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# Batteries

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US Industry Study with Forecasts to **2011 & 2016**

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**The Freedonia Group**

767 Beta Drive

Cleveland, OH • 44143-2326 • USA

Toll Free US Tel: 800.927.5900 or +1 440.684.9600

Fax: +1 440.646.0484

E-mail: [info@freedoniagroup.com](mailto:info@freedoniagroup.com)

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*Growth factors in US battery demand include strong demand for battery-powered products like cellular phones and digital cameras, and heightened production of light motor vehicles.*

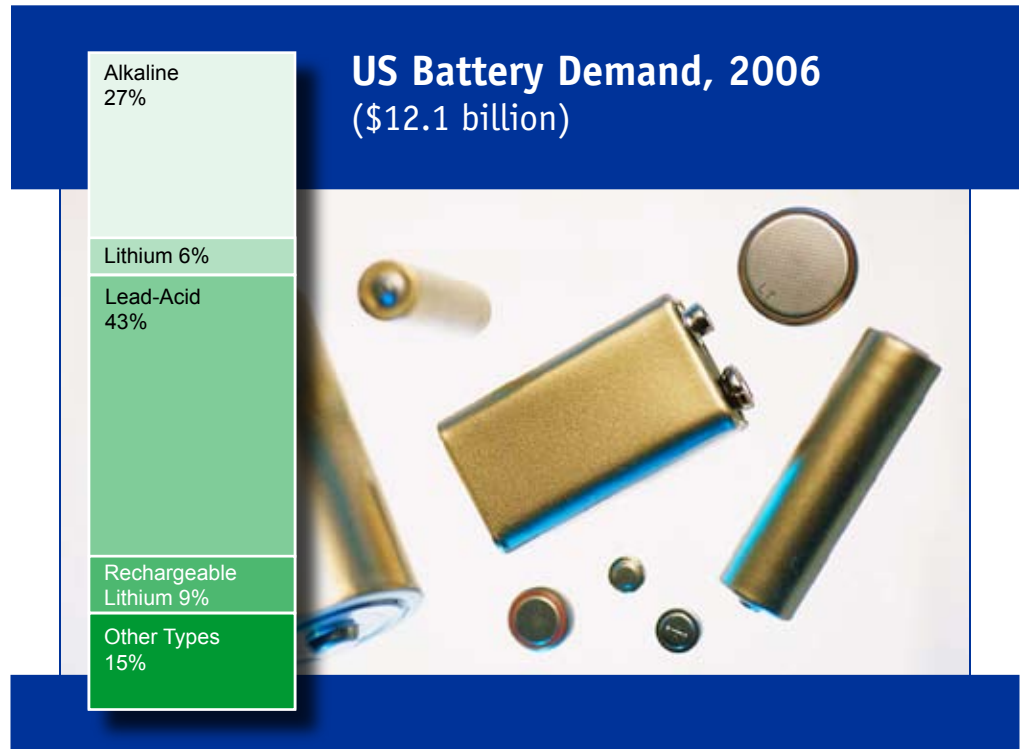
## US demand to grow 4.3% annually through 2011

US demand for primary and secondary batteries is forecast to increase 4.3 percent annually through 2011 to \$14.9 billion. Growth will be driven by such factors as strong demand for battery-powered products like cellular phones and digital cameras, and heightened production of light motor vehicles. Market gains will also be assisted by an ongoing shift in the product mix toward more expensive batteries (e.g., rechargeable lithium cells) that deliver improved performance for high-drain electronic devices.

## Primary batteries to outpace secondary types

Sales of primary batteries are expected to rise faster than secondary types through 2011, bolstered by increasing usage of primary lithium and other high-performance batteries in high-drain applications such as digital cameras. The recent introduction of the nickel oxyhydroxide primary battery chemistry, which can deliver more power and longer run times in many applications, will also support primary battery growth.

Consumer applications will continue to account for 72 percent of all primary battery sales value in 2011. Demand for replacement primary batteries will benefit from the burgeoning number of battery-powered portable devices in use, such as digital audio devices. Additionally, primary battery sales gains will be aided by rising durable goods production levels, which will stimulate demand in the industrial sector. Although alkaline batteries



will remain the dominant primary battery type, accounting for 70 percent of sales in 2011, other types such as primary lithium and zinc-air will grow faster. In particular, primary lithium batteries will post the fastest gains of all primary battery types due to a range of performance advantages, including a lighter weight than alkaline cells and a life span that can be up to seven times longer than alkalines in certain applications.

## Electronics, hybrid vehicles to benefit secondary types

Sales of secondary batteries will increase 4.0 percent annually through 2011 to \$9.1 billion, lagging overall battery demand. Although falling manufacturing costs of such advanced rechargeable chemistries as lithium-ion (Li-Ion)

and nickel-metal hydride (Ni-MH) will restrict gains in value terms, demand will be supported by a shift in the product mix toward advanced electronic devices such as MP3 players and multifunction cell phones, most of which require lightweight power sources with a high energy density. The expanding hybrid motor vehicle market will also bolster demand for advanced rechargeable lithium and Ni-MH batteries. As a result, lithium and Ni-MH batteries will see the fastest gains in the secondary battery market. Technological advances such as the incorporation of nanomaterials into Li-Ion cells will improve the performance attributes of advanced batteries, further supporting demand. Lead-acid batteries will continue to dominate the secondary battery market, accounting for nearly 70 percent of sales in 2011.

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## Sample Text, Table & Chart

### SECONDARY BATTERY MARKETS

#### Portable Devices Market

Demand for secondary batteries employed in portable electronic devices is expected to grow at a 2 percent annually through 2011. Growth is expected to be strong in the 2001-2006 period. Growth will be constrained by the competition and new technologies that provide effective alternatives. For example, Matsushita's rechargeable Ni-MH and hydroxide primary batteries are used in digital cameras -- products served by secondary cells. In addition, rapidly falling production costs of rechargeable lithium and Ni-MH batteries will also hold back value gains.

However, growth will be supported by expanding use of various high-drain products like digital cameras and advanced cellular phones outfitted with such features as e-mail, Internet access, cameras, color displays and music playback/storage. Growth in consumer durables expenditures through 2011 will also stimulate demand.

Battery suppliers have been reducing the time required to recharge certain secondary batteries, thus making the batteries more attractive to consumers who prefer more convenient primary cells. For example, in November 2005, A123Systems introduced a line of Li-Ion power tool batteries that can be recharged to 90 percent of their capacity in five minutes. Other advances have improved the overall convenience of secondary batteries by eliminating the need to charge the cells before initial usage. In late 2006, for instance, Spectrum Brands launched its HYBRID Ni-MH batteries, which are pre-charged during assembly, allowing the products to be used immediately after purchase. The batteries feature Spectrum Brands' ELECTRON RETENTION TECHNOLOGY, which employs a specially formulated nickel metal alloy and a nontoxic chemical process treatment to enable the batteries to retain their charge

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TABLE VII - 2

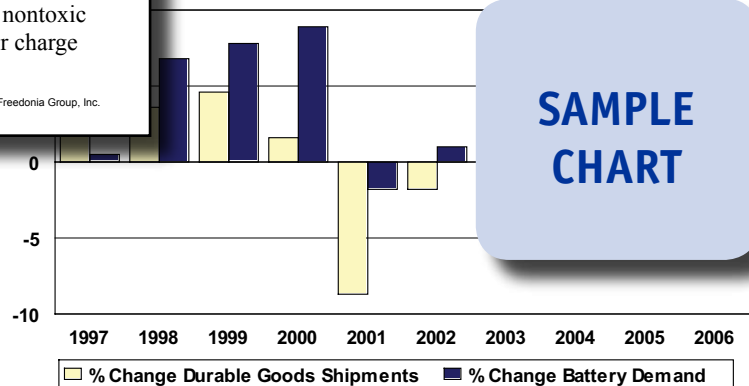
### LEAD-ACID BATTERY SUPPLY & DEMAND (million dollars)

Item	1996	2001	2006	2011	2016
Gross Domestic Product (bil \$)	7817				
\$ batteries/mil \$ GDP	441				
Lead-Acid Battery Demand	3450				
Starting/Lighting/Ignition	2800				
Non-SLI	650				
- net imports	-145				
Lead-Acid Battery Shipments	3595				
price deflator (2000=100)	102.1				
Lead-Acid Battery Shpts (mil 2000\$)	3521				

SAMPLE TABLE

CHART II - 1

### BATTERY CYCLICAL TRENDS, 1997-2006



SAMPLE CHART

## Sample Profile, Table & Forecast

### COMPANY PROFILES

#### Trojan Battery Company

12380 Clark Street  
 Santa Fe Springs, CA 90670  
 562-236-3000  
<http://www.trojan-battery.com>

Annual Sales: [redacted] ny, 1/07)  
 Employment: [redacted]

Key Products: [redacted] or starting,  
 ignition applic

**SAMPLE  
PROFILE**

Trojan, a privately held company, is a world leader in deep-cycle battery technology. The Company manufactures specialty deep-cycle lead-acid batteries for starting, lighting and ignition applications.

The Company's deep-cycle lead-acid batteries are designed for such applications as golf carts, marine equipment, recreational vehicles (RVs), renewable energy systems, aerial work platforms, floor care machines and commercial vehicles. Trojan's batteries are produced and sold under a variety of brand names, including TROJAN OUTDOOR, TROJAN MARINE/RV, TROJAN MILEAGE MASTER, SUPERGEL and TROJAN MAROON. In general, batteries from the Company feature a lower end-of-charge current acceptance than other batteries, thereby reducing battery heat, water consumption, recharge cost and damage to active materials. Additionally, Trojan's batteries are equipped with the Company's MAXGUARD advanced design separator and ALPHA PLUS technology, which utilizes needle-shaped lead dioxide crystals for increased cycle life and improved current flow. For heavy-duty applications, Trojan makes batteries with POLYON extra-durable cases.

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TABLE VI - 3

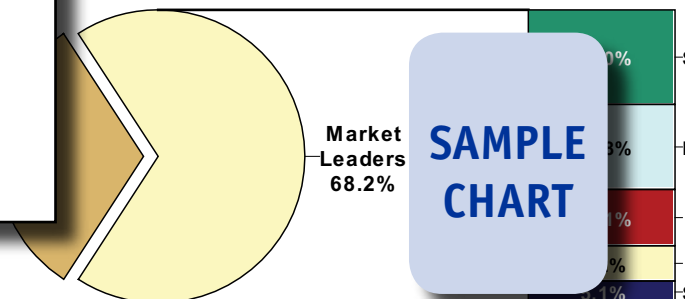
### CONSUMER PRIMARY BATTERY MARKET (million dollars)

Item	1996	2001	2006	2011	2016
Consumer Durables Expend (bil \$	653				
\$ batteries/000\$ expenditures	3.1				
Consumer Primary Battery Demand	2042				
By Application:					
Entertainment	776				
Lighting	408				
Toys & Games	286				
Photography	245				
Other	327				
By Chemistry:					
Alkaline	1530				
Primary Lithium	118				
Zinc-Carbon/Zinc-Chloride	324				
Other Primary	70				
% consumer	72.4				
Primary Battery Demand	2820				

**SAMPLE  
TABLE**

CHART IX - 4

### NON-LEAD-ACID SECONDARY BATTERY MARKET SHARE BY COMPANY, 2006 (\$2.2 billion)





**OTHER STUDIES**

**Battery & Fuel Cell Materials**

US demand for battery and fuel cell materials will rise 4.4% per year through 2011. Growth will be driven by rising production of high-performance batteries (e.g., lithium, Ni-MH) and a nearly fivefold jump in fuel cell demand. Metals will stay the leading material while polymers and carbon/graphite lead gains. This study analyzes the US battery and fuel cell material industry, with forecasts for 2011 and 2016 by type, function and application. It also details company market share and profiles major players.

#2244 ..... 10/2007..... \$4400

**World Fuel Cells**

Global fuel cell spending (R&D, investment, sales) will grow 15% yearly through 2011. Portable electronics will be the fastest growing commercial use while electric power generation will stay the largest. Proton-exchange membrane fuel cells will remain dominant over other chemistries. This study analyzes the \$5.2 billion world fuel cell industry to 2011 and 2016 by product, chemistry, application, world region and for 14 countries. It also reviews technology, evaluates market share and profiles major players.

#2194 ..... 04/2007..... \$5500

**Batteries in China**

Demand for batteries in China will grow 13.2% annually through 2010. Gains will be driven by the emergence of electric bicycles and strong domestic consumer demand for battery-powered products. Alkaline and lithium batteries will be the fastest growing primary type while rechargeable lithium batteries will pace the secondary battery segment. This study analyzes the ¥59 billion Chinese battery industry to 2010 and 2015 by product and market. It also evaluates market share and profiles leading competitors.

#2151 ..... 02/2007..... \$4900

**Solar Energy Products**

US demand for photovoltaic modules will more than triple by 2010, driven by innovations, economies of scale and government subsidies. Crystalline silicon cells will remain dominant while thin films will post stronger growth. Thin films use little or no silicon and can integrate photovoltaics within roofing shingles and other building materials. This study forecasts US solar energy product demand to 2010 and 2015 by product, market and region. It also evaluates market share and profiles major producers.

#2126 ..... 12/2006..... \$4300

**World Batteries**

Global battery demand will grow 6.9% yearly through 2010, led by China, India, Indonesia, South Korea, Poland, Brazil and Russia. Industrialized world markets will grow more slowly. Non-lead-acid secondary batteries will outpace primary and lead-acid secondary types. The consumer segment will lead gains by market. This study analyzes the \$52.6 billion world battery industry to 2010 and 2015 by product, market, world region and for 32 countries. It also evaluates company market share and profiles major firms.

#2095 ..... 08/2006..... \$5700

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