



Nickel in Batteries

Environmental and Economics
Committee

Item 4

Lisbon

23 April 2009



Nickel in Batteries

- Report completed April 2009
- Covers history of nickel in batteries, types of batteries, statistics on production, comparisons between batteries, environmental regulations, use in hybrid vehicles and recycling of batteries, list of producers



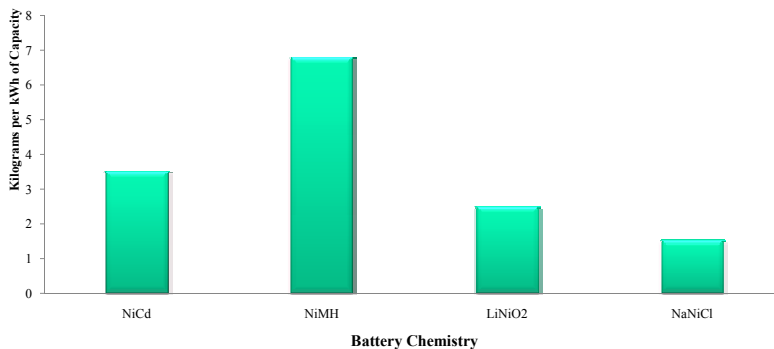
Nickel in Batteries

- Most important types of batteries containing nickel
 - Nickel Cadmium (NiCd)
 - Nickel-metal hydride (NiMH)
- Less common
 - Nickel zinc, nickel iron, nickel hydrogen and nickel sodium chloride, and some lithium batteries



Nickel in Batteries Nickel Usage by Chemistry

Nickel Used in Batteries by Type
Kg/kWh

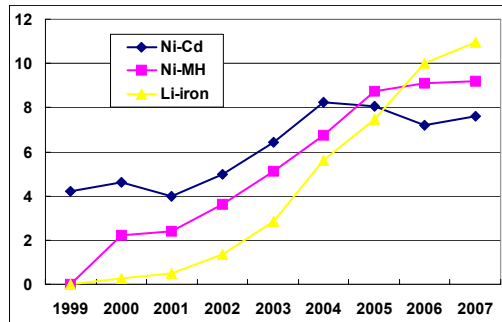




Nickel in Batteries Trends and Competition

Export of Batteries from China

Unit: Millions of cells



Source: BGRIMM



Nickel in Batteries Usage

- INSG estimates 38,900 tonnes of nickel used in batteries in 2007, slight decrease in 2008
- Roughly 3 percent of global usage (5% in China)
- By weight, 65 percent of nickel devoted to batteries is used for portable batteries, 30 percent in HEV batteries and 5 percent in industrial batteries.



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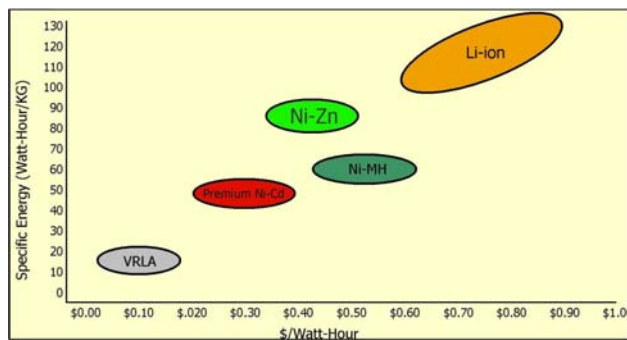
Energy Density and Cost

Comparison of Types of Nickel Batteries					
Density					
Technology	Energy Wh/kg	Wh/Liter	Power W/kg	Cost cents/Wh	
Nickel Cadmium	50	150	600	30-50	
Nicke Metal Hydride	80	200	600	35-60	
Nickel Zinc	60	170	900	40-60	
Nickel Iron	50	na	100	na	
Sodium Nickel Chloride	90	150	100	30	
Lead Acid	35	70	400	15	



Nickel Batteries

Energy Density and Cost



Source: Powergenix



Nickel in Batteries in Hybrid Cars

- Nickel-Metal Hydride batteries now dominate the hybrid vehicle market
- By 2012 - 3.2% of cars may be hybrid
- By 2020 - 25 to 45 % hybrid
- Projections for nickel in batteries of up to 18,700 t/a in 2012 and 400,000 to 700,000 t/a in 2020.



Nickel in Batteries List of Producers

- Report includes a list of producers with links to websites



Nickel in Batteries Outlook

- Outlook is favorable for increasing nickel usage in batteries
- Many uses for portable batteries
- Price of oil will impact demand for batteries for cars
- Competing technologies may require less nickel than the current NiMH battery, but many technologies use nickel



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