Battery & Fuel Cell Materials

US Industry Study with Forecasts for 2017 & 2022

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Gains in demand will be driven in part by the motor vehicle industry’s increasing adoption of advanced energy storage technologies to meet government fuel efficiency mandates.

US demand to rise 4.3% annually through 2017

US demand for battery and fuel cell materials is expected to grow 4.3 percent annually through 2017 to $6.1 billion. Rising motor vehicle production, as well as the motor vehicle industry’s increasing adoption of advanced energy storage technologies to meet government fuel efficiency mandates, will support growth in battery materials demand, particularly for polymers and chemicals. Though growing from a much smaller base, fuel cell materials demand will rise at a rapid double-digit annual pace due to the increasing adoption of fuel cells in electrical generation and industrial/motive power applications. However, even faster advances will be limited by the fuel cell industry’s continuing efforts to reduce costs, including through the adoption of less expensive and more efficient material alternatives.

Motor vehicle batteries, fuel cells to be key material markets

The ongoing rebound in US motor vehicle production will stimulate volume growth in lead-acid battery shipments, which will be the primary driver of rising battery materials demand overall. However, the motor vehicle industry’s ongoing efforts to meet increasingly stringent fuel efficiency requirements will lead to the more widespread adoption of alternatives to the traditional flooded lead-acid battery. The impact of this transition will begin to be felt by the battery materials industry over the forecast period. The rising adoption of rechargeable lithium-ion batteries in hybrid, plug-in hybrid, and electric vehicles will help drive above average growth in polymer and chemical battery materials demand as vehicle manufacturers ramp up domestic production of these batteries to supply their North American operations. Additionally, the increasing adoption of start-stop ignition technology will lead to the expanded use of absorbed glass mat (AGM) lead-acid batteries, boosting demand for specialty materials such as glass fibers.

Robust global demand for fuel cells as alternatives in electricity generation and industrial and motive power applications will support the rapid expansion of the US fuel cell industry and drive double-digit annual growth in fuel cell materials demand through 2017. Even faster growth in fuel cell materials demand over the long term will reflect the penetration of fuel cells in motor vehicle and portable device applications. All materials types will benefit as technological advancements and the realization of economies of scale allow volume growth to exceed value-based gains. However, industry efforts to find alternative electrode catalyst materials will limit faster advances in fuel cell metals demand.
BATTERY MATERIALS

Separators

Consumption of materials used in the production of battery separators is forecast to grow at a 3.8 percent annual rate through 2017 to $117 million. Market advances will be driven by healthy gains for batteries, which use high-performance glass fiber separators in stationary and motive power applications. In addition, increasing interest in technologically advanced materials in separators will fuel value gains, particularly in high performance Ni-MH and Li-Ion chemistries. Batterymakers continue to focus on product performance.

Separators are a critical component in most battery designs, serving as a nonconductive barrier that prevents the anode and cathode from coming in contact with one another, while at the same time enabling ionic transport between the two electrodes. In general, separator materials for primary batteries are lower-value products compared to those for secondary batteries, as the continued charge/discharge cycles in rechargeable cells require a more durable and better performing separator. Among the materials used in separator construction are carbon, graphite, cellulosics, ceramics, fabrics, fiberglass, foils, paper, rubber, and polymers. In addition to polyethylene -- which dominates automotive SLI battery applications -- polymers used as separator materials include nylon, phenolics, polypropylene, polyvinyl alcohol, polyvinyl chloride, and various composites. Demand for polyethylene separators in Li-Ion continues to increase as these batteries become more common in H/EVs. One example of a company supplying this market is ENTEK International, which produces a Li-Ion separator designed to be used in batteries powering cell phones, H/EVs, portable computers, and power tools.

The strongest growth is expected for glass fiber separators, which is the separator of choice in AGM VRLA batteries, benefiting from their ability to provide low impedance, high electrolyte retention, high surface area, and high density. Another advantage of AGM batteries

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Sample Profile, Table & Forecast

Hollingsworth & Vose Company
112 Washington Street
East Walpole, MA 02032
508-850-2000
http://www.hollingsworth-vose.com

Annual Sales: $300 million (estimated)
Employment: 1,100 (estimated)
Key Products: battery separators, glass microfibers, and advanced fiber nonwovens

Hollingsworth & Vose (H&V) is a privately held manufacturer of roll goods used in such applications as battery separator products, engine filtration media, high efficiency filtration media, gasket materials, and specialty and industrial nonwovens. The Company operates in three product groups: Filtration Media, Battery Separators, and Industrial Products.

The Company is active in the US battery and fuel cell materials industry through the Battery Separators and Industrial Products groups. Via these groups, H&V manufactures such items as battery separators, glass microfibers, and advanced fiber nonwovens.

The Battery Separators product group includes battery separators for valve regulated lead acid (VRLA) and primary lithium batteries, as well as glass microfibers. Among the Company’s VRLA battery separators are ENERGYGUARD and BGO series types that are suitable for use in batteries for automotive, motive power, uninterruptible power supply, telecommunications, and other applications. H&V’s ENERGYGUARD battery separators include ENERGYGUARD DB, ENERGYGUARD HB, and ENERGYGUARD WB products.

TABLE V-1
FUEL CELL MATERIALS DEMAND BY TYPE
(million dollars)

<table>
<thead>
<tr>
<th>Item</th>
<th>2002</th>
<th>2007</th>
<th>2012</th>
<th>2017</th>
<th>2022</th>
</tr>
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<tbody>
<tr>
<td>Fuel Cell Shipments</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$ materials/000$ fuel cells</td>
<td>410</td>
<td>533</td>
<td>466</td>
<td>473</td>
<td>468</td>
</tr>
<tr>
<td>Fuel Cell Materials Demand</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Metals</td>
<td>20</td>
<td>68</td>
<td>113</td>
<td>232</td>
<td>575</td>
</tr>
<tr>
<td>Ceramics</td>
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<td>6</td>
<td>72</td>
<td>119</td>
<td>245</td>
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<td>11</td>
<td>27</td>
<td>25</td>
<td>48</td>
<td>115</td>
</tr>
<tr>
<td>Carbon/Graphite</td>
<td>7</td>
<td>18</td>
<td>25</td>
<td>53</td>
<td>120</td>
</tr>
<tr>
<td>Chemicals &amp; Other</td>
<td>1</td>
<td>9</td>
<td>40</td>
<td>68</td>
<td>115</td>
</tr>
<tr>
<td>% fuel cell</td>
<td>2.2</td>
<td>3.4</td>
<td>5.6</td>
<td>8.6</td>
<td>15.1</td>
</tr>
<tr>
<td>Battery &amp; Fuel Cell Materials Demand</td>
<td>1906</td>
<td>3793</td>
<td>4925</td>
<td>6070</td>
<td>7750</td>
</tr>
</tbody>
</table>

This Freedonia study, Battery & Fuel Cell Materials, presents historical data (2002, 2007, 2012) plus forecasts for 2017 and 2022 for demand by function, material and application. The study also details key market environment factors, examines the emerging US industry structure, evaluates company market share and profiles 35 players in the US industry.
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