



Lithium Value Chain

Technology Market and Project Risk Analysis

Gulf LNG Solutions Technical Report Series | Energy and Process Technology Analysis

A technical guide to lithium extraction conversion battery materials and circular supply chains.

September 2026

Gulf LNG Solutions is an LNG-specialized engineering and technical consulting company. LNG and LNG facilities remain its core professional focus. The company also applies process-engineering capability across energy, oil and gas, petrochemicals, power generation, hydrogen, ammonia, and strategic-metal value chains. Lithium is included because battery materials and energy storage are increasingly important to resilient energy and industrial systems.

For Gulf LNG Solutions energy and process technology portfolio resources, visit www.GulfLNGSolutions.com or contact Info@GulfLNGSolutions.com

Contents

Executive Summary	4
1 Scope and Value Chain	5
2 Lithium Resources and Process Routes	5
3 Product Markets and Battery Integration	6
4 O&M Cost and Reliability Risk	7
5 Technology Licensors EPC Firms and OEMs	7
6 United States Market Analysis	8
7 China Market Analysis	9
8 Economics TIC and Investment	9
9 Environmental Social and Safety Risk	10
10 Project Development and Execution	11
11 Outlook and Strategic Significance	12
Appendix A Process Block Flow Diagrams	12
Appendix B Due Diligence and Risk Checklist	13
Appendix C Sources and Gulf LNG Solutions Resources	14
Expanded Technical Compendium	15
Chapters 12 to 19 Process and battery material design basis	17-24
Chapters 20 to 26 EPC design equipment TIC and execution	25-31
Chapters 27 to 30 Safety operations and market decision tools	32-35
Appendices D to G Review procurement cost and glossary templates	36-39
Decision Toolkit	40-120
Owner and developer toolkit	40-48
Investor and lender toolkit	49-57
EPC and EPCM toolkit	58-66
Process and metallurgy toolkit	67-75
Mechanical and reliability toolkit	76-84
Licensors OEM and supplier toolkit	85-93
Battery customer and R and D toolkit	94-102
HSE ESG and permitting toolkit	103-111
Portfolio governance and assurance toolkit	112-120
Chapter and page index: page references are checked against the rendered edition.	