

## INVESTMENT CHALLENGES FOR U.S. PROJECTS

Lithium, the lightest metal, is pivotal in manufacturing high-capacity rechargeable batteries. Extracted from brine pools or hard-rock ore like spodumene, the raw lithium undergoes an extensive refinement process. From evaporation of brines to chemical conversion of ores, the lithium is precipitated and then purified to yield lithium carbonate or lithium hydroxide. Lithium’s electrochemical potential makes it the bedrock of lithium-ion batteries, providing exceptional energy-to-weight ratios crucial for portable electronics and electric vehicles (EVs). Its role in enabling longer charge cycles and battery stability is unmatched, facilitating the transition to clean energy. Facing skyrocketing demand, the sustainable extraction and recycling of lithium are critical. They ensure a steady supply chain while minimizing ecological disruption, making lithium a cornerstone of both technological advancement and environmental stewardship.

### Applications requiring lithium.

China’s Influence	Mining (%)	14.6%
	Processing (%)	58.0%
	Export Rules	N/A
Electric Vehicles (incl. batteries)		✓
Aerospace		✓
Defense Technologies		✓
Mobile Electronics (incl. batteries)		✓
Satellites/Space (incl. batteries)		✓
Robotics (incl. batteries)		✓
Wind Turbines		
Solar Panels		
Nuclear Power		
Energy Storage		✓
Grid Infrastructure		
LED Lighting		

### Risks to establishing domestic lithium processing.

Feedstock Scarcity	Minor	Processing faces hurdles from dependency on imports, environmental and regulatory challenges in expanding local mining, and surging global demand competition.
Competition for Labor	Major	Labor difficulties are due primarily to niche skill shortages, better prospects in other industries, and geographic mismatches.
Need for Technical Expertise	Minor	Scaling requires optimizing extraction from brine pools due to its high solubility, enhancing purification, and advancing recycling technologies for battery recovery.
Immature Market	Major	Processing faces significant pricing volatility challenges, scarcity of established domestic industry counterparties, and intense competitive commercial realities.
Lack of Price Competitiveness	Major	Pricing in lithium is undermined by global competition, including Chile and Argentina’s low-cost operations.
Lack of Investor Interest	Mild	Investor hesitation arises from high initial costs, strong competition from South America, electric vehicle demand volatility, and market opacity.

### Overview of lithium processing.

Upstream Material	Common Mid-Stream Technologies	Mid-Stream Product Outputs
Lithium-containing spodumene or brine	<ul style="list-style-type: none"> <li>▪ From Spodumene, Hard Rock Ore:                             <ul style="list-style-type: none"> <li>◦ Physical Beneficiation [crushing, grinding, screening, flotation, magnetic separation, gravity separation]</li> <li>◦ Hydrometallurgy and Pyrometallurgy [concentration, acid roasting, sulfate solution processing, purification, precipitation]</li> </ul> </li> <li>▪ From Lithium Brine:                             <ul style="list-style-type: none"> <li>◦ Hydrometallurgy [pumping, evaporation, lithium carbonate precipitation, crystallization, conversion to lithium hydroxide if required]</li> </ul> </li> <li>▪ Direct Lithium Extraction (“DLE”)</li> </ul>	Lithium carbonate or lithium hydroxide