World Lithium

Industry Study with Forecasts for 2019 & 2024

Study #3331 | September 2015 | $6300 | 308 pages
Table of Contents

EXECUTIVE SUMMARY

MARKET ENVIRONMENT
General ............................................. 4
World Economic Overview ....................... 5
Recent Historical Trends .......................... 5
World Economic Outlook ........................ 6
World Demographic Outlook ..................... 9
World Manufacturing Outlook ................... 11
World Batteries Outlook ........................ 14
Primary Batteries .................................. 16
Rechargeable Batteries ........................... 17
World Hybrid & Electric Vehicle Outlook .... 19
World Flat Glass Outlook ........................ 21
International Trade ................................ 23
Pricing Trends ...................................... 24
Environmental & Regulatory Considerations ........................................... 26

MINE PRODUCTION & PROCESSING
General ............................................. 28
Lithium Production by Resource ................... 29
Brine .................................................. 30
Mineral Ore .......................................... 31
Other Resources .................................... 32
Identified Resources by Country ................. 33
Production by Country .......................... 35
Lithium Projects & Future Supply .......... 38

DEMAND OVERVIEW
General ............................................. 40
Demand by Region ................................ 42
Demand by Product ............................. 45
Lithium Carbonate ................................. 47
Lithium Hydroxide ............................... 48
Mineral Concentrates ............................. 50
Other Lithium Products ........................ 51
Demand by Market ................................ 53
Batteries ............................................. 55
Primary Batteries ................................... 57
Rechargeable Batteries ........................... 58
Glass & Ceramics .................................. 61
Lubricating Grease ............................... 63
Metallurgy .......................................... 65
Other Markets ..................................... 68

NORTH AMERICA
Economic Overview ............................... 71
Lithium Supply & Demand ....................... 72
Lithium Markets .................................... 75
United States ...................................... 77
Canada ............................................. 83
Mexico .............................................. 89

WESTERN EUROPE
Economic Overview ............................... 95
Lithium Supply & Demand ....................... 96
Lithium Markets .................................... 99
Germany ........................................... 101
France .............................................. 105
Italy .................................................. 112
United Kingdom ................................... 117
Spain .................................................. 122
Other Western Europe ........................... 127

ASIA/PACIFIC
Economic Overview ............................... 134
Lithium Supply & Demand ....................... 135
Lithium Markets .................................... 138
China .................................................. 140
Japan .................................................. 147
South Korea ........................................ 153
India ................................................... 158
Taiwan ............................................... 163
Indonesia ............................................ 168
Australia ............................................. 173
Other Asia/Pacific ................................... 178

OTHER REGIONS
Central & South America ......................... 184
Economic Overview ............................... 184
Lithium Supply & Demand ....................... 185
Lithium Markets .................................... 187
Brazil .................................................. 189
Other Central & South America ............... 195
Eastern Europe .................................... 201
Economic Overview ............................... 201
Lithium Supply & Demand ....................... 203
Lithium Markets .................................... 204
Russia .................................................. 206
Poland ............................................... 211
Other Eastern Europe ........................... 215

African/Mideast ..................................... 220
Economic Overview ............................... 220
Lithium Supply & Demand ....................... 222
Lithium Markets .................................... 223
Turkey ................................................. 225
Other African/Mideast ........................... 229

INDUSTRY STRUCTURE
General ............................................. 235
Market Composition ............................. 236
Market Share ....................................... 240
Marketing & Distribution ....................... 245
Acquisitions & Divestitures ..................... 246
Cooperative Agreements ......................... 249

COMPANY PROFILES
Albemarle Corporation ............................ 253
Axiom Chemicals .................................. 257
Bacanora Minerals ................................. 258
BASF SE .............................................. 260
Chengdu Tianqi Group ......................... 262
CITIC Group ........................................ 266
Critical Elements ................................... 268
FMC Corporation .................................. 269
Galaxy Resources .................................. 272
International Lithium ............................ 273
Jiangxi Ganfeng Lithium ......................... 274
Johnson Matthey .................................... 277
JSC TVEL Fuel ....................................... 279
Leverton Clarke ..................................... 280
Lithium Australia .................................... 281
Mahidhara Chemicals ............................ 283
Nemaska Lithium .................................... 284
Neogen Chemicals ............................... 286
Neometals Limited ................................. 287
Nippon Denko ....................................... 288
Nordic Mining ........................................ 289
Orocobre Limited ................................. 290
Qinghai Salt Lake Industry ...................... 292
RB Energy ............................................. 293
Sichuan Yahua Industrial Group .............. 294
Simbol Incorporated ............................... 295
Sojiedad Quimica y Minera de Chile ........ 296
Stella Chemifa ...................................... 299
Tibet Mineral Development Company ........ 300
Toda Kogyo .......................................... 302
Umicore SA/NV ..................................... 303
Western Lithium USA ............................ 304
Other Firms Mentioned in Study .......... 306-308
List of Tables/Charts

EXECUTIVE SUMMARY
1 Summary Table ...........................................3

MARKET ENVIRONMENT
1 World Gross Domestic Product by Region ..................9
2 World Population by Region ................................11
3 World Manufacturing Value Added by Region .............14
4 World Battery Shipments by Type & Region ................15
5 World Primary Battery Shipments by Region ................17
6 World Rechargeable Battery Shipments by Region ........19
7 World Hybrid & Electric Vehicle Production by Type & Region ..........................21
8 World Flat Glass Production by Region .....................23
Cht World Lithium Pricing, 2004-2014 .....................26

MINE PRODUCTION & PROCESSING
1 Lithium Production by Resource ..........................30
2 World Identified Lithium Resources by Country .........35
3 World Lithium Production by Country .....................37
Cht Lithium Production by Country, 2014 .....................37
4 Selected Lithium Projects in Development, 2014 ............39

DEMAND OVERVIEW
1 World Lithium Demand by Region ...........................44
Cht World Lithium Demand by Region, 2014 .....................45
2 World Lithium Demand by Product .........................46
Cht World Lithium Demand by Product, 2014 .................46
3 World Lithium Carbonate Demand by Country ..........48
4 World Lithium Hydroxide Demand by Region ..........49
5 World Lithium Mineral Concentrates Demand by Region ....51
6 World Demand for Other Lithium Products by Type & Region ....53
7 World Lithium Demand by Market .........................54
Cht World Lithium Demand by Market, 2014 .....................55
8 World Battery Market for Lithium by Application & Region ..............56
9 World Primary Battery Market for Lithium .................58
10 World Rechargeable Battery Market for Lithium by Application & Region ..........60
11 World Glass & Ceramics Market for Lithium by Application & Region ..........63

WESTERN EUROPE
1 Western Europe: Lithium Demand by Product ..........98
Cht Western Europe: Lithium Demand by Country, 2014 .................99
2 Western Europe: Lithium Demand by Market ..............100
3 Germany: Lithium Demand by Product ....................103
4 Germany: Lithium Demand by Market ....................105
5 France: Lithium Demand by Product ......................109
6 France: Lithium Demand by Market ......................111
7 Italy: Lithium Demand by Product .........................115
8 Italy: Lithium Demand by Market .........................117
9 United Kingdom: Lithium Demand by Product .........120
10 United Kingdom: Lithium Demand by Market ..........122
11 Spain: Lithium Demand by Product .......................125
12 Spain: Lithium Demand by Market .......................127
13 Other Western Europe: Lithium Demand by Product ....131
14 Other Western Europe: Lithium Demand by Market ....133

ASIA/PACIFIC
1 Asia/Pacific: Lithium Demand by Product, 2015 ..........137
Cht Asia/Pacific: Lithium Demand by Country, 2014 .............138
2 Asia/Pacific: Lithium Demand by Market .........139
3 China: Lithium Demand by Product ................144
4 China: Lithium Demand by Market ................146
5 Japan: Lithium Demand by Product ................150
6 Japan: Lithium Demand by Market ................152
7 South Korea: Lithium Demand by Product .................156
8 South Korea: Lithium Demand by Market ................158
9 India: Lithium Demand by Product ................161
10 India: Lithium Demand by Market ................163
11 Taiwan: Lithium Demand by Product ................166
12 Taiwan: Lithium Demand by Market ................168
13 Indonesia: Lithium Demand by Market ................171
14 Indonesia: Lithium Demand by Market ................173
15 Australia: Lithium Demand by Market ................176
16 Australia: Lithium Demand by Market ................178
17 Other Asia/Pacific: Lithium Demand by Product ..........181
18 Other Asia/Pacific: Lithium Demand by Market ..........183

OTHER REGIONS
1 Central & South America: Lithium Demand by Product ....187
2 Central & South America: Lithium Demand by Market .....189
3 Brazil: Lithium Demand by Product ......................193
4 Brazil: Lithium Demand by Market ......................195
5 Other Central & South America: Lithium Demand by Product ....199
6 Other Central & South America: Lithium Demand by Market ....201
7 Eastern Europe: Lithium Demand by Product ..........204
8 Eastern Europe: Lithium Demand by Market ..........205
9 Russia: Lithium Demand by Product ......................209
10 Russia: Lithium Demand by Market ......................210
11 Poland: Lithium Demand by Product ......................213
12 Poland: Lithium Demand by Market ......................215
13 Other Eastern Europe: Lithium Demand by Product ..........218
14 Other Eastern Europe: Lithium Demand by Market ..........220
15 Africa/Mideast: Lithium Demand by Product ..........223
16 Africa/Mideast: Lithium Demand by Market ..........224
17 Turkey: Lithium Demand by Product ......................227
18 Turkey: Lithium Demand by Market ......................229
19 Other Africa/Mideast: Lithium Demand by Product ..........232
20 Other Africa/Mideast: Lithium Demand by Market ..........234

INDUSTRY STRUCTURE
1 Primary Lithium Production by Company, 2014 .............239
Cht World Primary Lithium Market Share by Volume, 2014 ..................241
2 Selected Acquisitions & Divestitures .......................248
3 Selected Cooperative Agreements .........................250
World demand to rise 8.9% annually through 2019

Global demand for lithium metal is projected to rise 8.9 percent per year through 2019 to 49,350 metric tons. In lithium carbonate equivalent (LCE) terms, the value of the global lithium market is projected to reach $1.7 billion. Torrid advances in the rechargeable battery market will fuel increases, driven by rapid expansion in the lithium-ion (Li-Ion) battery industry as world demand for hybrid and electric vehicles (H/EVs), energy storage systems, and high-drain portable electronics continues to grow. Rising production of primary lithium batteries will also support market gains, especially as improving incomes in emerging economies spur shifts to better performing primary batteries. Other major markets for lithium -- including glass and ceramics, lubricating grease, and metallurgy -- are forecast to post relatively moderate gains. The lubricating grease segment will boast the best performance of these markets, spurred by the use of lithium-based greases in industrial and transportation equipment. Demand for lithium will also be strong in the smaller aluminum alloy market, where lithium is used to reduce weight and improve alloy strength.

Asia/Pacific region to see the fastest gains in demand

The Asia/Pacific region will see the fastest gains in lithium demand through 2019. China dominates the world lithium market due to the country's massive output of goods manufactured with lithium -- including batteries, glass, grease, air conditioning equipment, and synthetic rubber. China is expected to register the world's strongest yearly increases in lithium demand, boosted by a nearly threefold expansion in the country's rechargeable battery segment. Other major suppliers of Li-Ion batteries in the Asia/Pacific region, including South Korea and Japan, are also projected to see robust increases in lithium demand. Strong market gains in India will be driven by ongoing expansion in the country's manufacturing sector. Among other regions, North America is projected to post the fastest gains in lithium demand, buoyed by strong growth in the production of Li-Ion batteries in the US. Li-Ion battery output is also forecast to expand in Western Europe, particularly in Germany.

Lithium hydroxide to outpace lithium carbonate

Lithium is most widely consumed in the form of lithium carbonate due to the compound's application in a wide range of end uses (including glass, ceramics, and batteries). However, lithium carbonate is losing market share to lithium hydroxide, which is increasingly favored for its superior performance in Li-Ion cathode applications. Large volumes of lithium metal are also consumed in the form of mineral concentrates, which find applications in the production of glass, ceramics, and metal castings.
Sample Text, Table & Chart

WESTERN EUROPE

Germany: Lithium Markets

The market for lithium in Germany is forecast to advance 3.6 percent per year to 1,795 metric tons in 2019. Expansion in the rechargeable battery segment, the largest volume increment, is projected to grow 12 percent per year to 475 metric tons in 2024, eclipsing the glass and ceramics segment. Demand for lithium in the rechargeable battery segment is projected to grow 3.6 percent per year to 1,795 metric tons in 2024, eclipsing the glass and ceramics segment. Demand for lithium in the rechargeable battery segment is expected to grow 12 percent per year, supported by robust expansion in the H/EV and energy storage markets. Lithium-ion cell producer Leclanché, for instance, expanded capacity at its site in Willstätt, where the company manufactures batteries for energy storage systems. Demand for lithium metal, a primary battery application, will be limited by a lack of significant local capacity and by the already high penetration of primary lithium batteries in the region.

Germany’s glass and ceramics market is forecast to register weak gains through 2019. Overall flatness in domestic production of glass and ceramic products will contribute to slow increases in demand for lithium used as fluxes and in frits for glazes and enamels. However, the presence of major glass and ceramics producers, including locally based SCHOTT, will prevent a weaker performance through 2019. SCHOTT manufactures its ZERODUR line of low expansion glass-ceramics at a facility in Mainz.

Germany’s lubricating grease market for lithium is projected to post nominal gains through 2019, based on slowing output of industrial machinery, combined with flat trends in the motor vehicle industry and stifling growth. Among the country’s smaller lithium markets, moderate expansion in synthetic rubber production will support demand for lithium compounds such as butyllithium, which is employed as a catalyst in polymerization reactions. Germany benefits from the presence of major producers such as Dow Chemical and BASF in the region.

Table VII-3

CHINA: LITHIUM DEMAND BY PRODUCT (metric tons)

<table>
<thead>
<tr>
<th>Item</th>
<th>2004</th>
<th>2009</th>
<th>2014</th>
<th>2019</th>
<th>2024</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gross Domestic Product (bil 2013$)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$ GDP/capita</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Population (million persons)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Battery Shipments (mil $)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flat Glass Production (000 metric tons)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>grams lithium/mil $ GDP</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>grams lithium/capita</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lithium Demand</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lithium Carbonate</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lithium Hydroxide</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mineral Concentrates</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lithium Mine Production</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Minerals</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Brine</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: The Freedonia Group, Inc.

Chart IX-1

WORLD PRIMARY LITHIUM MARKET SHARE BY VOLUME, 2014 (35,800 metric tons)
Galaxy Resources Limited is a lithium resources company with assets in Australia, Canada, and Argentina. As of mid-2015, it was still in the exploration and development stage. In April 2014, Galaxy Resources sold the Galaxy Lithium Jiangsu Company Limited subsidiary (China), which made lithium carbonate at a plant in Jiangsu, China.

The Company is involved in the world lithium industry via the development of lithium projects in Argentina, Canada, and Australia. Galaxy Resources’ main operation in Argentina is the Sal de Vida Lithium and Potash Brine Project, known as Sal de Vida. Sal de Vida is situated in the Lithium Triangle, a region where Chile, Argentina, and Bolivia meet, and a region that, according to the Company, accounts for 60 percent of global lithium production. By the end of 2014, the Company had acquired the last remaining outstanding tenements in the project, resulting in the ownership of all the land parcels needed to build extraction and processing facilities in the future.

In Canada, Galaxy Resources’ presence include the James Bay Lithium Pegmatite Project in Quebec, which contains indicated mineral resources of 11.75 million metric tons grading at 1.3 percent lithium oxide and inferred mineral resources of 10.47 metric tons grading at 1.2 lithium oxide. This project is amenable to open pit extraction and has...
ONLINE: www.freedoniagroup.com
MAIL: Print out and complete the order form and send to The Freedonia Group (see address at the bottom of this form)
PHONE: Call toll free, 800.927.5900 (US) or +1 440.684.9600
FAX: +1 440.646.0484 (US)
EMAIL: info@freedoniagroup.com

Free Handling & Shipping
There is NO charge for handling or UPS shipping in the US. Expect delivery in 3 to 5 business days. Outside the US, Freedonia provides free airmail service. Express delivery is available at cost.

Orders Outside of the US
Checks must be made payable in US funds, drawn against a US bank and mailed directly to The Freedonia Group. For wire transfers please contact our customer service department at info@freedoniagroup.com. Credit cards accepted.

Credit Card Orders
For convenience, Freedonia accepts American Express, MasterCard or Visa. Credit card purchases must include account number, expiration date and authorized signature.

Save 15%
If you order three (3) different titles at the same time, you can receive a 15% discount. If your order is accompanied by a check or wire transfer, you may take a 5% cash discount (discounts do not apply to Corporate Use Licenses).

Corporate Use License
Now every decision maker in your organization can act on the key intelligence found in all Freedonia studies. For an additional $2600, companies receive unlimited use of an electronic version (PDF) of the study. Place it on your intranet, email it to coworkers around the world, or print it as many times as you like.

Click here to learn more about the Corporate Use License

Order Form
World Lithium ................................................................................ $6300

□ Corporate Use License (add to study price) * +$2600
□ Additional Print Copies @ $600 each *
□ Enclosed is my check (5% discount) drawn on a US bank and payable to The Freedonia Group, Inc., in US funds (Ohio residents add 8% sales tax)
□ Bill my company □ American Express □ MasterCard □ Visa

Name ____________________________________________ Title ____________________________
Company ________________________________________ Division __________________________
Street ____________________________________________ City/State/Zip _____________________
Country __________________________________________
Phone ____________________________ Fax ____________________________

Signature ________________________________________

* Please check appropriate option and sign below to order an electronic version of the study.

□ Individual Use License Agreement
The undersigned hereby represents that the above captioned study will be used by only ___ individual(s) who are employees of the company and that the study will not be loaded on a network for multiple users. In the event that usage of the study changes, the Company will promptly notify Freedonia of such change and will pay to Freedonia the appropriate fee based on Freedonia’s standard fee schedule then in effect. Note: Entire company corporate use license, add $2600; one additional user, add $600; two additional users, add $1200; three additional users, add $1800.

Signature ________________________________________
About The Freedonia Group

The Freedonia Group, Inc., is a leading international industry market research company that provides its clients with information and analysis needed to make informed strategic decisions for their businesses. Studies help clients identify business opportunities, develop strategies, make investment decisions and evaluate opportunities and threats. Freedonia research is designed to deliver unbiased views and reliable outlooks to assist clients in making the right decisions. Freedonia capitalizes on the resources of its proprietary in-house research team of experienced economists, professional analysts, industry researchers and editorial groups. Freedonia covers a diverse group of industries throughout the United States and other world markets. Industries analyzed by Freedonia include:

- Automotive & Transport
- Chemicals
- Construction & Building Products
- Consumer Goods
- Energy & Petroleum
- Industrial Components
- Healthcare & Life Sciences
- Machinery & Equipment
- Metals, Minerals & Glass
- Packaging
- Plastics & Other Polymers
- Security
- Services
- Textiles & Nonwovens
- Water Treatment

Freedonia Custom Research delivers the same high quality, thorough and unbiased assessment of an industry or market as an industry study. Since the research initiative is based upon a company’s specific needs, companies harness Freedonia’s research capabilities and resources to answer unique questions. When you leverage the results of a Freedonia Custom Research engagement, you are able to obtain important answers to specific questions and issues associated with: mergers and acquisitions, new product launches/development, geographic expansion, entry into new markets, strategic business planning, and investment and funding decisions.

Freedonia Custom Research is ideal for companies seeking to make a strategic difference in the status quo and focus on future business growth. Working side by side with clients, Freedonia's team is able to define a research project that is custom-tailored to answer specific questions and provide the basis from which a company can make informed business decisions.