

Lithium from Oilfield Brine in Alberta

³ Li
Lithium
6.941

- Alkali metal
- Highly reactive
- Soluble in H₂O
- Lightest metal

Two main 'conventional' sources of lithium:

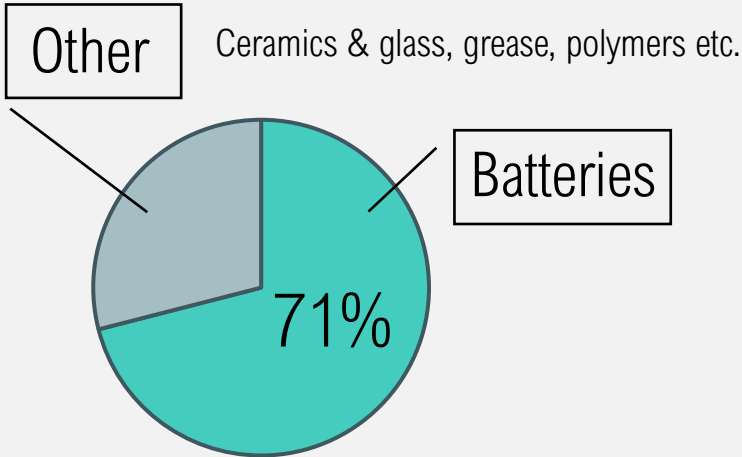


Brine (~160 – 1,400 ppm Li)
Surface evaporation of Li from saline water
Source: USGS. Critical mineral resources of the United States – Economic and environmental geology and prospects for future supply. (2017).



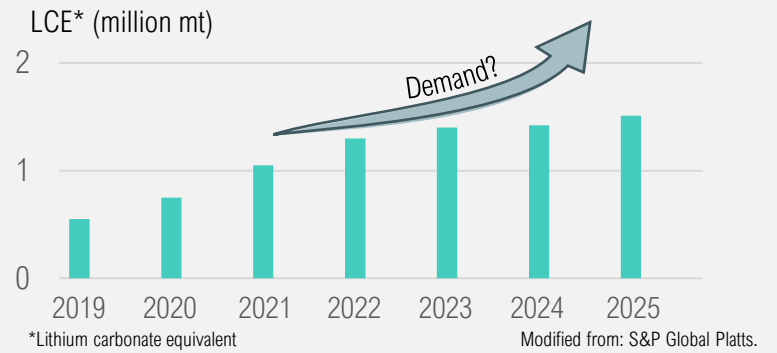
Granitic pegmatites
Hard rock mining

Main consumer of lithium:



Source: USGS Lithium Mineral Commodity Summary 2021.

Lithium production forecast



What is lithium from oilfield brines?

Lithium extracted from oilfield brines. These brines are saline formation waters in subsurface reservoirs that are typically produced with oil and gas.

- Benefits:**
- Utilizes existing oil & gas infrastructure
 - Taking advantage of Canada's oil and gas expertise
 - Potentially greener than current conventional methods – smaller environmental footprint

Who's currently active in Alberta?

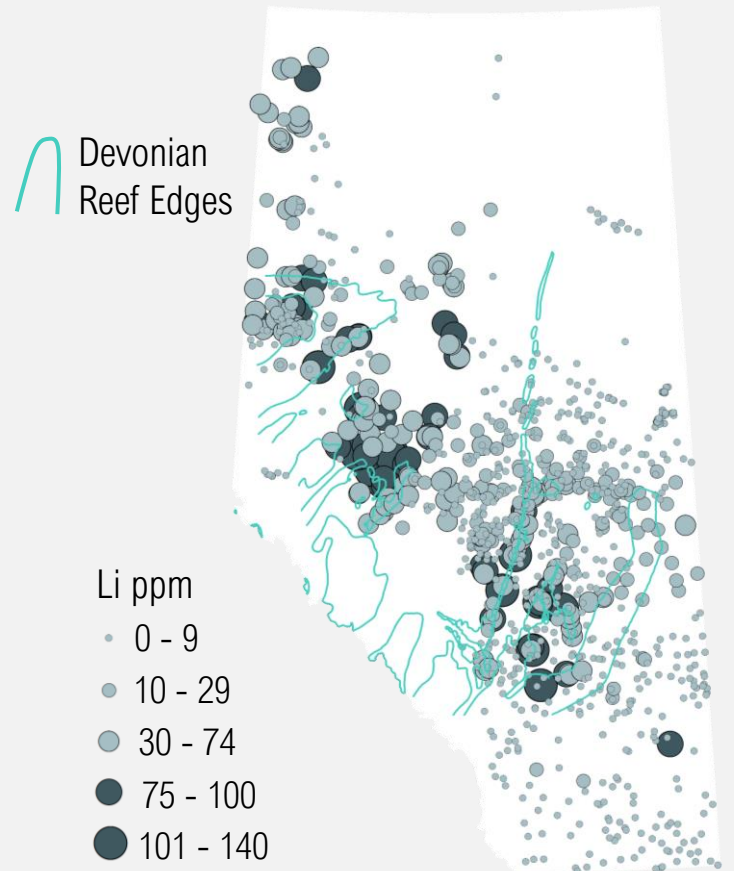
No commercial production in Alberta yet, but the companies highlighted below are positioned to be the first with their pilot projects.

Company	Technology	Objective
E3 Metals	Direct Lithium Extraction	Produce lithium hydroxide from the Leduc
Empire Metals	Unknown	Produce lithium from the Swan Hills
MGX Minerals/ PurLucid	Combined proprietary processes	Produce lithium carbonate from the Devonian
Prism Diversified	"LiREC®"	Produce lithium carbonate from the Leduc and Swan Hills

Source: Company reports and websites.

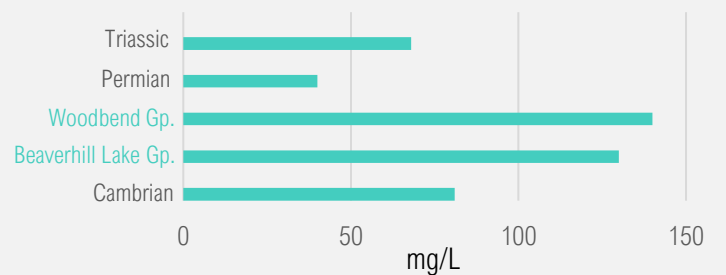
Lithium concentrations in Alberta

Higher Li concentrations are often found in the formation waters of Devonian reservoirs.



Source: Eccles, D.R. & Jean, G.M. (2013). Lithium Groundwater and Formation-Water Geochemical Data.

Maximum lithium concentration of Alberta formation waters



Source: Hitchon et al., 1993