Plug-in 2011 Highlights

Ten Battery Questions

The Plug-In 2011 conference that took place in North Carolina last week mostly focused on battery-related questions: How much battery do you need? What is the best system for charging the battery? At what level should the battery charge? Who is buying battery components from whom? How is government policy shaping battery development in the U.S? What is the battery of the future? How important is lithium supply? What challenges and opportunities do batteries represent for the management of our electric grid? Do batteries have an after-life? What other technologies might help overcome the battery barrier?

AFV Insider provides some insights on these issues drawn from questions to panelists and interviews conducted in Raleigh.

I. How much battery do you need?

Range anxiety is most often cited as the major consumer-generated roadblock to adopting electric vehicles. While 80% of Americans drive less than 40 miles per day, they are used to getting 200 to 300 miles per full tank of gas, which it only takes them a few minutes to fill up.
In order to beat the cost advantage of gasoline-powered vehicles, battery costs need to more than halve to $200/kWh. In the interim, automakers must decide how to strike a balance between battery cost and range.

Auto manufacturers have framed and responded to this issue with different strategies and products:

Toyota: the path of least battery

Toyota is hedging its bets when it comes to batteries. It will be coming out with a plug-in hybrid in 2012, but the vehicle will only be able to get 13 miles of pure electric range. As Toyota manager Geri Yoza explained, Toyota sees the plug-in as the next step in the development of its hybrid market-leading Prius line. In an evolutionary rather than revolutionary approach, Toyota is using a small battery to further optimize the Prius' fuel efficiency.
At the same time, Toyota is gearing itself for EVs, albeit not via the Prius, nor within the same market segments as its competition. Toyota's all-electric Scion iQ EV will also be released in 2012, but only to fleet purchasers. At 65 miles, even this vehicle has a relatively limited range when compared to Nissan's Leaf or Mitsubishi's i. Finally, rather than develop a battery with a greater range in-house, Toyota has partnered with Tesla in a $100 million deal to develop the powertrain for its RAV4 all-electric SUV, which will have a 100-mile range and is also scheduled for release in 2012.

GM: "no compromise"

GM has bet against all-electric vehicles in the short term. Its 2011 Chevrolet Volt's battery has enough range to cover the average daily drive for most Americans, but a gasoline-powered range extender allows the Volt to get a fuel efficient vehicle's 300 miles per tank of gas. This is what Chevrolet's director Britta Gross calls GM's "no compromise" answer to the battery dilemma. In other words, the Volt was built with typical ICE vehicle usage in mind: most drivers will presumably be able to drive in all-electric mode most of the time (i.e., less than 40 miles), but they will also have the convenience of being able to drive the same distance as an ICE before having to recharge and/or refuel. Consumer reports show that this battery size is allowing Volt drivers to average 1,000 miles on a tank of gasoline.

Ford: a portfolio approach

Following a "portfolio approach", Ford director Nancy Gioia explained that while sustainability is the driving force behind the company's embrace of alternative fuel vehicles, it is agnostic as to the form the latter will take. Ford is on the fence as to what technology consumers will adopt, and so the company will be offering a mixed bag: Ford will use its existing Focus model as the platform for a 2012 release of hybrid, plug-in hybrid, and all-electric models. The latter will have a 100-mile range.

Mitsubishi: the electric affordability plan

Mitsubishi has been producing the 100-mile range, all-electric iMiev in Japan and Europe since 2009 and has already delivered over 10,000 vehicles across 21 countries. Although Mitsubishi was the first automaker to mass-produce EVs, it is entering the U.S. market on the Nissan Leaf's bandwagon. Modified and scheduled for release as the "i" in the U.S. market in 2012, Mitsubishi's EV will already have been tested in other markets and benefit from some economies of scale. Mitsubishi vice president Gregory Adams claims this will make the i is the world's most affordable all-electric vehicle available to the mass market.

Nissan: commitment to zero emissions

Nissan caught rival automakers by surprise with its 2011 release of the all-electric Leaf. The Leaf is often compared to the Volt as these are the two currently available plug-in vehicles on the U.S. market, but the Leaf is more comparable to the Ford Focus EV and Mitsubishi i in terms of its battery range of 100 miles. Nissan senior vice president Brian Carolin emphasized the Leaf's commitment to the "power of zero", as touted in its zero emissions marketing campaign. Where competitors are testing the waters of the U.S. market's EV readiness, Nissan has fully committed to EVs. The company has invested in state-of-the-art auto and battery manufacturing facilities in Tennessee, with respective capacities of 150,000 and 200,000 units per year. Consumer reports indicate the most Leafs are being used as primary vehicles.

Tesla: the anxiety-free EV

As an EV-only automotive start-up, Tesla's fate entirely depends on its successful resolution of the battery dilemma, and it has decided to go all out on battery range. The Roadster, which was introduced in 2008, gets the same 245 miles to a charge that an ICE gets to gas tank. The battery range of its 2012 Model S is 300 miles. Tesla director James Chen compares Tesla's vehicles to cellphones: the first model serves as a proof of concept and subsequent models become increasingly cheaper (the Model S is half the price of the Roadster). Tesla cannot hope to achieve the economies of scale on components that its competitors wield, so its strategy is to capitalize on its technological innovation with regard to batteries, power electronics and the motor. As a result of this strategy, Tesla has no competition in the high-range battery segment and has secured strategic partnerships to supply batteries to other automakers, such as Toyota, Daimler-Chrysler, and Mercedes.

Toyota, GM, Ford, Mitsubishi, Nissan, and Tesla have adopted distinctive strategies, each of which has yet to prove its wisdom. And the many OEMs and automotive start-ups that were not present or vocal at the conference add even more variety to adopted approaches. With the 2011 models of the Leaf and Volt already sold out, and a raft of new hybrid, plug-in hybrid and all-electric vehicles coming out in 2012, the market will soon begin to signal which companies have best positioned themselves in the emerging alternative fuel vehicle market.