



# Direct Lithium Extraction (DLE)

Engineer the future of energy with  
Low Carbon Solutions





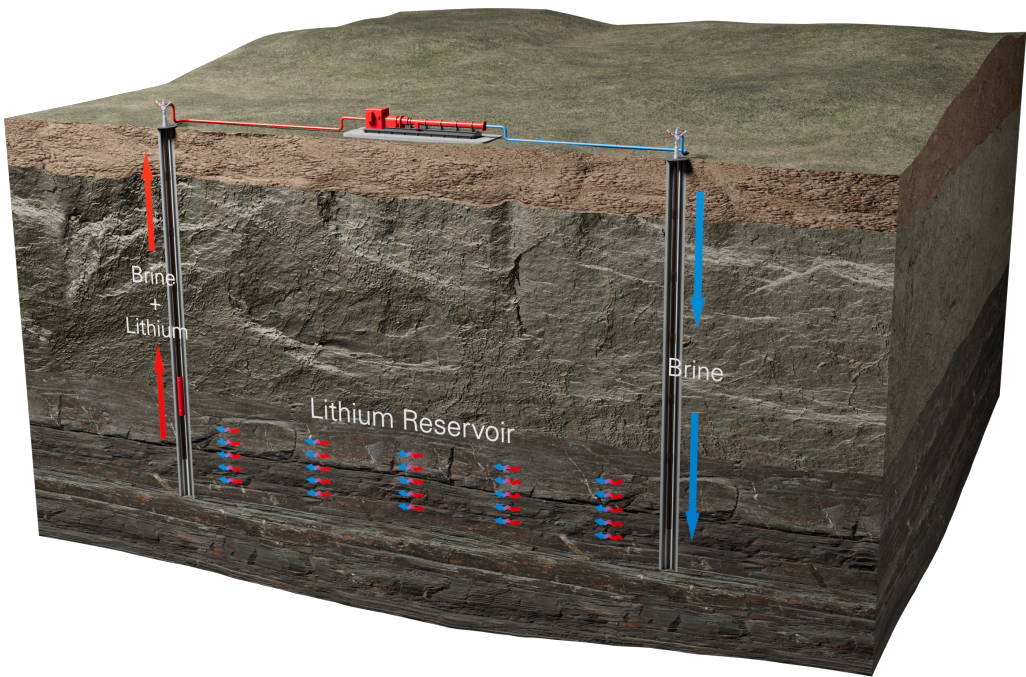
Halliburton helps reduce risks associated with mineral exploration and extraction

As lithium-ion batteries become a key component for electrification, demand for critical minerals, such as lithium, will increase. Direct Lithium Extraction (DLE) could revolutionize lithium mining, but it requires the right services and technology to safely and efficiently locate and mine critical minerals.

Halliburton draws upon its decades of subsurface evaluation, fluid sampling and analysis, drilling, artificial lift systems, well construction and completion solutions experience to help its customers expand into direct lithium extraction. Our methodologies, technologies, and best practices help translate into smaller project footprints with reduced environmental impact, lowered operational costs, and improved operational efficiency.

Our core competencies

- Mining-specific solutions. At Halliburton, we develop solutions for the extraction of critical minerals using tools such as the MineESP™ electric submersible pump and fluids formulated for mining.
- Next generation software. Our software identifies where and how to drill and extract critical minerals and allows mining companies to integrate their own data to provide enhanced models and predictions.
- Fluid sampling capabilities. Halliburton’s wireline tools help catch low contamination fluid samples.
- Ability to execute. Our extensive operational capabilities and direct experience with DLE, such as drilling wells to depths of up to 10,000 ft, helps our customers achieve success with extraction.



DLE mining capabilities\*

SITE SELECTION & EVALUATION	FLUID SAMPLING AND ANALYSIS	DEWATERING	SPECIALTY MINING FLUIDS
Consulting & project management for geohazard analysis  Software and experienced geoscientists	Wireline tools and services	Artificial lift systems	Proprietary fluid formulas

\*Learn more about our technologies and services at [Halliburton.com/LCS](https://Halliburton.com/LCS)

## Site selection and evaluation

Operators must understand subsurface characteristics prior to DLE extraction site selection. This helps reduce risks and uncertainty associated with drilling and identifies lithium-rich formations.

Halliburton's experienced geologists and software model subsurface conditions and help assess the potential for successful extraction. Customers can upload their own data to the software to gain more in-depth geological insights. Our geoscientists work alongside mining industry experts to adapt hydrocarbon workflows to the mining industry and mineral exploration to enhance and accelerate exploration strategies. Operators obtain increased confidence in their capabilities to make decisions with subsurface visualization tools, global models for exploration, and analytics features.

## Fluid sampling and analysis

Proper analysis of mining conditions requires the ability to collect fluid samples with extremely low levels of contamination. Ideally, samples contain less than 5% of contaminants to better understand mineral concentrations.

With decades of formation evaluation experience in the oilfield, Halliburton wireline technologies acquire high-quality fluid samples. In a single pass, operators can obtain formation pressure, fluid identification, and samples. Our wireline tools use magnetic resonance imaging and open hole sensors to collect test specimens and data that help increase efficiency, mitigate the likelihood of a stuck tool, and increase fluid sample purity.

## Dewatering

The ability to maximize mineral extraction depends on the ability to remove excess water through a process called dewatering. Often, this requires artificial lift technology such as submersible borehole and surface pumps.

Halliburton's artificial lift technology provides agile dewatering that adjusts to fluctuations of water volumes and pressure to help deliver continuous service. MineESP™, our electric submersible pump for the mining industry, is built for harsh conditions, including thermal

cycling, scaling, abrasion, and corrosion. Our horizontal pumping systems dewater deep open pits, decline mines, and shaft underground mines. These technologies can help improve mine productivity, reduce downtime due to inflow, and offer low operating and maintenance costs. The ability to monitor remotely allows for fast response and problem aversion.

## Specialty mining fluids

Optimal drilling fluids assist with the removal of drill cuttings and transport them to the surface. The process helps prevent well control issues and excessive mud losses and improves wellbore stability. These fluids assist even in shallow wells and help balance performance, economic, and environmental concerns. Halliburton's drilling fluid portfolio includes specialty mining fluids suitable for fresh water, salt water, and brine. Halliburton fluids are tailored to customers' mining requirements, such as fluids that offer stability up to 300°F, disperse easily in brine or fresh water, and/or offer suspension without the use of clays. Other cost-effective fluids reach maximum viscosity and can yield up to twice as much mud of the same viscosity as an equal weight of oilfield grade-fluid.



# Why Halliburton?



100+ years of well construction experience



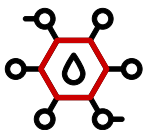
Success in global execution of low-carbon and new energy projects



Leading talent, products, services, and technology for direct lithium extraction



Strategic collaboration with top stakeholders worldwide



Integrated, full-cycle solutions for commercial viability



Onsite research and technology centers help improve current decarbonization solutions and develop new energy technology

At Halliburton, we collaborate and engineer solutions to help maximize asset value for our customers. All products and service solutions are available as integrated offerings or as individual services.



For more information on Halliburton direct lithium extraction services, please go to [halliburton.com/direct-lithium-extraction.com](https://halliburton.com/direct-lithium-extraction.com).

To learn more about our comprehensive portfolio of low carbon solutions, visit [halliburton.com/lcs](https://halliburton.com/lcs).

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