Lithium

An Economic Overview

ACC E&S; Smita_Bhatia@americanchemistry.com
6/26/2012
Introduction
This economic report covers mainly lithium’s end-use in the battery market. Lithium is currently produced from two sources, lithium-rich brines and lithium-bearing minerals. Lithium from mineral-based sources is primarily consumed in technical applications, while lithium from brines is primarily consumed in chemical applications. The main technical applications include glass, ceramic and metallurgical industries. The chemical market is primarily dominated by use in batteries, lubricant greases, primary aluminum production, air treatment as an absorbent and a desiccant, continuous steel casting, initiator in rubber and thermoplastic applications, pharmaceuticals and aluminum-lithium alloys in aerospace applications.

Batteries: End-Use Market
According to IHS\(^1\), lithium demand grew by 6.7% annually from 1997-2008. This growth was primarily driven by demand in secondary (rechargeable) batteries for the portable electronics market. The demand declined during the economic crisis in 2009; however, it rebounded in 2010 to near 2008 levels. In 2010, world demand for batteries accounted for 26% of total demand for lithium chemicals. Currently, lithium salts are mainly used as precursors for the cathode and electrolyte components in lithium-ion secondary (rechargeable) batteries (LIBs).

The major market for rechargeable lithium batteries is portable electronic devices. The portable electronics market includes mobile communications and computing devices, portable entertainment devices and power tools. SRI estimates that lithium-ion batteries (LIBs) now account for over 90% of this market, replacing both nickel cadmium (NiCd) and nickel metal hydride (NiMH) batteries.

According to SRI, future growth is forecast to be led by use of LIBs in electrified vehicles (EVs). This includes battery electric vehicles (BEVs), hybrid electric vehicles (HEVs) and plug-in hybrid vehicles (PHEVs). Overall growth in batteries is expected to be 7-8% annually during 2010-2015, and 11-12% during 2015-2020.

Manufacturing
Major rechargeable lithium battery cell manufacturers supply the global market, with production facilities in Japan, Korea and China accounting for most of the capacity.

The emerging demand for large-format lithium batteries for vehicle electrification (xEVs) and energy storage (ESS) applications is stimulating the development of cell production, not only in Asia, but also in other regions like the U.S. and Europe. Long-established companies who currently produce small-format cells for portable electronics as well as potential new entrants are targeting these new opportunities.

\(^1\) Lithium, Lithium Minerals and Lithium Chemicals, CEH Marketing Research Report
U.S. domestic manufacturing of lithium-ion battery cells is currently very small, thus, most are imported from Asia. In order for U.S to establish its market share in this growing industry, it has to become a producing location for lithium batteries.

For this purpose, the Obama administration passed The American Recovery and Reinvestment Act of 2009 (ARRA) which earmarked $2 billion in grants for the manufacturing of advanced batteries (and specifically mentions lithium-ion batteries). Battery research will also get a portion of $7 billion set aside in grants for research and development of renewable and efficient energy technology and for modernizing the current electric grid.

However, in order for U.S to be a competitive force in battery production and gain a significant market-share of this growing industry, commercialization of lithium battery R&D is crucial for success. The following section discusses the economic value impact of manufacturing lithium batteries in the US.

**Economic Impact Analysis of Lithium Battery Manufacturing in the U.S.**

The U.S. domestic manufacturing of lithium batteries is very small. Currently, the U.S. imports $1.041 billion worth of lithium ion batteries and $271 million worth lithium metal batteries. We used IMPLAN to model a scenario wherein the U.S. replaces $1.312 billion of imports with manufacturing output (or revenue) of the same amount. Specifically, we computed the economic contributions of lithium battery manufacturing in terms of employment, wages & benefits, and revenues.

**Results of Analysis**

- Employment generated: 13,753
- Employee wages: $0.8 billion
- Output or Revenue: $3.2 billion
- Federal Taxes: $174.5 million

<table>
<thead>
<tr>
<th>Impact Type</th>
<th>Employment</th>
<th>Labor Income($)</th>
<th>Output ($)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Direct Effect</td>
<td>3,352</td>
<td>247,638,577</td>
<td>1,312,000,000</td>
</tr>
<tr>
<td>Indirect Effect</td>
<td>4,527</td>
<td>291,264,732</td>
<td>1,038,640,064</td>
</tr>
<tr>
<td>Induced Effect</td>
<td>5,874</td>
<td>280,409,830</td>
<td>888,768,253</td>
</tr>
<tr>
<td>Total Effect</td>
<td>13,753</td>
<td>819,313,139</td>
<td>3,239,408,317</td>
</tr>
</tbody>
</table>