industry (Mines Canada 2024). While posing an empirical challenge (see also Section 3.1), these multi-scalar examples demonstrate the prescience of the Canadian case and its national and sub-national critical mineral strategies for investigating the role of discursive, calculative, and representative practices in shaping the evolving global geopolitical economy of CRMs which views collaboration and cooperation as increasingly important (IRENA 2022).

One limitation of the research could be its omission of alternative understandings due to the scope of the selected conceptual and analytical approach. While my research is grounded at

the intersection of well-established literatures, there are different approaches and conceptualisations within these which might illuminate a different set of relations and challenges if applied to the same or related empirics of the Canadian critical minerals case as used in this research. For instance, while I have focused on processes of resource- and state-making (more broadly, world-making) with close attention to discourses, representations, and statecraft, an ethnographic study could illuminate on-the-ground experiences of the effects of these practices (Valdivia et al. 2022). With respect to delineating processes of resource becoming and shaping ideas of space, place, and society, for instance, an ethnographic lens could help unpack material, socio-economic, and environmental relations vis-à-vis critical minerals (West 2006). This is to stress the value of drawing attention to the resource lives of peoples at Canada's mining frontiers, particularly Indigenous and remote communities (Cater & Keeling 2013; Jensen & Sandstrom 2020; Kingsbury & Wilkinson 2023). An extension of this is Yusoff's (2018) observation that focuses on resource 'becoming' can obscure the forms of exclusion and violence which enable the making and sustaining of resource assemblages, though I have engaged with such discussions in Chapter 5. Taking these concerns into account, I have sought to include the positions and concerns of Indigenous communities and populations in my analysis, particularly around issues of financial inclusion and meaningful, sustained engagement and benefit from critical mineral activities.

A further limitation is the study's replicability in relation to anonymity and interviewees' willingness to speak openly, both from personal perspectives and/or official positions (Sovacool et al. 2023). Prior to interviews starting, participants were informed that their identities would be protected and their interviewee statements anonymous, while the accessibility and publication of this research was also clarified with them. This may have influenced the openness of their responses. For instance, some government representatives clarified that their responses would reflect their respective department's or government's official position, such as representatives from NRCan. Participant 12 also observed that their response could come from either an official position or a personal viewpoint. I thus highlight that some participants may have been more open than others in terms of being willing to proffer perspectives outside the official position of their respective organisation. However, the widely accessible nature of strategy publications alongside government websites offers document-based data to support interpretations made from interview data.

#### **4 Producing and assembling critical minerals as investible resources**

The construction and positioning of Canadian minerals as ‘critical’ and investible ‘resources’ is examined through this chapter as it reproduces a set of arguments which demonstrate how discursive, calculative, and representational techniques work individually and in combination to assemble resources (Li 2014). I unpack how resources ‘become’ in the world – are made known, valuable, and accessible – as certain minerals are brought forth and rendered legible as objects of political and economic calculation (Valdivia et al. 2022). This involves tracing how these minerals are seen, classified, counted, and known in specific ways and for certain ends (Li 2014). I anchor this analysis and discussion with reference to five core discourses – criticality, urgency, potentiality, security, and responsibility – which are influential in determining the “resourceness” of certain minerals over others for Canadian jurisdictions (Richardson & Weszkalnys 2014: 6). In doing so, I trace the roles of domestic/international relationalities, temporal framings (Kama 2021: 59), and the projection and placing of notions of potential (Fry & Murphy 2021; Kneas 2020) in processes of resource becoming. The following sections thus proceed by demonstrating how intersecting discourses, representations, and practices around certain minerals contribute to their constitution as an ‘investible assemblage’ of knowable and actionable resources. Section 4.1 focuses on minerals’ legibility through spatial and temporal framings, while Sections 4.2 and 4.3 expand this to consider the discourse of potentiality wherein practices of assessing, quantifying, visualising, and placing potential are influential to how a specific set of ‘critical’ minerals is assembled as investible resources.

##### **4.1 Rendering minerals legible through intersecting discourses of criticality and urgency**

Building on Zimmermann’s (1951) oft-referenced observation that “resources are not, they become”, I contend that certain minerals in Canada are rendered ‘critical’ and thereby begin to be assembled as investible ‘resources’. In the current section, I demonstrate how this takes place through relational and temporal framings of their value and role in the world (Li 2014). I observe that discourses of ‘criticality’ and urgency are particularly significant for positioning certain minerals as objects of political and economic calculation as they appraise value and utility in relation to historico-geographical contingencies and visions of resource futures (Bridge 2009; Ferry & Limbert 2008). A discourse of ‘criticality’ has gained traction, particularly during the past decade, in the context of increased awareness and discussion around the need to accelerate the development of clean energy technologies for net-zero transitions and heightened concerns over the geographical concentration of supply chains and “strategic

adversaries” (Vivoda et al. 2024: 7; Machacek 2017). Highlighting the dynamic, spatio-temporal specificity of criticality criteria, I find that what is rendered legible as a ‘critical’ mineral resource, for whom, and when, is shaped by Canada’s vision to meet both domestic and international demands through a Canadian critical mineral supply chain.

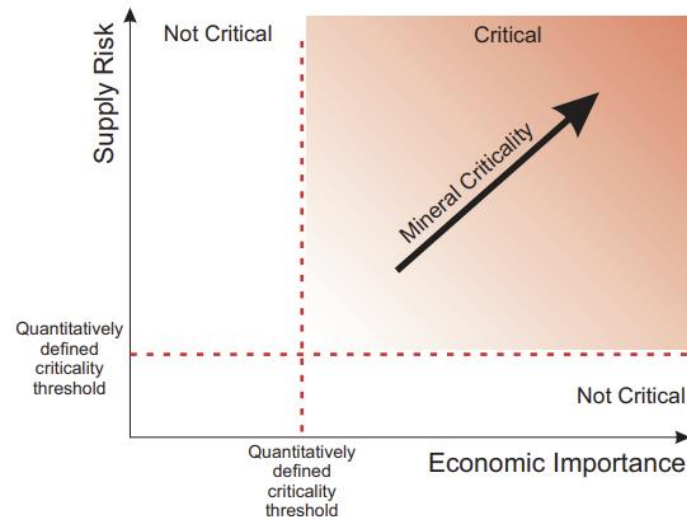


Figure 4.1: Criticality framework measuring supply risk against economic importance and acceptable thresholds. ‘Critical Minerals in BC: An atlas of occurrences and producing mines’. Source: Hickin et al. 2023: 3.

A core contention of resource-making is that there is more to a mineral’s ‘criticality’ than its physical qualities. That is, rather than being inherently ‘critical’ for their geological characteristics, criticality criteria are also defined by jurisdictions in relation to economic, political, and environmental concerns around the minerals which are specific to jurisdictions and their “like-minded partners” and are dynamic over space and time (NRCan 2022b: 2). Many criteria to determine criticality include the calculation of supply risk against economic importance, as shown by the formula given in *Critical Minerals in B.C.* (Fig. 4.1), and also used by other international jurisdictions, such as the UK (Josso et al. 2023). However, Table 4.1 illustrates that where Canadian provinces and territories have launched their own critical mineral strategies or plans, many have adopted additional or different elements to their determinations of ‘criticality’. An example of this is Québec’s definition of ‘critical’ and ‘strategic’ minerals which introduces a temporal differentiation between current and future economic importance regarding minerals’ applications. Criteria therefore differ between jurisdictions, although they point to a pan-Canadian alignment on positioning as a “global supplier of choice” where they all consider their own capacity to supply minerals as an element of criticality (NRCan 2022b: 2). Beyond supply risk and economic importance, geological capacity is a significant element of ‘criticality’ for Canadian jurisdictions. The result of such contingencies can be seen in the jurisdictional differences between which minerals are

deemed 'critical' (Appendix 2). For Canadian jurisdictions, then, the mineral criticality is predominantly from a supply perspective with domestic and international orientations. Thus, to further unpack the "taken-for-grantedness" of critical minerals as resources, I proceed to delineate the discourses and techniques which render certain minerals as legible and thereby begin to assemble them as investible resources (Valdivia et al. 2022; Li 2014). This involves analysing the criticality discourse as a moment of resource 'becoming' (Machacek 2017).

The practice of assessing and listing minerals through a discourse of criticality is spatio-temporally specific and varies between stakeholders (Valdivia et al. 2022). This can be seen through the differing perceptions of minerals' economic opportunities between jurisdictions. One example is the federal government's prioritisation of six of the minerals on its critical list – cobalt, copper, graphite, lithium, nickel, and REEs (Appendix 3). As mentioned in Chapter 3, this strategic decision is based on claims of these minerals' economic and developmental value as they "represent the greatest opportunity to fuel Canadian domestic manufacturing" and thus offer "the most significant potential for Canadian economic growth" (NRCan 2022b: 42-3). However, few sub-federal strategies reference this prioritisation – exceptions include Hickin et al. (2023) and Manitoba's nullified strategy (MB 2023). Moreover, Participant 11 questioned the results of this approach noting limited perceived impact on investment in Québec. The foregrounding of these six minerals is therefore one indication of jurisdictional differences which manifest through criticality criteria. It is therefore not just the material qualities or characteristics of a mineral which are used to render it a critical resource. Rather, the deployment of contextually specific geopolitical concerns around economic prosperity and security reiterates Banoub's (2017: 1) observation that resources are "irreducibly social rather than simply 'natural'". This counters an implication that resources exist in the world, ready for extraction. To extend this line of argument, a key moment of resource 'becoming' is identified wherein relationalities and temporalities shape articulations of mineral 'criticality'.

Relational determinations of criticality are used to influence the positioning of Canadian minerals with respect to strategically important international interests. I find that the emergence of a language of criticality in Canada lends spatio-temporal significance to the US' position on critical minerals as its closest neighbour and primary minerals trade partner (NRCan 2023b; Participant 7). US movements on critical minerals accelerated with an executive order in 2017 (US Dept of Commerce 2017), the *Energy Act of 2020* (US Dept of Energy (DOE) 2020), and *Critical Minerals and Materials Strategy* (US DOE 2021). With respect to this,

Participant 5 observed that Canada’s work on critical minerals began with the signing of the Canada-US *Joint Action Plan on Critical Minerals Collaboration* in January 2020, for which development started in 2019 (NRCan 2020a). Subsequently, Mines Canada included ‘critical minerals’ in 2020 and 2021 Action Plan updates to the *CMMP*. Since then, Canada has released the 2021 Critical Minerals List (Fig. 4.2), launched a federal strategy in December 2022, and updated its list which indicates how mineral criticality is defined relationally to international interests alongside Canadian domestic production requirements (NRCan 2021, 2022, 2024b). Canada requires that ‘critical’ minerals have a threatened supply chain and “reasonable chance [of] being produced by Canada” while “position[ing] Canada as a sustainable and strategic partner within global supply chains”, as one of three further criteria (NRCan 2024b; Table 4.1). However, it is important to highlight efforts to avoid politicising the 2024 list, despite the importance of other jurisdictions’ positions, as its consultation focused on “definitions of criticality and not on identifying the minerals” themselves to ensure that selected minerals were linked closely to clear, defined, and transparent criteria (Participant 3). A further example of US-oriented criteria is Saskatchewan’s (SK 2023: 7) reference to US geopolitical concerns through an extract from a White House factsheet, *Securing a Made in America Supply Chain for Critical Minerals*. Understanding the relational articulation of a discourse of criticality with US approaches and interests is one way in which the resourceness of Canadian minerals is constructed. However, it also points to how Canada is rendering its minerals legible through their criticality and positioning its status as a choice supplier to an evolving regional political economy and visions of resource futures.

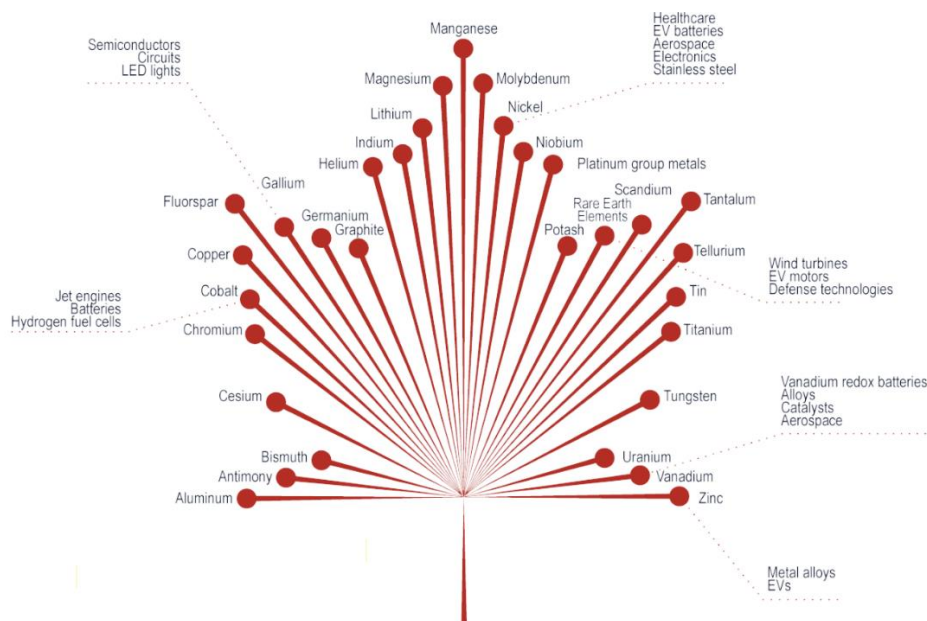


Figure 4.2: Canada’s 31 Critical Minerals and Some of Their Uses. Source: NRCan 2022b: 9.



**Table 4.1: Federal, provincial, and territorial critical mineral strategies in Canada. Comparison of critical minerals on respective lists: Appendix 2.**

| <b>Jurisdiction</b>   | <b>Strategy (or 'plan')</b>  | <b>List of critical minerals?</b>  | <b>Criticality criteria</b>  |
|---|--|--|--|
| Gov. of Canada (Gov.ca)<br>– Natural Resources<br>Canada                      | <i>Canadian Critical Minerals Strategy</i> (Dec. 2022); <i>Critical Minerals List</i> (2021, updated June 2024); <i>Canadian Metals and Minerals Plan</i> (2019, updated 2020, 2021) | 31 (Fig. 4.1); 34, as of June 2024. 6 minerals prioritised for 'significant potential for Canadian economic growth'.                   | Both: Threatened supply chain; Reasonable chance of producing the mineral in Canada.<br>One or more: Essential to Canada's economic or national security' Required for the national transition to a sustainable low-carbon & digital economy; Positions Canada as a sustainable & strategic partner within global supply chains. |
| Alberta – Ministry of<br>Energy & Invest Alberta                              | <i>Alberta's Critical Minerals Potential</i> (AB 2023); <i>Renewing Alberta's Mineral Future – Minerals strategy and action plan</i> (AB 2021)                                       | No: lists minerals with production potential in Alberta; Marks those classified as 'critical' by Canada, US, EU, and Japan.            | 'Critical' minerals are those "particularly important to the economy, face supply challenges & have no commercially available substitutes" & "strategic minerals & essential for military uses & national security" (AB 2021: 4).  |
| British Columbia –<br>Ministry of Energy,<br>Mines & Low Carbon<br>Innovation | <i>B.C.'s Critical Minerals Strategy – Phase 1, 'Made-in-B.C.' Strategy</i> (Jan. 2024); <i>B.C. Critical Minerals Atlas</i> (Hickin et al. 2023)                                    | Claims to have 16 of those on the federal list.<br>The Atlas' inventory does not constitute an official list.                          | "Criticality" is "informed by importance to the global energy transition, supply constraints, geopolitical risks, & economic importance". Typically, they serve an "essential purpose" (e.g. economic health, national security) & may be "at risk of supply disruption" (BC 2024).  |
| Manitoba – Ministry of<br>Economic<br>Development,<br>Investment & Trade      | Null: <i>Manitoba Critical Minerals Strategy: Driving Sustainable Growth</i> (MB 2023)   | No: claims MB's "significant potential" of critical & strategic minerals: 29 of Canada's 31, "including the six prioritised minerals". | "Essential for a wide range of applications" including clean energy technologies, telecoms, defence systems, & advanced manufacturing (Invest Manitoba 2024: 4). There is "increasing global demand for these minerals, which play a vital role in economic growth, innovation, & national security".                            |
| New Brunswick –<br>Natural Resources &<br>Energy Development                  | No strategy – information sheet: 'Critical Minerals of [NB]' (n.d.)  | No: "of the 31 critical minerals on Canada's list, NB has deposits of 13 & occurrences of 21".   | N/a  |
| Newfoundland &<br>Labrador – MiningNL;<br>Industry, Energy &<br>Technology    | <i>Our Critical Minerals Advantage: A Plan to maximise the Value of [NL's] Critical Minerals Resources</i> (NL 2023)   | Displays Canada's 31 critical minerals. Also links to US, EU, UK, Japan etc., suggesting NL's "potential" for 34 critical minerals.    | Necessity of the mineral in the "manufacturing of products required for [the] transition' of global economies to be 'green & innovative".<br>Criteria here include federal & international considerations of which minerals are 'critical'.  |

|  |   |   |   |
|--|---|---|---|
| Nova Scotia – Dept. of Natural Resources & Renewables  | <i>Nova Scotia’s Critical Minerals Strategy (NS 2023)</i>   | 16 elements are ‘critical minerals’. Compares with Canada, AB, ON, QC, & NL.  | List criteria: Potential for exploration & identification of a mineral resource in NS; Help NS reach emissions reduction targets (80% renewable energy by 2030, net-zero emissions by 2050); Current and/or expected supply & demand imbalance on a global scale; Likelihood of presenting a strategic opportunity for NS   |
| Ontario – Ministry for Northern Development, Mines, Natural Resources & Forestry                                       | <i>Ontario’s Critical Minerals Strategy 2022-2027: Unlocking Potential to Drive Economic Recovery &amp; Prosperity (Mar. 2022)</i>  | 33 minerals.  | Exploration and/or potential for development; Strategic importance to the economy; Application in end-uses for technologies that support the transition to a low-carbon economy; Global market demand.  |
| Prince Edward Island   | N/a   | N/a   | N/a   |
| Québec – Ministère de L’Énergie et des Ressources Naturelles   | <i>Québec Plan for the Development of Critical &amp; Strategic Minerals, 2020-2025</i>  | 2020 list: 22 CSMs, 10 of which are ‘critical’, 12 ‘strategic’. Based on those of the EU, US, Japan and Australia (QC 2022: 13) | ‘Critical’ minerals: “economic importance in key sectors of our economy today, present a high supply risk, & have no commercially available substitutes” (Participant 11). ‘Strategic’ minerals “linked to public policies & renewable energy” (Ibid.). See also: QC 2020b: 1).   |
| Saskatchewan – InvestSK; Ministry of Energy & Resources  | <i>Securing the Future: Saskatchewan’s Critical Minerals Strategy (2023)</i>  | No: highlights its 23 of the federal list’s 31.   | 3 main reasons why jurisdictions are “in a race” for certain minerals: “strategic importance to economic & national security” & “vulnerable to supply-chain disruptions”; “key inputs in renewable power generation, clean electricity technologies, & EVs”; & “essential for electronic devices” & other products.   |
| Northwest Territories – NWT & Nunavut Chamber of Mines; Minerals, Oils & Gas Division; Industry, Tourism, & Investment | <i>Priorities for Critical Minerals in the NWT (GNWT 2023); NWT Action Plan for Promoting Critical Minerals: What We Heard (Nov. 2021); Compilation of NWT Critical Mineral Showings (NWTGS 2022)</i> | No: highlights NRCan’s Critical Minerals List (2021)  | Those minerals “considered essential for renewable energy and clean technology applications” regarding “urgent need to transition away from carbon-emitting fossil fuels [...] & towards cleaner energy sources” (GNWT 2023: 9). Refers to 4 key criteria used in Canada: Importance to the digital economy; Supply risk; Importance of the mineral to fighting climate change; Strategic value to Canada (Ibid.) |
| Nunavut – Govt of Nunavut; Mining North, the NWT & Nunavut Chamber of Mines  | Not critical minerals specific: <i>Nunavut: Mineral Exploration, Mining, and Geoscience (NU 2023); Mineral Development in Nunavut (Mining North 2022)</i>   | Lists ‘critical minerals’ with known occurrences in Nunavut which are included on the Canada-US Joint Action Plan 2020.         | “Supply at risk due to geological scarcity, geopolitical issues, trade policy & other factors” (Mining North 2022: 23). Key role in energy transition for climate change, defence applications, economic well-being of world’s major & emerging economies.  |
| (The) Yukon  | <i>Yukon Mineral Development Strategy &amp; Recommendations (YT 2021)</i>   | N/a; Refers non-specifically to ‘critical minerals’ under Priority No. 5 (YT 2021: 42)  | Considers as ‘critical’ those minerals “considered rare in supply or of strategic importance”, particularly those “used in green technology applications” (YT 2021: 40).  |

Relational framings of criticality also work to position Canada as a supplier to a wider international political economy. Demonstrating this, critical mineral-focused factsheets by Saskatchewan articulate the province’s mineral occurrences through a definition from a group of international interests, specifically US, Australian, and Canadian geological surveys (USGS/GSA/GSC 2020; Appendix 4). Another indication of criticality determined through international relationality, beyond the US, is Participant 11’s statement that when determining its own list, the *QPDCSM* took account of those released by other states, namely the EU, Australia, Japan, and the US (QC 2022: 51). Similarly, Alberta published a table which compares its critical mineral occurrences to those considered ‘critical’ by other jurisdictions (AB 2023). One further example is British Columbia’s inclusion of gold in its critical minerals inventory: while it is generally not considered a critical mineral due to its relative abundance, it is included “because it appears on a list of a Canadian trading partner (Brazil)” as well as its economic importance to the province (Can\$1.5bn of total mine production, 2020) (Hickin et al. 2023: 8). Determining criticality in this relational way to international interests brings certain minerals forward as objects of political and economic calculation in accordance with the needs and interests of external jurisdictions. Thus, where most criteria established by Canadian jurisdictions include having known occurrences and a resultant ability for domestic production, cross-border relationality cements the positioning of Canadian jurisdictions with respect to objectives for domestic production for international supply. In this way, the appraisal of certain minerals based on relational assessments of economic value constitutes a key element of their resourceness, working also to the exclusion of other materials from such appraisal; it renders them legible as valuable and accessible where other materials are excluded or obscured. Mobilising mineral supply potential for external markets in this way constitutes their appraisal as valuable resources *for* and *from* Canada. This speaks to the country’s broader commitment to “establishing Canada as the leading mining nation” as a sustainable, strategic, and friendly supplier (Mines Canada 2020: 1). However, alongside an international relationality to define criticality is an orientation towards domestic demand.

Criticality in Canada is determined not only by what Canada can produce for the world, but also to meet domestic demand. At a federal level, the *CMMP* envisions a “made-in-Canada” approach to develop manufacturing capacity for technologies containing critical minerals (Mines Canada 2021: 4). However, this can also be clearly demonstrated by the strategic approach of provinces with large manufacturing bases (e.g. ON 2022: 14). Ontario has aligned

its critical minerals strategy with manufacturing plans, such as *Driving Prosperity: The Future of Ontario's Automotive Sector* (ON 2019). Here, the critical minerals strategy, in addition to positioning the province as a “preferred critical minerals supplier to trading partners and allies around the world”, aims to “[grow] domestic processing and [create] resilient local supply chains” (ON 2022: 22). Linking this vision to its automotive manufacturing plan, Ontario employs a demand-side framing as a moment of resource-making. It leverages and positions its minerals as valuable resources for within-province “high-growth industries” and the economic potential these represent (ON 2021: 14). Further illustrating this point, Phase 2 of *Driving Prosperity* emphasises that Ontario is “already ... a key producer” of minerals such as cobalt, nickel, graphite, and lithium which “could feed [the] battery supply chains” they seek to develop through the automotive sector (Ibid.: 13). Speaking more widely to the Ontario mineral strategy’s intention to establish “entire supply chains” in North America (ON 2022: 22), Phase 2 highlights the location of the automotive plan within a wider “North American hub” as a key destination for the province’s “wealth [of] critical minerals essential to [EV] batteries” (ON 2021: 4). Overall, the focus on domestic demand constitutes a key way in which minerals are assembled as ‘critical’ resources. With a relational positioning to domestic demand for strategic supply chain opportunities, minerals are appraised with utility and value for their material applications and wider “resourceness” as sources of economic growth and security for a localised economy (Richardson & Weszkalnys 2014: 6). The relational production of resources is also connected with temporal framings, particularly a discourse of urgency.

The role of resource temporalities in ‘making’ resources (Kama 2021) is demonstrated through Canadian constructions of ‘criticality’. For example, Québec differentiates ‘critical’ from “strategic’ minerals based on the latter’s significance for the *future* “implementation of major Québec policies”, such as its battery strategy and 2030 green economy plan, while the former are identified in relation to *current* concerns such as whether they are essential for key economic sectors at “high risk of lack of supply” with no substitutes (QC 2020b: 1). This helpfully introduces the significance of future-focused temporalities. I thus draw attention to the discourse of urgency and build on its identification in recent research on Australia’s critical minerals approach (Hine et al. 2023). In the Canadian case, NRCan’s (2022b: 4-5) strategic framing sees discourses of criticality and urgency intersect through its articulation of the necessity to seize a “generational opportunity”. The urgency of this opportunity is in turn linked to developing “domestic and global value chains for the green and digital economy” and

becoming a “stable supplier ... at home and abroad” (Ibid.). There is therefore a “contingent resourceness” to Canadian minerals as their ‘criticality’ is determined through a temporal discourse of urgency framed by the necessity of and speed at which Canada aims to develop a domestic critical minerals supply chain and capture the aforementioned ‘generational opportunity’ as the global political economy around CRMs evolves (Kama 2021: 59). Situating this more widely, a Dept for Business and Trade committee hearing in the UK saw a similar narrative for the UK context raise concerns that the country is a “bystander” in a “global battery arms race” (Moore 2023). Appraising ‘criticality’ through a temporality of urgency situates the resourceness of certain minerals in a specific political economic moment, particularly those with material applications in battery, EV, and renewable energy technologies (e.g. Fig. 4.2). A discourse of urgency can then in turn frame a course of action which renders legible and significant the materialities, such as grade and deposit volumes, of some minerals over others (Weszkalnys 2015), by suggesting a need to act and capture the unique economic and geopolitical opportunity of the moment. The notion of a “generational opportunity” is thus significant for it co-constitutes aspects of mineral criticality and contributes to inscriptions of investible mineral resources for urgent applications and capturable value (NRCan 2022b: 4).

The notion of a global “race” for certain minerals is a further example of urgency deployed as a temporal discourse in the making of ‘critical’ resources (e.g. SK 2023: 8). I contend in the Canadian context that this articulation of urgency also involves the notion of a zero-sum game and thus drives efforts to construct and position Canadian minerals as differentiated from those of other jurisdictions – the competitors in this ‘race’. It does so by employing discourses of responsibility and security alongside the temporal framing. The narrative of a “race” has emerged from a geopolitical economic context over the past five years which foregrounds threats of high geographical concentration, inter-dependency, and complexity in supply chains, alongside decarbonisation and digitalisation objectives (Kalantzakos 2020: 3; IRENA 2024). In this framing, China is a “non-like-minded [country]” against which Canada is deploying discourses of security and responsibility, alongside that of urgency, to position as a “leader” in the global race (NRCan 2022b: 1). However, NRCan also expresses the need to “avoid a race to the bottom” in terms of cost outputs in recognition of the discursive significance of urgency in taking on this role of “powering” green transitions through critical minerals supply (Ibid.: 33). Indeed, an NRCan representative stressed that Canada’s approach aims to ensure that discourses of security, urgency, and responsibility are not mutually exclusive (Participant 3).

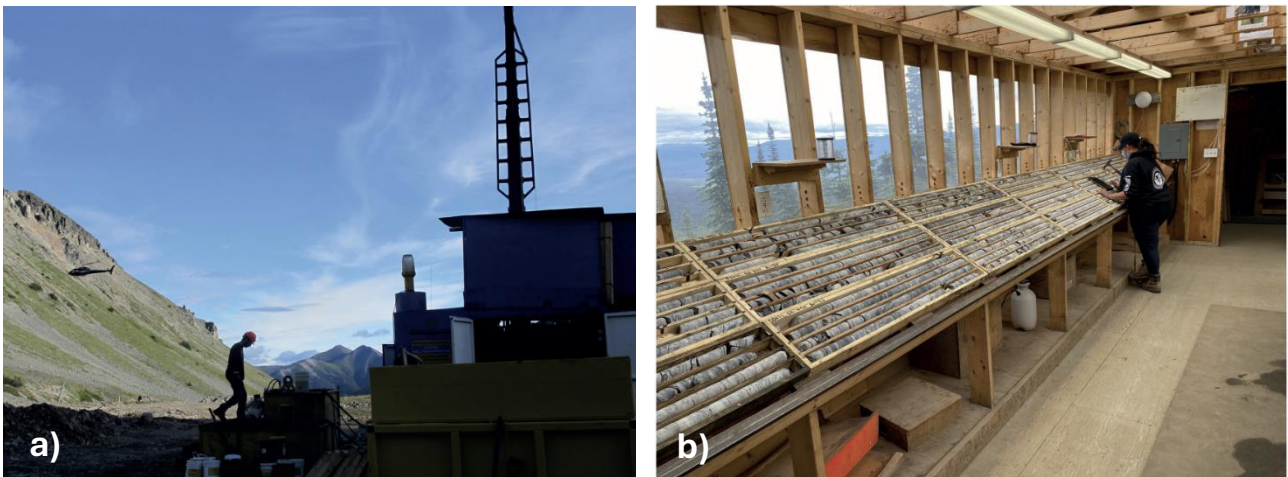
Crucially, they drew attention to the recent development of NRCan’s “dashboard” and “concierge service” which intends to streamline and reduce the duplication of regulatory processes across federal and non-federal levels. It is in this way that NRCan seeks to respond to urgency and security concerns in a way that also maintains a reputation for responsibility and reliability – it terms its minerals production as “responsible, inclusive, and sustainable” (NRCan 2022b: 33). This demonstrates that Canada’s visions to become a “global supplier of choice” *and* “the global leader in responsible and sustainable mining” are importantly linked (Ibid. 2, 33). In addition to making resources legible and actionable through temporalities which frame criticality in a specific geopolitical-economic moment, for Canada the race is also about leveraging a qualitatively different supply of minerals: a secure, sustainable, and responsibly sourced supply. However, a further step in the ‘more-than-mining’ story of resource-becoming is the extension of discursive inscriptions of relationality and temporality through the mobilisation of a discourse of potentiality through scientific, calculative, and visual practices.

#### **4.2 Quantifying and picturing the ‘potentiality’ of critical minerals in Canada**

To examine geological and economic potential as moments of resource-making, I highlight the role of a discourse of potential as it is incorporated into field-based, statistical, and cartographic assessments and visualisations of mineral opportunities (Demeritt 2001; Bridge & Frederiksen 2012). Focusing thusly on the intersection of scientific practices and statistical picturing devices to communicate the potentiality of certain minerals, I unpack the impact of speculative techniques and visual representations on the process of resource-making (Fry & Murphy 2021; Weszkalnys 2015). A central argument I seek make is that the use of scientific, quantitative, and infographic practices and representations together constitute ways in which Canadian jurisdictions articulate and mobilise notions of potentiality to assemble certain critical minerals as resources. I also consider the role of spatio-temporal specificities and framings of these practices. However, while projections of potentiality are significant in mapping the quality, extent, and abundance of minerals alongside speculative accounts of value, they can also obscure specificities and precarities of minerals and their potential. Unpacking this fragility, I conclude this section by reflecting on speculative economic futures and the productive nature of uncertainties for resource-making (Kuchler & Bridge 2023).

On-the-ground techniques of prospecting and analysing mineral occurrences contribute to processes of resource-making by indicating and making visible resources through notions of geological potentiality. Drawing on examples of geoscientific investigation as sites and devices

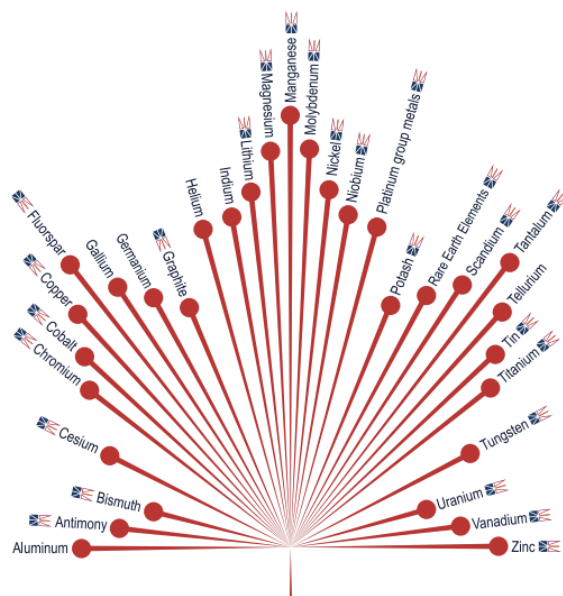
for assessing and picturing potentiality, I argue that scientific techniques constitute one way in which projections of potential bring certain minerals into being as useful and valuable resources (Bruun 2018; Tsing 2004). The Atlas, *Critical Minerals in British Columbia*, exemplifies this through its collation of provincial, national, and global contextual data on critical mineral occurrences and possibilities, and analysis of opportunities within BC (Hickin et al. 2023). Alongside a map showing geological “terrane” and proposed, under development, and advanced mining projects (Ibid.: 7-10), the Atlas includes discussion of on-the-ground sites of assessing mineral potentiality – a drill rig and core analysis laboratory at two copper-silver advanced projects in Kemess East and Stardust, respectively (Figs 4.3a & b). These exemplify how jurisdictions are assessing, quantifying, and then communicating geological potential through scientific practices (Bruun 2018). These sites of mineral assessment demonstrate how resources “come to exist” through modes of “technical invention and physical production” as in-the-ground minerals are assessed for their significance in terms of mineral grades, qualities, and concentration in located occurrences (Richardson & Weszkalnys 2014: 12). However, there are limitations of assessing the geological potential of critical resources which reflects their “irreducibly social” nature (Banoub 2017: 1): techniques face technological and political-economic contingencies with implications for what is or can be appraised as a ‘resource’.



*Figures 4.3a & b: Images of British Columbian mineral assessment activities: a) drill rig at Kemess East advanced project; b) core examinations at Stardust advanced project. Source: Hickin et al. 2023: 9.*

Measuring and communicating geological potential as a moment of resource-making is impacted by technological affordances and political-economic contexts which frame these “acts of epistemological and ontological creativity” of resource “becoming” (Richardson & Weszkalnys 2014: 12). This pertains to technological and contextual constraints on what can, or cannot, be assessed to be a ‘critical’ resource. For instance, the Atlas observes that the BC Geological Survey’s (BCGS) online database of natural resource occurrences has limitations

because “some critical minerals are underreported” due to either “not [being] historically considered by the exploration community” or the unavailability of “analytical technology [...] to test for some elements” in the past (Hickin et al. 2023: 11). Instead, the authors point to possibilities which lie in better identifying “high prospectivity” through “modern mineral potential modelling” (Ibid.). While scientific practices are therefore demonstrably important for making certain minerals legible and known as resources, assessing and then communicating potential is subject to technological and contextual limitations (Bruun 2018). However, the Atlas also points to the significance of speculative approaches for resource-making which work alongside scientific practices by connecting geological and economic potentiality through intersecting geological data with economic valuations and forecasts (Hickin et al. 2023).



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Figure 4.4: Newfoundland and Labrador's mineral potential visualised alongside the Canadian Critical Mineral List. Source: NL 2023: 3.

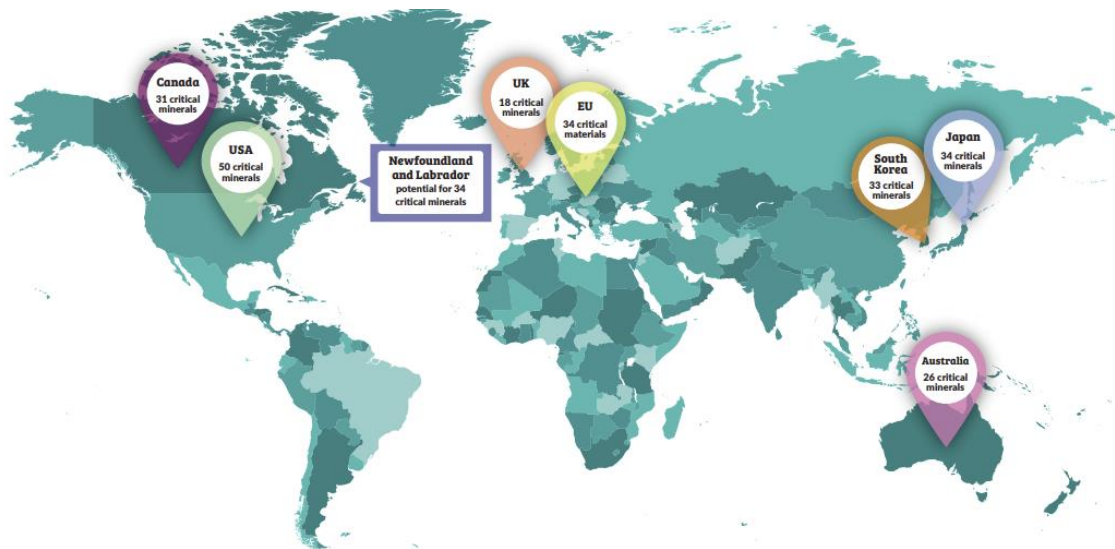


Figure 4.5: World map presenting NL's potential for critical minerals relative to the number of minerals featured on other jurisdictions' lists. Source: NL 2023: 3.



The sites and techniques of calculating potential are extended through infographic visualisations of geologic and economic opportunity. Newfoundland and Labrador’s (NL) plan, *Our Critical Minerals Advantage*, demonstrates how such ‘statistical picturings’ assemble investible resources by connecting a discourse of domestic mineral potentiality with global demand (Li 2014; Demeritt 2001). NL (2023: 4) adopts the maple leaf visualisation of the federal list, adding NL’s flag next to the 25 minerals to which the province is “home” (Fig. 4.4; cf. Fig. 4.2). To project notions of geological and economic potential, this indication of NL’s mineral occurrences sits alongside a map-based infographic to position its “potential for 34 critical minerals” in relation to other jurisdictions’ lists (Fig. 4.5; see also Appendix 2). Together, the picturings highlight NL’s (2023: 3) claimed opportunity of “critical mineral potential [...] to establish working relationships to advance projects within the province”, including collaborating with federal government on engagements with other countries. As such, NL combines discourses and projections of geological and economic potentiality – a “diverse mineral endowment with great exploration potential” – to position itself as a supplier to the demands of aligned countries (Ibid.: 4). Infographic representations of potentiality are thus influential to how NL’s critical minerals supplies are rendered more than just ‘occurrences’; they are constructed as legible and investible opportunities. They articulate a two-fold projection of potentiality: NL’s anticipated ability to supply from known occurrences – the promise of “exploration potential” (Fig. 4.4); and, the global demand used to anticipate potential by identifying possible destinations for NL’s minerals. Certain minerals thus attain qualities of resourceness as statistical picturings reinforce potential through relational positionings. Also significant is a temporal element to how domestic-international framings, calculations, and visualisations are used to project potentiality.

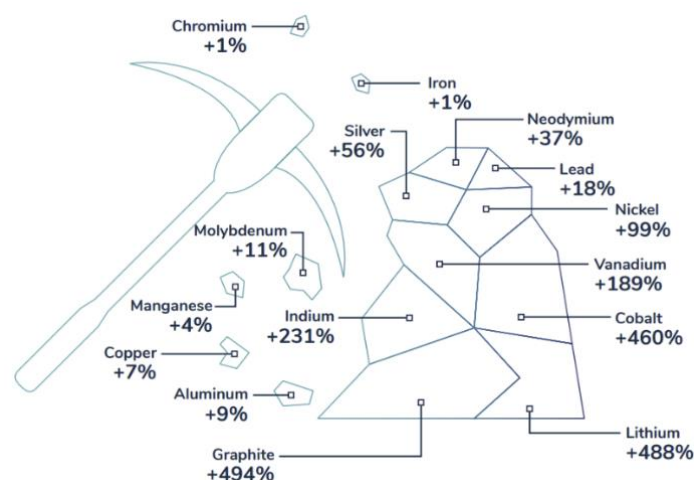


Figure 4.6: '[A]nticipated change in demand for minerals necessary for the 2018-2050 energy transition', data from the US Geological Survey (2019) and World Bank (2020). Source: QC 2020a: 1.

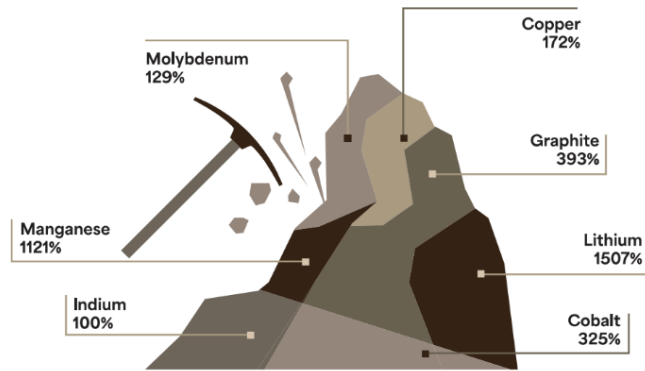


Figure 4.7: Infographic displaying 'projected demand increases for select critical minerals for clean energy technologies in a net-zero 2050 scenario compared to 2022', data from IEA (2023). Source: NS 2023: 14.

Furthering my earlier discussion of temporalities of resource-making (Kama 2021), I demonstrate here how these combine with speculative practices where statistical picturing devices utilise forecasts of mineral demand to generate notions of future economic potentiality (Tsing 2004). To exemplify this intersection of temporal dimensions of demand with notions of possibility (Zalik 2010), I draw attention to anticipatory infographics deployed by Canadian jurisdictions seeking to link their (claimed) critical mineral reserves and projects to envisioned economic futures based around their supply potential meeting forecasted demand (Fry & Murphy 2021). Examples from Québec's and Nova Scotia's strategies (Figs 4.6 & 4.7), launched respectively in 2020 and 2023, are informative as they position their respective mineral potentials in relation to projected international demand increased using statistics from the US Geological Survey, World Bank, and IEA. For Québec, seven of the minerals shown to have the largest forecasted demand increased in Fig. 4.6 (including graphite, lithium, cobalt, indium, and vanadium) are also on the province's critical and strategic minerals (CSM) list (Appendix 5). Moreover, Fig. 4.7 also shows suggests the economic potential of minerals on its critical list in relation to projected demand increases in a net-zero scenario. However, it excludes nickel for which it has not got supply potential, reflecting NS' determination of its criticality criteria around its potential to supply and thereby generate economic prosperity (Table 4.1; NS 2023). It therefore links NS' geological and economic potentiality with a temporal framing and articulation of its resource endowment in the context of projected future global demand. Together, the Québec and NS examples demonstrate the resource-making significance as the economic potential of certain minerals is projected simultaneously in terms of geological availability through supply potential *and* the economic opportunity which may be derived from such supply. These infographics therefore exemplify how anticipatory economic futures are articulated where jurisdictions deploy speculative, future-focused statistical picturings to

assign certain minerals value and utility as resources (Tsing 2004). Ultimately, these examples of statistical picturing devices deploy geological potentiality and anticipated demand to conjure notions of economic potential, ascribing value to jurisdictions' mineral occurrences and thereby positioning these resource assemblages as investible to *and* suppliers of the global market (Fry & Murphy 2021). This can also be identified in infographics focused on geographical distributions of current production.

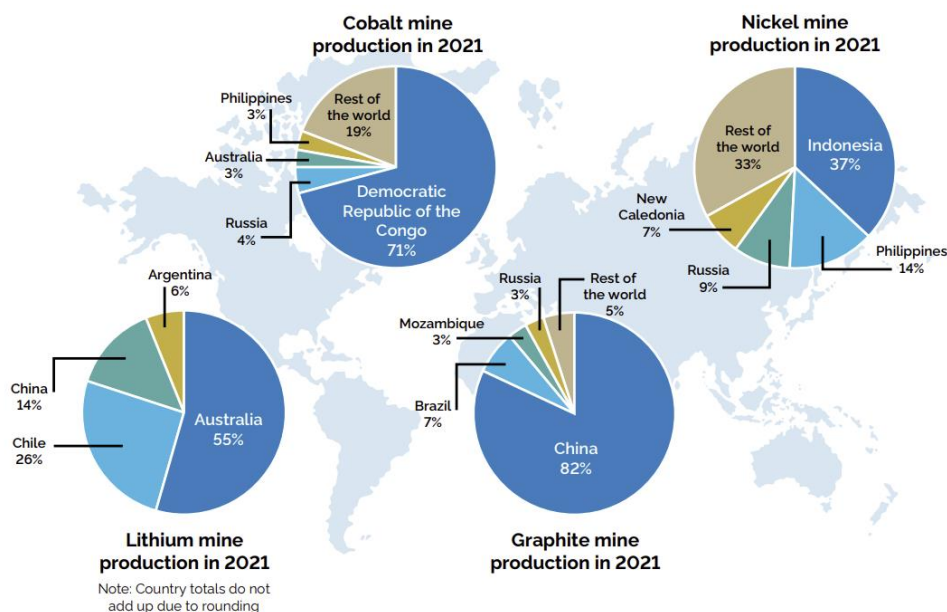


Figure 4.8: World map displaying data for the 'global supply for nickel, cobalt, lithium and graphite in 2021', no data source given. Source: ON 2022: 10.

Resource potential is also projected through infographics which incorporate a spatial element to temporal framings of supply and demand. They exemplify how geological and economic potential are quantified and gain significance through visions of undesirable and alternative futures linked to current market dynamics. Illustrating this is *Ontario's Critical Mineral Strategy's* which uses pie chart statistics overlaying a world map to display the distribution by nation of the global supply for four critical minerals on its provincial list – cobalt, nickel, lithium, and graphite – which are also considered important inputs to EV manufacturing in the province (Fig. 4.8; ON 2021, 2022). This infographic illustrates how, by drawing attention to the current distribution dynamics of critical minerals, Ontario is positioning its supply in relation to concerns about the risks posed by supply concentrations. It specifically visualises the dominance of potential adversaries and suppliers with poor ESG records in these supply chains – particularly, China, Indonesia, and the DRC (Vivoda et al. 2024). This spatio-temporal framing of potentiality is therefore situated alongside discourses of security and responsibility where this current distribution of production is viewed as threatening a future transition to a “more

connected, cleaner and technology-driven economy” (ON 2022: 9). Thus, in representing and discursively constructing the undesirable insecurity and ESG standards of the current supply chain distribution, Ontario mobilises notions of geological and economic potential to “make the province a premier global destination for investment into critical minerals development” (Ibid.). A further example of such a relational articulation of potentiality is found in Québec’s investor-oriented brochure published under the *QPDCSM*. The extract shown in Fig. 4.9 shows this where percentages of current geographical concentrations of CSM supplies are listed alongside data on their respective situations in Québec (“deposit appraisal”, confirmed deposits, and processing opportunities including end-products and recyclability) (QC 2022: 13). These examples from Ontario and Québec therefore illustrate resource-making where statistical picturings of current market dynamics are used assemble certain critical minerals as investible resources by mobilising and positioning Canadian geological and economic potential within a vision of diversifying global supply chains (Li 2014). However, within such an approach there is uncertainty to notions of potentiality which can be productive through speculative possibility.

| List of CSMs for Québec <sup>1</sup> | Main producing countries <sup>2</sup>                     | Situation in Québec |                                |              |  |
|--------------------------------------|---|---------------------|--------------------------------|--------------|--|
|                                      |   | Active mines        | Deposit Appraisal <sup>3</sup> | Deposits     | Processing                               |
| Cobalt                               | Congo (69%)<br>Russia (12%)<br>Australia (4.0%)           | 2 (b-p)             | 1 (b-p)                        | 4 (b-p)      |  |
| Copper                               | Chile (27.8%)<br>Peru (10.4%)<br>China (8.4%)             | 4 (b-p)             | 3 (b-p)                        | 6<br>7 (b-p) | Anodes<br>High purity metal<br>Recycling |
| Rare earth elements                  | China (58.3%)<br>United States (16.3%)<br>Myanmar (12.9%) | -                   | 2                              | 3<br>1 (b-p) | Recycling                                |

Figure 4.9: Extract of ‘list of CSMs and situation in Québec’ alongside data on main producing countries from the USGS (2022) Mineral Commodity Summaries. Complete version in Appendix 6. Source: QC 2022: 12.

Expanding on the conceptual intersection between potentiality, uncertainty, and speculative possibilities, I identify a productive precarity to certain projections of potential. Specifically, I contend that a discourse of potentiality is underpinned by not only that which is known but also that which is unknown or obscured. I connect this phenomenon to Kuchler and Bridge’s (2023) understanding that sustaining uncertainties can support efforts to render speculative economic futures attractive and attainable and position certain minerals as “worthy of continued exploration” (Fry & Murphy 2021: 1). For example, the strategy document *Priorities for Critical Minerals in the Northwest Territories* claims economic potential to be held within the as-yet unexploited Yellowknife Pegmatite province instead of highlighting identified geological

potential; rather, it refers to its status as a “very strong contender in the global rush for hard-rock lithium” (NWT 2023: 11). NWT places this opportunity within the territory’s “underdeveloped and undiscovered potential” (Ibid.). As a result, while there are identified deposits of lithium at this site (NWTGS 2022), it is the notion of the unproven, possible future of a viable and extractable reserve which is considered to “[put] the NWT in the middle of the current global rush for [critical minerals]” (Ibid.). A similar example is New Brunswick’s redeployment of the maple leaf symbology to signify their mineral occurrences (Fig. 4.10). This infographic clearly codes quantified geological potential by differentiating deposits, occurrences, and no documented occurrences within the province. However, it also deploys projections of possibility from the unknown by highlighting the presence of “the world’s largest undeveloped resource of lithium” and “North America’s largest resources of manganese” (NB n.d.; Appendix 7). With challenges to finance and develop a mining project from prospecting to production (Kneas 2020; Antweiler 2024), mobilisations of potentiality and uncertainty – and the notions of economic possibility which derive from them – are important facets of strategic efforts to render certain occurrences as known and accessible resources to potential investors and consumer jurisdictions (Fry & Murphy 2021). A politics of possibility is thus significant to mobilising investment into undeveloped and unexploited – yet known – occurrences. Through quantifications and picturings, certain minerals are abstracted from the physical environment in which they materially occur as part of a speculative “economy of appearances” whereby some minerals become resources inscribed with anticipated potential (Tsing 2004: 83). However, uncertainties that generate possibility can also lend precarity to these projections.

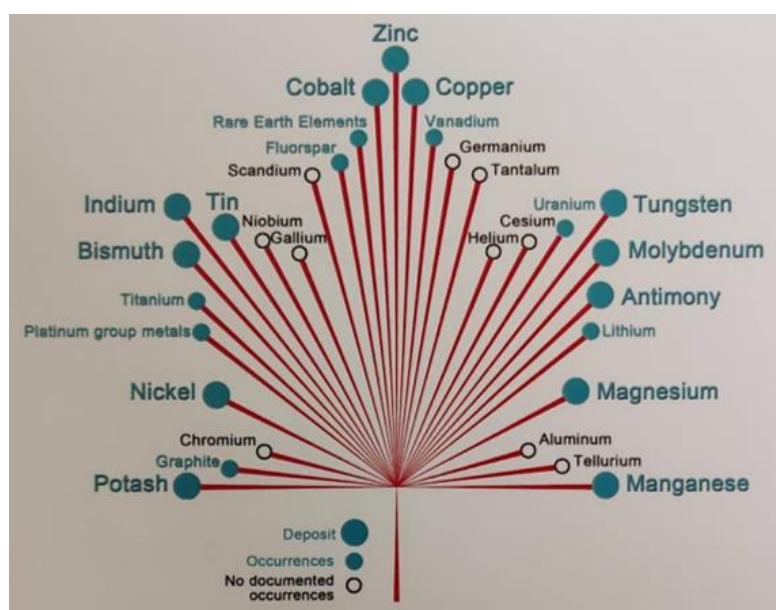


Figure 4.10: Graphic indicating New Brunswick’s critical mineral occurrences and deposits, and lack thereof, in relation to NRCan’s critical minerals list. See Appendix 7. Source: NB n.d.

While certain minerals are brought into being as valuable, useful resources in relation to notions of future economic potential, there are uncertainties which can undermine these projections. One such uncertainty is the volatility of critical mineral markets alongside the need for large capital investments and meaningful timescales to prospect and produce from mineral deposits to thus capture the “generational opportunity” this resource economy is considered to offer (NRCan 2022b: 4; Antweiler 2024). Indicative of this is Fig. 4.11 which shows that, since 2005, only four mines have been opened in Canada which supply critical minerals for the EV battery supply chain – and of these, only lithium and copper-nickel production which is taking place. Therefore, also linking examples such as those above from Ontario and Québec where statistical picturings “turn geologic natures into resources” through relational and temporal articulations of potentiality (Fry & Murphy 2021: 2), the uncertainties and fragilities of these projections can be obscured. Most obviously, current production capacity and the rate at which critical mineral mines are opening is observed to be far below that which is needed to position the nation as a serious contender for “mak[ing] Canada a global centre” for EV production and battery manufacturing (MAC 2024: 7-8). Participant 9 also argued this by bringing Fig. 4.11 to my attention, highlighting the information that a five-fold increase in the pace of mine openings is needed to “fully support domestic EV battery production”. Demonstrably, statistical picturings constitute speculative “gestures of potentiality”, though these can occlude the uncertainties of current and future production capacities (Kuchler & Bridge 2023: 5).

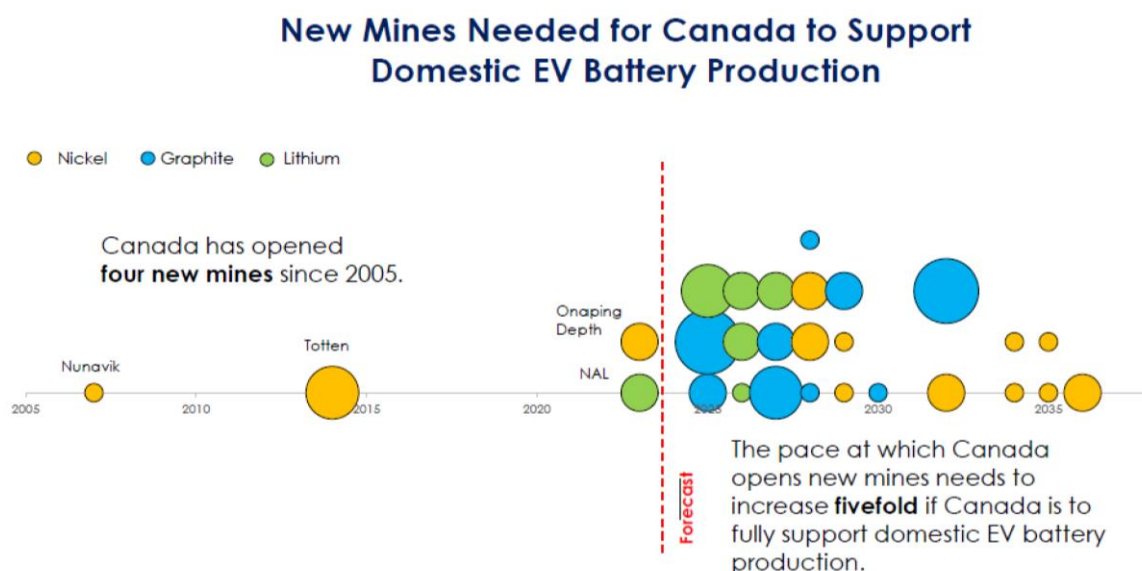


Figure 4.11: Graphic depicting a timeline of past and forecasted critical mineral mine openings for EV battery production. Source: Ghattas (2023). Provided by: Participant 9.

A further element of uncertainty emerges through the disjunct between those minerals identified as ‘critical’ and the specific forms in which these occur ‘in the ground’ and the grades



and types of compound needed for specific applications. Participant 9 raised concerns here that the grade of nickel to be produced at the North American Lithium (NAL) project has limited applications in the EV supply chain. This speaks to a practice utilised across numerous critical mineral strategies, most particularly in the formulation and presentation of critical mineral lists (e.g. Figs 4.2 & 4.10), where they appear to simplify resources through ‘criticality’ assessments and lack specificity around their chemical composition when extracted from the ground. There is thus a potential ‘slippage’ between which resources are framed as having geological ‘potential’ in Canada and their economic potential with regards to the appropriateness of their mineral grade for processing and applications in sectors named in criticality criteria.

To conclude this section, I foreground the precarity of projections of resource potentiality in relation to the notion of “impotentiality” (Kneas 2020: 269) or resource “unmaking” (Kama 2021: 61). Adding to the preceding paragraph’s discussion of how uncertainty and potentiality can be deployed productively, I highlight the volatility of critical mineral markets where these are situated closely to speculative economic futures around investment attraction and anticipated future supply/demand (Antweiler 2024). Sustained and/or significant fluctuations in critical mineral valuations could render some opportunities in Canada and beyond unattractive to investment. January 2024, for instance, saw nickel prices drop over 40% and lithium prices plummeted by more than 80%, compounding instability linked to long lead times for mineral projects (Dev 2024). Evidencing how such uncertainties can impact projects, the NAL project (Fig. 4.10) in Québec closed having gone bankrupt in 2019. This was linked to a drop in lithium prices as well as a co-owner filing for bankruptcy (Participant 9; Parizot 2023). However, with reserves of over 29 million tonnes (Mt) and estimated extractable potential of 25 Mt, NAL has been producing lithium spodumene concentrate since March 2023 (Sayona 2024). Such impacts of market volatility can be significant given the high capital investment needed from both public and private sources to support mineral exploration, development, and extraction, as well as to enhance processing and manufacturing at mid- and down-stream sectors of the supply chain (Antweiler 2024). I thus problematise speculative rhetoric, quantifications, and visualisations – or statistical picturings – which “hype investment potentials” for certain mineral resources (Fry & Murphy 2021: 3). These challenges suggest a role for other practices aligned with projections of potential because discourses and calculative “conjurings” cannot alone ‘make’ resources and sustain them as an investible assemblage of resources (Ibid.).

### 4.3 ‘Placing’ critical mineral potential: rendering visible and actionable Canadian resources

The ‘placing’ of resource potential within the territorial extend of Canada and Canadian jurisdictions extends from an analytical focus on projections of potentiality as elements of resource-making. Recognising a co-constitutive role for statistical picturing devices, I turn my analysis to how the discursive-statistical construction of Canadian critical mineral resources takes place alongside a “spatial politics of calculation” and the strategic co-location of resource opportunities existing and future resource activities, infrastructures, and economies (Rose-Redwood 2012: 297; Kneas 2020). Placing potentiality refers to how “qualitative understandings of potential” deploy narratives, calculations, and notions of space – including existing infrastructures – to facilitate specific appraisals of minerals’ value and utility as resources (Kneas 2020: 269). Overall, I identify rhetorical *and* cartographic techniques of ‘placing’. I contend that these two practices of strategically co-locating resource potential are significant to how certain mineral opportunities are rendered legible, desirable, and accessible and are thereby assembled as investible resources (Li 2014).

The national critical minerals strategy utilises maps which present Canada’s geology to communicate resource values and endowments. They thus inscribe resource spaces with value and utility by placing notions of abundance and other elements of ‘potential’ (Li 2014). I contend that they effect resource-making through co-locating potential through cartographic representation of mineral opportunities (e.g. occurrences, exploration activities, processing capacities etc) and rhetorical framings (Kneas 2020). Fig. 4.12 maps mineral mines, smelters and refineries, and advanced projects in Canada, ‘placing’ potential in space and thereby rendering opportunities visible to investor interests. This is also placed within a spatio-temporal rhetoric as “preliminary analysis has identified several Canadian regions with high potential for mineral exploration and development in the near term” which extend “from coast to coast to coast” (NRCan 2022b: 10-11). This framing of resource possibilities is connected with discourses around the economic potential of a reliable pan-Canadian supply chain. This constitutes a national economic rhetoric aimed at incentivising investments from industry and consumers by making visible and increasing confidence in Canada’s geological and economic potential. With this view, NRCan emphasises the need to nationally integrate industrial stages to build “competitive value chains in Canada” around critical minerals (Ibid.: 11). A further example of a strategic co-location of resource potential with rhetoric is Fig. 4.13’s emphasis on Canada’s offering of “secure and reliable sources” in relation to the search by “leading



economies”, also referred to as “Canada’s partners” (NRCan 2020b). Evidently, cartographic and rhetorical placings of mineral potential combine to position Canadian minerals as ready, desirable, and viable for exploration and development, and investment into these activities (Kneas 2020). Beyond cartographic-rhetorical placings is the co-location of potential with spatial elements including existing mining activities, infrastructures, and economies.

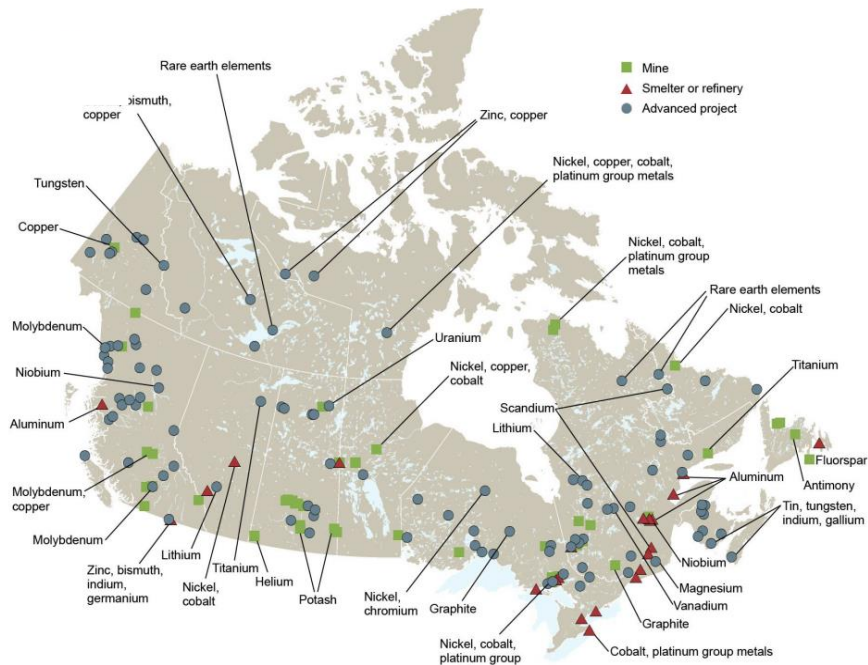


Figure 4.12: Map showing 'Critical Mineral Opportunities Spanning All Regions of Canada', Canadian Critical Minerals Strategy, NRCan 2022b: 10.

**CANADA IS AN EMERGING SUPPLIER OF MANY OTHER CRITICAL MINERALS INCLUDING RARE EARTH ELEMENTS, LITHIUM, VANADIUM, MANGANESE, PHOSPHATE AND MAGNESIUM**

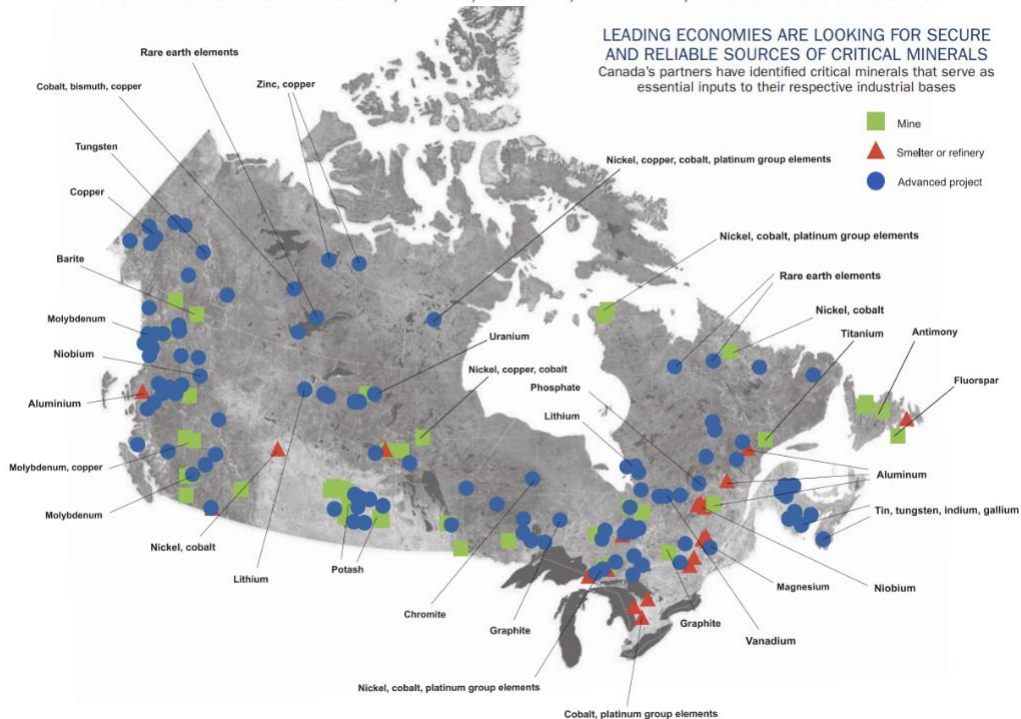


Figure 4.13: Map showing mines, smelters and refineries, and advanced projects for critical minerals in Canada. Full version available at Appendix 8. Source: NRCan 2020b.

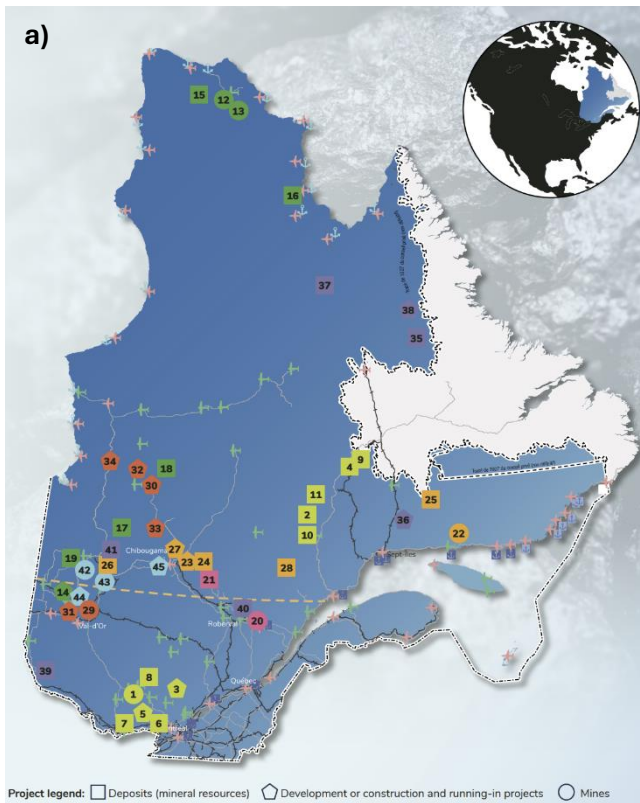


Figure 4.14a: 2022 version of Fig. 4.14, indicating resource potential (deposits & project development stages) but showing more transport infrastructure across the province, cf. Fig. 4.14b. Map key available at Appendix 10. Source: QC 2022: 9.

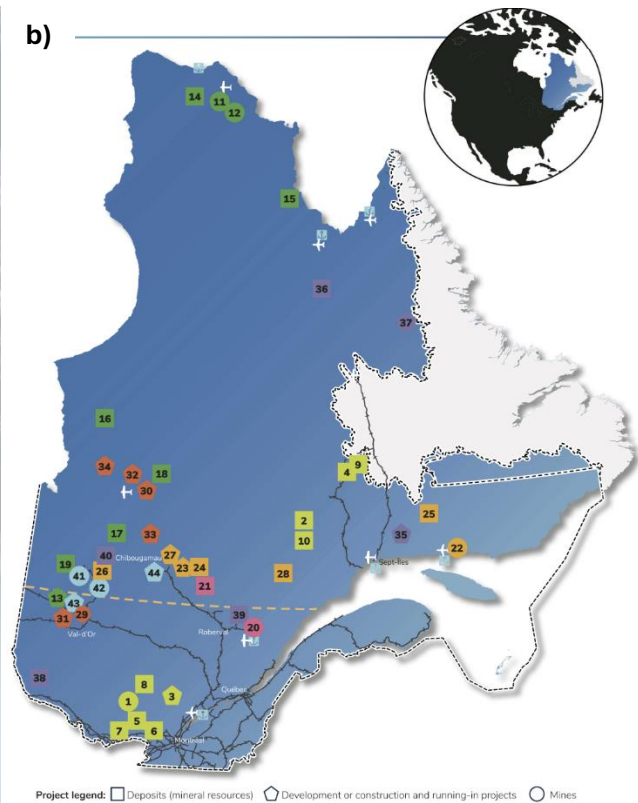


Figure 4.14b: Map locating mineral resource deposits and their respective stages of development, including transport infrastructure. Source: QC 2020c: 11.

The strategic co-location of mineral potential is an important element of resource-making through cartographic representations and is deployed at provincial and territorial levels with implications for assembling resources and producing investibility. A key example of this is Québec’s mapping of resource opportunities alongside transport and other infrastructures for critical mineral supply chains, including airports, seaports, and railways (QC 2020c: 11). While other examples exist, such as in BC’s ‘Atlas’ (Appendix 9), Québec offers a more expansive empiric with ‘placing’ through co-located illustrated with rhetoric, transport, and economic regions. Fig. 4.14a, published in the investor-oriented brochure version of the *QPDCSM*, illustrates where geological potential is closely entwined with economic potential suggested by access to a wide range and extensive network of transportational infrastructures. Moreover, Québec also includes a detailed key with Fig. 4.14a which lists the mineral occurrences and their various statuses as deposits, in-construction, or active mines (QC 2022: 8). This is used as an opportunity to add qualifying statements to the indications of geological and economic potential, such as by highlighting that “Québec has high lithium potential”, “has several rare earth deposits and is recognised as having global potential”, and that “several graphite projects

are underway” (Ibid.; Appendix 5). With this in place, the *QPDCSM* also commits to extend and improve the infrastructures alongside which mineral opportunities have been placed with an objective to “favour access to Québec’s territory and serve not only [the] development of projects related to CSM sectors, but also for many other users and local and indigenous communities” (QC 2020c: 12). Fig. 4.14b may reflect progress on this objective as it shows a more expansive network than the 2020 version. By signalling accessibility through a strategic co-location of geological potential with transportational infrastructures, Québec works to project – or conjure – potential value as a way of assembling investible resources (Kneas 2020).

Placing resource potential through strategic co-location also takes place in relation to economic opportunities indicated through regional resource economies. There is therefore a multi-scalar approach which leverages a jurisdiction’s competitive advantages and positions its geological and economic potential in relation to a wider regional economy around critical minerals supply chains, from exploration to manufacturing applications. Within this, speculation and proximity are important tools employed through placing techniques to inscribe and picture investible resources (Kneas 2020; Fry & Murphy 2021). To illustrate this, I continue to draw on empirics from the *QPDCSM* and particularly its alignment with *The Québec Battery Initiative* (Investissement Québec (IQ) 2021). In the latter document, Fig. 4.15 co-locates Québec’s opportunities within the wider North American “battery cell manufacturing landscape” by drawing attention to the province’s proximity to evolving manufacturing markets for battery cells, as well as rail links and deep-sea ports (IQ 2021: 4). Through a multi-scalar co-location of an emerging North American battery cell manufacturing supply chain and market with the minerals to sustain it, Québec’s CSMs are placed within a wider political economy where they are appraised and assembled as investible resources. Furthermore, Fig. 4.15 is presented alongside Fig. 4.16 which shows the presence of mineral resources and exploitation in Québec and surrounding provinces, particularly Ontario, and world rankings of Québec’s and Canada’s deposits and production. This co-location of reserves and resources with a relational articulation of their international significance demonstrates how Québec has sought to place and position its CSMs in such a way that they are rendered legible and accessible to investment and development interests (Li 2014). Collectively, these maps demonstrate how the inscription and statistical picturing of resource spaces and the placing of geological and economic potential within them serve as powerful ways in which certain minerals are assembled as investible resources.

## North American battery cell manufacturing landscape Company announcements, 2019-2021

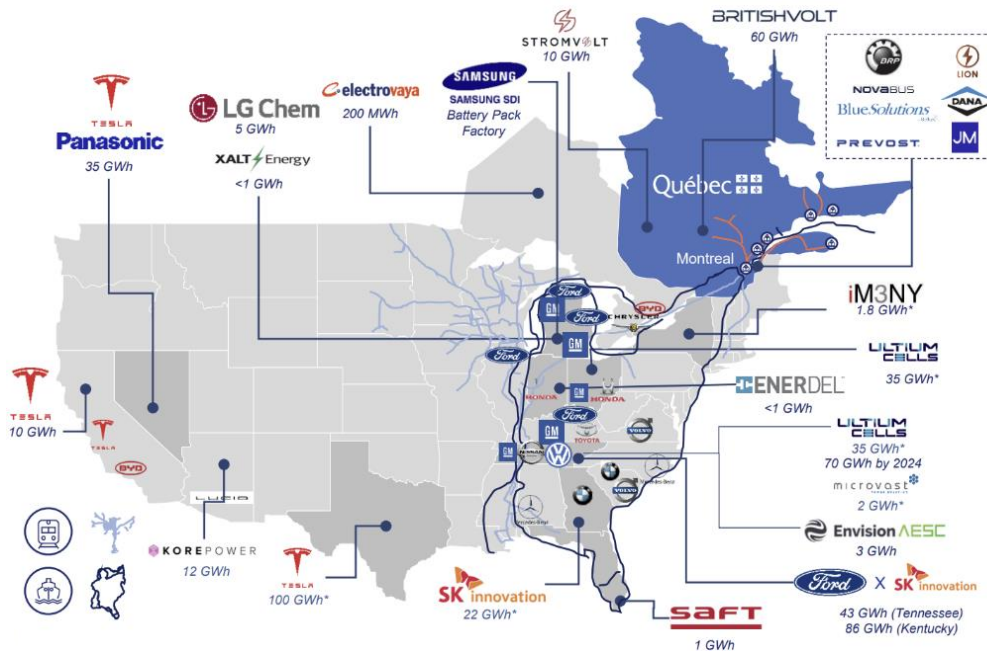


Figure 4.15: Map showing “Québec located strategically within the North American EV market” with company announcements of commitments to battery cell manufacturing in GWh. Source: IQ 2021: 4.

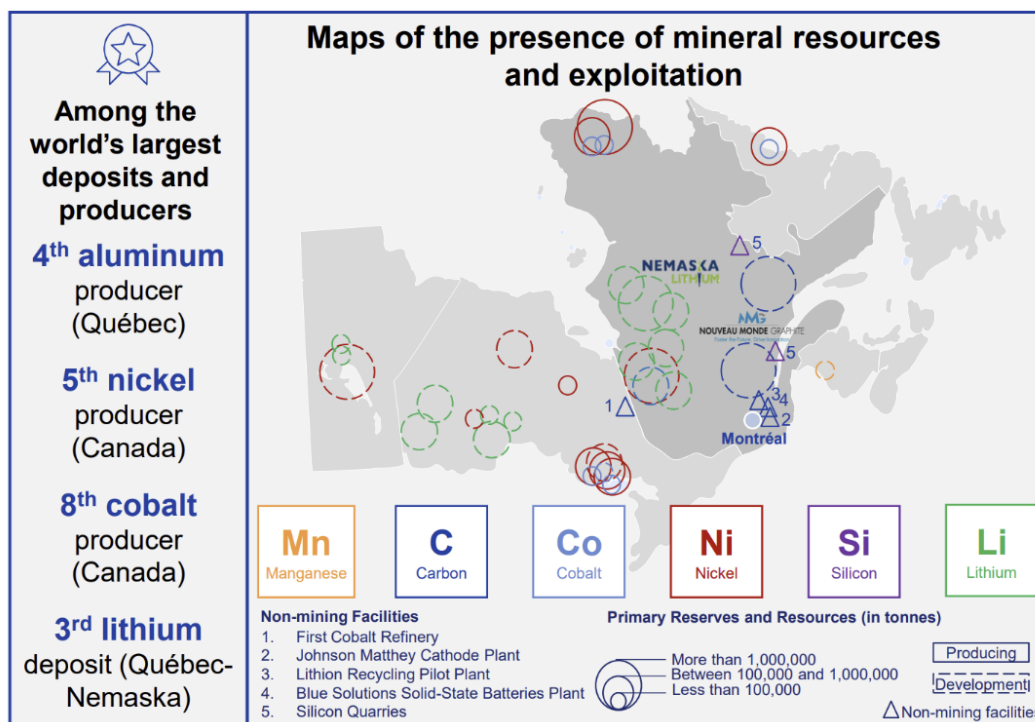


Figure 4.16: “All key mineral resources for battery manufacturing can be mined locally: Map of the presence of mineral resources and exploitation”. Source: IQ 2021: 5.

### 4.4 Critical minerals ‘becoming’ legible and actionable as an ‘investible assemblage’

This chapter has traced, across Canadian critical mineral strategies, how discourses of criticality, urgency, and potentiality have intersected with and helped sustain visions for secure and responsible futures for Canada and its like-minded partners, anchored around developing

domestic Canadian critical minerals supply chains. Relational, temporal, and spatial framings of criticality have demonstrated the multiple ways in which certain minerals become “objectives of significance” (Kneas 2020: 269; Kama 2021). While technological and geographical contingencies create differences in what is assessable and economically significant as a ‘critical’ resource, agreement has formed around concerns for clean energy technologies, global production distribution, and supply potential in Canada – significant as it is a net-exporter (Kelley et al. 2021). Further observations are that projections and placings of potential, and productive possibilities rooted in uncertainty, constitute spatially and temporally specific ways of conjuring the geological and economic potential of certain minerals to render them legible, investible resources (Kuchler & Bridge 2023; Li 2014). However, such practices also combine with geoscientific knowledge to construct territory as valuable resources for the state and its partners. With this in mind, a critical next step for this research is to delineate the enrolment and maintenance of the ‘investible assemblage’ by and for the state. This extends my argument to examine the co-constitution of resources and the state through focuses on knowledge production and mechanisms of statecraft over Chapters 5 and 6.



## **5 Rendering state space knowable, actionable, and investible**

This chapter seeks to understand how assembling critical minerals as investible resources (described in Chapter 4) also, at the same time, co-produces the state. This co-constituting relationship is conceptualised as the resource-state nexus (Bridge 2014; Huber 2019). Thus, to understand how the Canadian state is made “geopolitically coherent and cohesive” (Zhou 2022: 6), I illuminate how spatialised practices and discourses reproduce the state as an “effect” not just an actor (Schouten 2013: 1). The ‘state effect’ refers to its constitution through spatialised practices and performances alongside state-based identities and power, as well as the state as an agent of statecraft (Mitchell 1991; Koch 2015). With this in mind, I trace how the state attains a “myth of coherence” by examining processes of state-making wherein some minerals and the spaces in which they are contained are rendered legible, exploitable, and investible frontiers for mining activities and investments (Koch 2015: 29). I examine how “technologies of observation, reproduction, and display”, such as cartographies, involve the enactment and ‘consumption’ of the Canadian state as a territorial space with ‘effect’ through how it is seen and imagined by its population and the world (Campbell & Power 2010).

My approach through this chapter responds to Koch’s (2022; 8) argument that “[a] state can’t be made real by cartographers alone” as I analyse the different actors and discursive, calculative, and representational decisions connected to the production of geoscientific knowledge about mapped territories – including where notions of the geologically ‘unknown’ facilitate mining’s spatial expansions (Hine et al. 2023). Section 5.1 considers how geoscientific knowledge ‘scales’ resources to state space and thus makes possible new ‘frontiers’ for critical mineral activities. A problematisation of this is where cartographic representations can obscure or exclude alternative ways of knowing and living with land and resources. With resource spaces made knowable and actionable, Section 5.2 examines the effect of the “derisking state” in producing “investibility” via domestic initiatives of statecraft (Gabor 2021: 429). My argument thus extends into Chapter 6 as I examine how the state is not only an actor or object of statecraft, but is also constituted *through* statecraft, where the latter is the effect of multi-scalar practices and discourses (Kuus 2017; Koch 2015; Coleman 2007).

### **5.1 Producing vertical state space and mineral frontiers**

Resource-making and state-making processes intersect to render state territory knowable and actionable frontiers for mineral activities (Himley 2021). I find that the generation of knowledge about and the mobilisation of subsurface resources by “seeing geologically” is significant to

how the investible assemblage of critical mineral resources is brought into the reach of the Canadian state (Bruun 2018: 38). By examining the co-constitution of the resource-state nexus with the production of resources as “vertical territory”, I establish how the Canadian state is enacted, its power reified, and becomes ready to investment (Marston 2019: 3; Bridge 2014). This link to the resource-state nexus conceptualisation helps demonstrate how the state’s “ontological and territorial coherence” is secured through efforts to bring resources and resource spaces within its territorial extent alongside notions of state sovereignty and identity (Zhou 2022: 8). With these conceptual and analytical approaches in mind, this section considers the expansion of geoscientific knowledge to enhance the calculating and mapping of minerals as important objectives of numerous Canadian jurisdictions’ critical mineral strategies. For instance, it is considered vital to “unlocking [their] critical minerals potential” (NL 2023: 13) and “better support[ing] critical mineral industry members and other interested parties” (NS 2023: 4). To “find the deposits of the future” is therefore closely connected with capacities in geological mapping, geophysical surveying, and scientific assessments (NRCan 2022b: 19). The extension and enhancement of these capacities helps render certain minerals visible and contributes to their physical and financial accessibility as viable deposits.

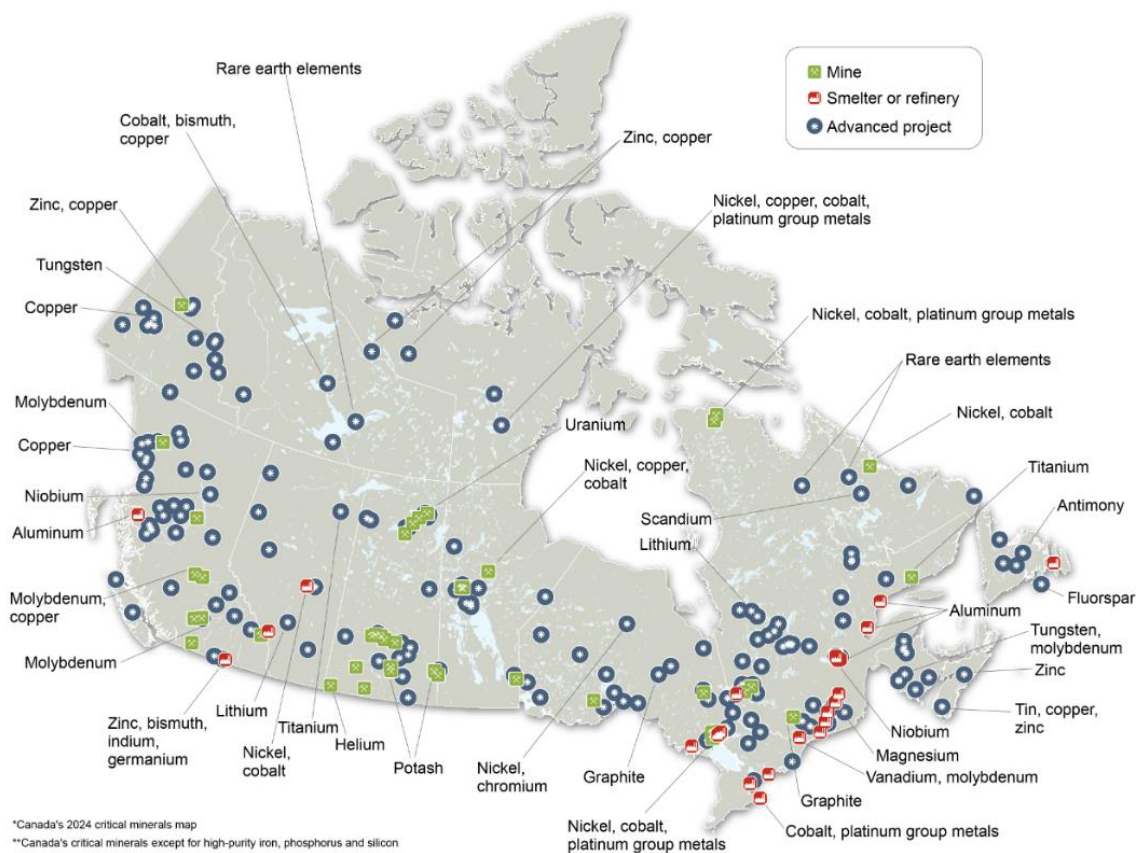


Figure 5.1: 'Critical mineral development across Canada', a map showing mines, smelters, refineries, and advanced projects in 'all Canadian provinces and territories' except PEI. Source: NRCan 2024a.

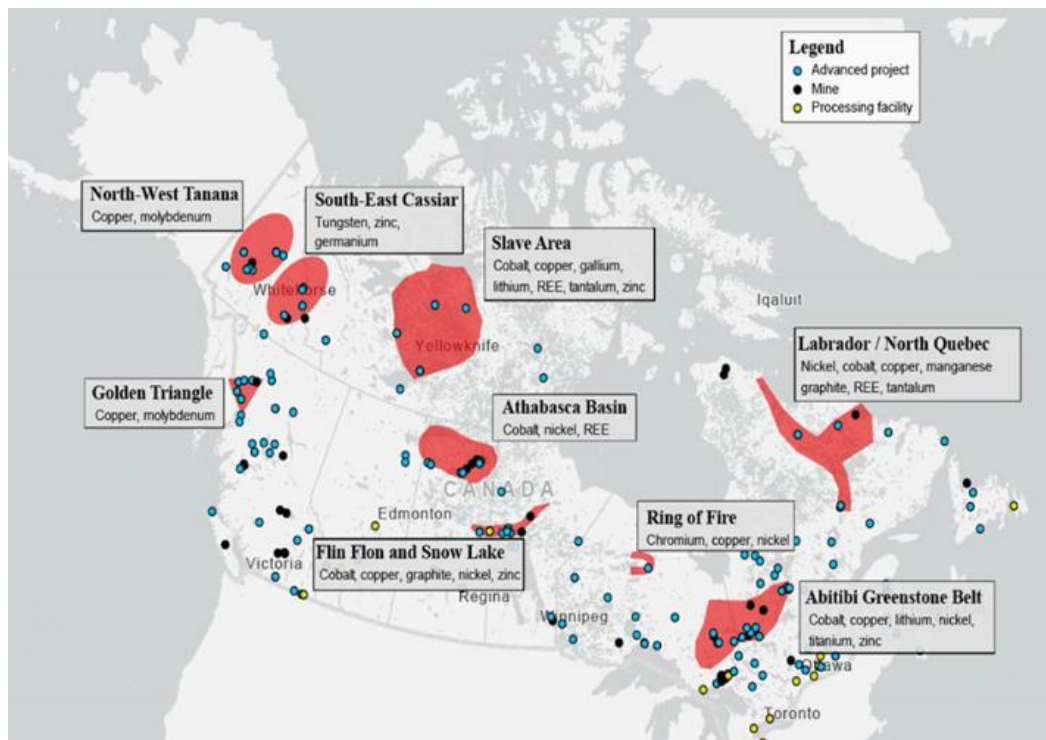


Figure 5.2: Map showing 'critical mineral-rich regions' with economic growth and developmental potential.

Source: NRCan 2022a: 25.

The production and dissemination of geoscientific knowledge through maps constitutes an important connection between processes of resource becoming and state-making as it locates and scales resources to the territorial extent of the state, alongside a discourse of resource nationalism as an element of such state building efforts (Fogelman & Bassett 2017; Childs 2016). In the Canadian context, this demonstrates where critical minerals are mobilised through geoscientific processes which produce the substrata as “vertical state territory” (Marston 2019: 1) as the state “see[s] geologically” (Braun 2000). At the federal level, there have been several national-scale maps presenting various moments of “critical mineral opportunities spanning all regions of Canada” (NRCan 2022b: 10-11), such as Figs 5.1 and 5.2 (see also Figs 4.12 & 4.13: 62). These examples represent spatialised discourses of abundance across the nation, articulating and presenting “enormous resource wealth ... from coast to coast to coast” (Ibid.: 5). The maps work to mobilise subsurface potential by displaying a selecting geological knowledge of the underground as active, investment-ready opportunities within a wider “geopolitical project of state formation” (Huber 2022: 2). The ‘state effect’ is thus constituted in a two-fold manner. Firstly, Figs 5.1 and 5.2 scale resources to the state’s territorial extent. Secondly, this constitutes a mode of abstraction where minerals are made legible to the state and abstracted from environments and other non-state-based relations in which they are located (Scott 1998). The maps thus illustrate one way in which the Canadian state is made coherent as it gains knowledge of and power over resource opportunities within

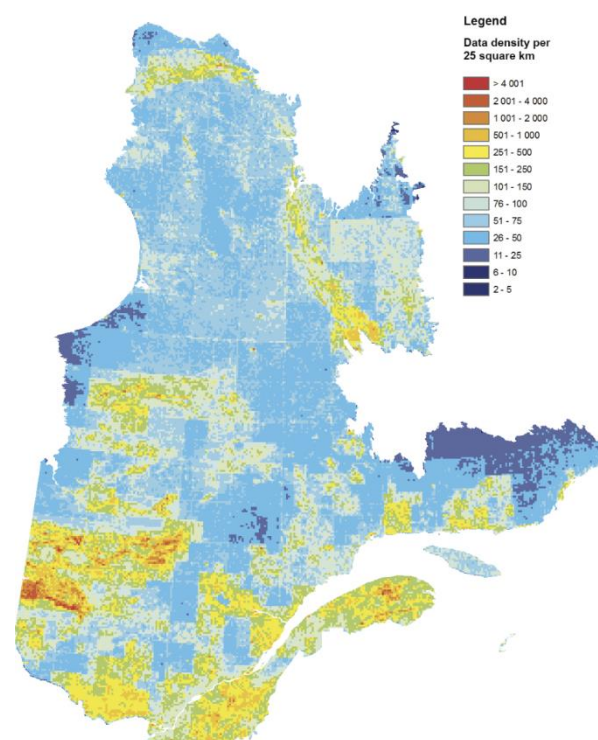


its territory and removes them from alternative socio-economic relations: resources become known and understood *through* and *in relation to* the state. However, it is not just the spatial extent of mineral opportunities which is significant; also influential to the resource-state nexus is their spatial distribution – the densities of clusters and the spaces in-between them.

The indication of pan-Canadian abundance represented through Figs. 5.1 and 5.2 is not evenly spread across the territory of the Canadian state. Instead, the clustered character of this representation of critical mineral opportunities – and, by extension, areas of dispersal and spaces of apparent ‘nothingness’ – disrupts the notion of opportunities “spanning” all of Canada (NRCan 2022b: 10-11). Where the maps draw attention to high density clusters of opportunities, particularly across mining and refining sectors, they are framed as more promising than others in relation to their strategic co-location activities (Kneas 2020). However, there is also a notion of productive possibility invoked by representations such as the spatial extents of the red regions of Fig. 4.2 which are identified particularly for their potential for cobalt, copper, nickel, and REE production (NRCan 2022b: 25a). The absence of ‘dots’ across these expanses suggests untapped, undeveloped opportunity (Kuchler & Bridge 2023). This gives a further meaning to Demeritt’s (2001: 438) notion that such representations indicate more than just a “scatter of ... dots on [a] page”. The expansionary vision invited by these untapped, unknown spaces reflects observations of how the state coheres around presentations of “unknown ‘empty’ space” positioned as sites of critical mineral potential to be discovered (Hine et al. 2023: 243). Moreover, these maps draw attention to areas of northern Canada and the notion of an expanding resource frontier and a “widening” of Canadian critical mineral activities into new geographical spaces (Bisht 2021: 3). It is therefore demonstrated that the vision of that which is unknown but seen to contain geological and economic potential is as significant as occurrences and potentiality which are known and visible (Kuchler & Bridge 2023). In this way, the co-constitution of resources and the state takes place by making spaces of ‘nothingness’ legible and actionable to the state.

The productive possibility of the unknown is also demonstrated at the provincial scale where sub-federal jurisdictions can also acquire the state ‘effect’ where resources and resource spaces intersect with knowledge production and notions of sovereignty (Koch & Perreault 2019; Kuus 2017). An informative example here is Québec’s inclusion in the *QPDCSM* of a map of the spatial extent and density of its geological data about the province (Fig. 5.3). Through this, the province is able to cohere around its current knowledge of the subsurface as well as the

possibilities held within “a whole world to explore and wealth to discover” (QC 2020c: 17). Where data densities are shown to be lower (darker blues), Québec is able to position these as frontiers for geoscientific knowledge creation and as potential sites of exploration for economic opportunities – “especially in northern and eastern Québec” (Ibid.). That is, through Fig. 5.3’s positioning of the certainty of geological knowledge and potential which could be uncovered in both areas of very high and very low densities of information, the province underpins its claims of being “highly prospective for critical minerals”, particularly lithium, graphite, and REEs – indeed, Québec is the location of more than half of Canada’s lithium mines (East 2024). Further to the suggestion of economic potential located in areas of low knowledge which the state seeks to capture, it is importantly the act of producing and holding this information in and of itself which has value for the state and the enactment of state power (Marston 2019; Himley 2014). Indeed, the *QPDCSM* highlights that “the acquisition of this knowledge will allow the consolidation of Québec’s expertise, which is strategic economic wealth in itself” (QC 2020c: 18). This reflects that the “generation and dissemination of territorial data through mapmaking” and the connected production of “vertical territory” are demonstrably important for legitimating and consolidating the state (Marston 2019: 3; Braun 2000). However, as Huber (2022: 2) observes, the knowledges and institutions which underpin resource nationalism in constituting the state and the related expansion of resource frontiers may also be “inhospitable to Indigenous autonomy” and more generally obscuring alternative ways of knowing and relating to resources and the lands in which they are contained.



*Figure 5.3: Map showing the state of geoscientific knowledge in Québec, indicating the spatial extent and density of data per 25km<sup>2</sup>. Source: QC 2020c: 17.*

A further implication of the production and deployment of geoscientific knowledge production is therefore the possible obfuscation of alternative uses and users of the lands within which resources have been identified as valuable and useful for Canadian strategic visions (Huber 2022). This includes a reimagination of space as areas of geological possibility through geological knowledge production and its cartographic representation. However, this takes place at the risk of obscuring alternative ways of knowing and interacting with these lands and the resource ‘potential’ they are claimed to contain (Himley 2021). In particular, a further invocation of the notion of “empty-yet-full” space constructs it as seemingly “empty” of people and their histories and livelihoods yet “full” of geological and economic potential for use and exploitation by the state (Peyton & Keeling 2017: 118; Bridge 2001).

A crystallisation of this obfuscation is visible where indications of mineral potential occlude alternative ways of knowing and using land, and thus shape a specific set of resource-state relations at the potential expense of local and Indigenous communities (Hine et al. 2023). An example I draw on here is a map (Fig. 5.4) from *Ontario’s Critical Minerals Strategy* which depicts the Ring of Fire and its claimed deposits of nickel, copper, platinum, and chromite and is used to underpin calls for investment to drive infrastructural connections between this frontier and the province’s better-connected southern shores and borders (ON 2022). For Ontario, the Ring of Fire represents a potential resource frontier where the Ontarian government is seeking to develop critical mineral operations (Ibid.). However, Fig. 5.4 does not represent an indication that these lands are shared by First Nations. This is despite an accompanying narrative to the map which calls to progress the “Corridor to Prosperity” through collaboration with First Nations of the province (Ibid.: 13). In response to such omissions, the Wildlife Conservation Society of Canada and northern Ontario’s Attawapiskat First Nation engaged in a counter-mapping project (Fig. 5.5) which sought to cartographically depict and make visible the excluded spatial intersections of First Nation communities’ reserves across the province and ecosystem and land use data with mining claims and developing/active mines (Bryan 2021). This follows a longer history of counter-mapping in Canada, such as the Dene Mapping Project, which depicted traditional land uses alongside pipeline proposals (Nahanni 2017). These counter-mapping projects demonstrate how a core aspect of Canadian state-making is simultaneously constructing state space as resource-replete and visually empty of socio-cultural activity (Avila et al. 2021). An extension to the counter-mapping project is where Indigenous organisations are driving their own vision to the development of infrastructural

connections to Ring of Fire deposits, such as the Northern Road Link collaboration of First Nations in Ontario (NRL 2024).

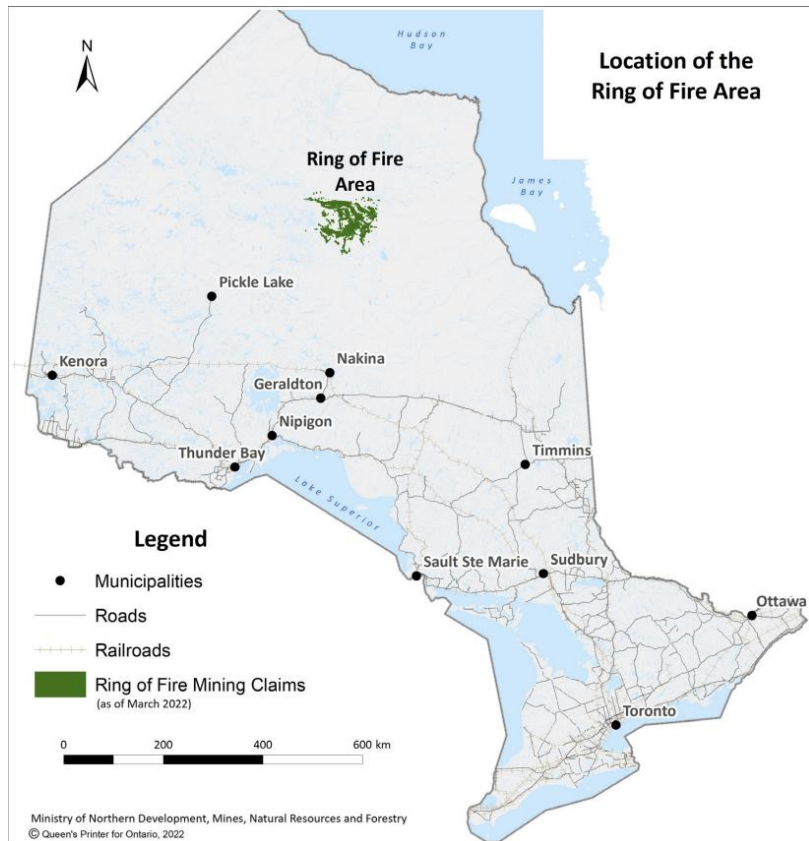


Figure 5.4: Map showing the location of mining claims in the Ring of Fire, co-located with mapped infrastructure. Source: ON 2022: 13.

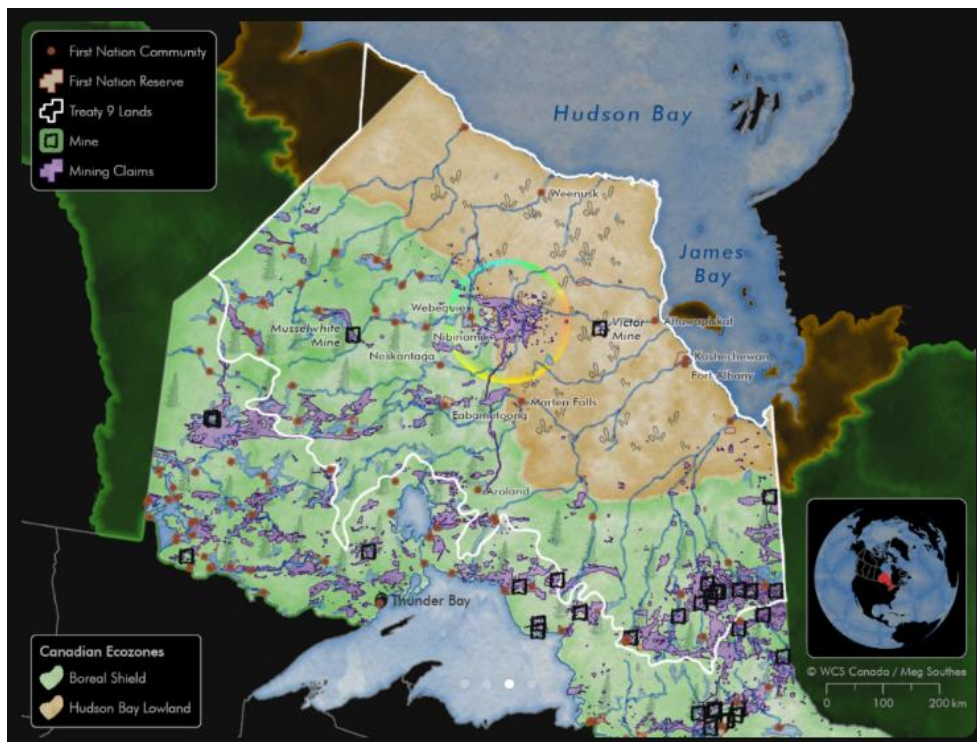


Figure 5.5: WCS and northern Ontario First Nations counter-map to highlight Indigenous homelands in relation to mines and mining claims, particularly in the Ring of Fire region. Source: WCS 2022.

A discourse and geopolitics of differentiation is significant to these practices of producing and representing geological knowledge within a project of state-making. This is particularly apparent as the Canadian federal strategy aims to position the state to be a “global supplier of choice” of critical minerals for transitions to green energy and net zero emissions targets (NRCan 2022b: 1). Linking this with Himley’s (2014: 177-178) identification of the role of a “*pais minero*” discourse in Peru and its mobilisation of underground resources, I find that Canada’s generation and dissemination of geological knowledge contributes to an imagining of state space as replete with “valuable – and ready-to-be-had – mineral deposits”. The discursive and representational practices of Canadian jurisdictions therefore work to connect resource-making with a state-making process which brings ‘critical’ minerals of the subsurface into being within the “rationalised realm of the state” (Marston 2019: 1). In Section 5.2, I move beyond a geoscience focus to consider how the state repositions geopolitically and geoeconomically through financial-oriented objectives that constitute the state’s coherence and sense of identity. This considers domestic initiatives of economic statecraft and their role in facilitating and incentivising investment through a project of derisking.

## **5.2 A derisking state? Producing investibility through domestic initiatives of statecraft**

To facilitate and incentivise investment towards exploring and developing Canadian critical mineral opportunities, practices of derisking emerge as important tools of state-making. More specifically, derisking sees modes of economic statecraft deployed to produce investibility and thereby contribute to the coherence of the state as both actor and effect, exerting influence and power over resource opportunities and the financial arrangements which surround them (Valdivia et al. 2021; Mitchell 1991). Therefore, I turn to critical microfinance literatures to examine how the emergent research opportunities and frontiers indicated in Section 5.1 can be derisked for investment. In so doing, I consider Gabor’s (2021: 429) conceptualisation of the “derisking state” in the context of green industrialisations, such as that represented by increased demand for ‘critical’ minerals for clean energy technologies (IEA 2023). This orientation invites a focus on state-building as intersecting with shifting public and private capital relations where the state increasingly uses “fiscal resources to cover demand risks and political risks in relation to public-private partnerships (Ibid.: 435). Domestic initiatives of economic statecraft analysed in this section include financial derisking tools such as public subsidies and guarantees (tax incentives, direct grants, loan guarantees etc.) (Ferguson et al. 2023). As “state interventions” (Gabor 2023: 2), these techniques of statecraft combine with

discourses, such as responsibility and reliability, to constitute “political technologies of derisking” in the production of investibility around Canadian critical mineral resources and resource spaces (Gabor 2021: 434). Drawing on examples from federal and provincial levels, my analysis ultimately highlights an influential intersection between certain discourses and financial instruments of statecraft to drive a project of derisking the state. This is impactful as these efforts seek to facilitate investment in a high-risk, high-capital sector with respect to mineral prospecting operations and long lead times for bringing new mines and other parts of the supply chain ‘online’ (Antweiler 2024; Kneas 2020).

An important financial tool of derisking in Canada are flow-through shares (FTS). These are offered to investors as a means of supporting expenditures into mineral exploration (NRCan 2022b: 20), and thus de-risk such activities from a finance capital perspective. However, there are concerns that such a mechanism risks entrenching a ‘mining story’ which is focused on prospecting through a “supply push” perspective – as opposed to a “demand pull” orientation towards investor and consumer attention towards ESG concerns and circular economies (Participant 9; C2M2A n.d.). FTS are a popular mechanism in the Canadian natural resource sector for junior mining explorations in particular (Kneas 2020) and operates through mineral tax credits which allow mining companies in Canada to subtract certain exploitation and early development expenses from their taxable income (NRCan 2022b). Therefore, to incentivise investment in exploration activities, FTS are envisaged to “provide certainty and predictability that will encourage investment ... and economic growth” (Stanley 2016: 2423). The Standing Committee on Natural Resources has updated the scope of FTS, alongside other financial measures, “to spur investment in critical mineral exploration projects” (Maloney 2021). In this vein, the federal strategy announced that a re-positioning of the FTS programme to include the newly launched Critical Minerals Exploration Tax Credit (NRCan 2022b: 20). However, although such economic mechanisms of statecraft are influential for producing investibility around which the state coheres as an architect and effect of these public-private capital relations, they risk entrenching a ‘mining story’ which can lack a long-term value-add incentive and an emphasis on responsibility. Here, Participant 9 observed that the orientation of Canadian FTS towards prospecting has involved limited regard for long-term project development due to a “supply push” mentality. Moreover, related concerns around long-term visions include how FTS may undermine Indigenous sovereignty (Stanley 2016). FTS thus risk undermining visions for

sustainable value chains and raise questions around whether the production of investibility through derisking investments may come at the expense of responsibility.

A 'responsibilisation' of resource supply is therefore an important way in which the Canadian state is presenting and structuring its approach to the federal critical minerals strategy, particularly with respect to "economic reconciliation" with Indigenous populations (NRCan 2022b: 28). However, despite this orientation in strategic approaches to critical minerals, FTS may lead to a constitution of the resource-state nexus which obscures alternative pathways to developing critical mineral resources which incorporate longer-term social, economic, and environmental sustainability concerns beyond just a 'mining story'. At the intersection of these concerns around socio-economic implications, I further problematise FTS in Canada by reiterating concerns that these financial tools can be used to obscure the interests and needs of Indigenous peoples on whose lands many critical mineral exploration activities are to take place (Stanley 2016). Through a critical geographical lens on risk management and colonialism, Stanley outlines how the FTS system enables this where costs associated with Indigenous engagements are eligible for offset to "decreas[e] the risk of development" to counter perceived "threat[s]" posed by the potential disapproval of extractive industries by Indigenous communities (Ibid.: 2428, 2431). In the current context of Canadian critical minerals, Participant 9 called for modifications to this financial mechanism to tackle short-term thinking. Specifically, they observed that the FTS system can fail to encourage meaningful, maintained engagement with local and Indigenous communities, and can favour a profit-making model through the flow of tax credits instead of longer-term incentives to bring prospects to production: "[making] lots of money, but not lots of product" and failing to "[uplift] local communities and [build] a sustainable economy" (Participant 9). This said, it is the nature of the risks associated with prospecting that many projects fail to identify deposits significant and financially viable enough for extraction, despite FTS incentives (Antweiler 2024). Thus, FTS are problematised for the approaches to investment derisking they may preclude, such as those which are more inclusive to Indigenous participation. The very 'risks' of Indigenous sovereignty which some deployments of FTS seek to address – alongside their objective to manage and reduce risk to facilitate investment – may undermine their derisking practices by failing to incentivise longer-term, socio-economically sensitive approaches. Failing to incorporate more meaningful and supportive pathways to economic reconciliation may increase the perceived 'risk' of disapproval by challenges from Indigenous stakeholders (Macfarlane 2024).

Alternative approaches to FTS are exemplified at provincial levels. Extending the preceding discussion, I consider where domestic initiatives of economic statecraft involve different modes of public-private capital relations to FTS to approach green industrial development around critical minerals differently, particularly with respect to concerns around socio-economic sustainability (Gabor 2023). I particularly consider where notions of certainty and responsibility are integral discourses to practices of derisking as they complement the financial elements of these tools of statecraft. In so doing, I reflect on the extent to which these make possible a ‘more-than-mining’ story about Canadian critical minerals.

The province of Québec offers useful examples where an orientation towards longer-term, sustainable thinking around CSM development draws attention to the intersection between derisking practices and ideas around certainty, risk-sharing, and responsibility. Specifically, I contend that Québec’s derisking state strategy is two-fold: firstly, the government operates as a partner alongside private investors of capital; secondly, it also has direct involvement in communicating and monitoring on the regulatory side. As a result, a notion of certainty is connected to related discourses of reliability, security, and responsibility to become central in reinforcing the province’s use of financial tools to produce investibility. Here, risk-sharing through government participation in and commitment to certain projects can lend certainty to prospective investments into the province’s CSM opportunities. Together, these elements constitute a process whereby discourses and practices of statecraft influence how Canadian space is scripted as investible resources around which the state gains coherence (Zhou 2022).

To illustrate the above, I examine the work done by Investissement Québec (IQ) to enact objectives of the *QPDCSM*. IQ is a Gouvernement du Québec-owned company which aims to favour and facilitate investment international investors through financial tools as well as partnerships with international businesses (IQ 2024a). In its structure, it is considered a “unique ecosystem” where the provincial government takes part ownership in projects (Participant 11). The province’s investor-oriented brochure, which presents the *QPDCSM* to business and investment audiences, identifies IQ as one route through which the province provides “reliable support for the mining industry via access to several types of capital” (QC 2022: 5). For instance, seeking to support the development of a CSM-focused resource economy and the objectives laid out in the *QPDCSM*, IQ has a natural resources and energy capital fund totally around Can\$1bn with which the “government is able to invest directly into projects” (Participant 11). The structure of IQ thus favours a risk-sharing approach which is



facilitated through the relationship it fosters between public and private capital and the government's direct engagement in the projects it financially supports. This situates IQ as a core part of the province's claim to be an "attractive business environment" which it anchors also on tax incentives, research and innovation, modern treaties and partnerships with Indigenous nations, and advantageous geographical positioning (as explored in Chapter 4) (QC 2022: 5). Where Québec seeks to derisk investments and incentivise private capital for CSM developments, it does so through IQ's provision of public capital and partnership as tools of economic statecraft, alongside other derisking instruments. IQ also offers loans to facilitate more investment-friendly risk/return profiles (Ibid.) It is through this unique system of public-private capital relations that IQ shares characteristics of a derisking state approach (Gabor 2023). Participant 10 summarises this in observing how significant IQ's role is for increasing investor confidence as the system facilitates and demonstrates Gouvernement du Québec's own financial commitment to the projects in which IQ invests and supports. The state thus undertakes a financial and symbolic position as a partner in critical mineral projects, supporting their longevity and perceptions of certainty for private capital, international investors as one way in which the province's investment environment is derisked.

In Québec, SOQUÉM (Société Québécois d'Exploration Minière) offers a further example of the intersection of risk-sharing and certainty in the province's use of economic initiatives of statecraft to derisk investments for international interests. Focused on critical mineral exploration, SOQUÉM is a government-owned exploration company and subsidiary of IQ (QC 2020c: 25). Specifically, through co-investment between IQ and SOQUÉM, the latter facilitates joint ventures with independent, Québécois companies or outsources projects from a portfolio to external companies. Having created over 1,000 permanent jobs in exploration in Québec, SOQUÉM is also credited with rendering critical mineral exploration opportunities financially accessible (Ibid.). With more attractive risk profiles to overseas investors and businesses seeking to participate in joint ventures, SOQUÉM is considered "one of the most prolific exploration companies in Québec" (Ibid.). Viewing IQ and SOQUÉM in combination draws attention to the mechanisms of domestic economic statecraft which they represent in furthering derisking through the *QPDCSM* (Ferguson et al. 2023). For instance, recent data attributes a 600% increase in investment and a two-fold increase in the number of projects to the province's policy and approach through IQ and SOQUÉM (Douh ret, in Lazenby 2024). In this way, domestic initiatives of economic statecraft have been significant in driving forwards

practices of derisking by deepening ties with industry partners and financially supporting mining projects through a capacity for risk-sharing at the scale of the province. Here, Québec works to produce investibility by scripting as derisked the state space over which it has jurisdiction with a specific structure of public-private capital relations (Gabor 2023). This signals to other jurisdictions, investors, and businesses the investment climate of Québec and thereby suggests its desirability as a target destination.

Extending the focus on risk-sharing, the structure and purpose of IQ suggests its combined significance with responsibility in practices of derisking, including its direct involvement in assessing projects against requirements of environmental impact assessments. For instance, IQ ensures due diligence alongside its facilitation of investment through tools such as government-backed funding and business partnerships. It achieves this because projects which receive IQ's support are subject to analytical scrutiny from various government ministries to garner their support at various stages from prospecting to mine decommissioning and rehabilitation (Participant 10). This serves to increase certainty with respect to the responsibility of a project as well as IQ signalling an opportunity's potential through financial commitments. This vision for IQ, as an institutional fund and involved partner, constitutes a unique way of enacting domestic initiatives of economic statecraft (Ferguson et al. 2023). IQ's financial partnership "sends a very clean [and] strong signal" to both the investment communities at provincial to global scales, and the markets for which an IQ-supported project has been deemed a "positive development opportunity" (Participant 11). With other provinces lacking such an "ecosystem" for facilitating overseas investment (Participant 11), IQ constitutes a clear way in which the *QPDCSM* is carried out and whereby Québec comes to be understood and engaged with as a lower-risk, "attractive business environment" (QC 2022: 5). In the Canadian context, it is also important to consider where the interests and participation of Indigenous communities intersect with derisking and responsibility, as discussed earlier in this section with respect to the FTS mechanism.

I contend that the intersection of investment derisking and responsibility is significant where these are deployed together in modes of economic statecraft to produce investibility around critical mineral opportunities. Demonstrating this, I draw on examples of domestic statecraft from Saskatchewan which constitute a 'responsibilisation' of investment through risk management and Indigenous engagement alongside financial tools of derisking. My analysis focuses where the province employs Indigenous-focused initiatives for their significance in

demonstrating how economic reconciliation can be integrated into practices of derisking. To counteract the high risks associated with critical mineral projects (Antweiler 2024), such an approach foregrounds longer-term socio-economic benefits which reflect that “what is good for people and planet is good for long term profit” (Participant 9). This orientation stresses that meaningful and effective engagement with Indigenous stakeholders itself constitutes a form of derisking when combined with financial instruments which both derisk investment opportunities and drive economic reconciliation – the latter also constitutes an opportunity for risk reduction, as I demonstrate in the latter part of this chapter.

An important element of Saskatchewan’s critical minerals strategy is the *Saskatchewan Indigenous Investment Finance Corporation* (SIIFC) which was launched in 2022 (SK 2023; SIIFC 2022). A project of the Ministry of Trade and Export Development, the SIIFC offers Indigenous groups an opportunity to apply for loan guarantees of minimum Can\$5mn (a total fund of Can\$75mn in 2022) to create entry routes to their becoming equity owners in critical minerals projects (SK 2022). In so doing, the province is one of only two in Canada with specified mandates to increase indigenous communities’ access to capital (Representative of SK Ministry of Trade & Export Development, at CMA UK 2022). The ultimate objective of SIIFC is to “increase access to capital for Indigenous communities and entities to participate in natural resource development and value-added [projects]” in the province (SIIFC 2022). Recognising the potential for such forms of meaningful economic engagement and participation to help sustain Saskatchewan’s position as a “low-risk jurisdiction” (Participant 6), the SIIFC deploys what can be considered financial tools of derisking (Gabor 2023). Moreover, Participant 12 stressed the SIIFC’s importance for representing efforts in the province to be more “socially and economically” inclusive towards Indigenous communities where these are understood to be inseparable qualities of engagements with these populations. This speaks to a wider emphasis on meaningful and mutually beneficial relations with First Nations around critical minerals. More precisely, it is connected with a reduction in Indigenous communities’ rejection of projects by foregrounding their voices and roles in decision-making and driving longevity for the socio-economic benefits which these communities may derive from a more active role in mining activities (Participant 12). Demonstrably, the derisking project and impact of the SIIFC is two-fold: Indigenous communities experience reduced barriers to entry and projects attain greater financial support; and, investment interests see a jurisdiction that is low-risk given its investment-friendly environment where risk reduction is derived in part from engaging

Indigenous communities meaningfully with a broader vision to responsibility. ‘Responsibilising’ economic initiatives of statecraft for derisking investments is significant where public-private capital relations have been focused on Indigenous economic participation. It signals a means by which the derisking state finds meaning and effect – becomes coherent and effective (Zhou 2022) – where state space is inscribed through Saskatchewan’s vision to be a “safe, secure, and sustainable” jurisdiction (SK 2023: 27).

Meaningful participation-driven and economic engagement of Indigenous peoples is a demonstrably significant tool for risk management (Stanley 2016). It is situated within a wider responsabilisation of investment by helping “to ensure common understanding of the project from the outset and avoiding misunderstandings and surprises which can derail progress” (Participant 12). Overall, the SIIFC represents an approach to advance economic reconciliation which is closely intertwined with derisking investment and the wider assurance that critical mineral projects contribute directly to the province’s long-term and sustainable growth regarding regulatory, operational, and financial measures to mitigate risks (SIIFC 2022). As a result, the SIIFC’s derisking effect is multi-layered. Its fostering of extended – deepened and temporally longer – economic engagement with and the socio-economic resilience of Indigenous communities can help limit the risks of disapproval and mitigate the long-term nature of the assets in which investments are being made (SK 2023: 20; Stanley 2016). That is, while it derisks investment opportunities for Indigenous partners, the SIIFC can be considered a key tool of economic statecraft for demonstrating to international investment interests the stable, responsible, and low-risk qualities of Saskatchewan’s critical mineral opportunities. The SIIFC also complements other approaches to financial derisking which the province is undertaking, such as an Indigenous Leadership and Development Programme with the University of Saskatchewan (Participant 12), although this is outside the scope of my analysis.

Despite the SIIFC’s demonstration of how discourses of responsibility, certainty, and risk-sharing combine to enhance the derisking effect of certain domestic economic initiatives of statecraft, it is important to note that while it supports mining projects performing extraction and processing, it does not do so for mineral exploration. As such, thinking back to other examples of this section which are oriented towards prospecting, the SIIFC alone is unable to lower investor concerns around this particularly high-risk destination for investment (Kneas 2020). Due to factors such as potentially low success rates and the variability of some commodity market cycles impacting such “high risk endeavours” (Participant 6),

Saskatchewan as part of its critical minerals strategy has also enhanced two programmes targeting mineral exploration growth: the Saskatchewan Mineral Exploration Tax Credit (SMETC); and the Targeted Mineral Exploration Incentive (TMEI) (SK 2023: 16). These government-backed programmes have sought to assist the junior exploration industry and increase financing (Ibid.). Such financial instruments act as a signal to broader Canadian and international interests that a province is 'open for business' with investment environments that are facilitatory, reliable, and responsible (Ferguson et al. 2023).

### **5.3 Productive intersections of geoscience and domestic initiatives of statecraft**

It is useful to reflect on where approaches to developing critical mineral potential in Canada and producing the investibility of critical minerals and state space intersect. With the prominent position of expanding geoscientific capabilities in several Canadian strategies, these demonstrate how the enactment and coherence of the state is facilitated through knowledge production and connected techniques of observation and representation around valued resources and the land in which they occur (Bruun 2018, Koch 2015; Campbell & Power 2010). This expansion of knowledge takes place alongside practices of derisking where these include domestic initiatives of economic statecraft to facilitate and incentivise investment from international investors – which includes also derisking investments for domestic interests, particularly Indigenous communities and entities (Gabor 2023). In this way, the state effect is mobilised where the public-private capital relationship shifts to drive new modes of financial engagement and resource futures (Ibid.). Here, I found that geological knowledge production and statecraft to de-risk, and thus incentivise, investment are complementary practices in making Canadian space known and actionable: Generating and disseminating geological knowledge renders certain resources and resource frontiers accessible and attractive to investment, and is underpinned by efforts of economic statecraft to financially de-risk and thus facilitate such investments. However, while geoscientific knowledge constitutes a site of state-making which can obfuscate Indigenous populations (Marston 2019), some initiatives of statecraft are anchored on meaningful engagement with these communities. Specifically, this is to pursue objectives of economic reconciliation through a 'responsibilisation' of investment. Extending to a more explicitly international facet of my analysis of the state effect, state-making, and statecraft, Chapter 6 examines such mechanisms of economic and diplomatic statecraft in more detail, specifically where these intersect and where derisking is understood through intertwined discourses of security, responsibility, and reliability.

## **6 Extra-territorial practices of statecraft: security, trust, and innovation in supply chains**

To extend the previous chapter's examination of statecraft, I now focus my analysis on cross-border elements of critical mineral supply chains and extra-territorial statecraft. I analyse Canadian statecraft objectives and mechanisms oriented towards being a preferred partner for critical minerals supply. This includes positioning 'secure' supply chains as derisked and mobilising notions of trust and innovation through investment attraction and the Canada-UK bilateral partnership. Conceptually, statecraft entails "acts of calculation and creativity" (Nelson & Shelton 2023) and is deployed at multiple scales to "advance geopolitical objectives" (Breslin & Nesadurai 2023: 929). The latter connects with a multi-scalar understanding of practices which co-constitute the state effect (Koch 2015). My discussion approaches resource diplomacy as extra-territorial statecraft wherein Canadian agencies and their "intellectuals of statecraft" engage with and within external jurisdictions (Kuus 2017). However, I also consider where resource diplomacy is complemented by economic statecraft initiatives, extending focuses on strategic partnerships through an economic lens (Ferguson et al. 2023).

Across three sections, this chapter traces extra-territorial framings and activities of diplomatic and economic statecraft. I take discourses of security, trust, and innovation in turn while also considering their intersections and cumulative nature as elements of Canadian practices of statecraft over critical minerals. I open by examining the bridge between domestic and extra-territorial initiatives of statecraft where securing supply chains *for* certain actors involves their securitisation *from* others within a project of derisking. The securitisation of critical minerals in this context is understood as the adoption of certain policies or frameworks as securitising logics are shaped by conceptualisations of where such resources are framed as economic and/or geopolitical security concerns that pose an "existential threat to state interests" (Wilson 2019: 1). I then consider approaches of nation branding and bilateral partnership as extra-territorial, internationally scaled statecraft, focusing on trust and innovation. I demonstrate how the state is encouraging investment and collaboration to establish Canada as an important global supplier of minerals to specific markets (Hine et al. 2023). Section 6.3 makes a distinct contribution by focusing on the development of circular economic practices as strategic partnerships aim to extend supply chains to material recovery, reprocessing, and recycling.

### **6.1 Securing critical mineral supply chains**

Derisking approaches take place through a dual securitisation of critical mineral supply chains and investments into them *against* "non-like-minded countries" and *for* like-minded nations

and international trading partners (NRCan 2022b: 1, 17). Extending the discussion of derisking in Chapter 5, in this section I draw on its conceptual roots in traditional geopolitical concerns around risk, security, and vulnerability linked to supply concentrations and interdependencies (Kalantzakos 2019). To unpack how these frame security as a method of derisking supply chains and understanding their construction and effects when deployed through mechanisms of statecraft, I analyse initiatives around foreign direct investment (FDI), supply diversification, and ESG+I. I observe that derisking is articulated through visions of supply chains as ‘secure’ – stable, safe, and protected – and positionings around for and against whom securitisation is enacted. In turn, this has implications for how the state is positioned itself as a preferred partner. Conceptualising this intersection between statecraft and security, I find that one way in which “supply chain resilience” (NRCan 2022b: 37) is ensured for advanced economy partners is how risks are employed through diplomatic tools shaped in relation to securitising logics (Sovacool et al. 2023). Furthermore, I find that practices of derisking through securitisation also work alongside a geopolitics of differentiation which has significance for processes of state-making and Canada’s positioning of itself within the evolving international political economy around critical minerals (Himley 2021). This speaks to discussions of resource nationalism discourses where state-based identity politics and market forces see security, resources, and the environment intersect (Koch & Perreault 2018) Overall, I trace how ‘securing’ critical mineral supply chains for certain actors takes place through statecraft; this involves securitising supply chains and investment into them *against* other actors and is the product of discursive logics of risk, protection, vulnerability, and responsibility.

Discourses of security invoke affective notions around protection and vulnerability as the Canadian state endeavours to ‘secure’ critical mineral supply chains *from* “strategic adversaries” and *for* like-minded partners (Vivoda et al. 2024: 2). Canada’s position with respect to such adversaries is illustrated through its visualisation of jurisdictional dominances along the REE supply chain (Fig. 6.1). Here, faded Canadian flags demonstrate the state’s vision to capture downstream value and, importantly, be a ‘secure’ supplier along the supply chain to counteract the vulnerability implied by a single actor’s dominance – China’s “capabilities at every step [of] the value chain” – through international cooperation which “mitigate[s] supply chain risks” (NRCan 2020a: 8). In this context, I identify a dual positioning where Canadian state space is scripted for “trusted security partners” – Canada’s consumption-oriented allies - as simultaneously vulnerable *and* protected (Ferguson et al. 2023: 1163). I further demonstrate

that this dual framing determines actions to securitise supply chains against certain foreign investments through tools of economic statecraft (such as FDI and strategic cooperation) which connect with a discourse of protection (Ibid.). Being at once vulnerable and protected shapes the logics and practices driving the broader project where security is equated to – or is at least considered a necessary characteristic to achieve – the derisking of supply chains. Vulnerability and the risks associated with critical minerals’ supply at a global scale (Kalantzakos 2020) are used to justify a securitising, protection-focused logic against threats of interference by adversaries. At the same time, Canadian state space and the resources contained within it – and the supply chains along which they are transported and transformed – are geopolitically scripted as ‘secure’ supplies. Focusing on the intersecting approaches of the federal critical minerals strategy and the *Investment Canada Act (ICA)*, I highlight how these approaches orient economic and diplomatic statecraft by focusing on “protecting Canadian assets while encouraging FDI under certain conditions” and positioning Canada as a “global supplier of choice” (NRCan 2022b: 17). I thus unpack how a vulnerable/protected duality of Canadian state space shapes a logic of securitising investment opportunities against certain jurisdictions – preventing them from investing in Canada – and to thereby ‘secure’ supply chains as attractive to investment and for offtake agreements. I thus contribute to understandings of how a “logic of securitisation” can position resources as a “focus and tool of statecraft” in such a way that reifies state oversight and control of certain materials and the economic system within which they are produced, transported, and consumed (Bridge 2015: 330).

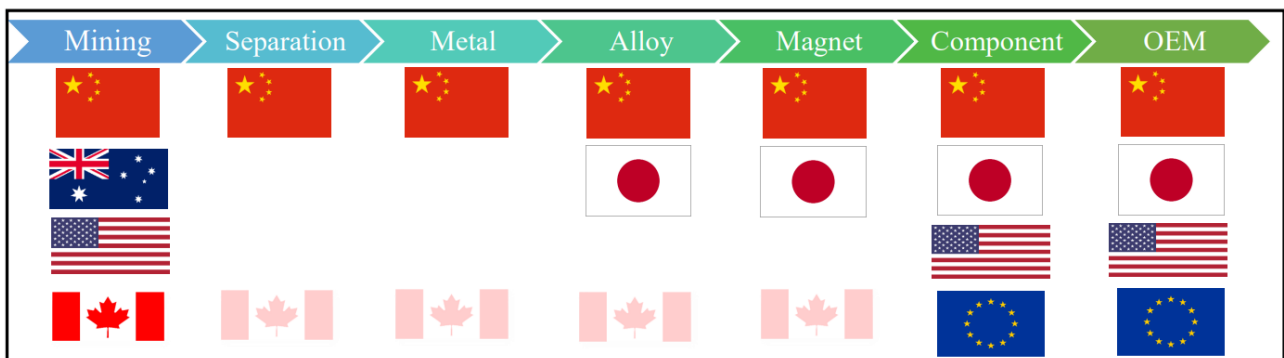


Figure 6.1: Canada’s value chain vision: “Building value downstream: an REE example” where China has “capabilities at every step along the value chain”. Source: NRCan 2020a: 8.

Recent amendments to the *ICA* exemplify a securitisation of supply chains and FDI which is framed by discursive – and concurrent – logics of vulnerability and protection. That is, Canadian state space is considered, at the same time, both vulnerable and protected to justify a specific set of security-focused practices to ‘derisk’ supply chains. Enacted in November 2022, just



prior to releasing the *Canadian Critical Minerals Strategy*, these changes included implementing new requirements for scrutiny over and pre-approval of FDI, including streamlined processes for initiating national security reviews of such investments, and preventing larger mergers and acquisitions to take place (Canada Gov. 2022; Rajagopal 2024). The changes were part of a review and modernisation of the *ICA* to “strengthen the defence of Canadian infrastructure, democracy, and Canadian citizens against foreign interference” (GAC 2022: 8) and to build “transparency and accountability” to support national security (ISED 2024). It is thus that the changes are part of the Canadian government’s response to the shifting global geopolitics by *protecting* critical minerals – vis-à-vis securing – as a “vulnerable” sector (Boynton 2022). Therefore, orienting these actions towards “sensitive sectors” (Minister Champagne, cited in *Ibid.*), discourses of protection and vulnerability are mobilised together in efforts to secure Canadian supply chains through economic initiatives of statecraft enacted by the *ICA*. For example, a key moment of this policy shift saw three companies with connections to China ordered to divest from Canadian lithium opportunities (Shakil & Liu 2022; Sevastopulo & White 2022). More recently, SRG Mining and Solaris Resources – graphite and copper producers, respectively – have cancelled proposed foreign investment plans by Chinese firms (Fildes 2024). Extending analyses of statecraft through derisking and security, I demonstrate how a discourse of vulnerability is used to invoke certain practices of derisking through a logic of securitisation. By making FDI more difficult – specifically for perceived adversaries – Canada is derisking supply chains by positioning them as “vulnerable”. This rationalises a securitising logic to render them “protected”, secure supplies for allied consumer states (Boynton 2022). Thus, Canadian statecraft efforts illustrate a logic to secure FDI from strategic adversaries to support a vision of sovereign state security, with wider implications for securing cross-border elements of supply chains, extending security visions beyond state territory (Bridge 2015).

Canada’s enactment of securitising practices takes place alongside a discourse of security which, through a geopolitics of differentiation, deploys extra-territorial statecraft through resource diplomacy as part of efforts to derisk supply chains. Exemplifying this is another strategy aligned with the federal government’s focus on critical minerals and followed by the *ICA* amendments: *Canada’s Indo-Pacific Strategy* (Global Affairs Canada (GAC) 2022). One orientation of this strategy is to counter China whose “reshaping [of] the strategic outlook of every state in the region, including Canada” has led to its framing as an “increasingly disruptive global power” (*Ibid.*: 3, 7). It is in this context that the *Indo-Pacific Strategy* pinpoints domestic

initiatives of statecraft to review and modernise the *ICA* to “protect [Canada’s] national interests” such as when “investments from state-owned enterprises and other foreign entities threaten [Canada’s] national security, *including our critical minerals supply chains*” (Ibid.: 8). Here, the *Indo-Pacific Strategy* redeploys this statecraft to present Canada as a secure jurisdiction, supporting its claim to be a “global supplier of choice” (NRCan 2022b: 2) while trading partners pursue friend-shoring policies to diversify their critical minerals supply (Riofrancos 2022). For example, highlighting critical minerals as an area of “Canadian strength” where the nation has a “global reputation for excellence”, the strategy represents efforts by Canada to secure its domestic critical minerals sector within the Indo-Pacific regional context (GAC 2022: 2). Further to the role of geopolitical differentiation through this form of resource diplomacy, the *Indo-Pacific Strategy* also highlights the importance of sovereignty as the “cornerstone of the rules-based international order [and] government’s ability to work together to solve shared problems” (Ibid.: 3). This positions Canada as an actor seeking to work in coordination with partners through a diplomatic form of statecraft that does not encroach upon the sovereignties of other states, such as by seeking to force behavioural change (Breslin & Nesadurai 2023). It thus differentiates itself from the approach of China – indirectly framed as “foreign interference” (GAC 2022: 8) – while committing to continue to “pursue dialogue with China” and thus advance Canadian national interests while “remaining true to our values [and] priorities” (Ibid.); situating principles of sovereignty alongside concerns to secure supply chains *from* adversaries and *for* consumer, allied states.

A further example of geopolitical differentiation through resource diplomacy as statecraft lies at the intersection of security and responsibility. Canada considers ESG, as well as ESGI, to be an important element of a reliable supply chain and Canada’s role as a preferred partner for critical minerals (Statistics Canada 2023; NRCan 2022b). This reflects broader trajectories in the global political economy towards greater emphases on ESG investing and consumer requirements with respect to ESG standards for mining activities (Michaels et al. 2022). For example, when asked about the intersection of calls for security, responsibility, and urgency in the context of developing critical minerals and their supply chains, a number of participants highlighted concerns and commitments in Canada for these not to become mutually exclusive or at each other’s expense (Participants 1, 2, & 3). From the perspective of NRCan, Participant 3 drew attention to the department’s approach to “facilitate inter-jurisdictional collaboration to support industry” and launch a “regulatory concierge service to respond to industry questions”.

The service, housed within NRCan, is an effort to “reduce the challenge and the time but not the quality of the regulatory review” (Participant 3). This vision was also expressed by Minister Wilkinson at PDAC 2024’s ‘Canada Day’ – a series of presentations and panel discussions hosted by Invest in Canada – wherein he spoke about the federal strategy’s objectives to consolidate a pan-Canadian approach to enhance *and* accelerate regulatory and permitting processes (Woodside 2022). This acceleration and enhancement of regulatory processes is positioned to ensure Canada’s reputation as a responsible partner alongside its framing of the strategy as, in part, a geopolitical response to security concerns, such as where “Canada’s European allies have recently experienced the consequences of dependence upon non-like-minded countries for strategic commodities” and the need to “avoid recreating [such] vulnerabilities in emerging markets such as critical minerals” (Minister Wilkinson, cited in *Ibid.*). Connecting also with trust-building exercises, this intersection of security and responsibility is situated within the federal government’s interest to “[work] with like-minded partners, increasing the value of ESG products over those that are done without respecting human rights [and] environmental laws” (Participant 3). I therefore contend that, for Canada, *responsible* supply chains are *secure* supply chains. Derisking through enhancing regulatory processes and ‘securing’ an alternative supply chain to existing dependencies is to enact a resource diplomacy that differentiates Canada as hosting a trustworthy, reliable, responsible, and thereby secure – in multiple senses – critical minerals supply chain. This can be connected to Riofrancos’ (2022: 1) conceptualisation of a “security-sustainability nexus” which sees reputational aspects and benefits intersect with supply security. However, the author also draws attention to tensions around a “just transition” and the expansion of the extractive frontiers of the energy transition (see Chapter 5) where onshoring critical mineral supply chains may undermine socio-environmental relations despite the discursive fusion of security with sustainability in the strategic policy paradigm around critical minerals (*Ibid.*: 4).

Relatedly to the latter reflection on intersections yet tensions between sustainability and security, and in addition to differentiation around responsibility, are the roles of discourses of trust and reliability. This particularly reflects the opportunity they offer to present Canadian supply chains (as far as these may extend from up- to down-stream sectors) to communicate competitive advantages which has become an important aspect of the statecraft enacted through critical mineral strategies. I find that this involves a two-fold differentiation of Canadian jurisdictions from “non-like-minded countries” and from other like-minded, even fellow

Canadian, jurisdictions through demonstrations of competitive advantages (NRCan 2022b: 1; Vivoda et al. 2024). Moving to empirics at the provincial level, exemplifying this are two important parts of Saskatchewan’s critical minerals strategy: its climate of being a “safe, secure, and sustainable” jurisdiction, and its goal to establish itself as a “Rare Earth Elements Hub” via the Saskatchewan Research Council’s (SRC) flagship Rare Earth Processing Facility (SK 2023: 28, 12). These two approaches work in tandem to offer an alternative supply chain vision which is understood through discursive languages of safety, reliability, and responsibility, and thereby supports Saskatchewan’s reputation as a low-risk jurisdiction (Participant 6). With the REE Hub, for instance, the province is seeking to occupy a key role in a developing Canadian and North American, more widely, supply chain to produce REEs for the global market (SK 2023). This speaks not only to the SRC’s position as the second-largest research council in Canada (Participant 6), but also the security and trust framing of the Hub with respect to the perceived threat of pressure from dominant suppliers in the global REE supply chain – not least as the Hub would be one of very few outside China (SK 2023: 28). In this way, a security framing combines with competitive advantages of the reliability and trustworthiness of a jurisdiction. Here, Saskatchewan positions itself as a key player to “actively pursue” opportunities with the federal government and its allies to “secure REE materials [and] expertise” to ultimately “enable secure North American supply chains” (Ibid.: 13). Saskatchewan’s employment of a geopolitical differentiation which combines discourses of security and trust is significant for scripting its provincial resource spaces and its evolving REE supply chain, in particular, as derisked and attractive to external jurisdictions. However, beyond focuses on derisking supply chains through logics and practices around security and initiatives of economic statecraft therein, a further element to competitive advantages as part of statecraft is where they come to constitute part of a jurisdiction’s “brand” and the opportunities they form for resource diplomacy as extra-territorial statecraft (Participant 6).

Ultimately then, the logics of statecraft and securitisation outlined are contributing to a framework conceptualised as “protect, promote, partner” (Hamilton & Renouard 2024). This understanding foregrounds the significance of a discourse of protection, as explored alongside notions of vulnerability and security. In particular, while GAC (2022) indicates commitments to maintain dialogue with China, initiatives of economic statecraft connected with the discursive framing and vision of the *ICA* may challenge this. For instance, the end of August 2024 saw Canada announce 100% tariffs on imported Chinese-made EVs in a move which is framed as a

challenge to China's subsidisation of its EV industry and support Canada's efforts to become more significant in the global EV supply chain (da Silva 2024). With such challenges in mind, further to efforts to protect – indeed, protectionism – are Hamilton and Renouard's (2024) observation of moves to “promote” and “partner”. I turn to these in the following sections through a focus on nation branding and bilateral partnerships.

## **6.2 Nation branding and investment attraction**

To further examine how Canada is positioning itself as a preferred partner in the global critical minerals supply chain, this section examines where resource diplomacy, as diplomatic statecraft, intersects with economic initiatives of statecraft. I trace how two ‘moments’ of extra-territorial resource diplomacy evolve: firstly, nation branding operates as a way of scripting state space with a specific set of discourses articulated to external jurisdictions and actors; subsequently, jurisdictions’ brands become significant for extra-territorial actions of resource diplomacy and the economic initiatives of statecraft they aim to progress (Power & Mohan 2010). In this way, nation branding constitutes a form of diplomatic statecraft wherein vision documents – such as strategy publications – employ discursive practices to make possible certain state resource futures (Browning & de Oliveira 2017). Through nation branding, elites – or “intellectual of statecraft” (O Tuathail 1996: 61) – “exercise power by depicting and representing places in certain ways” with effects for the inscription of space to further their specific interests and visions (Müller 2013: 54). Linked in this way to critical geopolitical work on spatial scripts, nation branding reflects observations that the “state is not the basis for, but the effect of, discourses of [...] security and identity” (Kuus 2017). The critical geopolitical conceptualisation of nation branding as diplomatic statecraft also connects resource diplomacy to state-making through discourses of resource nationalism and the effects of political economic power (Perreault 2021). This section also critically examines where trust and awareness building are enrolled by projects and agents of resource diplomacy as statecraft. In so doing, it complements world-making analyses of the intersecting roles of logics and actors of the state in shaping the systems within which certain minerals are brought into being and circulated as resources (Valdivia et al. 2021).

The Canadian state and its resource spaces are scripted through practices of resource diplomacy as they employ the vision and framing of a national brand. To do so, Canadian opportunities are made known and attractive to consumer countries and investment by leveraging specific qualities of its mining industry – beyond material characteristics of its

geology – including partnerships, knowledge, and values, particularly trust and responsibility. The *Canadian Critical Minerals Strategy* and the preceding *Canadian Minerals and Metals Plan (CMMP)* constitute national vision documents and thereby can be considered examples of national branding efforts alongside and through their strategic objectives (Alderman & Eggeling 2024). The documents demonstrate how international orientations and a specific vision of the nation’s resource future can influence the modes and intentions of territorial engagement – or statecraft – and, by extension, how the state is known and viewed by external actors as an “arbiter” of natural resources (Koch 2020: 112). Firstly, the *CMMP* is positioned to develop a core element of Canada’s extra-territorial resource diplomacy approach through nation branding as it focuses on developing a “Canada Brand for Mining” within a wider aim of “global leadership” – one of six strategic directions of the plan (Mines Canada 2020: 5). The brand is envisioned to support a “sharpened competitive edge and increased global leadership” in part through establishing and communicating a set of principles (Ibid.; Fig. 6.2). These are devised to characterise the Canadian mining sector through a visible, understandable brand to external actors and support a wider “vision” that “Canada is the leading mining nation” (Mines Canada 2021: 5). Such resource diplomacy is to not only enhance Canada’s reputation as “an exploration and mining power” but also aligns with economic statecraft activities to increase FDI through being “one strong, unified voice” (Ibid.: 19). This alignment can be seen particularly in the 2<sup>nd</sup> and 4<sup>th</sup> principles of partnership and values which focus on alliances and safe, responsible, and sustainable mining, respectively (Ibid.). Demonstrably, the national brand represents a way in which diplomatic statecraft “mobilises discourses of the nation” and thereby constitutes a narration of it as a distinct global player (Saifer 2020: 562).

### In September 2020, Canada’s Mines Ministers endorsed four elements for a Canada Brand:

- Endowment
- Partnerships (alliances and Indigenous engagement)
- Excellence (global authority on innovation and mining sciences)
- Values (sustainable, safe and responsible mining)

Figure 6.2: Extract showing the four principles which make up the Canadian Brand for Mining. Source: Mines Canada 2021: 20.

As the *CMMP* is a precursor to and has a broader purview than the current federal strategy, it is important to also draw attention to where nation branding is employed as diplomatic statecraft in the latter – the more recent, sector-specific document. While the Canadian strategy of 2022 does not refer to the *CMMP*'s "Canada Brand for Mining", it incorporates elements of this national vision by continuing the central objective to establish itself as a preferred partner within the international political economy. It particularly does so by driving engagements with "like-minded partners" over "common standards" (NRCan 2022b: 35). Building in this way on the "elements for a Canada Brand" presented in Fig. 6.2, the federal strategy foregrounds discourses and practices around trust and awareness building as part of its objectives. I contend that, in so doing, it enacts extra-territorial forms of statecraft where nation branding influences a scripting of state space which crystallises around qualities of responsibility and trustworthiness, thus leveraging competitive advantages in ESGI.

Exemplifying how resource diplomacy is focused on leveraging Canadian competitive advantages around trust and responsibility is the Mining Association of Canada's (MAC) programme, *Towards Sustainable Mining (TSM)*. While the MAC is a non-governmental organisation, the *TSM* is a core aspect of how Canadian mining firms and activities – acting domestically and internationally – are viewed within the global political economy (Buchanan & Marques 2018; Jarvie-Eggart 2013). *TSM* is a globally recognised standard for mining which has close links to the approach and positioning of the national brand vision laid out in the *CMMP* (MAC 2024). This is reinforced by the federal critical mineral strategy's mention of the *TSM* in its discussion of Canadian opportunities and objectives. Specifically, it highlights that adopting the programme is mandatory for all members of MAC which operate in Canada and, in this way, *TSM* constitutes a significant element of Canada's ESG credentials and strategic approach to ensure resilient and responsible critical mineral activities (NRCan 2022b: 15). Creating and leveraging a national brand around principles of responsibility and trust in this way demonstrates the role of resource diplomacy in positioning the "world's best national mining brand" (Berrada 2021: 354). This reflects the conceptualisation that such strategic "brand" documents enact diplomatic statecraft through the "scripting and spreading of national visions" as the state aims to become visible and attractive to both extra-territorial investors and mineral consumers (Alderman & Eggeling 2024: 298). The economic initiatives of statecraft which support a facilitatory investment and operating environment to drive Canadian critical

minerals development, such as tax credits and a streamlined regulatory system (Section 6.1), are anchored on a “brand” underpinned by principles of trust, ESGI, and sustainability. Competitive advantages are thus influential forms of resource diplomacy mobilised through the establishment and articulation of a national brand. Approaches to investment attraction also constitute an important site where nation branding and the roles of awareness-building and trust illuminate the intersection of diplomatic and economic modes of statecraft.

Examining how investment attraction is targeted as an objective of a project of diplomatic and economic statecraft by Saskatchewan, I also show that trust and awareness raising are important elements of brands at the provincial level. I thus extend preceding analyses of resource diplomacy as efforts to script Canadian resource space and build collaborative and coordinated approaches with like-minded partners to ensure responsibility and reliability along supply chains (Sovacool et al. 2023). Saskatchewan’s critical minerals strategy (SK 2023) and the recent *Investment Attraction Strategy (IAS)* (SK 2024) present the investment and operating environment of the province to external jurisdictions and actors by incorporating within the province’s “brand” its domestic initiatives of economic statecraft. For instance, financial policies which offer tax incentives and the SIIFC are highlighted for their support of notions of the jurisdictions’ certainty, stability, and transparency as an investment destination and operating environment (SK 2024; Section 5.2). In doing so, Saskatchewan formulates a brand vision wherein “reliability is a large part of the Saskatchewan brand” as a low-risk jurisdiction that is trusted and responsible (Participant 6). Here, a form of state branding therefore takes place at the scale of the province as critical mineral and investment attraction strategy documents work to position Saskatchewan’s “natural advantages” as a lead producer of REEs and a provider to the world of a “safe, secure, stable supply chain of critical minerals needed to fuel the future” (Premier Moe, in Ibid.: 4). The province thus deploys resource diplomacy through a branding vision of Saskatchewan as “the best place in the world to invest” (Ibid.: 5), underpinning it through close intersection with a project of economic statecraft focused on attracting investment and deploying financial incentives (SK 2024). This combined diplomatic-economic statecraft mechanism thus works to script jurisdictional – state – space through geopolitically significant discourses of security, reliability, and responsibility (O Tuathail 1996). There is a further modality to resource-diplomacy which takes these document-based brand visions and economic initiatives into extra-territorial activities of diplomatic statecraft.



Provincial government representatives demonstrate how extra-territorial actions of resource diplomacy are taking place to ‘enact’ national brand visions and thereby also progress the economic initiatives of statecraft which I have established to be closely connected with them. Participant 12 detailed to me how the province, particularly through its Investment and Trade Office for Western Europe and the Nordics, conducts awareness raising as part of its efforts to promote investment opportunities to international interests, such as by facilitating access to Saskatchewan as a jurisdiction through deepened understandings of its operating environment and principles. This is crystallised through examples concerning Indigenous communities’ participation in the critical minerals sector, and which also point to this chapter’s final section and its focus on Canada-UK bilateral partnerships. CMA UK (2023) and CMIA (Critical Minerals International Alliance 2023) are organisations which hosted representatives from the Saskatchewan government on two separate occasions – an online webinar and an in-person ‘fireside chat’ – to discuss the province’s critical minerals strategy and operating and investment conditions. As practices of diplomatic statecraft, these events offered awareness-raising opportunities around Indigenous participation amongst other concerns for investment decisions. For instance, discussing effective, early, and consistent engagement facilitated exploring how to support economic reconciliation and meaningful participation with a UK audience (Representative for Indigenous Economic Development, SK, in CMA UK 2023). Participant 12 also drew my attention to a recent awareness-raising and trust-building exercise which took place when the Canadian High Commission hosted Indigenous leaders at Canada House, London. This pan-Canadian event saw resource diplomacy mobilise the *CMMP*’s “Canada Brand” element of Indigenous engagement through partnerships (Mines Canada 2021: 20). It was thus also connected with economic initiatives of statecraft in multiple ways as it sought to increase knowledge about Indigenous communities’ economic participation in the critical minerals sector *and* facilitate investment through deepening UK investors’ knowledge and understanding of this aspect of Canadian mineral activities (Participant 7, 12). In this way, focuses of the provincial brand were enacted, or demonstrated, through extra-territorial practices of statecraft, bringing this scripting of state space to life through a project to build awareness and trust between Saskatchewan as an investment destination and critical mineral supplier and UK interests.

A further example of extra-territorial actions of resource diplomacy given by Participant 12 involved their efforts at the Investment and Trade Office to connect the SIIFC’s loan guarantee

programme with growing sensitivity and interest in the UK regarding the importance engaging with Indigenous communities but limited knowledge of how to do so. The SIIFC operates as a domestic initiative of economic statecraft which bridges into extra-territorial resource diplomacy because its role in creating equity partnerships with Indigenous enterprises and communities is foregrounded through the province's 'brand' as a jurisdiction with a commitment to ensure Indigenous peoples' "meaningful economic reconciliation" (SK 2024: 16). The SIIFC's enrolment in extra-territorial resource diplomacy is demonstrated where it offers opportunities for UK companies to partner with Indigenous organisations in Saskatchewan (Participant 12), driving economic statecraft through partnerships and the mobilisation of the Saskatchewan "brand" of a low-risk jurisdiction to UK partners (Participant 6). These examples of investment attraction approaches therefore demonstrate how the role of trust and awareness are driven through the province's branding and its connection with other forms of resource diplomacy, such as strategic partnerships with UK actors (Ferguson et al. 2023). Raising awareness and strengthening knowledge around Indigenous communities, their history, and their proximity to Canadian jurisdictions' branding are integrated into extra-territorial modes of resource diplomacy and its enrolment of initiatives of economic statecraft in the project of nation branding. The intersection of a national brand vision into strategic partnerships is therefore an important part of Canada's and Canadian jurisdictions' strategies to attract investment and build partnerships around critical mineral supply chain opportunities.

This section has identified how nation branding (as a mode of resource diplomacy) intersects with economic statecraft. This combination of diplomatic and economic capital, I contend, is key to Canada's capacity to form and maintain strategic partnerships (Goddard et al. 2019). This also connects to the role of practitioners of statecraft in driving a further modality of resource diplomacy which sees national brands mobilised through extra-territorial activities of resource diplomacy (Kuus 2017). In this way, I have examined vision documents themselves, such as through examples of the *CMMP* and Saskatchewan's *IAS*, and demonstrated how they constitute the state extra-territorially through principles of ESGI and partnerships. Here, the SIIFC offered a critical exemplification of the cross-cutting modalities and scales of statecraft as it facilitates Indigenous participation within the province and with UK partners, with a further initiative of its economic statecraft being to create stability and certainty within the province and thus incentivise investment. I thus contribute to Ferguson et al.'s (2023) conceptualisation of economic statecraft by foregrounding the significance of diplomatic elements of statecraft

and the intersection of domestic and extra-territorial mechanisms. Following this analytical progression from domestic to extra-territorial interconnecting modes of economic and diplomatic statecrafts, this chapter's final section focuses on the evolving bilateral, strategic partnership between Canada and the UK, with a specific consideration of its orientation towards integrating and enhancing circularity within supply chains.

### **6.3 Not just a mining story? Innovating circular economies through strategic partnerships**

Driving technological innovation needed to enhance circular economies is a significant challenge facing the future of critical minerals and their “secure, sustainable, and ethical” supply (Vivoda 2023: 1; Graedel et al. 2019). In this context, adopting circular economy approaches has been identified as an alternative pathway towards low-carbon futures, particularly the entrenchment of dependence on more mining (Young & McCarney 2022). Building on the arguments developed through the previous sections, I unpack here how Canada and the UK are engaging in a bilateral strategic partnership to drive R&D for critical mineral circularity, including mineral recovery, reprocessing, and reuse (NRCan 2022b: 41). In doing so, I demonstrate that strategic partnerships are not just economic statecraft, but are also important sites of resource diplomacy (Power et al. 2012). I find strategic partnerships to be mechanisms of intersecting economic and diplomatic initiatives which enrol discourses of innovation and trust to achieve certain geopolitical objectives – i.e. driving cooperation and collaboration with like-minded countries to “protect, promote, partner” with respect to resource supply chains (Hamilton & Renouard 2024). A key contention which I make is that mechanisms of statecraft are extending beyond focuses on altering the behaviours of other states, such as through tariffs and embargoes as economic statecraft, to manage security externalities (Sovacool et al. 2023). This is in the context of increased calls for diplomacy over raw materials rather than competition (Müller et al. 2023). Instead, evolving Canada-UK partnerships signify an approach which combines economic and diplomatic initiatives to foster investment and facilitate collaboration, also extending traditional statecraft focuses on maximising economic gains from trade (Ferguson et al. 2023). While the latter is still a concern, I find that trust-building and knowledge-sharing also offer such economic potential, particularly in the context of developing circular economies for critical mineral supply chains through strategic partnerships (World Circular Economy Forum (WCEF) 2021). The “establishment of trust” is considered a crucial complement to resource diplomacy efforts around engagement and knowledge-building (Macfarlane 2024: 138).



Figure 6.3: ‘The Value Chain of Critical Minerals Addressed in This Strategy: From Exploration to Recycling’, infographic depicting the value chain vision of the Canadian critical minerals strategy. Source: NRCan 2022: 11.

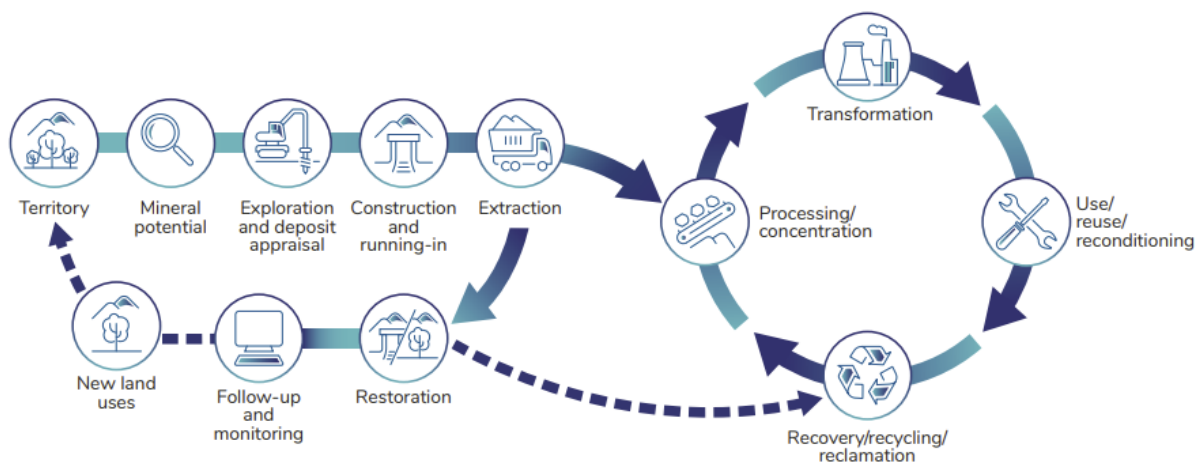


Figure 6.4: ‘Typical CSM Value Chain in a Circular Economy’, infographic depicting Québec’s vision for a circular economy value chain for critical minerals. Source: QC 2020c: 5.

The evolving Canada-UK strategic partnership through the *Dialogue* aims to progress R&D collaboration and capture value-add opportunities from integrating circularity practices and technologies into supply chains – pursuant to the circular economic visions of their respective critical minerals strategies (NRCan 2022b; UK Gov. 2023). However, before considering the specificities of how economic and diplomatic statecraft is taking place through this evolving strategic partnership, I firstly establish how the federal strategy conceptualises circularity in its critical mineral supply chains, which the *Dialogue* seeks to develop and enhance. NRCan’s (2022b) vision demonstrates efforts to work towards reducing the extraction of mined materials and increasing the recycling, reprocessing, and reclamation of critical minerals from manufactured products. Aiming to recover “valuable minerals and metals” from “secondary and unconventional sources”, value is ascribed to ‘waste’ materials and thus presents a vision, in addition to mineral recovery from end-use productions, to innovate the reprocessing of mine

tailings and mineral processing by-products (Ibid.: 41-2). However, the supply chain visualisation included in the strategy represents only the recycling of downstream end-use products (Fig. 6.3). I thus also consider Québec as a sub-federal example. The province positions a circular economy for critical minerals as a conditional part of the *QPDCSM* – the plan has no approval without a commitment to developing circularity (Participant 11) – and an opportunity to be progressed through economic and diplomatic statecraft (QC 2024). Similarly to the *Dialogue*, the *QPDCSM* highlights the use of secondary sources, utilising the term “residues” instead of ‘waste’ for by-products (QC 2020c: 14). It thus emphasises the value-add opportunities of innovating recycling capabilities to integrate circularity along the value chain (QC 2023). This focus is visualised in Fig. 6.4 where inputs to mineral recovery and recycling are shown to be from the reuse of manufactured products as well as the processing and pre-processing stages. Therefore, integrating circularity into supply chains is foregrounded within Canadian strategic approaches and can be analysed for its significance within evolving strategic partnerships over critical minerals.

Building on the above outline of NRCan’s (2022b) vision around circular economies for critical minerals, a useful launching point is the *Dialogue* signed between Canada and the UK at PDAC 2023. This agreement exemplifies how mechanisms of statecraft are being employed to drive innovation in critical mineral circularity. Entitled the *Critical Minerals Supply Chains Dialogue*, and stated to be oriented towards strengthening collaboration and boosting “green tech supply chains” by the Canadian and UK governments, there are a number of aspects of the *Dialogue* which are of interest to a focus on statecraft (NRCan 2023a). As an example of an evolving strategic international partnership, the *Dialogue* reflects how the focuses and tools of economic and diplomatic statecraft are changing within wider shifts in the global political economy of CRMs. The purpose of this mechanism of bilateral engagement is to ensure that the UK and Canada are “collaborating together”, referencing closely NRCan’s strategic vision to encourage cooperation by “bringing investors and companies together”, “facilitating ... research groups”, and generating opportunities to establish collaborative projects (Participant 4). In this way, the *Dialogue* centres around visions for an evolved Canada-UK collaboration around critical mineral resources and forging (new) strategic partnerships which operate as a mechanism of statecraft supporting critical mineral supply chain development (Hine et al. 2023). It can thus be observed that, similarly to Australia, the Canadian federal government’s strategic approach is leveraging the critical minerals sector as a foundation for greater

economic cooperation with “trusted security partners” (Ferguson et al. 2023: 1163), though this may be to the potential exclusion of perceived “strategic adversaries” (Vivoda et al. 2024: 2). It is important to note that this statecraft approach shifts geostrategic objectives beyond traditional focuses on maximising the economic gains from trade; it moves towards an attendance to supply chain development to ensure diversification away from and security against potential threats, such as influence or disruption by China (Müller et al. 2023; Ferguson et al. 2023). A significant facet of this statecraft approach is its focus on establishing a circular economy to contribute to the sustainability and attainability of extraction and processing demands for critical minerals. A further significance to the *Dialogue* as an influential tool of statecraft is the role it emphasises for innovation and trust in establishing circular economies.

With the *Dialogue*'s emphasis on connections and cooperation across Canadian and British strategic approaches to developing circular economies around critical minerals, trust and innovation complement each other as core facets of this mechanism of statecraft. Specifically, as the two countries' respective strategies “share similar values and goals”, the *Dialogue* centres bilateral economic engagement to ensure “diverse, ethical, fair, and transparent” critical mineral markets through innovation, high ESG standards, and prioritising “security of supply and joint economic prosperity” (NRCan 2023). In particular, one of the *Dialogue*'s three main objectives is leveraging both countries' respective strengths by promoting R&D and skill-sharing between industries, governments, and academia in both nations (Ibid.). Cooperation on these areas will “[extend] to downstream reuse and recycling” in addition to “build[ing] new connections in upstream and midstream segments of critical mineral supply chains” (Ibid.). Thus, developing knowledge and capacity for recovery, reprocessing, and reuse is a central objective shaping the trajectory of the evolving Canada-UK partnership over critical minerals and to “spur supply chain innovation” through strengthened trust and collaboration (Ibid.). More broadly, the *Dialogue* itself operates as a signal from government of a commitment to inter-state collaboration and supporting cooperation between businesses and government agencies, and creates enabling business conditions by guiding activities and building confidence (Participant 12). To further unpack the Canada-UK *Dialogue* as an approach to statecraft, and particularly its vision to facilitate and finance innovation through knowledge-sharing and trust-building facets of strategic partnerships, I examine activities between Innovate UK and the National Research Council of Canada (NRC).

Knowledge-sharing practices are significant to strategic partnerships which combine economic and diplomatic modes of statecraft, such as the *Dialogue* and its pursuit of innovation to enhance mineral circularity. They also emphasise the value of trust in resource diplomacy activities, as is reflected by an increased emphasis on collaborative statecraft beyond traditional focuses on deploying economic tools to drive behaviour change by other jurisdictions (Breslin & Nesadurai 2023; Müller et al. 2023). Illustrating such a shift, the *Dialogue* has facilitated economic and research cooperation through joint programmes between the UK's national innovation agency, Innovate UK, and NRC's Industrial Research Assistance Programme (NRC IRAP). Through these programmes, Canada enacts resource diplomacy and economic statecraft by targeting opportunities in R&D – particularly mineral reuse and upcycling – to develop circularity along critical mineral supply chains. Through this evolving bilateral partnership, it is envisaged that business, academic, and government interests will collaborate to develop a supply chain which also meets requirements around ESG, transparency, diversification and sustainability (NRCan 2023). For example, the *Global Business Innovation Programme in Canada – Critical Minerals (GBIP)* has seen representatives from 15 companies of the UK's critical minerals sector visit Canada to connect and facilitate collaborative R&D and drive market familiarisation with Canadian companies as potential business partners (Innovate UK 2023). *GBIP* visits also involved provincial-level cooperation as companies were welcomed by jurisdictions such as Québec and Saskatchewan in December 2023 (Participants 11 & 12). Participant 12 connected the value of this opportunity for the work of Saskatchewan's Trade and Investment Office in London, noting how it “foster[s] partnerships at the research and commercialisation levels” across provincial-global scales and “stimulate[s] business opportunities”. Alongside *GBIP*, another project of economic-diplomatic statecraft is the £5.4mn shared between Canadian and UK SMEs for *joint* R&D to innovate critical minerals circularity (UKRI 2023). The themes covered include enhanced circularity in battery systems and permanent magnets, focusing on minerals including cobalt, lithium, nickel, graphite, silicon, and REEs, as well as mineral substitution and improved ESG through life cycle analyses and traceability (Ibid.). This demonstrates a key site where economic and diplomatic initiatives of statecraft intersect to drive innovation with financing and cooperation, through knowledge-sharing and pitching projects to business audiences.

As the preceding paragraph has touched on, Canada-UK partnerships over critical minerals are also taking shape at the provincial level which foreground the significance of knowledge-

sharing alongside economic initiatives of statecraft. For example, representatives from Québec detailed how the province’s approach recognises the importance of a comprehensive and long-term CSM plan to develop the circular economy “hand-in-hand” with the rest of the value chain (Participant 10) which involves working through cooperation with regional to international partners (QC 2020c: 6). Thus, the province positions circular economy visions at the “heart” of the *QPDCSM* (QC 2024), while Participant 10 expressed Québec’s position that “the beauty of critical minerals” and the wider “electronic economy” of which they are a part is this opportunity – indeed necessity – to integrate circularity into the value chain. With this background in mind, Participant 11 stressed that, in addition to domestic initiatives to drive innovation in recycling by Québec industries, it is important to “be a partner in an international mineral circularity knowledge base”. This vision foregrounds the significance of knowledge-sharing to mechanisms of diplomatic and economic statecraft seeking to drive innovation in mineral circularity. This is highlighted through Québec’s view that “strong established partnerships” are critical to contributing to the development of mineral recycling activities both within *and* outside Canada, such as in smaller European countries which do not have the ability to supply their own raw materials (Participant 11). A related example is Saskatchewan’s recent interest in participation in the ENSuRe research hub at Durham University which could see an SRC steering committee collaborate and share information with the programme where one of the research themes considers the circular economy through recycling, substitution, and the efficiency of resource use (Participant 12; ENSuRe 2023). I thus observe that the positioning of knowledge-sharing as a focus of extra-territorial resource diplomacy, in alignment with economic initiatives of statecraft, is a significant means by which Canadian jurisdictions are seeking to enhance circularity in both domestic and international critical mineral supply chains. This foregrounds understandings of how strategic partnerships over critical minerals must increasingly orient towards cooperative approaches to drive long-term, sustainable innovation in global value chains, particularly where trust constitutes an important aspect where concerns around supply chain security abound (Ferguson et al. 2023).

In addition to the role of trust through knowledge-sharing, a further aspect is its connection with traceability within a wider project of circular economy-focused statecraft. A central idea here is that “trust is the invisible wiring that allows systems change to occur” (WCEF 2021: 6). I thus contend that Canadian approaches to strategic partnerships reflect this emphasis on trust and transparency to drive collaborative forms of statecraft centred on economic



cooperation and resource diplomacy – differentiated from tendencies towards statecraft which seeks to instigate behavioural change by perceived adversaries (Sovacool et al. 2023). Examples of this are *The Québec Battery Initiative* (IQ 2021, 2024b) and a pilot project on “mechanisms of traceability” for battery minerals (Propulsion Québec 2022: 6) which discuss strategic partnerships with industry and how to increase stability along the battery value chain, especially through opportunities for the province to engage with the *Global Battery Alliance’s* (GBA) Battery Passport. The vision is to build traceability and trust into critical mineral supply chains for batteries, not only through tracing extraction and manufacturing origins, but also being able to provide information on “battery life extension and recycling”, for instance through a minimum recycled component proportion which will increase over time (Propulsion Québec 2022: 14). Participant 11 connected this opportunity with the importance of sharing knowledge and collaboration with “shared value partners in Europe and the UK”. This underpins the significance of trust in sustaining strategic partnerships to drive innovation and transparency to optimise operations in the battery supply chain. It also indicates where the Battery Passport itself presents an interesting site of international, multi-stakeholder collaboration (Global Battery Passport 2023). Indeed, the Government of Canada has announced its support of the Battery Passport as part of “multi-stakeholder efforts that promote responsible and sustainable global battery supply chains” (Minister Wilkinson, cited by GBA 2023). While the multilateral element of this partnership is beyond my research scope, it exemplifies this section’s argument wherein “partnership [may be] the new leadership in efforts to progress circular economy strategies through innovation and trust” (WCEF 2021: 9).

Throughout this section, I have demonstrated the significance of practices of resource diplomacy for strategic partnerships as more than practices of economic statecraft (Ferguson et al. 2023; Power et al. 2012). In particular, I have identified important implications where these help to build trust and transparency and can thus complement the success of economic initiatives, such as funding joint research to innovate and enhance circular economy value chains (Innovate UK 2023). My observations can also be situated in relation to calls at the international level for strengthened collaboration and knowledge exchange, through bilateral and multilateral initiatives (IRENA 2023b; WCEF 2021), and indeed a wider trans-Atlantic network of relations where increased focuses on cooperation have been identified (Hamilton & Renouard 2024). By tracing an evolving Canada-UK bilateral partnership oriented towards critical mineral circularity, I have contributed an expanded set of empirics and conceptual-

analytical approach. In particular, I have demonstrated an important intersection of (resource) diplomacy and economic statecraft and the implications this has on driving innovation and change along critical mineral supply chains and foregrounding opportunities for Indigenous economic participation (Section 6.2). Economic and diplomatic statecrafts ultimately work in combination to position Canada as a preferred “sustainable producer and global supplier” within an evolving international political economy around critical minerals (NRCan 2022b: 12).

## **7 Conclusions and Further Avenues**

This concluding chapter summarises the main findings of the thesis in response to the research questions set out in the introductory chapter. I begin with a reiteration of the research's empirical, theoretical, and analytical grounding at the productive intersection of critical resource geographies and critical geopolitics literatures. Section 7.2 continues by tracing and summarising the central observations and arguments made by the analysis and reflects on their significance with reference to the literatures. This is followed by Section 7.3's discussion of the implications of these findings before a consideration of the limitations of the research and suggestions of further avenues for study.

### **7.1 Contextual, conceptual, and empirical framing**

With the acceleration of climate change and clear evidence of its global impact, it has become a priority for world leaders to drive a transition to cleaner, renewable, and sustainable energy systems (Canadian Climate Institute 2023; Yu et al. 2024). In this context, critical minerals have emerged as a focal point of discussion and action given their applications in EVs, batteries, and other energy technologies (IEA 2021). A further driver concerns national security with respect to critical minerals' defence applications (NRCan 2024a; MAC 2024). This is emphasised in the criticality criteria of some western jurisdictions (e.g. US DOE 2019; UK Gov. 2023; EC 2023). However, the feasible framing and analytical scope of a research project of this size has led me to focus empirically on those minerals with importance for clean energy technologies, although concerns related to national security emerged in Section 6.1. My study has thus considered how Canada is positioning itself within the global political economy to 'secure' critical minerals for the "green energy transition for Canada and the world" (NRCan 2022b: 10).

This thesis is situated at the productive intersection of critical resource geographies and critical geopolitics to produce an account of how and what resource and state futures are envisioned and made possible by Canadian critical mineral strategies, aligned policies, and the actions they preclude. These disciplines informed a conceptual and analytical approach which delineated the production of certain minerals as critical resources and how the state is rendered coherent. In this vein, I have illustrated how Canadian strategic approaches to critical minerals constitute "more than a mining story" (Participant 9). Firstly, the critical lens of my research has examined the discourses and technical, representational, and statecraft practices – beyond mining activities – which influence processes of resource- and state-making. Resources do not simply exist in the ground with inherent value and use in the world;

rather, they are brought into being through specific appraisals of that which they represent and ‘do’ in the world (Valdivia et al. 2022; Bridge 2009). Moreover, this framing has drawn attention to Canada’s need to develop its ability to supply critical minerals from mid- and down-stream opportunities, especially mineral circularity, not just upstream prospecting and extraction.

My critical perspective and its examination of critical minerals and strategies through a novel set of Canadian empirics are situated within a research agenda which has hitherto largely been a focus of conventional geopolitics and the political and economic sciences, particularly IR. In response to this predominance, I have sought to delineate the case at the integrative space between critical resource geographies and critical geopolitics. This speaks to a growing literature tackling critical mineral plans and policies from critical social science perspectives (Bridge & Faigen 2023; Hine et al. 2023; Kneas 2020). As Section 7.3 elaborates, my empirical and conceptual contributions also extend to the critical minerals research agenda of the political and economic sciences (Vivoda et al. 2024; Kalantzakos 2020) and an expanding, non-academic literature (journalistic or popular geopolitics, one might say) with roots in conventional geopolitics (Scheyder 2024; Sanderson 2023; Conway 2023; Pitron 2022). To make a significant empirical and conceptual contribution to both critical and non-critical approaches in this integrative space of critical resource geographies and critical geopolitics, my chosen approach has examined intersecting discourses, techniques, and practices across multiple scales and, in so doing, has responded to research questions which ask:

How are ‘critical’ minerals in Canada rendered valuable and accessible resources?

How are investibility and the state co-constituted through practices of de-risking?

What influence do Canada-UK bilateral partnerships have on the scripting of Canadian space as investible resources?

## **7.2 Main findings and contributions: tracing resource- and state-making processes**

### **7.2.1 Assembling resources: critical, urgent, potential**

By means of response to the first research question and underpinning the latter chapters’ conceptual approaches, Chapter 4 delineated resource-making processes to show how Canadian minerals come into being as both critical *and* resources through appraisals of value, use, and accessibility. I delineated the discursive, calculative, and visual practices which construct and make legible some minerals as ‘critical’ instead of others, and their intersection

with historical-geographical contingencies and spatio-temporal framings (Bridge 2009; Li 2014; Kama 2021). With this analytical focus, I identified discourses of criticality, urgency, and potentiality, and also demonstrated their significance, alongside representational techniques, for shaping processes of resource becoming – individually and in combination.

I observed strong spatio-temporal framings of criticality. Here, I found a relational positioning between Canadian mineral opportunities and supply orientations towards external and domestic demand. The former furthered a critical examination of processes of friend-shoring where Canadian jurisdictions' definitions of criticality aligned with key trade partners, such as the US, enacting such supply chain shifts (Riofrancos 2022; Yellen 2023). Despite being largely framed as a net-exporter (Kelley et al. 2021), also significant were orientations where Canada is concerned to develop its own processing and manufacturing opportunities. Here, relational framings of criticality focused on meeting domestic demand such as Ontario's alignment of its critical minerals strategy with an automotive manufacturing plan focused on EVs (ON 2021, 2022). Expanding conceptualisations of a discourse of urgency (Hine et al. 2023), I also demonstrated the significance of temporal relationalities through their intersection with criticality. Notions of a "generational opportunity" (NRCan 2022b: 4) and a global "race" (SK 2023: 8) were shown to influence resource becoming as certain minerals gain significance in relation to these temporal framings (Kama 2021).

I demonstrated geological and economic potential to be two 'moments' of resource-making which are significant for their "conjuring" of speculative possibilities around that which is known *and* unknown about the subterranean occurrences, deposits and reserves, current and future demand, and global production distribution of minerals (Fry & Murphy 2021). Specifically, the "resourceness" of certain minerals was shown to be determined through scientific, quantitative, and visual techniques which appraise minerals' value and utility through projections of geological and economic potentiality (Richardson & Weszkalnys 2014: 6). Statistical picturings are a significant tool in this process as they connect calculative techniques and temporal framings within projections of potential (Li 2014). Reflecting analyses from the literature, infographics from jurisdictions such as Québec, NS, and NL connected current geological potential with future economic potential based on forecasted demand (Fry & Murphy 2021). These operate as "conjurings" (Tsing 2000: 121) as speculative possibilities of future potential render certain minerals – even those undiscovered – as 'ready-to-be-had' for the state's strategic project. An extension of statistical picturings of potential is their placement

within rhetoric and in co-location with other economic opportunities (Kneas 2020). Examples from Québec demonstrated this through the implied economic possibilities offered through existing infrastructures and proximate economic regions vis-à-vis minerals' accessibility and perceived greater value than those occurrences located further from such sites (IQ 2021).

However, an important insight into the role of potentiality in resource-making is the uncertainty and precarity it can lend to speculative projections of potential and, by extension, to the critical mineral developments they seek to drive. Extending the approach of Kuchler and Bridge (2023), I drew on examples from NRCan, New Brunswick, and the NWT to demonstrate how the productive role of uncertainties can also be seen to shape resource-making processes around Canadian critical minerals. For instance, while the NWT (2023: 11) utilised speculative discourses to mobilise notions of geological “underdeveloped and undiscovered” potential, New Brunswick incorporated such discourses into infographic presentations of potential with more specific data on mineral occurrences (Appendix 7). There is demonstrably a significance to the mobilisation of that which is unknown and thus uncertain in projections of geological and economic potential. However, my analysis also highlighted where concerns have been raised around the precarity of such projections, particularly with reference to long lead times to develop projects to production and the impacts of market volatility (Antweiler 2024). Since 2005, only four mines producing minerals for EV batteries have opened in Canada, and one of these, NAL, had a multi-year hiatus having closed due to financial challenges which were in part connected to a drop in lithium prices in 2019 – it restarted production in March 2023 (Piedmont Lithium 2023).

### **7.2.2 Rendering actionable, derisked, and investible resources and state space**

The cartographic approaches considered through analyses of picturing and placing potentiality represent an empirical bridge between processes of resource- and state-making. Here, my analysis in Section 5.1 highlighted the influential relationship between the production and dissemination of geoscientific knowledge and how resource frontiers are rendered as “knowable and actionable space” (Himley 2021: 1). Illuminating these practices drew on conceptualisations of the resource-state nexus whereby the Canadian state, and sub-federal jurisdictions were seen to gain coherence in relation to the investible resource assemblage and effects of political economic power through bringing resources into the reach of the state (Zhou 2022; Bridge 2014). Speaking to this nexus relationship, my analytical approach drew on Koch's (2022: 8) observation that “[the] state can't be made real by cartographers alone” to argue that

the generation of geoscientific knowledge enables a state 'effect' through "seeing geologically" (Braun 2000: 38) and its dissemination compounds the production of vertical and horizontal state territory (Marston 2019). My analyses make a conceptual contribution in understanding this latter 'move' to result in a scaling of resources to the territorial extent of the state. Constituting an element of state-making, I illustrated this case with examples of scalings which construct Canadian resource spaces as at once abundant and geographically expansive: from "coast to coast to coast", yet dispersed with spaces of apparent "emptiness" and unknown 'potential' (NRCan 2022b: 10). In these ways, "claims of sovereignty and practices of governance" through geoscientific knowledge enable the state to cohere around resource occurrences and notions of geological and economic potential (Bridge & Wyeth 2020: 253).

However, a further element of the state-making process through Canadian critical mineral strategies is that which it occludes or excludes. Extending the conceptual contribution I have made with respect to mobilisations of the 'unknown', I have also demonstrated how representations of Canadian resource space as "empty-yet-full" do so by including, and excluding, certain information and mobilising discourses around the possibilities held within the unexplored and undeveloped (Hine et al. 2023). Importantly, this can also extend to exclusions which prioritise state-resource relations over other land uses, such as cartographies which do not include Indigenous and other local communities (Peyton & Keeling 2017). An informative empiric here was Ontario's Ring of Fire deposit. Not only does it constitute an important part of the province's critical minerals strategy – singled out for discussion (ON 2022: 13); it also demonstrates actions to counteract exclusions, such as counter-mapping and an Indigenous organisation driving and taking ownership of a vital infrastructure project, the Northern Road Link (Avila et al. 2021). With such challenges in mind, my research also considered Indigenous communities' engagement in critical minerals at the intersection of practices of derisking as economic statecraft and critical minerals strategies.

I have found practices of derisking investment to be impactful through domestic initiatives of economic statecraft, particularly where the state is seeking to reposition itself geopolitically and geoeconomically by producing investibility (Gabor 2021; Ferguson et al. 2023). Specifically, Section 5.2 argued that notions of responsibility and certainty complement financial instruments as economic statecraft. In doing so, I have contributed to critical microfinance literatures which conceptualise practices of derisking through financial tools, such as tax credits and loan guarantees, but have hitherto not focused on how certain public-private

capital relations incentivise investments into critical minerals in the context of a broader green industrial transition (Gabor 2023). Thus, through derisking approaches by Québec and Saskatchewan, I have identified how financial tools of statecraft intersect with a discourse of responsibility and notions of certainty. Approaches by IQ and the SIIFC demonstrated the investment risk reduction opportunities derived from ensuring that Indigenous communities benefit socio-economically and in the long-term. For IQ, this connected to its role in ensuring due diligence as an invested partner on critical mineral projects, while the SIIFC offers equity partnerships for Indigenous enterprises and communities. Drawing such examples together, I have contended that this intersection has a two-fold derisking effect: firstly, investment opportunities are derisked for involved Indigenous communities; secondly – extending from the certainty linked with the former’s fostering of Indigenous relations – a stable, low-risk jurisdiction is constructed for external actors as a destination for international investment (Participant 6). By examining some of the implications for indigenous communities of financial tools of statecraft, such as FTS, I have continued such discussions in existing literature (Stanley 2016; Bélanger 2017). However, given my research’s limited scope, I call for further critical engagement at this conceptual intersection of derisking – critical minerals, domestic initiatives of economic statecraft, and Indigenous participation (Ferguson et al. 2023; Gabor 2023).

### **7.2.3 Extra-territorial modes of statecraft: securing supply chains and nation branding**

Continuing my analysis of state-making, Chapter 6 turned to examine how Canada has sought to position as a preferred partner through a project of derisking which involves the securing of supply chains. With a focus on extra-territorial mechanisms of statecraft and the scripting of state space, I took a critical perspective to an understanding of derisking mobilised predominantly through conventional geopolitical literature (Vivoda et al. 2024). Through a set of empirics focused on the actions of the federal government, I found that amendments to the *ICA* and the *Indo-Pacific Strategy* were aligned with concerns of the federal critical mineral strategy. Here, I observed the significance of a dual scripting of Canadian resource spaces as vulnerable and protected. This framing has precluded a specific set of actions focused on efforts to ‘securitise’ FDI *from* certain actors – such as by ordering divestments from Chinese-owned companies and limiting large mergers and acquisitions (Rajagopal 2024) – to thereby ‘secure’ supply chains for both Canada and its interested trading and investment partners. Approaching such practices of statecraft from a critical orientation, I have further developed concerns in the literature across security and critical geoeconomics and geopolitics (Ferguson



et al. 2023; Sovacool et al. 2023). In particular, I was able to show how diplomatic elements of statecraft intersect with economic initiatives to preclude certain approaches, such as the *ICA*'s tools to securitise FDI, in efforts to position Canada as a preferred partner through a scripting of state space and the cross-border elements of supply chains as 'secure' from interference by adversaries, and thereby a 'secure' supply. That is, a 'secure' supply for some "trusted security partners" (Ferguson et al. 2023: 1163) is one which has been secured against, or securitised from, other "non-like-minded countries" (NRCan 2022b: 1).

An extension to this bridge between diplomatic and economic modes of statecraft is my deployment of the concept of nation branding. My analysis examined how the mobilisation of national brands through vision documents constitutes a mode of resource diplomacy (Browning & de Oliveira 2017) with implications for the spatial scripting of state space as a form of "geopolitical storytelling" (O Tuathail & Agnew 1992: 192). To further develop these ideas, Section 6.2 examined the branding concept at national and sub-national scales. Empirics offered by the *CMMP*'s "Canada Brand for Mining" and Saskatchewan's *IAS* were significant here for demonstrating how brands which focused on notions of responsibility and reliability drove awareness-raising and trust-building efforts as central elements of their resource diplomacy. An important observation was resource diplomacy's intersection with economic statecraft, for instance where investment attraction demonstrated how domestic policies, such as the *SIIFC*, are incorporated into a jurisdictions' brand and how this is communicated to external actors. I demonstrated this by conceptualising two 'moments' of extra-territoriality through resource diplomacy as brands are created and communicated with effects of spatial scripting, but are then also mobilised as diplomatic practices, such as through events hosted by or with overseas interests. In this way, I have extended Alderman and Eggeling's (2024) conceptualisation of nation branding by identifying its intersection with modes of economic statecraft, including domestic initiatives and international strategic partnerships (Ferguson et al. 2023). The latter constitutes the focus of the next, and final, analytical progression of my research as I build on Section 6.2's brief examples of Canada-UK bilateral engagements to consider critical minerals circularity.

#### **7.2.4 Bilateral partnerships: collaboration, trust, and innovation for circular economies**

The central placing of partnerships within strategic visions around critical mineral has been demonstrated in political and economic science approaches (e.g. Vivoda 2023; Vivoda et al. 2024). To offer a developed critical perspective to this emergent literature, in Chapter 6 I

examined the financial, knowledge-sharing, and technological development opportunities offered through strategic partnerships. In particular, I analysed how evolving Canada-UK bilateral partnerships focus these opportunities on integrating and enhancing circular economies in critical minerals supply chains, doing so through intersecting modes of diplomatic and economic statecraft which enrol discourses of trust, transparency, and innovation. I sought to conceptually and empirically extend Ferguson et al.'s (2023) account of strategic partnerships as forms of economic statecraft enacted through Australia's critical minerals strategy. While I also discussed Québec's perspectives on the significance of resource diplomacy in the context of the multilateral 'Global Battery Passport' and the intersections of this with the province's approach to its engagements with the UK, the central empiric of the section was the Canada-UK *Dialogue* on collaboration over critical minerals.

My analysis of the *Dialogue* agreed between Canada and the UK demonstrated how a focus on strengthening collaboration through R&D and other innovation-focused activities drives developments in capabilities for critical mineral recovery and reprocessing. Particular examples of this were located in knowledge-sharing and collaborative actions, such as the funding of Innovate UK and NRC IRAP's *GBIP* programme to connect UK and Canadian SMEs focused on enhancing circularity in supply chains. These were also significant for provincial level bilateral partnerships as Participants 11 and 12 emphasised the value offered by expanding knowledge of respective jurisdictions and increasing access to funding for innovative approaches seeking commercialisation. A further aspect of such extra-territorial actions of statecraft is where shared values and knowledge-sharing underline the importance of trust and transparency for effective diplomatic statecraft, specifically when it comes to initiating systems change such as developing circular economy technologies and capacities (WCEF 2021). I therefore suggest that emphases on collaborative statecraft through trust and knowledge-sharing signify a move away from modes of economic statecraft which focus on driving behavioural change in other states (Breslin & Nesadurai 2023; Sovacool et al. 2023). In this way, my analysis has documented a broader shift in statecraft focused on natural resources which stresses collaborative and cooperative approaches to develop productive and effective interdependencies (IRENA 2022, 2023b; Hamilton & Renouard 2024).

Ultimately, the case of emerging Canada-UK bilateral partnerships points also to the significance of resource diplomacy and economic statecraft in facilitating a 'more-than-mining' story for Canada within the wider international political economy of critical minerals. Such

partnerships contribute to enhancing circularity in supply chains through collaborative approaches centred on trust, innovation, and transparency, which are facilitated through knowledge-sharing and financial support for projects. With projected increases in mineral demand, reducing the amount of mineral extraction to meet this demand might be achieved by re-circulating minerals within the supply chain (Riofrancos 2023). Therefore, identifying ways in which to drive the integration of circularity in value chains – capitalising on the value-add opportunities of up-cycling minerals from end-of-use productions and the residues of extraction and processing activities – is important for a clean, sustainable energy transition.

### **7.3 Implications and significance of the critical lens**

Through these findings, my research has pointed to a number of implications for Canada and the wider global political economy. More precisely, it has illuminated and driven forward alternative ways of understanding resources and our relationships to them – three of which I draw out through this section. These point beyond supply/demand-focuses which take resources as having inherent value and waiting to be brought into supply chains (Bridge & Wyeth 2020). The value of the alternative perspectives is therefore located in how they draw attention to resource relations and opportunities which are more socio-economically and environmentally sustainable, reflecting critical analyses of by whom, when, and where these determinations of “resourceness” take place (Richardon & Weszkalnys 2014: 6; Kama 2019). They thus also have merit for furthering conceptual understandings of resource- and state-making processes with respect to whom or what may be obscured and excluded, alongside opportunities for statecraft to foreground principles of responsibility and trust where critical mineral strategies focus on ESGI.

Firstly, deconstructing what constitutes a critical mineral resource for different jurisdictions, such as specific spatio-temporal framings and notions of potential, also invites considerations of how critical minerals may be assembled otherwise. Certain materials can be understood and known differently, thus shaping their effects in the world through socio-ecological relations – part of the “who, where, when, and to what effect” of resource-making and contestation (Koch & Perreault 2019: 614). Therefore, the logics of appraising a particular mineral as valuable and useful – its ‘resourceness’ – are not fundamentally tied to its material qualities, but also existing relations of political, economic, and social power. By making visible alternative ways of constructing and making known resources, my research has demonstrated how different socio-ecological relations with resources may be brought forth, e.g. those which are more

socially and environmentally just. For instance, the mainstream, non-critical employment of languages of criticality can make it difficult to frame mineral resources in ways other than as a supply problem. However, by problematising the discourses and practices surrounding mineral criticality, I have brought forward an alternative framing of demand-side focuses. This invites attention to ways in which more sustainable and less resource-intensive resource relations may be facilitated (Dunbar & Fraser 2024). I thus point to emergent literature on and increased discussions around enhancing and integrating circularity into critical mineral value chains (Nygaard 2023; Graedel et al. 2019). Here, adopting a circular economy approach is considered an alternative pathway to dependence on “more mining” which has implications for the materials subject to demand and their “environmental and social footprint” (Young & McCarney 2022). However, I also highlight Riofrancos’ (2023) observation that fundamental shifts in our relationship with energy consumption are needed to reduce our absolute demand for critical minerals. Such a concern is important as it calls on us to problematise our relationship with resources and their consumption – e.g. replacing our fossil fuel consumption with renewable energy technologies and the extracted resources on which they depend. This demonstrates the value of an alternative to mainstream understandings of ‘criticality’ where this precludes a focus on a supply problem. It drives a need to derisk and thus ‘secure’ current and future stocks of minerals, rather than rethinking our consumptive-relationship with these minerals.

A further implication of my research derived from a critical engagement with notions of security, problematising framings and interventions which are inspired by non-critical engagements with security discourses. Specifically, while my approach has emphasised the opportunities of cooperative and collaborative modes of statecraft, this also points to the potentially counter-intuitive logics of such practices as ‘securitising’ FDI and aspects of critical minerals trade and investing (see Section 6.1). For instance, diversifying global supply chains from “hotspots of contention” could lead to creating concentrations elsewhere in supply chains or cool international relations to frostier iterations where China continues to build dominance despite western attempts to ‘protect’ themselves against potential geopolitical disruption (Kalantzakos 2019: 2). Indeed, more broadly, Hamilton and Janouard (2024) observe that approaches to derisking can be characterised as “protect, promote, partner” within greater trans-Atlantic unity which could entrench the era of Sino-Western confrontation and disruption in which these concerns have emerged. Moreover, in the context of political uncertainty in the US, a recent broadcast of *The Inquiry* highlighted concerns that Project 2025’s reorientation of

foreign policy could include cutting off the economies of the US and its allies from China (Hurlburt, in BBC World Service 2024). However, Canada's *Indo-Pacific Strategy* (GAC 2022) does acknowledge such concerns in its discussion of its reputation for critical minerals and its commitment to maintain dialogue with China.

The final alternative perspective of my approach which I wish to foreground is articulated through a critical perspective which does not take as given the discourse of 'security' and the notions of risk and vulnerability associated with it. In addition to its connection to the language of 'criticality' highlighted above, I draw attention to the impact on Indigenous communities which arises from the languages and practices around securing critical minerals. Specifically, my critical approach focused where connected notions of risk are articulated in relation to Indigenous communities' perspectives towards critical mineral projects, positioning these as influential to perceptions of security or stability (Participant 6). For instance, I analysed how some financial instruments, such as FTS, adopt short-term economic focuses and exclude Indigenous communities' participation. This is to offset the costs of engaging with these populations, and in so doing undermine their sovereignty which is considered a threat to mining activities. (Participant 9; Stanley 2016). However, I also explored alternative possibilities for economic engagement, such as where obtaining the support of Indigenous peoples is considered integral in driving longevity and sustainability. Lower investment risks are associated here with ensuring Indigenous approval and the certainty and investor confidence which can derive from this. This alternative framing of a discourse of security – as one which has implications for how Indigenous communities' socio-economic relations are shaped through practices of derisking – also extends to a broader impact of my research with respect to how responsibility and security can be considered linked qualities of critical mineral supply chains. That is, an ESGI-focused supply chain is one which can be considered secure in relation to notions of certainty and longer-term sustainability – in addition to assessments of geopolitical security through diversifying and 'friend-shoring' supply chains – as investors and consumers are situated in a context of environmentally and socio-culturally conscious investing (Michaels et al. 2022). This speaks to Riofrancos' (2022) conceptualisation of a security-sustainability nexus for lithium as these concerns acquire mutual significance.

#### **7.4 Limitations and avenues for further research**

This study is situated within an evolving research agenda on critical minerals in Canada anchored conceptually and analytically in critical resource geographies and critical

geopolitics. To signal opportunities to extend research at this productive intersection, this final section reflects on three limitations of my study and discusses where these might invite further study with related or different analytical or empirical approaches.

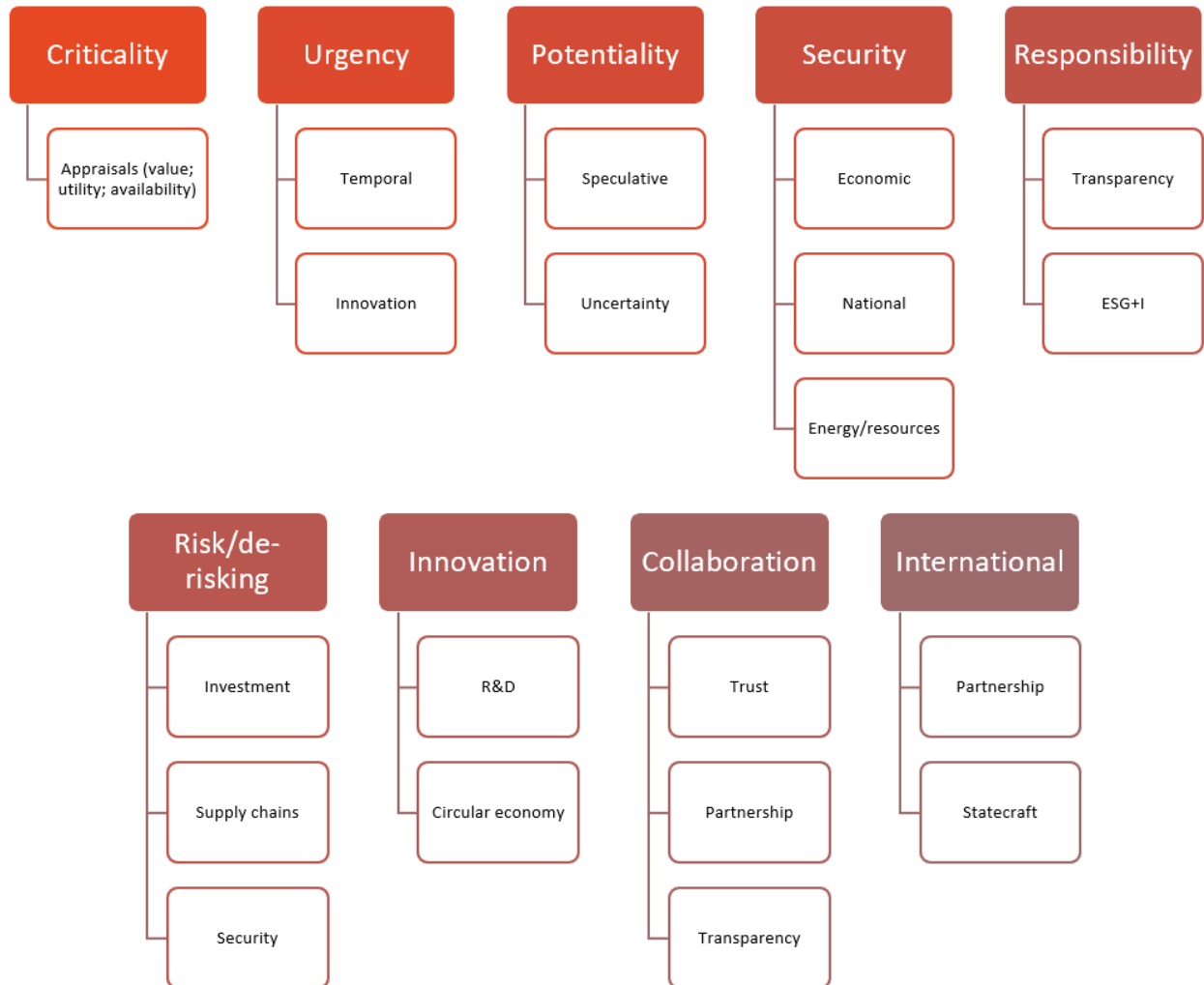
Firstly, research participants were mostly government representatives which reflected the state-focused framing of my analysis and the feasible scope of my research. However, a different research framing could involve participants from a wider range of backgrounds, including industry stakeholders, officials from different government departments, and Indigenous representatives. For instance, this could be a focus on a particular provincial or territorial case to explore in greater granularity of detail the approaches, experiences, and visions of implementing a sub-federal critical minerals strategy by including this wider range of participants. Furthermore, given the temporal constraints of my data collection phase (February-June 2024), I had a limited timeframe within which to connect with participants and conduct interviews. With data collection also dependent on response rates from potential participants, it was not feasible to widen the scope of my methodology to industry stakeholders. I recognise the limitations of this especially with respect to exploring the implications of specific policies and strategic orientations, and thus conclude that focuses on this area within the Canadian context could be of great value to this growing empirical and conceptual body of literature.

A second limitation relates to the geographical scope of my research where it was feasible to focus on empirics of Canadian strategies and Canada-UK partnership, though some discussions included examples from the North American region. In relation to this, an avenue for future research which I am keen to emphasise is the study of bilateral relationships between Canada and other states, such as the US, EU, and Japan. My research is proximate to a growing literature on relatively under-studied medium-sized economies in the global market, such as Australia and Canada, despite their significance as mineral suppliers (Hine et al. 2023; Ferguson et al. 2023). In this vein, research which examines both Canada and Australia, for instance, would contribute further insights into how supply-oriented states are seeking to secure global leadership as producers of critical minerals. Further investigation could be situated in an expanding literature on multilateral partnerships over critical minerals, such as Vivoda's (2023) analysis of the *Minerals Security Partnership*. A possible empiric here is the *Critical Minerals Mapping Initiative (CMMI)* which represents a collaborative partnership between Australia, Canada, and the US to expand geoscientific knowledge (Kelley et al. 2021).

Finally, continuing an empirical focus on Canada, further research could advantageously foreground the voices of Indigenous communities with respect to how discourses of criticality and security are imperilling their livelihoods and landscapes. In doing so, a different narrative could be brought forward around ‘critical’ minerals of vulnerability, domination, and a continuation of colonial land relations through extractivism (Zografos & Robbins 2020), as has similarly been discussed in relation to liquefied natural gas in BC (Sax & Tubb 2021). While my research explored certain concerns of Indigenous communities, such as in the context of projects of counter-mapping and financial instruments of statecraft for derisking (Chapter 5), these analyses would benefit from insights about colonialities and vulnerabilities through extractivism. Moreover, my research did not involve interviews with representatives from First Nations groups, and so I recognise a key limitation wherein the implications of certain representational practices and initiatives of statecraft are not evidenced through Indigenous perspectives. In this way, an alternative empirical framing could generate more detail on the nature of Indigenous-resource relations in the context of expanding critical mineral frontiers – or sacrifice zones where First Nations already have established livelihoods obscured by ‘empty-yet-full’ representations – and would also offer opportunities to engage directly with Indigenous stakeholders (Dempsey & Pasternak 2022). This observation links to research implications outlined in Section 7.3 where adopting a critical perspective demonstrated ways of knowing and interacting with the land outside an extractivist framing. Further research with a provincial or territorial focus or analysing Indigenous-state relations could thus offer an empirical framing which deepens understanding of Indigenous-land-resource relationships and dynamics in the context of critical minerals developments, especially if undertaken through an ethnographic lens (Cater & Keeling 2013; Jensen & Sandstrom 2020).

## Appendices

**Appendix 1: Thematic coding and sub-coding employed in the analysis of strategy and related government documents and interview transcript data. Author's own.**





**Appendix 2: Table comparing the ‘critical’ (and/or ‘strategic’) minerals compiled as listed by Canadian jurisdictions, or listed as known/potential occurrences considered critical by other jurisdictions (e.g. MB, BC, NL, SK, NU).**

| Critical (and strategic*) minerals  | Canada <sup>1</sup> | AB <sup>2</sup> | BC <sup>3*</sup> | MB <sup>4</sup> | NL <sup>5</sup> | NS <sup>6</sup> | ON <sup>7</sup> | PEI | QC <sup>8</sup> | SK <sup>9†</sup> | NWT <sup>10</sup> | NU <sup>11</sup> | YT <sup>12</sup> |
|-------------------------------------|---------------------|-----------------|------------------|-----------------|-----------------|-----------------|-----------------|-----|-----------------|------------------|-------------------|------------------|------------------|
| Aluminium                           | X                   | X               | X                |                 |                 | X               |                 |     |                 |                  |                   |                  |                  |
| Antimony                            |                     |                 |                  |                 | X               |                 | X               |     | X               |                  | X                 | X                | X                |
| Arsenic                             |                     | X               |                  |                 | X               |                 |                 |     |                 |                  |                   | X                |                  |
| Barite                              |                     | X               | X                |                 | X               |                 | X               |     |                 |                  |                   | X                |                  |
| Beryllium                           |                     |                 |                  |                 | X               |                 | X               |     |                 |                  |                   |                  |                  |
| Bismuth                             | X                   | X               |                  |                 | X               |                 | X               |     | X               |                  | X                 | X                | X                |
| Cadmium                             |                     |                 | X                |                 |                 |                 |                 |     | X               |                  |                   |                  |                  |
| Cesium                              | X                   |                 |                  | X               | X               |                 | X               |     | X               |                  |                   |                  |                  |
| Chromite/ium                        | X                   | X               |                  | X               | X               |                 | X               |     |                 | X                | X                 | X                | X                |
| Cobalt                              | X‡                  | X               | X                | X               | X               | X               | X               |     | X*              | X                | X                 | X                | X                |
| Copper                              | X‡                  |                 | X                | X               | X               | X               | X               |     | X               | X                | X                 |                  | X                |
| Feldspar                            |                     |                 |                  |                 | X               |                 |                 |     |                 |                  |                   |                  |                  |
| Fluorspar                           | X                   |                 |                  |                 | X               |                 | X               |     |                 | X                | X                 | X                | X                |
| Gallium                             | X                   | X               |                  |                 |                 | X               | X               |     |                 | X                |                   |                  | X                |
| Germanium                           | X                   | X               | X                |                 |                 | X               | X               |     |                 |                  |                   |                  | X                |
| Gold                                |                     |                 | X                |                 |                 |                 |                 |     |                 |                  |                   |                  |                  |
| Graphite                            | X‡                  | X               |                  | X               | X               | X               | X               |     | X*              | X                |                   | X                |                  |
| Hafnium                             |                     | X               |                  |                 | X               |                 |                 |     |                 |                  |                   |                  |                  |
| Helium                              | X                   |                 |                  | X               |                 |                 |                 |     |                 | X                |                   |                  |                  |
| Indium                              | X                   | X               | X                |                 |                 | X               | X               |     | X               |                  |                   |                  | X                |
| Iron Ore (high-grade, low-impurity) | X                   |                 | X                |                 | X               |                 |                 |     |                 |                  |                   |                  |                  |
| Lead                                |                     |                 | X                |                 | X               |                 |                 |     |                 |                  |                   |                  |                  |
| Lithium                             | X‡                  | X               |                  | X               | X               | X               | X               |     | X*              | X                | X                 | X                | X                |
| Magnesium                           | X                   | X               | X                | X               | X               |                 | X               |     | X*              | X                |                   |                  | X                |
| Manganese                           | X                   | X               |                  |                 | X               | X               | X               |     |                 | X                | X                 | X                | X                |
| Metallurgical coal                  |                     |                 | X                |                 |                 |                 |                 |     |                 |                  |                   |                  |                  |
| Molybdenum                          | X                   |                 | X                |                 | X               | X               | X               |     |                 | X                | X                 |                  | X                |
| Nickel                              | X‡                  | X               | X                | X               | X               |                 | X               |     | X*              | X                | X                 |                  | X                |
| Niobium                             | X                   | X               | X                |                 | X               | X               | X               |     | X*              | X                | X                 | X                | X                |
| Palladium                           |                     |                 |                  |                 |                 |                 |                 |     |                 |                  | X                 |                  |                  |
| PGEs/PGM                            | X                   | X               | X                | X               | X               |                 | X               |     | X*              | X                | X                 | X                | X                |
| Phosphate/-orous                    | X                   |                 |                  |                 |                 |                 | X               |     |                 |                  |                   |                  |                  |
| Potash                              | X                   | X               |                  | X               | X               |                 |                 |     |                 | X                |                   |                  |                  |
| REEs                                | X‡                  | X               | X                | X               | X               | X               | X               |     | X*              | X                | X                 | X                | X                |
| Scandium                            | X                   | X               |                  |                 | X               |                 | X               |     | X*              | X                |                   |                  |                  |
| Selenium                            |                     |                 |                  |                 |                 |                 | X               |     |                 |                  |                   |                  |                  |
| Silica/on                           | X                   |                 | X                | X               | X               |                 |                 |     |                 |                  |                   |                  |                  |
| Silver                              |                     |                 | X                |                 |                 |                 |                 |     |                 |                  |                   |                  |                  |
| Tantalum                            | X                   | X               | X                | X               | X               | X               | X               |     | X*              | X                | X                 | X                | X                |
| Tellurium                           | X                   |                 |                  |                 |                 |                 | X               |     | X               |                  |                   | X                | X                |

|           |   |   |   |   |   |   |   |  |    |   |   |   |   |
|-----------|---|---|---|---|---|---|---|--|----|---|---|---|---|
| Tin       | X | X |   |   | X | X | X |  | X  |   | X |   | X |
| Titanium  | X | X |   | X | X |   | X |  | X* | X |   | X | X |
| Tungsten  |   |   | X | X | X | X | X |  |    | X | X | X | X |
| Uranium   | X | X |   |   | X |   | X |  |    | X | X | X | X |
| Vanadium  | X | X |   | X | X |   | X |  | X* | X | X | X | X |
| Zinc      | X | X | X | X | X | X | X |  |    | X | X |   | X |
| Zirconium |   | X |   |   | X |   | X |  |    |   |   |   |   |

\* Québec considers lists strategic minerals as those “necessary for the implementation of major Québec policies” (QC 2020b: 1). Manitoba’s Critical Minerals Strategy (2023) also refers to ‘strategic’ minerals, but without definition or differentiation between ‘critical’ and ‘strategic’ minerals when providing its list. Québec ‘strategic’ minerals are marked with a ‘\*’.

\* ‘Critical’ minerals listed here for British Columbia are those that “are significant” to the province, excluding those which require further evaluation to understand BC’s opportunity and those which it is unlikely to produce (Hickin et al. 2023: 2).

† Saskatchewan does not have a list, but identifies 23 minerals of the Canadian Critical Mineral List’s 31 which ‘occur naturally’ in the province (SK 2023: 2).

‡ Six critical minerals identified as holding “the most significant potential for Canadian economic growth”, out of the 31-mineral-long list (NRCan 2022b: 42-43).

Sources: <sup>1</sup> NRCan 2024b; <sup>2</sup> Government of Alberta 2023; <sup>3</sup> Hickin et al. 2023; <sup>4</sup> Government of Manitoba 2023; <sup>5</sup> Government of Newfoundland and Labrador 2023; <sup>6</sup> Government of Nova Scotia 2023; <sup>7</sup> Government of Ontario 2022; <sup>8</sup> Gouvernement du Québec 2022; <sup>9</sup> Government of Saskatchewan n.d. (see Appendix 4); <sup>10</sup> Government of Northwest Territories 2022; <sup>11</sup> Government of Nunavut 2020; <sup>12</sup> Lewis & Relf 2021.

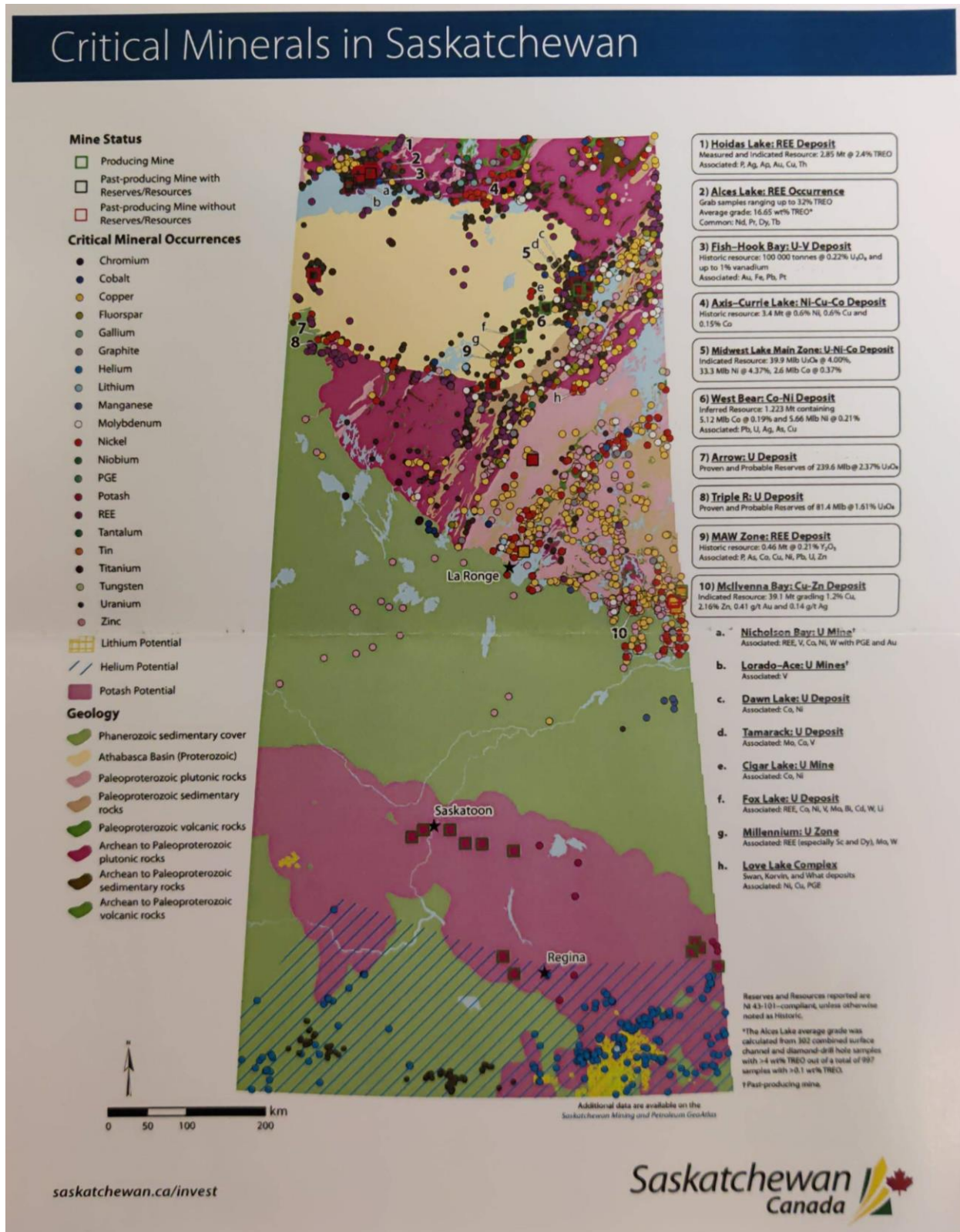
**Appendix 3 : Extract from the *Canadian Critical Minerals Strategy* showing the six priority minerals of the federal government’s critical minerals list and possible applications.**

**Source: NRCan 2022b: 42-3.**

Among the critical minerals essential for priority supply chains, advanced manufacturing, clean technologies, and zero-emission vehicles, six hold the most significant potential for Canadian economic growth. These include:

| <b>Critical Mineral</b>    | <b>Value Chains</b>                                      | <b>Major Application</b>  | <b>Examples of Specific Products</b>   |
|----------------------------|--|---|--|
| <b>Lithium</b>             | Clean technologies and defence and security technologies | Batteries, glassware, ceramics  | Rechargeable batteries (phones, computers, cameras, and EVs); hydrogen fuel storage; metal alloys (military ballistic armour; aircraft, bicycle, and train components); specialized glass and ceramics; drying and air conditioning systems.                                   |
| <b>Graphite</b>            | Clean technologies                                       | Batteries, fuel cells for EVs   | Metal foundry lubricants, vehicle brake linings, metal casting wear, crucibles, rechargeable battery anodes, EV fuel cells, electrical motor components, frictionless materials, pencils.  |
| <b>Nickel</b>              | Clean technologies and advanced manufacturing            | Stainless steel, solar panels, batteries, aerospace, and defence applications | Metal alloys (steel, superalloys, non-ferrous alloys), jet and combustion engine components, rechargeable batteries (phones, computers, EVs), industrial manufacturing machines, construction beams, anti-corrosive pipes, cookware, medical implants, power plant components. |
| <b>Cobalt</b>              | Clean technologies                                       | Batteries   | Battery electrodes; metal alloys; turbine engine components, automobile airbags; catalysts in the petroleum and chemical industries; drying agents for paints, varnishes, and inks; magnets.   |
| <b>Copper</b>              | Clean technologies and advanced manufacturing            | Electrical and electronics products   | Power transmission lines, electrical building wiring, vehicle wiring, telecommunication wiring, electronic components.   |
| <b>Rare earth elements</b> | Zero-emission vehicles                                   | Permanent magnets for electricity generators and motors                       | Flat screens, touch screens, LED lights, permanent magnets, electronic components, EV drive trains, wind turbines, aircraft components, vehicle components, speakers, steel manufacturing, battery anodes, chemical catalysts, glass manufacturing, specialized glass lenses.  |

Appendix 4: Information sheet on 'Critical Minerals in Saskatchewan'. Acquired at PDAC 2024. Source: Government of Saskatchewan & Saskatchewan Geological Survey n.d.





# Critical Minerals in Saskatchewan

## What are Critical Minerals?

"Critical minerals are metals, non-metals and mineral compounds essential to the economic and national security of nations. They are commodities that have important uses and few effective substitutes" (USGS/GSA/GSC, 2020). Many critical minerals are key components of rare and specialty metal alloys, or are strategic to the development of batteries and emerging technologies. Critical minerals have the potential to become scarce because of geological, political, or technical factors. Canada, like many other countries, has developed a list of critical minerals. The Canadian list includes 31 critical minerals, 23 of which can be found in Saskatchewan.

### Saskatchewan's Critical Minerals

|           |            |          |
|-----------|------------|----------|
| Chromium  | Magnesium  | Scandium |
| Cobalt    | Manganese  | Tantalum |
| Copper    | Molybdenum | Tin      |
| Fluorspar | Nickel     | Titanium |
| Gallium   | Niobium    | Tungsten |
| Graphite  | PGE        | Uranium  |
| Helium    | Potash     | Zinc     |
| Lithium   | REE        |          |

## Deposit Types

Critical minerals are found in a variety of deposit types in Saskatchewan (see map on reverse). Most people know about the province's vast potash deposits and the ultra-rich uranium deposits of the Athabasca Basin, but Saskatchewan also has the potential for significant rare earth element (REE) mineral deposits and the polymetallic nature of unconformity-associated uranium deposits, which can host a variety of critical minerals.

## Resources and Production

- Saskatchewan is the most prolific potash producer in the world: it routinely generates about 1/3 of annual global production, and is home to over 40% of the world's recoverable ore reserves (USGS, 2020);
- We have the largest high-grade uranium deposits in the world with an annual production capacity of 65 Mlb U<sub>3</sub>O<sub>8</sub>;
- We have new helium production wells, and 2 million hectares disposed for helium exploration and development;
- The Hoidas Lake REE deposit has NI 43-101 Measured and Indicated Resource estimates of 2.85 Mt @ 2.4% Total REE; and
- We have the potential for lithium production from the Western Canadian Sedimentary Basin.

## Strong Potential

In addition to world class potash and uranium deposits, there are numerous under-developed critical mineral deposits in Saskatchewan, including the Hoidas, Alces and Archie lakes REE projects as well as the multi-elemental MAW zone project. Numerous magmatic PGE-Cu-Ni sulphide occurrences are present in the Love Lake area (Korvin, Swan and What deposits), and Cu-Ni-rich layered mafic intrusives, with variable amounts of ubiquitous Co, occur in the Axis-Currie Lakes regions, north of Lake Athabasca. Unconformity-related and vein-type polymetallic deposits including Vanadium, Cobalt and other technology metals are located throughout the Athabasca Basin and in the Uranium City area. These deposits include: Millennium (REE [especially Sc and Dy], Mo, W); Tamarack (Mo, Co, V); Fox Lake (REE, Co, Ni, V, Mo, Bi, Cd, W, Li); Midwest Lake (Ni, Co); Dawn Lake (Co, Ni); West Bear East (Co, Ni) and the Cigar Lake Mine (Co, Ni) in the Athabasca Basin, and the former Fish-Hook Bay (V, Co, Pt), Nicholson Bay (REE, V, Co, Ni, W along with PGE and Au), Lorado (V) and Ace (V) mines in the Beaverlodge Domain.

## For more information

### Saskatchewan Geological Survey

Ministry of Energy and Resources, Government of Saskatchewan  
p: 306-787-2585 email: [skgeosurvey@gov.sk.ca](mailto:skgeosurvey@gov.sk.ca)

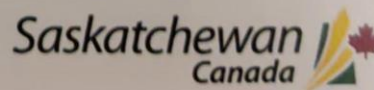
### Saskatchewan Mining and Petroleum GeoAtlas

[www.saskatchewan.ca/GeoAtlas](http://www.saskatchewan.ca/GeoAtlas)

### References:

United States Geological Survey, Geoscience Australia and Geological Survey of Canada (2020): *International geoscience collaboration to support critical mineral discovery*; United States Geological Survey, Mineral Resources Program, Fact Sheet 2020-3035, 2p. doi.org/10.3133/fs20203035  
USGS Potash Data Sheet: <https://pubs.usgs.gov/periodicals/mcs2020/mcs2020-potash.pdf>

[saskatchewan.ca/invest](http://saskatchewan.ca/invest)



**Appendix 5: List of critical and strategic minerals for Québec. Source: Gouvernement du Québec 2020c: 51.**

Québec's preliminary list of 22 critical or strategic minerals

| Critical   | Strategic                                      | Strategic  |
|--|--|--|
| Necessary to supply Québec transformation plants | Linked to public policies and renewable energy | Products with good deposit appraisal potential in Québec |
| 1. Antimony <sup>2</sup>                         | 11. Cobalt <sup>2</sup>                        | 17. Magnesium <sup>4</sup>                               |
| 2. Bismuth <sup>2</sup>                          | 12. Rare earth elements (REE)                  | 18. Niobium <sup>1</sup>                                 |
| 3. Cadmium <sup>2</sup>                          | 13. Platinum group elements (PGE) <sup>2</sup> | 19. Scandium <sup>4</sup>                                |
| 4. Cesium  | 14. Graphite (natural)                         | 20. Tantalum   |
| 5. Copper <sup>2</sup>                           | 15. Lithium <sup>3</sup>                       | 21. Titanium <sup>1</sup>                                |
| 6. Tin <sup>2</sup>                              | 16. Nickel <sup>1</sup>                        | 22. Vanadium <sup>3</sup>                                |
| 7. Gallium <sup>2</sup>                          |  |  |
| 8. Indium  |  |  |
| 9. Tellurium <sup>2</sup>                        |  |  |
| 10. Zinc <sup>1</sup>                            |  |  |

- 1 Produced or transformed as a principal substance.
- 2 Produced as a secondary substance from concentrate or as a smelter by-product.
- 3 Mineral development project.
- 4 Transformation project.

This list was validated by a government committee of experts in June 2020 and will be reviewed periodically.

**Appendix 6: List of CSMs and the Situation in Québec. Source: Gouvernement du Québec 2022: 12-13.**

| List of CSMs for Québec <sup>1</sup> | Main producing countries <sup>2</sup>                                 | Situation in Québec |                                |              |  |
|--------------------------------------|---|---------------------|--------------------------------|--------------|--|
|                                      |   | Active mines        | Deposit Appraisal <sup>3</sup> | Deposits     | Processing   |
| Antimony                             | China (55.0%)<br>Russia (22.5%)<br>Tajikistan (11.7%)                 | -                   | -                              | -            | High purity metal<br>Alloys<br>Semi-conductors<br>Recycling          |
| Bismuth                              | China (84.2%)<br>Laos (5.3%)<br>South Korea (5.1%)                    | -                   | -                              | -            | High purity metal<br>Salts<br>Alloys<br>Recycling                    |
| Cadmium                              | China (41.7%)<br>South Korea (12.5%)<br>Japan (7.8%)                  | -                   | -                              | -            | High purity metal<br>Alloys<br>Semi-conductors<br>Recycling          |
| Cesium                               | N.A.  | -                   | -                              | -            | Catalysts  |
| Cobalt                               | Congo (69%)<br>Russia (12%)<br>Australia (4.0%)                       | 2 (b-p)             | 1 (b-p)                        | 4 (b-p)      |  |
| Copper                               | Chile (27.8%)<br>Peru (10.4%)<br>China (8.4%)                         | 4 (b-p)             | 3 (b-p)                        | 6<br>7 (b-p) | Anodes<br>High purity metal<br>Recycling                             |
| Rare earth elements                  | China (58.3%)<br>United States (16.3%)<br>Myanmar (12.9%)             | -                   | 2                              | 3<br>1 (b-p) | Recycling  |
| Platinum group elements              | South Africa (48.4%)<br>Russia (30.3%)<br>Zimbabwe (7.3%)             | 2 (b-p)             | 1 (b-p)                        | 4 (b-p)      | By-product of copper refining  |
| Pewter                               | China (31.8%)<br>Indonesia (20.1%)<br>Myanmar (11%)                   | -                   | -                              | 1            | High purity metal<br>Alloys<br>Semi-conductors<br>Recycling          |
| Gallium                              | United States (96.9%)<br>Russia (1.5%)<br>China (0.9%)                | -                   | -                              | -            | High purity metal<br>Salts<br>Recycling                              |
| Graphite (natural)                   | China (78.9%)<br>Brazil (6.6%)<br>Mozambique (2.9%)                   | 1                   | 2                              | 8            | Micronization<br>Spheroidization<br>(demonstrators)                  |
| Indium                               | China (56.3%)<br>South Korea (21.9%)<br>Japan/Canada (6.9%)<br>(each) | -                   | -                              | -            | High purity metal<br>Salts<br>Alloys<br>Semi-conductors<br>Recycling |
| Lithium                              | Australia (48.1%)<br>Chile (26.1%)<br>China (16.1%)                   | -                   | 6 <sup>4</sup>                 | -            | Sulphate<br>Hydroxide<br>Recycling (pilot)                           |

| List of CSMs for Québec <sup>1</sup> | Main producing countries <sup>2</sup>   | Situation in Québec |                                |              |   |
|--------------------------------------|---|---------------------|--------------------------------|--------------|---|
|                                      |   | Active mines        | Deposit Appraisal <sup>3</sup> | Deposits     | Processing  |
| Magnesium                            | Compound:<br>China (70.4%)<br>Brazil (6.7%)<br>Turkey (5.4%)<br><br>Metal:<br>China (88.6%)<br>Russia (4.8%)<br>Israel (1.9%) | -                   | -                              | -            | Recycling (demonstrator)  |
| Nickel                               | Indonesia (30.7%)<br>Philippines (13.3%)<br>Russia (11.3%)  | 2                   | 1                              | 5<br>2 (b-p) |   |
| Niobium                              | Brazil (88.3%)<br>Canada (9.6%)<br>Other (2.0%)   | 1                   | -                              | 1<br>2 (b-p) | Ferroniobium  |
| Scandium                             | N.A.  | -                   | 1 (b-p)                        | 1            | Demonstrator plant under development (pilot)                          |
| Tantalum                             | Congo (37.1%)<br>Brazil (22.4%)<br>Nigeria (12.4%)  | -                   | 1 (b-p)                        | 2 (b-p)      | Recycling   |
| Tellurium                            | China (58.7%)<br>Japan (12.5%)<br>Russia (12.6%)  | -                   | -                              | -            | High purity metal<br>Salts<br>Semi-conductors<br>Dioxide<br>Recycling |
| Titanium                             | Ilmenite and rutile:<br>China (32.6%)<br>South Africa (12.9%)<br>Mozambique (11.3%)   | 1                   | 1                              | 2 (b-p)      | Slag  |
| Vanadium                             | China (66.7%)<br>Russia (18.6%)<br>South Africa (8.2%)  | -                   | 2 (b-p)                        | 1 (b-p)      |   |
| Zinc                                 | China (33.8%)<br>Peru (11.1%)<br>Australia (10.9%)  | 1<br>1 (b-p)        | 3 <sup>4</sup><br>1 (b-p)      | 5<br>3 (b-p) | High purity metal<br>Salts<br>Alloys<br>Semi-conductors<br>Recycling  |

1. The list of critical and strategic minerals for Québec was based on those from the European Union, the United States, Japan and Australia, and was endorsed by a committee of government experts in June 2020.

2. Mineral Commodity Summaries 2022, United States Geological Survey: <https://pubs.usgs.gov/periodicals/mcs2022/mcs2022.pdf>

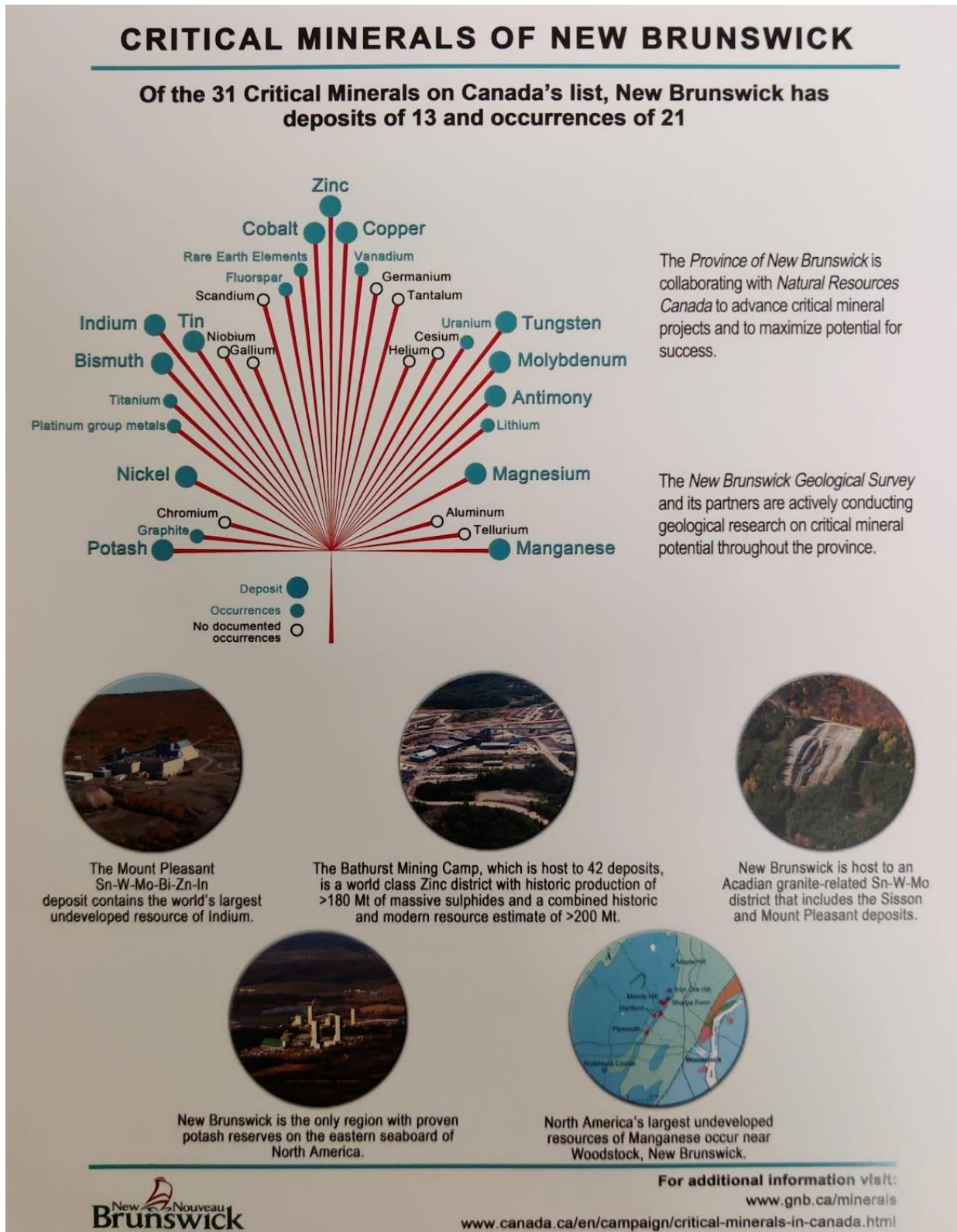
3. To be regarded as under development according to the Mineral Development Process, a project must have been the subject of at least one preliminary economic survey.

4. Includes mining projects at the development stage and one mine under maintenance.

b-p. Element as a by-product



Appendix 7: Information sheet acquired at PDAC 2024 which displays information about critical mineral deposits and occurrences in New Brunswick and connecting this 'potential' to a broader context of the federal government's list. Source: Government of New Brunswick n.d.



**Appendix 8: Information sheet including map demonstrating that ‘Canada is an emerging supplier of many other critical minerals’. Source: NRCan 2020b.**



Natural Resources Canada  
Ressources naturelles Canada



# CRITICAL MINERALS

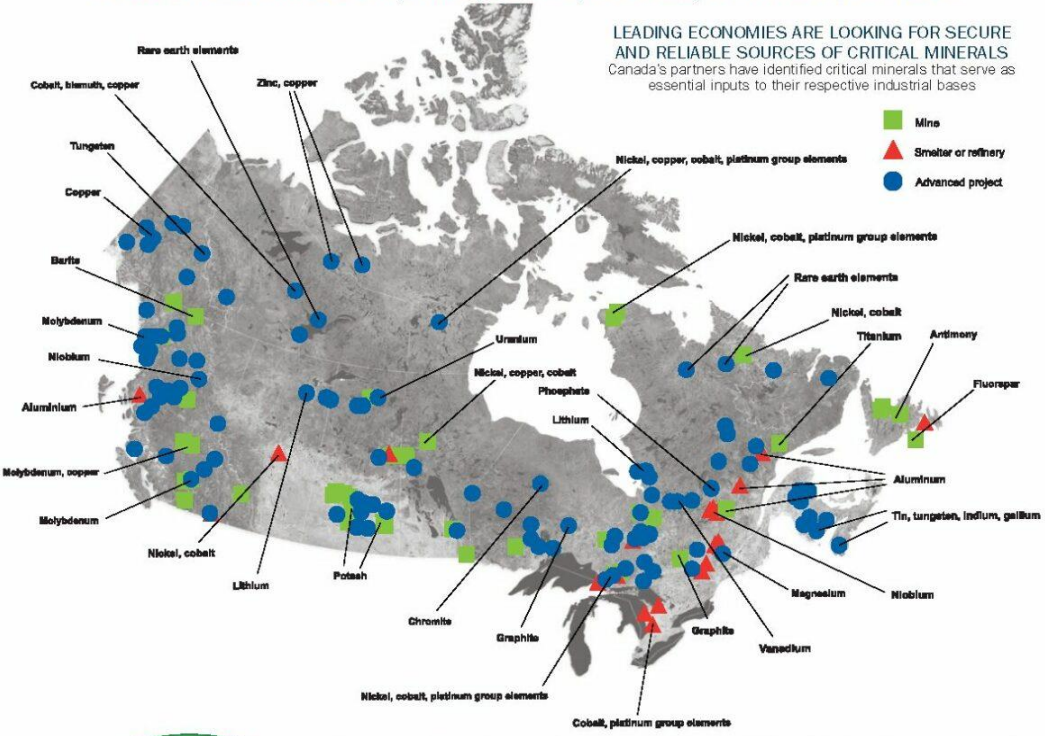
Critical minerals are in increased global demand and needed to support important manufacturing sectors such as communication technology, aerospace and national security, and low-carbon and digital technology.

## CANADA IS A GLOBAL LEADER IN RESPONSIBLE AND SUSTAINABLE MINING OF CRITICAL MINERALS


**GLOBAL PRODUCER**

|  |  |   |   |  |
|--|--|---|---|--|
| <b>1<sup>st</sup></b><br>of<br><b>POTASH</b> | <b>2<sup>nd</sup></b><br>of <b>NIObIUM</b><br>and <b>URANIUM</b> | <b>3<sup>rd</sup></b><br>of <b>PALLADIUM</b><br>and <b>TITANIUM</b> | <b>4<sup>th</sup></b><br>of <b>ALUMINIUM</b> , <b>INDIUM</b> (refined)<br>and <b>PLATINUM</b> | <b>5<sup>th</sup></b><br>of <b>GRAPHITE</b><br>and <b>NICKEL</b> |
| 19<br><b>K</b><br>Potassium                  | 41<br><b>Nb</b><br>Niobium                                       | 92<br><b>U</b><br>Uranium   | 46<br><b>Pd</b><br>Palladium  | 22<br><b>Ti</b><br>Titanium                                      |
| 13<br><b>Al</b><br>Aluminium                 | 49<br><b>In</b><br>Indium  | 78<br><b>Pt</b><br>Platinum   | 6<br><b>C</b><br>Carbon   | 28<br><b>Ni</b><br>Nickel  |

### CANADA IS AN EMERGING SUPPLIER OF MANY OTHER CRITICAL MINERALS INCLUDING RARE EARTH ELEMENTS, LITHIUM, VANADIUM, MANGANESE, PHOSPHATE AND MAGNESIUM



LEADING ECONOMIES ARE LOOKING FOR SECURE AND RELIABLE SOURCES OF CRITICAL MINERALS  
Canada's partners have identified critical minerals that serve as essential inputs to their respective industrial bases



**Cobalt, graphite, lithium, and nickel** are in high demand in their raw, processed and manufactured forms as **batteries for electric vehicles and advanced energy storage.**

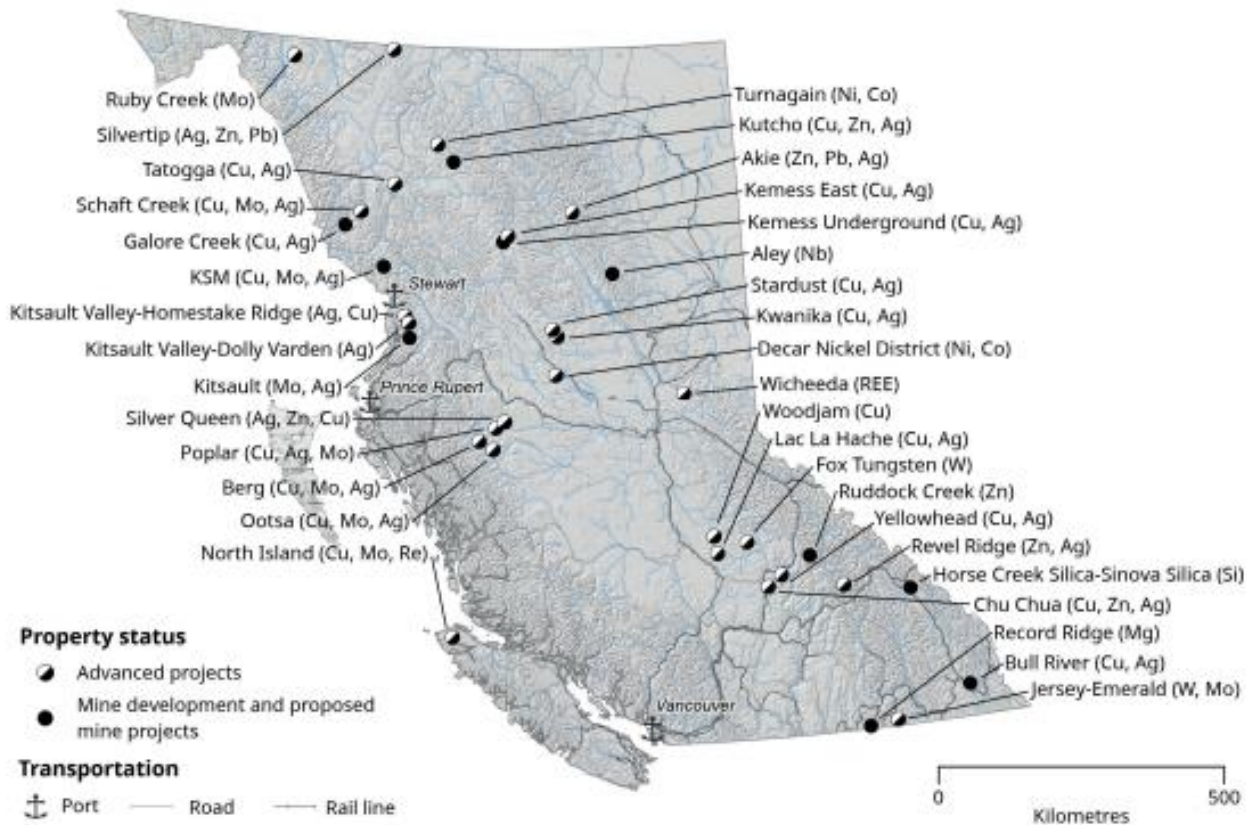
For more information, please contact: [NRCan.questions.RNCan@canada.ca](mailto:NRCan.questions.RNCan@canada.ca)  
[www.nrcan.gc.ca](http://www.nrcan.gc.ca)

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**Appendix 9: ‘Mine development and proposed mine projects and advanced projects in British Columbia, 2023, with critical minerals indicated in parentheses’: Map featured in *Critical Minerals in British Columbia: An atlas of occurrences and producing mines, 2023* which illustrates the strategic co-location of resource opportunities with transportational infrastructures. Source: Hickin et al. 2023: 8.**



## Appendix 10: CSM Development in Québec: Deposits, Development Projects and Mines.

Source: Gouvernement du Québec 2022: 8.



N.B. North American Lithium is no longer in maintenance and has been producing spodumene (a source of hard-rock lithium) since March 2023 (Sayona 2024).

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