



SBI

**Advanced Storage Battery Market:
From Hybrid/Electric Vehicles to Cell Phones**

SBI Energy White Paper

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Through 2013, SBI believes that lead-acid will continue to have the largest market share of rechargeable batteries. However, it will be lithium-ion sales that will show the most growth in the market segment. Certainly no other rechargeable battery technology is going to supplant lithium-ion's dominance in the portable electronics sector by 2013. While other technologies, such as nickel-zinc battery chemistry, capacitor/battery hybrids and fuel cells, will make significant strides up to 2013 both economically and technologically, new energy storage technologies are adopted by the mainstream market at a much slower pace.

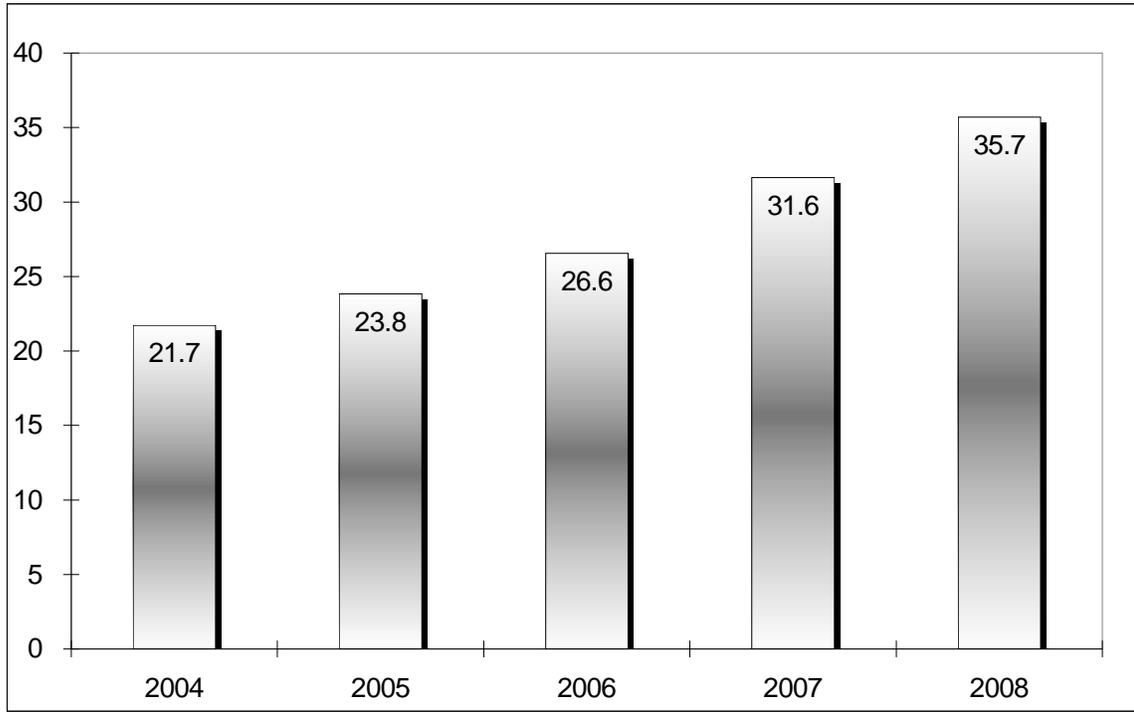
Three key factors that dictate the expected growth in rechargeable batteries through to 2013:

- The steady growth of the portable electronics market
- The increasing power requirements of those same portable devices and the increasing utility convergence that forces each device to be able to do more and more
- A sense of growing environmentalism, particularly in the wake of the escalating oil prices in 2008 that spurred the renewed interest in alternative energy sources.

Advanced storage batteries are also known as *secondary* batteries and *rechargeable* batteries. The terms are used interchangeably throughout this white paper.

The world secondary battery market has seen double digit growth since 2004, with a Compound Annual Growth Rate (CAGR) of 13% from 2004 to 2008. And while the lead-acid battery market grew a healthy 10% from 2007 to 2008, it was nickel cadmium (Ni-Cd), nickel metal hydride (Ni-MH) and lithium-ion sales that grew an impressive 20% in the year. Much of this growth was due to lithium-ion and lithium polymer battery sales, as this chemistry continues to take over traditional Ni-CD and Ni-MH markets.

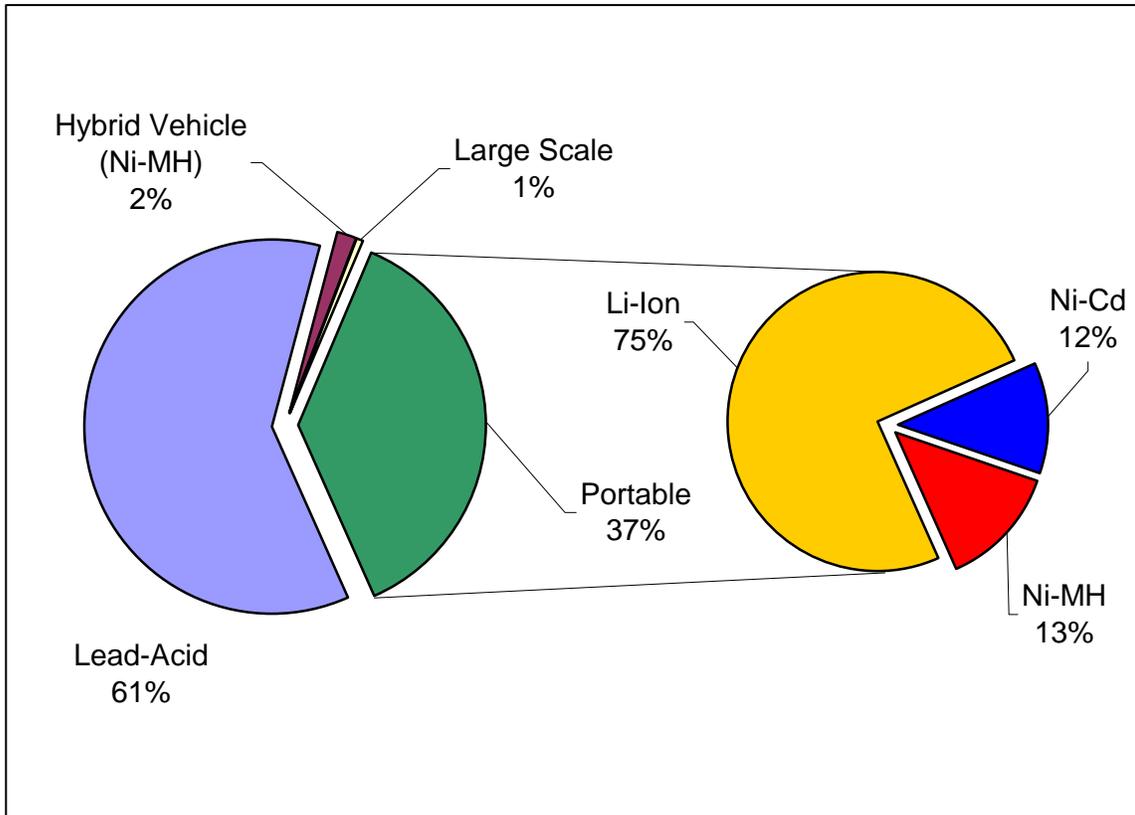
Figure 1
World Secondary Battery Market, 2004-2008
(in billions of dollars)



Source: Calculated and estimated by SBI.

SBI estimates that lead-acid batteries accounted for 61% of the world's rechargeable battery market in 2009 (autos). The remaining 39% of the market segment is dominated by Lithium-ion batteries (75%--attributed to portable electronics) and Ni-MH and Ni-Cd batteries making up the other 25%. Ni-MH batteries for hybrid vehicles and large scale batteries (high temperature sodium and flow chemistries) together accounted for only 2.4% of the world's rechargeable battery market in 2008.

Figure 2
Rechargeable Battery Market Share by Battery Chemistry, 2008
(percent)



Source: Calculated and estimated by SBI.

Overall, secondary batteries accounted for 73% of the total U.S. battery market in 2008, up from 68% of the market in 2007. With a CAGR of 11% between 2002 and 2008, the secondary battery market grew considerably faster than the primary battery market, which posted only a 2% CAGR for the same period. A significant part of this gain came from increased lead-acid shipments, particularly in 2006-2008.

The U.S. lead-acid battery category grew tremendously in 2008 to \$6.4 billion, gaining 33% over the 2007 market of \$4.8 billion.

Imports of Ni-Cd batteries into the U.S. have slowly been increasing since 2006, most likely making up for the declining exports during the same period. Based on import and export numbers for 2008, SBI estimates that Ni-Cd shipments for the year were \$115 million and the total U.S. Ni-Cd market was \$357 million.

