

Exclusive interview with Dan Squiller, CEO PowerGenix

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PowerGenix manufactures high-power, low-cost Nickel-Zinc rechargeable batteries. During the 11th AABC in Pasadena, cars21.com met up with Dan Squiller, CEO of PowerGenix and talked with him about Batteries for HEVs.

Dan Squiller, CEO of PowerGenix

cars21.com: Looking at the website of PowerGenix, we get the impression your focus lies more on HEVs rather than EVs?

D.S.: That is absolutely correct, in fact our website is not completely representative of what we do because we started out as a consumer battery company. Our mission was to demonstrate the potential for nickel zinc technology in small consumer battery cells and then to gradually move to bigger

cells which are more difficult to produce. So we introduced our first product in 2008, a AA (double A) that you can buy almost anywhere and that turned out to be very successful. We achieved high volume production while 9/10 of high technology battery companies fail before they ever reach this stage. So this was a major milestone, crossing the chasm to high volume manufacturing.

cars21.com: Do you see yourself going beyond hybrid electric vehicles into plug-in hybrids and pure battery? Is your technology suitable for these types of vehicles? And as a company, are you also looking at different chemistries to suit these different markets?

D.S.: We only do one thing, we do it really well and we do something that nobody else can. We figured out a way to make nickel zinc chemistry work and therein solved a 100 year old problem Nobody has ever been able to do that before. This nickel zinc chemistry is perfectly suited for hybrid electric vehicles.

We heard today in the conference about applications that require a lot of power. Our power delivery is unmatched by any chemistry. We can deliver well over 2,000 watts/kilogramme at prices of less than 50 cents per W/h or 500 dollars per kW/h. Nobody else can do that and so that is our niche.

In an electric vehicle, what you really need is energy density. So the niche for our chemistry is in start stop hybrids, a technology in which Europe is on the forefront.

This is our focus. Moving beyond that into full electric vehicles is not interesting for two reasons:

- It is not the sweet spot of the chemistry.
- We do not want to wait 10 years until there is a market for that.

cars21.com: Can you be more specific about the discharge rate, the lifetime and the power levels?

D.S.: I will start on lifetime. We have cells that we cycled over 250,000 times to U.S. ABC regimes, and we also have cells that we have cycled to the micro

hybrid of the start stop regimes. Those regimes are anywhere from over 3,000 cycles on some tests to over 120,000 cycles on others. We exceed the best lead acid batteries as well as the auto industry specifications for micro hybrids. The real weakness of nickel zinc was the fact that it could only cycle a few hundred times and this is precisely the issue we managed to solve.

Just as important, our NiZn batteries have significantly better charge acceptance than lead-acid and will maintain that charge acceptance over many years. Even the best lead-acid batteries rapidly lose charge acceptance in start stop hybrids, which leads to much lower fuel economy.

cars21.com: You insist a lot on safety and environmental performances; can you elaborate a little bit for us on these points?

D.S.: Yes, from a safety point of view, we use a water based electrolyte whereas lithium-ion uses a petroleum based electrolyte. This means that you can throw our cells into fire, you can puncture them, you can run them over with a truck and they will still not explode, they will not catch fire. So fundamentally, a water based electrolyte provides a much higher level of safety in the battery cell than a petroleum based electrolyte.

With respect to recyclability, the primary constituent materials of our cells are nickel, zinc, and copper. But primarily nickel and zinc. Those are commodity elements; there are established secondary markets to monetise the constituent material. Once again this is possible because we use a water based electrolyte. When you use a petroleum based electrolyte, the lithium and the other elements get permeated with that electrolyte. In consequence, the processes required to purify the metals are much more expensive, use more energy and create their own environmental debris.

So out of all the different battery types, like lithium-ion and nickel-cadmium, our batteries have the highest percentage of recyclable materials. Our batteries are clearly the greenest and we even meet the European ROHS standards.

cars21.com: So in terms of business, are you able to sell these batteries?

D.S.: It is working for us in the small cells. We sold millions of dollars worth, primarily in the U.S.. In 2009, we were named as one of the best new products by *Popular Science* magazine. We have the market acceptance.

However, the sad reality, particularly in the U.S., is that people don't really care if the battery is green or recyclable. However in Europe they do!

The reason why the batteries are doing well in the U.S. is because of their performance. You put one of our AA (double A) batteries into a flash unit or double camera and the difference in performance is just amazing.

In the hybrid market on the other hand, we do not have any sales yet but we are optimistic. And as I said, we don't want to wait 10 years! To push sales in this sector, we will be providing samples in Q2 to probably 6 out of the 10 largest automakers in the world. 2011 is a key year for PowerGenix in this respect. The cells have already been designed, we are building them right now. Obviously we want to go through a lot of testing before sending it out to automakers so revenue in the form of development programmes is slated to happen in 2012 and then production programmes about a year later.

cars21.com: You have talked a little about the U.S. and the EU but what about China? Is that something you have looked at with the many competitors over there?

D.S.: Interesting you ask this questions because, what most people do not know, is that our business is primarily based in China! We have got substantially more people working in China than in the U.S.. Our intellectual property is developed in the US and China, our products are engineered in China, our supply chain is in China.

So we have met not only with Chinese auto companies but also regional governments in China who have billions of RMB in subsidies and grants. They offer you land, they offer to build a factory for you, etc. talking of large amounts of money. PowerGenix will therefore not build a factory in the U.S. with our own investors' money but we are going to build or buy a factory through a joint

venture. A factory that is large enough so that OEMs will see PowerGenix not as a small advanced battery company but rather as a company that has substantial manufacturing capabilities.

cars21.com: So you really see the automotive market for hybrids as being a key market for you. And between Chinese, European and American market, which one do you see developing faster?

D.S.: Absolutely, the hybrid automotive market will be the key for PowerGenix. And I believe the Chinese market has more potential because it moves faster.

cars21.com: But WHY China?

D.S.: The statistics show that more cars were sold in China than in the U.S. for the first time last year. Also, the subsidies that the Obama administration has given out for battery companies and energy storage are a drop in the bucket compared to what China and Beijing have put out.

Nowhere in the world is there higher velocity of change in the environmental sector and environmental legislation than in China. So when you go to a Chinese automaker or a regional government and say: "We have the most recyclable, non toxic, cleanest chemistry and battery technology for HEVs that currently exists", you instantly win them over.

That is the broader context. But in general, the aggressiveness of Chinese companies is impressive. We have a big facility in Shenzen (China) and we do things twice the speed in China than what we were ever able to do in the U.S. because of their cultural mentality. They want to catch up.

Also, China would love to overtake Japan. For that reason, they don't want to use Japanese technology. The Chinese model is to have sexy American technology combined with all the great things about China and delivered through a Chinese model and then it becomes Chinese! This is exactly what they want to do.

We as PowerGenix are in the process right now of talking to possible joint

venture partners and we could be making an announcement by the end of 2011.

cars21.com: But looking beyond HEVs into plug-in hybrids and pure battery electric vehicles. Do you see that as a market for you or not..?

D.S.: No. Fact is, you want to enter a market in a segment where your value proposition is the most powerful and the most differentiated. When we talk about EVs and PHEVs, you talk about an application that needs more energy density than power density. In energy density, we are at about 90-100, with the AA slightly over 100. But the energy density of li-ion is much higher. So this market is not of interest to us.

Maybe later in our maturity, we might consider moving into EVs and PHEVs with new cells optimised for energy. Our market right now is HEVs which is still a growing market.

cars21.com: So just looking ahead five years from now, where do you see the market and where do you see PowerGenix?

D.S.: Most estimates, including recent numbers heard here at the AAB conference, predict that the world battery market for HEVs will sum up to around \$4.5 billion by 2015. Today it's less than 1 billion. So we are looking at a huge growth rate.

cars21.com: What about the over-supply issue? We might have too many manufacturers and not enough contracts and some countries might lose out. For example, start-ups or less established companies might struggle in this area?

D.S.: I think yes, they will. But I also think that in this particular segment, I would not want to be a lithium-ion company where four or five different flavours of lithium-ion compete with each other. In li-ion the differentiations between different offers are small and many factories have already been built for demand that is just not there yet today.

So even though we come into this game a little bit late, the timing might actually be an advantage. Because we don't have that legacy and we don't have to pay for cost of capital and all those things. We are going to pick a partner and size the factory right for what we think the demand is going to be in the coming year. We don't have to worry about a factory that is running at 20% capacity. This a is a big advantage.

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