

## Summary:

For the July 2<sup>nd</sup> issue of NAATBatt's Advanced Battery Weekly, we highlight the ongoing sector activities. On July 21<sup>st</sup>, we will be hosting a webinar "Hybrid Battery-Ultra Capacitor Systems for Automotive Applications - Why Can't We Just Get Along?"

The NAATBatt Index was flat while the U.S. Battery Index increased 2.0%. The Asia Battery Index declined 4.7%. The S&P 500 and Russell 2000 declined 3.5% and 2.8%, respectively.

Jim Greenberger ponders the wisdom of "The 500 Mile Battery Prize" in *Executive Directors' Notes*.

## Key Highlights:

- The successful **Tesla Motors** IPO (raising \$266 million) should help garner more focus on the electric drive industry. TSLA shares increased 41% on the first day of trading.
- **Mitsubishi Motors** and **PSA Peugeot-Citroen** are considering a joint development agreement for power train technology that will be used in small commercial electric vehicles (EVs). Mitsubishi and Peugeot-Citroen would manufacture the power train and develop power-management systems.
- **Toshiba** is building a 25 billion yen (~\$284 million) lithium-ion (li-ion) battery plant that is scheduled to begin operations next spring. The firm is in final stage of talks with **Volkswagen AG** to supply batteries.
- **Toshiba** is jointly developing car battery systems with **Mitsubishi Motors**. The companies have been working on developing a pack containing Toshiba's "super-charge ion battery," or SCiB.
- The **Shanghai Government** is planning to construct 400 EV charging stations this year. The city government will add **SAIC's (Shanghai Automotive Industry Corp) Roewe 750** to its purchase list in an effort to increase EV awareness.
- **BMW** unveiled its planned all-EV. The company is intent is to build a new class of vehicle and delivering substantial numbers to showrooms by 2013.
- **ECotality** has been working with the **City of Knoxville, Oak Ridge National Laboratory, Knoxville Utilities Board, Tennessee Valley Authority** and **Knox County** to determine where to locate 350 publicly accessible EV charging stations. The charging stations will collect data from the EVs that ECotality will use to help develop a nationwide infrastructure capable
- The **State of Washington** has received \$1.32 million in federal economic stimulus funds to build 4 or 5 EV charging stations along the I-5 corridor from **Canada** to **Oregon**. The plan is to space the charging stations at about 80-mile intervals along the 276-mile length of I-5 in the state, within a mile of the freeway.
- Auto manufacturers have raised concern the **U.K. Government** could jeopardize EV uptake as it has yet to confirm a grant that would give purchasers a maximum £5,000 (or \$6,188) discount starting January 2011. **Peugeot Citroën, Mitsubishi, Nissan, Peugeot** and **Renault** are indicating that without the incentives, the U.K. would become a significantly less attractive market to place their products.

- **Raser Technologies** and **Hyundai Heavy Industries (HHI)** announced the signing of a memorandum of Understanding (MOU) for the joint development of renewable energy and EVs.
- **Car Charging Group** is providing **Artech** with electric car charging services in their 800-foot-long, 5-story parking garage. Artech will share a percentage of the revenue derived from the charging stations.
- All-EV manufacturer **CT&T** (Korea-based) formed a joint venture (JV) with the **2AM Group**, called **CT&T Southeast**. The JV is investing \$21 million to open an assembly facility in South Carolina.
- **Leo Motors** opened its first EV manufacturing plant in Korea. The company is targeting production of over a 1,000 units of **Hilless 1, 3 and 5 scooters** (see **Exhibit 4**) per month in the new plant.
- **SouthWest NanoTechnologies** (SWeNT), a manufacturer of carbon nanotubes (CNT), along with the **University of Oklahoma (OU)** have been awarded a \$500,000 grant by the **Oklahoma Center for the Advancement of Science and Technology (OCAST)**. The award is to be used for the development of CNT enhanced cathode materials that will form the basis for the production of low-cost and li-ion EV batteries.

## A Few More Details:

The successful Tesla Motors IPO (raising \$266 million) should help garner more focus on the electric drive industry. TSLA shares increased 41% on the first day of trading. The company is plans to begin selling the Model S sedan (as shown in **Exhibit 1**) in 2012 for a minimum of \$50,000.

### Exhibit 1: The Tesla Model S



COURTESY: TESLA

Mitsubishi Motors and PSA Peugeot-Citroen are considering a joint development agreement for power train technology that will be used in small commercial electric vehicles (EVs). Mitsubishi and Peugeot-Citroen would manufacture the power train, develop power-management systems and assemble batteries with the first application for small EVs. Currently, Mitsubishi makes batteries in a joint venture with Japan's GS Yuasa Corp.

Source: *Dow Jones and Nikkei*

Toshiba is building a 25 billion yen (~\$284 million) lithium-ion battery plant that is scheduled to begin operations next spring. The firm is in final stage of talks with Volkswagen AG to supply batteries. Toshiba also plans to build a U.S. plant to supply electric-vehicle motors to Ford Motor.

Source: *Nikkei*

Toshiba is jointly developing car battery systems with Mitsubishi Motors, which could evolve into a supply agreement. The companies have been working on developing a pack containing Toshiba's "super-charge ion battery," or SCiB, for use in EVs. The advantages include extended cycle life and recharging speed.

Source: *Dow Jones*

The Shanghai government is planning to construct 400 EV charging stations this year. The city government will add SAIC's (Shanghai Automotive Industry Corp) Roewe 750 (as shown in **Exhibit 2**) to its purchase list in an effort to increase EV awareness. SAIC is expected to start selling the mild hybrid EV by year end.

Source: *China Business News*

**Exhibit 2: The Roewe 750**



Source: SAIC

BMW unveiled its planned all-EV. The company is intent is to build a new class of vehicle and delivering substantial numbers to showrooms by 2013. The company stated battery technology has “reached the point where it really makes sense to drive electric. BMW is taking a different path than competitors by designing a megacity vehicle around its electric drive system from the start.

Source: NY Times

ECotality has been working with the City of Knoxville, Oak Ridge National Laboratory, Knoxville Utilities Board, Tennessee Valley Authority and Knox County to determine where to locate 350 publicly-accessible EV charging stations in Knoxville and the surrounding area – including 10 solar-powered stations. As part of the 3-year EV Project, the charging stations will collect data from the EVs that ECotality will use to help develop a nationwide infrastructure capable of supporting millions of EVs. The group has looked at over 100 proposed locations in Knoxville, Knox County and surrounding counties.

Source: City of Knoxville, Tennessee

The state of Washington has received \$1.32 million in federal economic stimulus funds to build 4 or 5 EV charging stations along the I-5 corridor from Canada to Oregon. The funds would ultimately pay for 7 to 10 stations on I-5 and I-90. The exact locations have not been identified. The plan is to space the charging stations at about 80-mile intervals along the 276-mile length of I-5 in the state, within a mile of the freeway. Charging stations located at the rest stops would be “level 2,” requiring about 3 to 8 hours to fully recharge an EV. Future stations would be classified as “level 3” with the ability to fully charge a vehicle in 15 to 30 minutes.

Source: Herald Net

Auto manufacturers raised concern the U.K. Government could jeopardize EV uptake as it has yet to confirm a grant that would give purchasers a maximum £5,000 (or \$6,188) discount on electric, plug-in hybrid and hydrogen vehicles starting January 2011. Peugeot Citroën, Mitsubishi, Nissan, Peugeot and Renault are indicating that without the incentives, the U.K. would become a significantly less attractive market to place their products. Each of the companies is planning to mass market next year.

Source: The Guardian

Raser Technologies and Hyundai Heavy Industries (HHI) announced the signing of a Memorandum of Understanding (“MOU”) for the joint development of renewable energy and EVs. The agreement also sets forth the first phase of commercial production of electric fleet vehicles utilizing HHI's high tech engineering and Raser's powertrain technology. The “Well-to-Wheels” demonstration projects, identified in this initial MOU, consist of a 5 megawatt solar power generation project, and the production of the first 3 extended range electric trucks (“E-REV”) for U.S. fleet customers.

Source: Raser Technologies

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Car Charging Group is providing Artech (a 232-residence luxury condominium located in Florida) with electric car charging services in their 800-foot-long, 5-story parking garage. Artech residents who own electric vehicles will now be able to conveniently charge their vehicles at the charging stations located on site. Under the agreement, Artech will share a percentage of the revenue derived from the charging stations.

*Source: Car Charging Group, Inc.*

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All-EV manufacturer CT&T (Korea-based) formed a joint venture (JV) with the 2AM Group, called CT&T Southeast. The JV is investing \$21 million to open an assembly facility in South Carolina. CT&T Southeast will manufacture the cZone and eZone (as shown in **Exhibit 3**) EVs. Depending on the type of battery, the EV could travel up to 50 or 100 miles on a before a charge is required. A fully depleted battery takes about six hours to charge; a half-depleted battery, about two hours.

*Source: Southern Governors' Association*

### **Exhibit 3: The eZone**



*Source: Green Car*

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Leo Motors opened its first EV manufacturing plant in Korea. The company is targeting production of over 1,000 units of Hilless 1, 3, and 5 scooters (see **Exhibit 4**) per month in the new plant. Leo had outsourced its manufacturing to an independent supplier's facilities but found it not to be cost-effective.

*Source: Industry Week*

### **Exhibit 4: The Hilless 5**



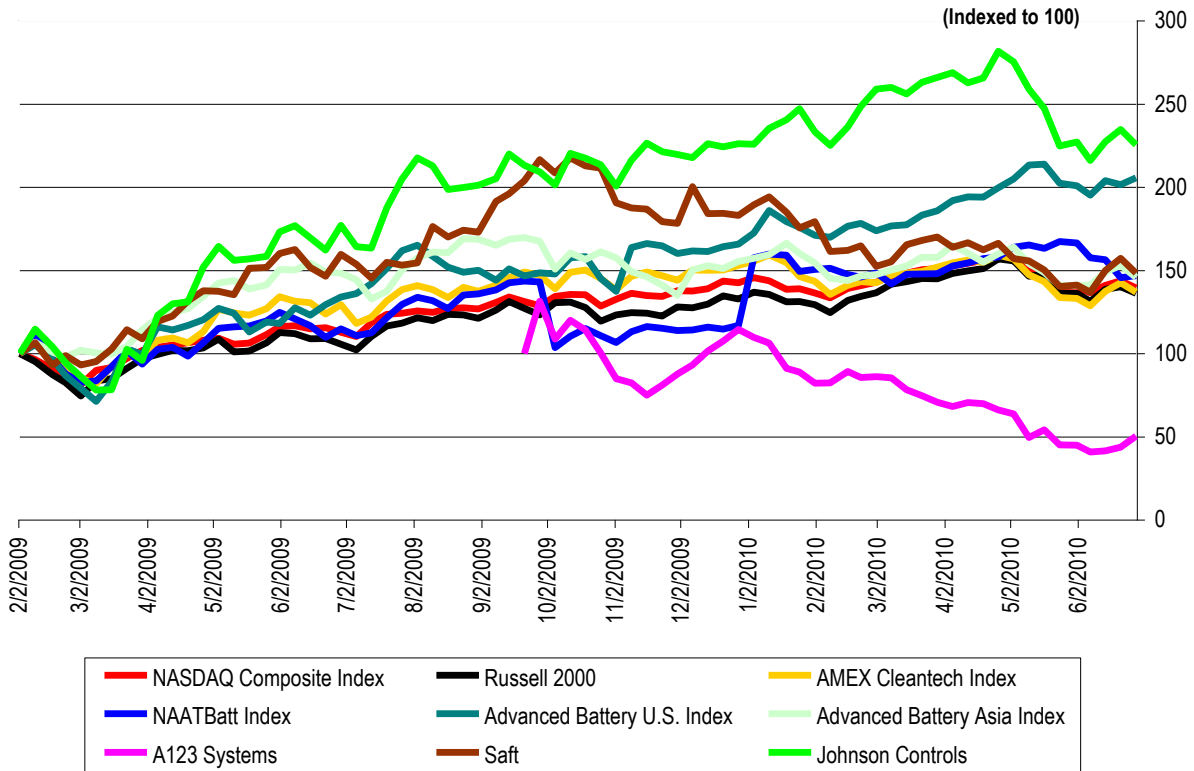
*Source: Leo Motors*

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SouthWest NanoTechnologies (SWeNT), a manufacturer of carbon nanotubes (CNT), along with the University of Oklahoma (OU) have been awarded a \$500,000 grant by the Oklahoma Center for the Advancement of Science and Technology (OCAST). The award is to be used for the development of CNT enhanced cathode materials that will form the basis for the production of low-cost and li-ion EV batteries. Under the 3-year grant, SWeNT will be working with OU to solidify partnerships with automotive manufacturers as well as li-ion battery producers to advance all-EVs.

*Source: Nanowerk*

**Exhibit 5: Indices Performance  
(From February 2, 2009)**

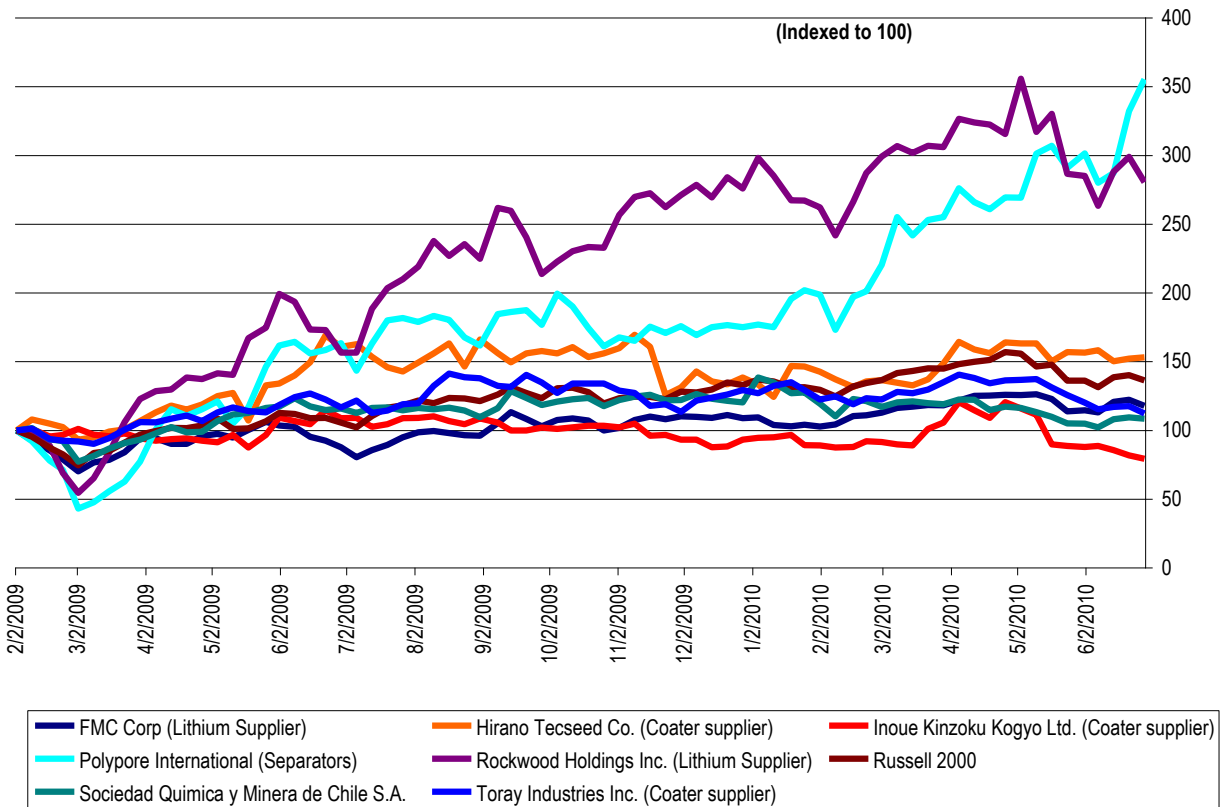


Index	Close on 6/28/2010	52-Wk High	% of 52-Wk High	Performance		
				LTM	YTD	Week
Dow	10,138.5	11,309.0	89.7%	20.1%	(2.8%)	(2.9%)
S&P 500	1,074.6	1,219.8	88.1%	16.8%	(3.8%)	(3.5%)
NASDAQ	2,220.7	2,535.3	87.6%	20.6%	(3.2%)	(3.0%)
Russell 2000	641.5	746.0	86.0%	25.2%	2.1%	(2.8%)
AMEX Cleantech Index	951.3	1,112.5	85.5%	5.9%	(10.8%)	(3.9%)

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 6: Supplier Performance  
(From February 2, 2009)**



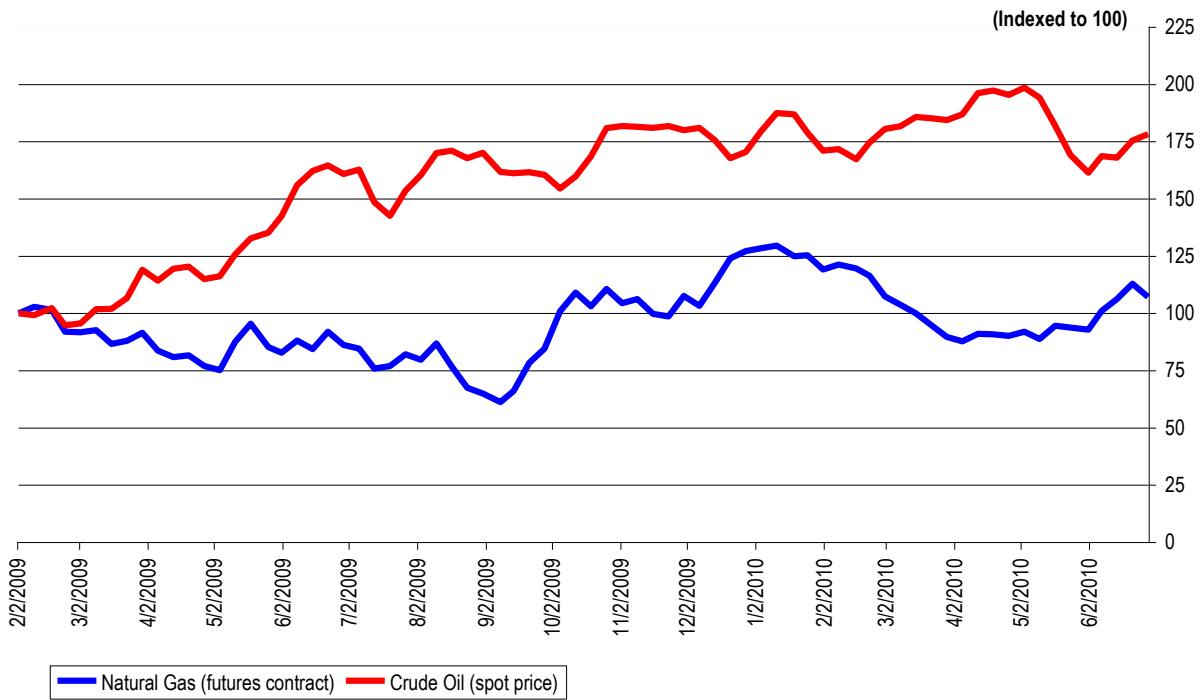
Source: Bloomberg

**Exhibit 7: Commodity Prices**

Commodity	Price on 6/28/2010	Price on 6/21/2010	Price on 5/28/2010	1 Week Change	1 Month Change
LME Nickel (Cash, \$ per tonne)	20,205	19,930	21,550	1.4%	(6.2%)
LME Lead (cash, \$ per tonne)	1,827	1,786	1,820	2.3%	0.4%

Source: LME

**Exhibit 8: Natural Gas and Crude Oil**  
**(From February 2, 2009)**



Source: EIA

## Executive Director's Notes



### THE 500 MILE BATTERY PRIZE

The proposed Electric Vehicle Deployment Act of 2010 (S.B. 3442) contains a number of provisions of interest to the advanced battery community, but none more innovative than the Advanced Batteries for Tomorrow Prize referenced in Section 10 of the bill. The Prize would award \$10 million to an entrant submitting a cost-effective, reasonably sized battery that could power a plug-in electric drive vehicle for 500 miles before recharging.

The devil, of course, is in the details, but the concept is clearly to create something similar to the Ansari X Prize. That prize was awarded to Burt Rutan and the Tier One Project for their successful multiple launch of SpaceShipOne. Although the Ansari X Prize paid out \$10 million in an award, it is estimated that it encouraged more than \$100 million of investment in private space travel.

The important question, however, is not whether awards are an appropriate way to encourage investment in advanced batteries, but rather whether the award focuses on an appropriate goal. A battery that would power a vehicle for 500 miles would certainly solve an important problem with electric vehicles. But is it the most important problem?

I recently attended the 2010 Automotive News Green Car Conference and Exhibition in Novi, Michigan at which representatives of many of the automotive OEM's made presentations about the status of their electric drive programs and their expectations concerning consumer acceptance of those projects. The big take away for me from was that although the 100 mile range of first generation electric vehicles sounds like a big problem, the OEM's are less concerned about range than they are about cost.

Several speakers, in fact, addressed the issue of battery cost vs. battery range. The interesting and almost universal view expressed was that if battery makers could improve significantly the energy density of lithium-ion batteries, the OEM's would be more inclined to reduce the size and cost of the batteries installed in vehicles rather than extend the range of the vehicles.

I could not help thinking about this insight when I read Section 10 of S.B. 3442. The 500 mile battery is a great concept. But let's not take our eye off the ball: The real issue is cost. Unless and until electric vehicles become affordable and value competitive with traditional ICE-powered cars, electric drive will remain a side show in the automotive market. It really does not matter how far a Tesla Roadster can travel on one charge. A prize for an automotive battery that can be mass produced for \$150 per kWh--now you are talking!



James J. Greenberger  
Executive Director

July 2, 2010

North American Industry  
Announcements and Calendar

- **Next Webinar Program: Hybrid Electric Systems for Automotive Applications:** The NAATBatt Webinar series continues on Wednesday, July 21, 2010, with a program entitled “Hybrid Battery-Ultra Capacitor Systems for Automotive Applications—Why Can’t We Just Get Along?”. The program will examine whether combining high energy lithium-ion batteries with high power ultra capacitors would provide a better power system for electric vehicles than a power system based solely by lithium-ion cells. The speakers at the program will be Dr. Ted Bohn of Argonne National Laboratory and Dr. John M. Miller of Maxwell Technologies, Inc. The program will begin at 2:00 p.m., EDT, and continue for approximately 60 minutes. Employees of NAATBatt member firms may register for the program on a complimentary basis by clicking the following link: <http://events.meetingbridge.com/Register/?06123179151&code2> Non-members are welcome to join the program for a \$30.00 charge. If your firm is not yet a member of NAATBatt, please click on the following link to register (or, better yet, join NAATBatt now!): <http://events.meetingbridge.com/Register/?06123179151>
- **Storage Week 2010:** Storage Week 2010, sponsored by Infocast, will be held on July 12-15, 2010 at the Rancho Bernardo Inn in San Diego, CA. The conference will focus on grid level storage with separate tracks on bulk storage and grid services. NAATBatt is a supporting organization of the conference. Information about the conference can be found at: <http://www.infocastinc.com/index.php/conference/storage10>.
- **Challenges and Opportunities: Building a U.S. Battery Industry for Electric Drive Vehicles: Progress Challenges and Opportunities:** The National Academy of Sciences’ Board on Science, Technology, and Economic Policy (STEP), in cooperation with the Michigan Economic Development Corporation and the Department of Energy, will hold a conference in Livonia, Michigan on July 26-27. The conference will bring together key stakeholders from industry, federal and state governments, and universities to review DOE and other initiatives to support the battery industry and highlight key issues to be addressed.
- **The Battery Show 2010:** The Battery Show, a conference and exposition focused on multiple battery chemistries and applications will be held in San Jose, California on October 5-7, 2010. Information about the show can be found at: <http://www.thebatteryshow.com/index.php>
- **Battery Power 2010 Conference:** Battery Power 2010 will be held in Dallas, Texas on October 19-20, 2010. NAATBatt is a supporting organization of the conference. Information about the conference and registration for it may be found at: [http://www.batterypoweronline.com/bppt-conf10/bp10\\_supportingorg.php](http://www.batterypoweronline.com/bppt-conf10/bp10_supportingorg.php)
- **U.S. National Electric Vehicles Safety Standards Summit:** The U.S. National Electric Vehicles Safety Standards Summit, a joint program of the National Fire Protection Association and SAE International, will be held on October 19-20, 2010, at the Cobo Convention Center in Detroit, Michigan. Information about the event can be found at: [http://www.nfpa.org/newsReleaseDetails.asp?categoryId=488&itemId=46997&cookie\\_test=1](http://www.nfpa.org/newsReleaseDetails.asp?categoryId=488&itemId=46997&cookie_test=1)



- **NAATBatt Membership Information:** NAATBatt is taking applications for 2010 membership from well qualified industry participants and supporters. Membership in NAATBatt is a great way to keep abreast of developments in advanced technology batteries and to support the growth of a market for products that could change the world. Your support for NAATBatt programs, newsletters, committees and the upcoming roadmap project is essential to the success of our organization and our industry. To inquire about membership, please complete the following inquiry form: <http://naatbatt.org/membership-inquiry/>. NAATBatt will respond with additional information about membership.



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