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Western Canadian Lithium as a Critical and Strategic Mineral for Clean Tech Battery Storage Technologies

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Matters Commented On: The [Canadian Minerals and Metals Plan 2019](#); Review of the Alberta Mineral Development Strategy 2002 by the [Alberta Mineral Advisory Council](#); [Québec Plan for the Development of Critical and Strategic Minerals \(2020-2025\)](#)

Critical and strategic minerals (CSMs), including lithium, are essential for the transition of the global economy to “net-zero.” The COVID-19 pandemic will only serve to accelerate this transition. Calls for rebuilding economies on ambitious and sustainable climate principles have become louder since the pandemic began. At a multilateral level, the April 2020 [Petersberg Climate Dialogue](#) established clear directions towards a sustainable and climate-focused post-pandemic recovery. Such recovery plans are also echoed in the European Commission’s [Next Generation EU recovery plan](#), and the September 2020 Government of Canada’s [Speech from the Throne](#), both of which set out clear impulses towards developing clean tech industries as part of post-pandemic economic recovery.

However, CSMs, such as lithium, have been recognized for their importance well before the pandemic. In 2019, [the International Renewable Energy Agency](#) reported that global sales of electric vehicles, which rely heavily on lithium-ion batteries, increased significantly from 500,000 units in 2015 to over 2 million units in 2018. [The Bank of Canada](#) recently cited the International Energy Agency’s projection that there will be 120 million plug-in hybrid or battery electric vehicles on the world’s roads by 2030. In Canada, the share of all electric vehicles amounted to approximately 2.3%, or 90,100 vehicles, of the total vehicle market in 2018, with 51% consisting of battery electric vehicles. In addition, the rapid scaling-up of wind and solar renewable electricity generation is not only vital for decarbonizing global energy systems, but will crucially depend on [electricity storage technologies](#). Lithium-ion batteries are efficient and have fast charging and discharging rates, making them ideal for the large-scale implementation of renewable energy sources to meet baseload power demands.

As the [Canadian Minerals and Metals Plan 2019](#) notes, reliable supplies of CSMs are essential to key sectors of the Canadian economy, including a growing focus on “clean technologies” (at 2). Clean tech battery storage technologies are vital for the scaling-up of the clean transportation sector, including the expansion of electric vehicles and trucks. CSMs are required for the manufacturing of renewable energy generation installations such as solar panels and wind turbines, and for the subsequent storage of the generated renewable electricity in batteries to address intermittency and supply challenges. CSMs are also critical for Canada’s national security, as well as the security of Canada’s strategic allies. Already, Canada’s global partners,

first and foremost the United States of America, are acting to diversify and to secure their supplies of CSMs through strategic partnerships and joint actions.

Within the context of renewed focus on CSM extraction in Canada, this post examines the development and expansion of Western Canada's lithium industry as one CSM industry in Canada. Novel lithium mining and extraction technologies in Western Canada may allow lithium to be extracted from subsurface brines and put Canada on the forefront of supplying the increased demand for lithium resources both domestically and internationally. In our recent publication in the [Journal of Energy & Natural Resources Law](#), we examine the legal considerations and risks associated with the development of a petro-lithium industry in Alberta, in particular the question of whether the existing oil and gas focussed regulatory regimes will be prepared for the lithium industry as a new subsurface participant.

Localizing Lithium Supply Chains for a Clean Tech Industry

In the 1990s, the Alberta Geological Survey discovered the existence of high concentrations of lithium in saline brines associated with oil and gas reservoirs across the province. The interest in Alberta's lithium reserves began in earnest in 2009. At that time, several mining companies solicited metallic and industrial mineral permits in areas known to have high concentrations of lithium. This initial interest in Alberta's lithium, however, was short-lived. After some preliminary work related to Alberta's lithium potential, the financial troubles in the global mining industry in 2012 saw lithium extraction efforts being abandoned across the province. Interest was reawakened to Alberta's lithium potential in 2015 after the price of lithium and its demand increased significantly. By 2018, the [Government of Alberta](#) reported that "lithium was the main focus of metallic and industrial mineral exploration in Alberta" (at 3).

Increased demand for lithium-ion batteries is spurring global production of the mineral. While already used in devices such as mobile phones and medical and military technology, the growing electric vehicle market, as explained above, will require increased quantity and quality of lithium. [Canada](#) is home to approximately 4% — 2 million tonnes — of the world's known lithium deposits. If Western Canadian lithium extraction potential develops as promised by industry, Canada will have a potential abundance of lithium resources.

One question that arises is how "Canadian-sourced lithium" could support a broader clean-tech battery storage manufacturing industry in Alberta or, for example, in Ontario's traditional auto-manufacturing sector. To increase production to 500,000 electric vehicles per year, [Tesla](#) alone will require today's entire worldwide supply of lithium-ion batteries. As part of an industrial re-focus, efforts could be made to attract a Tesla Gigafactory to Alberta, with operations benefiting from a localized supply chain of domestic lithium which mitigates global supply security risks. The potential for locally-sourced lithium is said to have influenced Tesla's decision to build a Gigafactory in the [State of Nevada](#). Given Canada's long transportation distances and dependence on transporting freight and goods by truck, developing a Canadian [electric trucking industry](#) is another sector with high potential for clean tech deployment that would be driven by Canadian lithium.

From a geopolitical supply-chain and security perspective, as the [US Geological Survey](#) noted in 2020, “lithium supply security has become a top priority for technology companies in the United States and Asia. Strategic alliances and joint ventures among technology companies and exploration companies continued to be established to ensure a reliable, diversified supply of lithium for battery suppliers and vehicle manufacturers” (at 99). Canada’s emerging lithium sector can be positioned as able to provide a reliable supply of lithium to the United States and to strategic partners in the European Union and Asia. An analogy can be drawn to Canada’s established uranium mining and processing industry, and the export of uranium to the United States for enrichment. In January 2020, Canada and the United States launched a [Joint Action Plan on Critical Minerals Collaboration](#) tasked to secure supply chains for critical minerals. Already, there are calls for a national stock-pile of CSMs in Canada, including lithium, to address potential supply-chain vulnerabilities for strategic sectors of the economy. The time may, therefore, be ripe to develop a Canadian lithium industry, spearheaded by Canada’s longstanding energy province, Alberta.

Legal Considerations and Risks for the Production of Lithium from Brines in Alberta

Mining and extraction of critical minerals are currently far from the environmentally friendly operations one would expect when purchasing an electric vehicle marketed as “sustainable.” The majority of the world’s lithium is produced from six hard rock mining operations in Australia, two brine extraction operations in both Chile and Argentina, and a hard rock mining operation and brine extraction operation in China. Current hard rock mining and brine extraction processes for lithium raise significant [environmental and social concerns](#). Accordingly, there is increasing debate as to whether the upstream environmental and social costs of extracting lithium are worth its downstream benefits, as global lithium production scales up to meet a growing demand. Increased investor focus on the global mining industry with respect to the evolving field of so-called [environmental, social and governance \(ESG\) standards](#) adds another layer of complexity to the importance of finding more sustainable and ethically produced sources of CSMs.

To achieve the desired environmental, social and governance credibility of lithium extraction and the development of clean tech technologies, an innovative lithium extraction process has been developed by the lithium industry. Instead of extracting lithium through large evaporation ponds, a process that can take years, several companies are actively working on brine water filtration and purification technologies so that lithium may be scrubbed from brines almost instantly after being extracted. This process may be completed through the purification of wastewater from oil and gas operations or the standalone extraction of lithium-enriched brines. Herein lies Western Canada’s lithium potential.

In our recent publication in the *Journal of Energy & Natural Resources Law*, our analysis of Alberta’s subsurface regimes identifies three critical issues related to lithium extraction: 1) the unique regulatory considerations for the lithium extraction industry, 2) the risks arising from multiple stakeholder-subsurface interactions, and 3) the contractual considerations for lithium companies seeking to operate in Alberta.

a) Potential Regulatory Issues

Lithium extraction from brines is a novel type of mineral extraction with unique regulatory considerations. Is petro-lithium governed by water laws, mineral laws, or both? How efficiently can the petro-lithium extraction industry navigate the multiple regimes they may fall under? Our research identifies ambiguities that the Alberta government needs to address in its current laws and policies to provide greater clarity for how lithium extraction participants fit within its regulatory regimes.

b) Potential Conflicts Among Subsurface Participants

Another challenge identified in our research is the question how lithium operations will be prioritized in contrast to other subsurface participants in Alberta, especially oil and gas operations. One may wonder whether the government will hold that oil and gas operations should supersede lithium operations if subsurface conflicts arise. As a starting position, Alberta already has a large oil and gas industry with huge sunk costs and a strong lobby. The province may hold to the position that exiting a recession should be done through its oil and gas industry, and may have less appetite to allow a newer, less proven industry to receive subsurface priority. Potential conflicts between subsurface interests may therefore play out within, and influence the direction of, Alberta's regulatory regime in relation to lithium extraction operations.

c) Potential Contractual Issues

Similarly, our analysis of contractual considerations for the petro-lithium extraction industry shows that there are unique considerations to consider when advising parties involved in the new lithium industry. How might lithium extraction participants interact with other subsurface participants? What contractual protections can the lithium extraction industry consider in light of how they stand in priority compared with other subsurface participants? While counsel may look to contractual governance in an oil and gas context to inform their advice, they will also need to appreciate the ways in which lithium extraction differs from oil and gas extraction and ensure that lithium extraction-related contracts reflect the same.

While lithium companies may have some control over the terms of their own contracts going forward, they will also need to be aware of potential issues that might arise from any pre-existing contracts relating to the subsurface tract they are seeking to operate in. For example, in Alberta, while much of the subsurface resources are owned by the Crown, there still exist several large tracts of land where century-old Canadian Pacific Railway contracts vested the ownership of resources to private parties. In the same way that disputes arose over the split title of oil and gas based on the language of private grants and contracts, disputes could arise over the ownership of lithium based on the language of Crown grants of minerals. The content of particular rights and determining ownership interests is a potential issue of conflict that may require clarification from the legislature or judiciary.

A main contractual consideration for lithium extraction companies will therefore be ensuring that their contracts are clear about the chain of title in relation to the lithium they are seeking to extract, refine and sell. If a lithium extraction company is working alongside oil and gas

operations, they will need to ensure that contracts clearly set out who the owner of the final produced lithium is. Traditional contracts used in the oil and gas industry for those providing wastewater services were likely drafted with the understanding that oil and gas wastewater was of little value. The recent value attributed to brines has already raised legal ambiguities in some US states about whether a mineral owner or surface owner owns brines. Similar legal ambiguities may arise in a Canadian context. For example, while it may be clear that “all minerals” or “minerals” in traditional leases were meant to include lithium, it is less clear whether “valuable stone” was meant to cover lithium. Is lithium dissolved in brine considered a “valuable stone”? These ambiguities may pose clear risks for investors. As examined further in our research, we note that contractual clarity about the chain of title over lithium will create legal certainty and address potential investor concerns. The drafters of new contracts will need to consider the chain of title of lithium based on the type of contract that the parties are entering into.

Previous litigation in Canada has shown that whenever new resources have been found to be valuable, such as potash or helium, issues related to the place of the resource within pre-existing leases arise. An excellent example is the protracted litigation in Alberta related to the title of [coalbed methane \(CBM\)](#). Although CBM was not initially thought to be very valuable, over time oil and gas companies started to realize how lucrative it could be to extract the CBM that was being co-produced from their oil and gas operations. Beginning in 2006 in Alberta, disputes arose between oil and natural gas lease holders and those holding mines and minerals titles to coal over who the proper owner of the CBM was. In the context of extracting lithium from brines, an analogy could therefore be drawn to the dispute between coal owners and natural gas lessees over title to CBM, which gave rise to the *Encana Corporation v ARC Resources Ltd*, [2011 ABQB 431 \(CanLII\)](#) dispute series. The varied language and leases arising from conveyances in the early twentieth century by Canadian Pacific Railway and other railways in Alberta to settler or homesteader third-parties may also potentially complicate the question of title and ownership over lithium. Just as with CBM, the potential inclusion of lithium in the lease “bundle” language will determine the issue of title and ownership. Accordingly, the language of the contract is important, which will determine not only the ownership of the brine (e.g. the *Anderson v Amoco Canada Oil and Gas*, [2002 ABCA 162 \(CanLII\)](#) question) but also the question of how the wording relating to the minerals granted is drafted to either include or exclude lithium as a mineral. The reasoning of the Alberta courts in *Encana* may thus influence the discussion of the ownership interest in lithium and underline the importance to secure clarity on the subsurface priority of the lithium.

Based on our analysis, as set out in more detail in our forthcoming publication, we conclude that the current legal landscape in Alberta, from both a regulatory and contractual perspective, needs further clarity in order to attract a large-scale and viable lithium industry. Nevertheless, despite our call for greater regulatory and contractual clarity, we note that Western Canada is ripe with opportunity to commercialize a more sustainable lithium extraction industry from its subsurface brines. There is, justifiably, an increased interest from both industry and the government for the development of such an industry, including in Saskatchewan and Manitoba.

Growing Interest in Critical and Strategic Mineral Development and Global Supply Security

In closing, we also note that the increased interest in supply security of CSMs, including lithium, at both federal and provincial level, and most recently in Québec, cannot be ignored. The short- and long-term development of CSMs from Canada may be driven by both economic and strategic national security considerations.

The Government of Alberta has recognized the potential for lithium extraction in the province from its lithium-enriched brines as by-products of oil and gas operations. Alberta views the industry as an important component of the province's economic diversification strategy and to create jobs. [The Alberta Minister of Energy](#) has previously expressed a desire to “make Alberta the most competitive jurisdiction in all of North America to attract companies and innovation” in lithium production. Acting on this mandate and acknowledging that “technological advancements...and national security” are driving a global demand for CSMs, Alberta established a [Mineral Advisory Council](#) in September 2020. The council is tasked to advise on the development of a Minerals Strategy and Action Plan for Alberta which would replace the eighteen-year old [Alberta Mineral Development Strategy](#) of 2002. Existing interest in prioritizing the development of Alberta's critical mineral resources, including lithium, can therefore be expected to grow further in the province.

Similarly, [Saskatchewan's Energy and Resources Minister](#) recently expressed enthusiasm for the lithium extraction potential in Saskatchewan after the announcement of a [joint venture](#) of the province's first lithium extraction operation: “Lithium has great potential, due to increasing worldwide demand, which is why supporting extraction technologies and a viable lithium sector are included in Saskatchewan's growth plan.” Interest in lithium production has also increased in [Manitoba](#).

At the federal level, the [Canadian Minerals and Metals Plan 2019](#) identified that Canadian mining production, including “increase[ed] demand for graphite, lithium and rare earth elements...are key for clean technologies, such as wind turbines, solar panels, batteries and energy storage units” (at 2). The plan also notes that for the critical production of solar panels to support the clean tech revolution, fourteen of the nineteen mineral products and metals required to produce solar planes, “including six critical materials - are found and/or produced in Canada” (at 2).

On October 29, 2020, Québec similarly released the [Québec Plan for the Development of Critical and Strategic Minerals \(2020-2025\)](#) that identifies twenty-two CSMs. Lithium is noted as a mineral strategic to the province's public policies (including green transportation) and renewable energy. CSMs are minerals that have economic importance in key sectors of the Québec economy (including renewable energy and energy storage), that “present a high supply risk, and [that] have no commercially available substitutes” (at 1). As the plan notes, countries such as the USA, Germany, France and Japan consider certain minerals as strategic to their economies “and are acting to diversify and secure access to supplies of CSMs” (at 2). CSMs also play a crucial role in strategic initiatives such as the Gouvernement du Québec's cooperation with the Government of Canada pursuant to the Canadian Minerals and Metals Plan (which in turn

supports the Joint Action Plan on Critical Minerals Collaboration between Canada and the USA). As such, CSMs are viewed as essential to Québec’s “new economy” and for the province’s and Canada’s national security.

Québec envisions itself contributing to global green energy and technological transitions by acting as a “recognized...reliable, ethical and sustainable partner” in CSM supplies (Québec Plan at 13). Consisting of eleven concrete objectives and twenty-two action points to foster development of mines and to structure “value chains geared to the emerging and growing CSM markets”, the Québec Plan also contains strong provisions on partnerships with regional and Indigenous communities and on improving “multi-user infrastructure and access corridors to CSM resources” (at 22). Accordingly, the plan discusses an integrated vision for the implementation of a “northern transportation, renewable energy and telecommunications network” (at 22). Establishing Québec as a hub of battery and energy storage development and manufacturing forms another core component of the strategy, also seeking to fulfill the government’s “determin[ation] to make Québec a preferred haven for CSM value enhancement,” including localized clean tech development and manufacturing (at 45).

The need for CSMs has been recognized for several years; however, the need for solid supply chains has only increased today as economies look to exit the pandemic more “green” than they entered. It is expected that several jurisdictions both domestically and internationally may mirror the approach recently expressed by Québec. What remains to be seen is whether Western Canada, known as a traditional energy supplier, can successfully pivot to become a dedicated supplier of CSMs, including lithium, which is one of the most important minerals that it is currently known to have in abundance. Western Canada has the technical expertise and workforce to meet the current and forthcoming demand – but, a strong political appetite will also be necessary to develop a flourishing lithium extraction industry.

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