

Summary:

For the February 27th issue of NAATBatt's Advanced Battery Weekly, In addition, we have reposted an interview with Boston-Power given the company is going "full steam ahead" with Saab on its EV development.

For the week ending 2/22/10, the NAATBatt Index declined 1.0% while the U.S. Battery and the Asia Battery Indices increased modestly by 1.0% and 1.3%, respectively. The S&P 500 and the Russell 2000 increased modestly by 1.2% and 1.8%, respectively.

Key Highlights:

- **Sanyo** expects to increase its markets share of the lithium-ion (li-ion) battery market to increase to at least 40% (from ~30%) by 2015. Mitsuru Homma (an executive vice president at Sanyo Electric) stated that the company is targeting about 25% market share of the electric vehicle market by 2020.
- The **UK government** has announced a network of EV charging hubs will be installed in London. About 11,000 recharging points will be installed nationwide over the next 3 years. Installation of the first phase of 40 charge points in Newcastle and Gateshead is due to be completed in the coming weeks.
- **Tesla Motors** will begin offering a lease option on the Roadster and Roadster sport models in an effort to increase mainstream adoption. The 2010 Roadster will be available on a 3-year, 30,000-mile lease based on the manufacturer's price of \$111,005.
- The Beijing Branch of **China Petroleum & Chemical Corporation (Sinopec)** and **Beijing Capital Sci-Tech Group Corp.** are forming a joint venture (JV). The JV will develop Sinopec's gas stations into stations available for both fuel-based and EVs. A national plan to accelerate the development of China's auto industry calls includes a short-term target for EV output of 500,000 units in 2011.
- **Azure Dynamics** won an order of five Balance hybrid electric delivery trucks from **Canada Post**. Azure is participating in Canada Post's effort to replace 3,000 aged vehicles over the next five years.
- Robert Purcell Jr. has joined **Boston-Power's** board of directors. Purcell is a former executive with **General Motors** and had led its Advanced Technology Vehicles Group.
- **ISE Corporation** has supplied a 20 hydrogen fuel cell buses to BC Transit. BC Transit has put the buses into service at the 2010 Olympic Games. Each fuel cell bus utilizes a lithium phosphate battery system produced by **Valence Technology**.
- The **Transport of Rockland, NY (TOR)** has rolled out 16 hybrid electric buses. The TOR electric bus fleet will soon increase to 25 shortly. Each of the new buses cost about \$550,000.

A Few More Details:

Sanyo expects to increase its market share of the lithium-ion (li-ion) battery market to increase to at least 40% (from ~30%) by 2015. Mitsuru Homma (an executive vice president at Sanyo Electric) stated that the company is targeting about 25% market share of electric vehicle (EV) market by 2020. Panasonic has a joint venture (JV) with Toyota Motor to produce batteries for hybrids and EVs. Sanyo also has a strong solar-panel business, already does business with Honda Motor Co., Volkswagen AG and Ford Motor Co.
Source: Associated Press

The UK government has announced a network of EV charging hubs will be installed in London. Plugged-In Places will appear in car parks, supermarkets and retail centers and on the street. About 11,000 recharging points will be installed nationwide over the next 3 years. Installation of the first phase of 40 charge points in Newcastle and Gateshead is due to be completed in the coming weeks. In addition, motorists who buy an ultra-low carbon car will receive 25% off the price, up to a maximum of £5,000 (or ~\$6,743). PHEVs must emit less than 75g/km CO₂ and have an electric range of 10 miles, while all-EVs must be emissions free and travel for at least 75 miles on battery power to qualify. The government has indicated a grant will be available in January 2011 when a list of eligible vehicles is announced.
Source: UKPA and BBC

Tesla Motors will begin offering a lease option on the Roadster and Roadster sport models in an effort to increase mainstream adoption. The 2010 Roadster will be available on a 3-year, 30,000-mile lease based on the manufacturer's price of \$111,005. A lease requires an up front \$12,453 payment (including a \$1,658 first monthly payment, a \$9,900 down payment and an \$895 acquisition fee). In the past, the Roadsters were only available for an outright purchase. There are about 900 Roadsters on the road. The all-electric vehicle (EV) is with a 240-volt house plug (see **Exhibit 1**). Tesla estimates the cost savings compared to a similar gas power car is \$85 per month, based on Environmental Protection Agency studies and an estimated 833 miles driven monthly.
Source: WSJ

Exhibit 1: Universal Connector with Roadster



Source: Tesla Motors

The Beijing Branch of China Petroleum & Chemical Corporation (Sinopec) and Beijing Capital Sci-Tech Group Corp. are forming a joint venture (JV). The JV will develop Sinopec's gas stations into stations available for both fuel-based and EVs. The Chinese government support is supporting the market growth. A national plan to accelerate the development of China's auto industry calls includes a short-term target for EV output of 500,000 units in 2011. The construction of charging stations will be vital to the growth of the domestic EV sector.

Source: *People's Daily*

Azure Dynamics won an order of five Balance hybrid electric delivery trucks from Canada Post. The company stated that five vehicles will serve at Canada Post's facilities across Canada. Azure is participating in Canada Post's effort to replace 3,000 aged vehicles over the next five years. The vehicles are expected to be delivered in the first quarter of 2010. Azure vehicles will help Canada Post deliver more than 11.8 billion letters and packages to 31 million Canadians and over 1 million businesses and institutions

Source: *Automotive Business Review*

Robert Purcell Jr. has joined Boston-Power's board of directors. Purcell is a former executive with General Motors and had led its Advanced Technology Vehicles Group. The company has been focused on increasing penetration into the emerging electric vehicle market. The addition of Purcell follows the acquisition of Saab by Spyker Cars, in which CEO Christina Lampe-Onnerud indicated that the EV partnership with Saab Automobile is "full steam ahead".

Source: *Boston Globe and Saab History*

ISE Corporation has supplied a 20 hydrogen fuel cell buses to BC Transit. BC Transit has put the buses into service at the 2010 Olympic Games in Vancouver and Whistler, British Columbia. Each fuel cell bus utilizes a lithium-ion battery (43 Kilowatt-hour, 614 Volt) produced by Valence Technology. Compared to traditional internal combustion buses, the hydrogen fuel cell buses can operate for up to 15 years at 2x the efficiency with lower maintenance costs and a 62% reduction in greenhouse gasses.

Source: *Valence Technology*

The Transport of Rockland, NY (TOR) has rolled out 16 hybrid electric buses (see **Exhibit 2**). The TOR electric bus fleet will soon increase to 25 shortly. The buses utilize a GM-Allison Hybrid EP40 System with regenerative braking to optimize fuel efficiency, low noise and also reduce emissions. The regenerative braking accounts for 40% of overall fuel economy improvement, which is 20-54 percent more than the conventional buses. Each of the new buses cost about \$550,000.

Exhibit 2: A Hybrid Electric Bus Operated by the TOR



Source: *Outlook Press*



Interview with Dr. Christina Lampe-Onnerud, CEO of Boston-Power:

Please describe Boston-Power.

Founded in 2005, Boston-Power designs, develops, manufactures, and distributes next-generation Li-ion battery cells. Our lithium-ion battery technology platform provides a unique combination of dependable cycle life, fast charge, multiple independent safety features, and environmental sustainability at the highest energy density available today; we believe this is unmatched by any other commercially available product. With a design that emphasizes a whole system approach capable of powering end-applications ranging from portable consumer electronics to transportation, our initial product offering, Sonata®, was first introduced to the market through a strategic relationship with HP, the world's number one provider of notebook PCs. Since then, the company has leveraged the technology benefits and proven mass production of its initial product to expand its offerings into the transportation and energy storage markets with Swing™, continuing our support of the global shift towards cleaner forms of energy.

Our Li-ion battery technology platform is in mass production today in one of the world's most advanced manufacturing facilities in Asia, with the capacity to scale to millions of batteries per month. With over 60 patents pending, Boston-Power is headquartered outside of Boston, Massachusetts, with Six Sigma-level mass production operations in Asia.

How does Boston-Power's technology address the thermal runaway (safety) issues?

Many of us at Boston-Power have been with the Li-ion industry since its inception and we have been involved in over a hundred safety investigations and failure audits worldwide prior to starting Boston-Power. As such, we gave safety equal weight at the design "table" when we created the technology platform. Our cell design has multiple independent safety features that activate at precise trigger points, resulting in what we believe is the safest battery system available today.

In conventional batteries, for example, vents which can alleviate pressure are located on top of each cell, where, because they are packed in-series, they touch the next cell. This means that if the cell needs to vent, it does so directly onto the next cell. This, in turn, greatly increases the likelihood of the "cascading effect" associated with thermal runaway, where the failure of one cell leads to the failure of others.

Boston-Power cells incorporate vents on the side of the cell so that if they are activated, they vent away from other cells. This patent-pending design significantly reduces the impact on the other cells in a battery pack. This, combined with our lower-pressure aluminum can design and CID device, as well as lower temperature PTC (fuse), also means our cells will shut themselves down long before they reach the point where a thermal runaway could occur. We also designed a new chemistry to slow down kinetics of the system.

Is the cathode material the most important variable?

While our cell chemistry is certainly critical to several key features of our product, our Li-ion battery technology platform was conceived and designed as a system. The founding members of Boston-Power, who consulted to the world's largest battery manufacturers, saw that everyone was looking for a "silver bullet," or a single feature that would improve safety, increase longevity, and boost energy density. The impetus behind the founding of the company was based on this collective insight, that there is no single feature that can revolutionize the Li-ion battery world. Instead, the focus is on a systems approach where

all cell features, internal chemistry (where cathode and anode choices are critical), separators, safety components, cell shape, and housing material, work in harmony to deliver the industry-leading performance of our Sonata and Swing cells.

How do you see demand evolving across various end-markets over the next three years?

While the focus in transportation has been on short-range HEVs to bring some small savings in on-going fuel costs to consumers, over the next three years, we expect that the focus will shift towards PHEVs and BEVs, as battery technologies continue to improve, automotive manufacturers standardize on large format battery packs, and the recharging infrastructure grows to meet the increasing number of vehicles on the road. At Boston-Power, we have focused our development on high energy batteries that fulfill the end goal of electric drive, an all-electric car, or long range plug-in hybrid car. We believe this segment will dominate in Asia first, fueled by strong legislation and consumer pull. We further believe that the United Nations-led climate change debates leading up to the meeting in Copenhagen in December 2009 will further strengthen the political outlook to prefer long-range electric drive. High energy density and low cost are the two driving parameters to make this market real.

In the portable power space, we see the need for advanced battery technologies increasing dramatically as consumer and business end-users' appetite for more advanced and portable devices grows. In addition to increased runtime, these users will also be looking for smaller, lighter devices, which will lead to the development of smaller and more powerful batteries. The paradigm of replaceable, rechargeable lithium-ion batteries will also shift as it becomes possible, with technologies like Sonata, to embed battery cells into products that will last as long, if not longer, than the products they power. Finally, we continue to see more requirements around "green" initiatives, driven by the IT departments of large multi-nationals, as well as organizations in Europe specifically. Many governments also have strict mandates on IT purchases around environmental sustainability and reduced carbon footprint.

What is the company's go-to-market strategy for new market opportunities?

We have focused our go-to-market strategy in the electric vehicle market on establishing programs with large OEM end-customers, tier 1 system suppliers, and battery pack suppliers globally. In fact, you can expect to hear more from us in the coming months on this front. In the portable power space, we continue to focus on strategic alliances with the key OEMs, ODMs, and packers in the notebook PC and other consumer electronic segments. Beyond these markets, we expect opportunities in the energy storage area, where the unique benefits of our battery technology platform can bring demonstrable benefits to customers and users...and in many cases facilitate the growth of alternative/cleaner energy sources overall.

How will the various energy and power requirements for various markets be addressed?

Our next-generation Li-ion battery technology platform has been designed specifically to deliver low-cost, long cycle life, dependable energy density, and sufficient power for multiple applications, including BEV and PHEV applications. This is in contrast to other technologies in the market designed specifically for use in HEV applications, which require high power density. In fact, we believe that force-fitting HEV-type technology for PHEV and BEV applications will lead to a situation where low cost cannot be achieved, and volumetric and mass constraints will present significant challenges. Our Swing battery cell for EV and transportation applications, and our Sonata cell for notebook and portable power applications, both evolved from our next-generation Li-ion technology platform and leverage its core attributes for different applications.

Please characterize the competitive landscape. Where do you believe Boston-Power could have an advantage?

The lithium-ion battery market includes several established companies, primarily based in Japan and Korea, and some more recent market entrants, primarily based in the U.S. and targeting the HEV market with high-power solutions.

In the PHEV and BEV market, our technology competes extremely favorably around the core industry drivers of: weight and space; cost; reliability (long calendar life); safety, and the environment. In the portable power market, our unique chemistry and mechanical design have also enabled us to enjoy industry leadership and differentiation in long cycle life, fast charge, safety and environmental sustainability. Recently, there have been competitor claims of long cycle life, but due to architectural constraints, this is achieved at the expense of capacity, fast charge, safety, and environmental sustainability.

Discuss some the challenges ahead for Boston-Power and the battery industry.

For Boston-Power, our biggest challenge is to stay focused on our core mission and vision. We are in exciting times, with many exciting opportunities ahead of us, in applications ranging from portable power and transportation to energy storage. We have strong and visible momentum in the market, and we will continue to balance that momentum with focus and scale.

For the battery industry, the biggest challenge may be the “explosive growth” in mobile power coinciding with the onset of automotive and large format applications worldwide.

Many in the U.S. have indicated a preference for PHEV versus all-electric. What are your thoughts?

While the market for BEVs and PHEVs is still developing, we believe that there will be significant demand for both. Initial growth of BEVs may actually show up in vehicle “fleet” customers, where the advantages of electric versus gasoline power will be seen very quickly. Individual consumers may initially prefer PHEVs in order to gain comfort around the range capabilities, but there is some thought that BEVs will become the “second car” in many people’s driveways. And since both PHEVs and BEVs require high energy batteries, compared to the high power batteries used in HEVs, our Swing cells offer a significant price/performance advantage, as well as perhaps the most elegant technical solution to meet these needs.

How big do you envision the electric vehicle market (including autos, ebikes) will be by 2015?

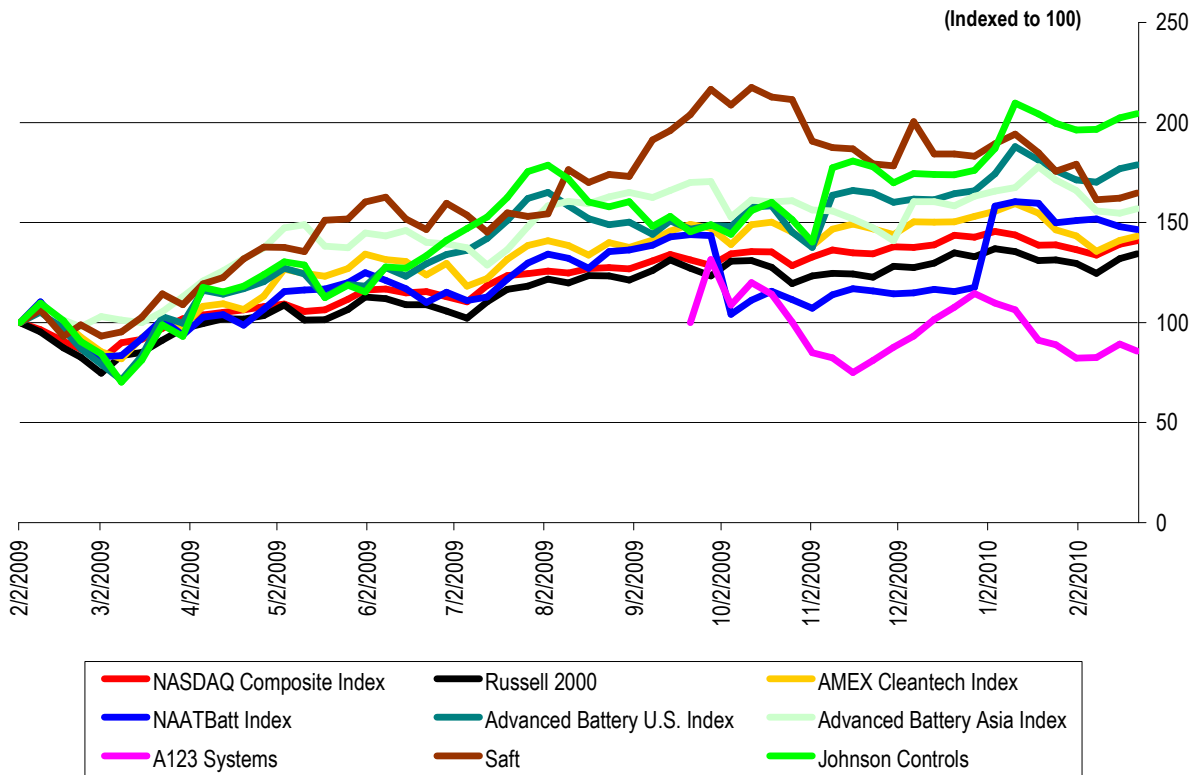
By 2015, we see the electric vehicle market really beginning to take off. At that time most of the major automakers will offer some form of PHEV and BEV in their portfolios, many governments and municipalities will have zero emission vehicle (ZEV) type requirements, and Li-ion battery costs will begin to come down as volumes increase. This may be a multi-billion dollar segment of the market at that time.

Forecasts for the two-wheeled EV segment, including e-bikes, e-scooters, and e-motorcycles, has already grown to almost 30 million units per year today. This trend will continue to grow, especially in geographies including China, India, Japan, and Europe, where there is already a high level of consumer acceptance.

Some thoughts in conclusion?

Driven by a data-driven culture and offering an innovative battery platform that has already been introduced and accepted by the leaders of the electronics industry, Boston-Power intends to help build a battery industry to support one of the most exciting markets of our times, the electric car. By offering a high energy density Li-ion battery technology platform which is already in mass production, we believe we can help shape the ultimate long-range electric vehicle. We are excited by this challenge and look forward to sharing more information with you soon!

**Exhibit 3: Indices Performance
(From February 2, 2009)**

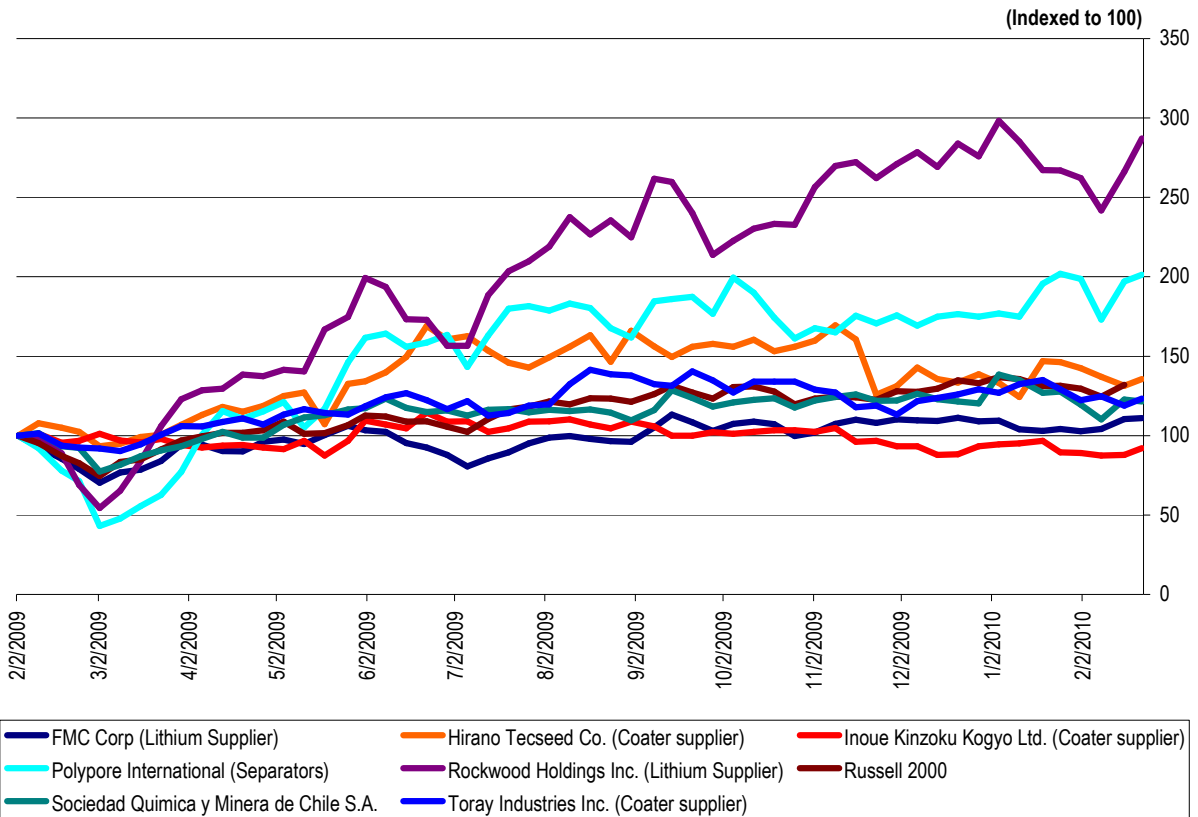


Index	Close on 2/22/2010	52-Wk High	% of 52-Wk High	Performance		
				LTM	YTD	Week
Dow	10,383.4	10,767.2	96.4%	45.9%	(0.5%)	1.1%
S&P 500	1,108.0	1,150.5	96.3%	49.1%	(0.8%)	1.2%
NASDAQ	2,242.0	2,326.3	96.4%	61.6%	(2.3%)	1.3%
Russell 2000	632.3	649.2	97.4%	60.2%	0.7%	1.8%
AMEX Cleantech Index	994.7	1,112.5	89.4%	54.4%	(6.8%)	1.6%

Source: Bloomberg and ThomsonOne

Note: The select NAATBatt Index is a market-value-weighted average and includes ALTI, BASF, COP, ENS and XIDE. The Advanced Battery U.S. Index is a market-value-weighted average and includes HEV, MGA, MXWL, UQM and VLNC. The Advanced Battery China Index is a market-value-weighted average and includes BYD, CBAK, GS Yuasa, LG Chem and Panasonic.

Exhibit 4: Supplier Performance
(From February 2, 2009)



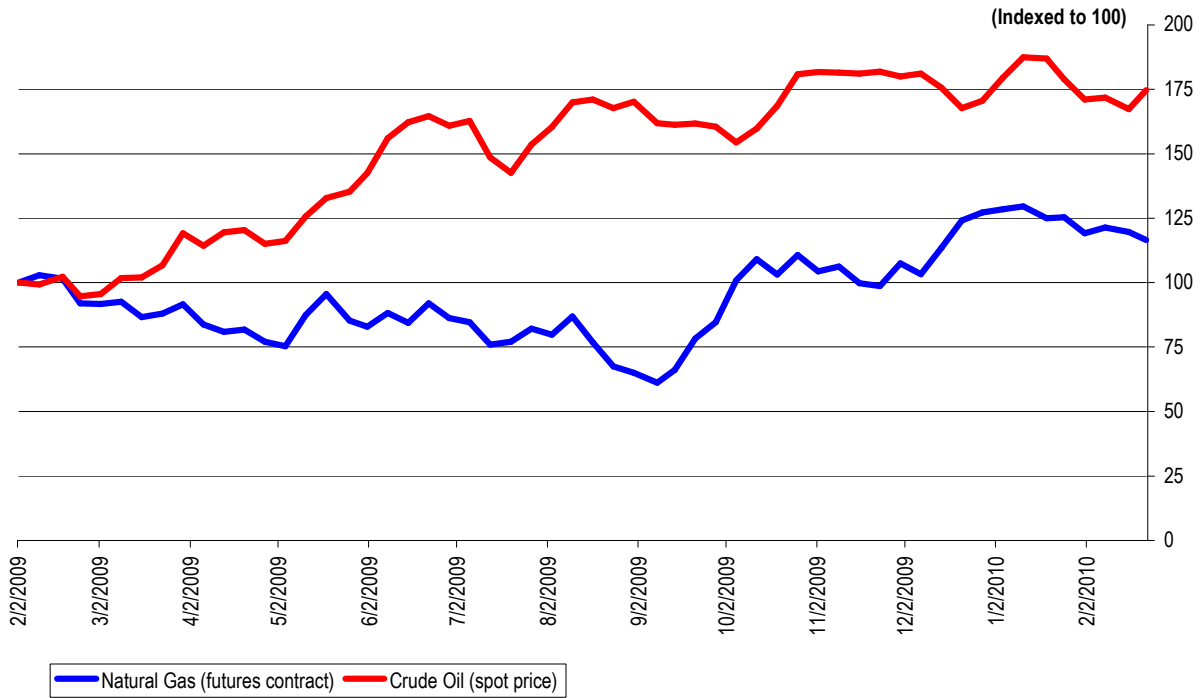
Source: Bloomberg

Exhibit 5: Commodity Prices

Commodity	Price on 2/22/2010	Price on 2/16/2010	Price on 1/22/2010	1 Week Change	1 Month Change
LME Nickel (Cash, \$ per tonne)	20,530	19,575	18,450	4.9%	11.3%
LME Lead (cash, \$ per tonne)	2,319	2,195	2,226	5.6%	4.2%

Source: LME

Exhibit 6: Natural Gas and Crude Oil
 (From February 2, 2009)



Source: EIA



LI-ION BATTERIES: THE NEXT BUBBLE?

The news media has been filled this week with reports of the imminent popping of the Li-Ion “bubble”. Powertrain 2020, a study of the Li-Ion battery industry released by Roland Berger Strategy Consultants, predicts significant Li-Ion battery manufacturing overcapacity in the period between 2014 and 2017 (200% of 2016 demand already in 2015), especially in the US and Japan. The study anticipates significant contraction in the industry with no more than six to eight survivors, each with minimum revenues of about \$800 million.

Properly understood, Powertrain 2020 should be seen not as an obituary but as a call to action. Its dismal industry forecast is premised on low demand for EV’s and PHEV’s. Not surprisingly, the report attributes low demand to the high price of Li-Ion batteries. Powertrain 2000 predicts that advances in technology and manufacturing should be sufficient by 2018 to reduce the price of batteries to the point where demand will catch up with capacity.

We have to do better than that - and we can. Too much rides on the success of electric drive to leave its success to speculative advances in technology and economies of scale by 2018. As an industry we must find ways to reduce battery costs quickly, by developing standards and best manufacturing practices, and by taking the burden of the costs that will inevitably remain off the shoulders of American consumers, whose product choices over the next few years will determine the success or failure of our industry.

NAATBatt will continue to do its part. I hope that you or the appropriate people in your organization have registered for our March 1 Webinar on “Reducing Waste in the Manufacture of Li-Ion Cells and Electrodes” with Dr. Mohit Uberoi of MEGTEC Systems and John Dispennette of KEMET Corporation (lines are still available; e-mail Suzanne@mccloudcommunications.com to register). The Webinar will discuss ways that manufacturers are working to reduce waste in the production process.

Our March 15 Webinar will examine the important issue of standards. Standardization of advanced batteries is a critical prerequisite for reducing the cost of electric vehicles. Bob Galyen of Magna, who currently chairs the SAE Battery Standards Committee, and Priya Tabaddor of Underwriters Laboratories will discuss the standardization process in the US, assess its progress and prospects in the battery area, and inform participants how they can help move the process forward. I hope you will join us on March 15 for this important program.

Thank you as always for your support of our industry and for your support of NAATBatt.



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