

Success Story

UNLOCKING LITHIUM THROUGH SUSTAINABLE, EFFICIENT BRINE CONCENTRATION

Gradient's new solution, in partnership with SLB, is unlocking sustainable lithium extraction process for reduced time-to-market and environmental footprint. Gradient's technology integrated into the SLB lithium flowsheet, enables up to 15x lithium concentration in a fraction of the time versus conventional methods, while also reducing carbon emissions, energy consumption, and capital costs when compared to thermal-based technologies. This technology integration can be applied to new lithium mineral extraction and production sites, opening opportunities to untapped lithium production regions, as well as existing lithium production operations.

The Challenge

The surging global demand for lithium and other battery minerals, driven by the rapid adoption of electric vehicles and energy storage solutions, presents a formidable challenge in identifying sustainable supply sources. Producers are grappling with deploying new, more efficient, and environmentally sustainable technologies. In response to this challenge, SLB (formerly Schlumberger) has developed a direct lithium extraction (DLE) and production flowsheet. In this flowsheet, Gradient's technology concentrates the lithium solution and generates fresh water, a critical element in sustainable lithium production from brine. This solution is now deployed at SLB's Nevada site, marking a pivotal step towards meeting the escalating demand for lithium in a more sustainable manner.

The Solution

DLE uses chemical and physical processes to extract lithium from saline brine sources or other unconventional deposits. DLE technologies include ion exchange, adsorption, solvent extraction, and membrane separation. DLE is suitable for lithium resources in regions with a wide range of brine compositions and environments, making it an effective alternative in areas where evaporation ponds may not be viable.



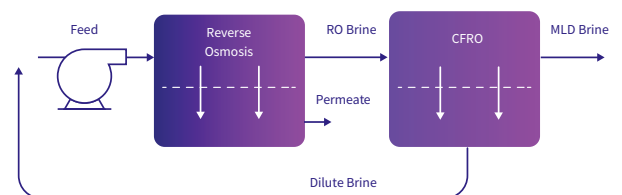
Mining



United States

Fast Facts

Location:	Clayton Valley, Nevada, USA
End-User:	SLB (formerly Schlumberger)
Solution:	Brine Concentration
Industry:	Resource Recovery of Lithium
Feedwater Source:	Subsurface Brine
Technology:	alkaLi EC ² RO Infinity with CFRO
System Configuration:	Single Train, Multi-Stage
Commissioning Date:	2023
Delivery Model:	Design-Build (DB), Operate & Maintain (O&M)



RO Infinity with CFRO - Process Flow Diagram

Up to
15x
Concentration Factor



50%
Cost Savings
vs Traditional
Technologies

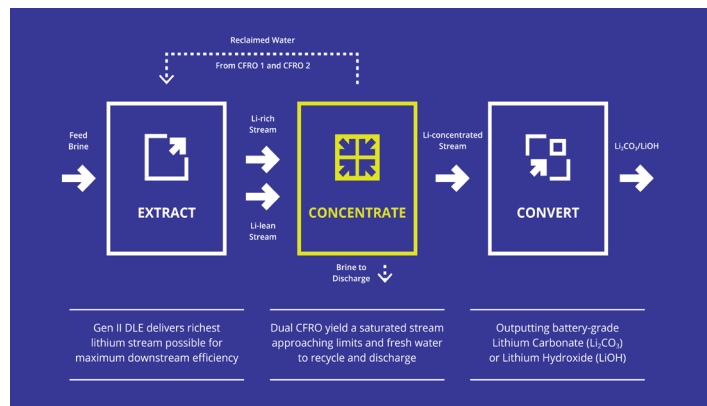


Up to
100%
Water needs met
for DLE process
through reuse



Gradiant deployed its unique Concentrate process as part of alkaLi's EC² technology stack. Gradiant is now operating a RO Infinity with CFRO system to concentrate lithium up to 15 times to enable higher lithium recovery. The innovative brine mining process concentrates the lean liquors to maximize the efficiency of lithium production at the site. The system is fully integrated into the SLB flowsheet and ensures that brine is treated and pre-concentrated before the CFRO step. The system operates at normal RO pressures, allowing standard commercially available membranes and components to be used. RO Infinity's high system recovery rates serve to reduce downstream evaporator size and cost and, in some cases, remove the need for them entirely.

Squeezing every last drop of water from the DLE process is highly important to SLB, given the site's remote location in an arid region with limited access to water. A second RO Infinity system is available at the site to produce fresh water from the DLE waste stream. This minimizes or can avoid the need for groundwater withdrawals or the need to truck in water from off-site.



alkaLi's EC² Process Flow Diagram

The Benefits

Gradiant's new alkaLi's Concentrate solution improves the lithium extraction process for reduced time-to-market and environmental footprint. The technology enables high levels of lithium concentration in a fraction of the time required by conventional methods (seconds instead of years) while reducing carbon emissions, energy consumption, and capital costs compared to thermal-based technologies. RO Infinity concentrates process streams close to saturation limits, reducing or eliminating the need for downstream evaporators or ZLD systems. This technology integration can be applied to new lithium mineral extraction and production sites, opening opportunities to untapped production regions and existing production operations.

Learn More at gradiant.com/solutions/resource-recovery-lithium

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