

# Automotive News shift

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## An Interview with Our Next Energy (ONE) CEO, Mujeeb Ijaz

*Interviewed by Pete Bigelow and Leslie Allen on July 25, 2021*

**Q: You founded ONE about a year ago. Tell us a little about the company.**

**A:** A year ago when we started the company, we formulated an idea around what's important for the electrification movement to take hold and penetrate the market. At the heart of it is the attribute of range, thinking about how the adoption of electric vehicles has gone along with range. In the '90s, our range was 50 miles. When you really go back to that root of range's importance, the advent of nickel-cobalt chemistries is what kicked the industry off. But, that's not where the long-term consumer value is satisfied.

I started Our Next Energy with the fundamental premise that market adoption is linked to range. And, range for bigger products like trucks and SUVs is far beneath its needs, so let's solve that problem. If you look at where most of the industry have gone, I don't think it's to continue using nickel-cobalt chemistries for three reasons.

First, raw material availability. The raw minerals are mined across the world which is a constraint on supply. Second, as you have supply constraints, you will have increased costs. Third is around the safety



of the materials. Nickel-cobalt batteries can self-oxidize and enter thermal runaway, which is dangerous.

ONE was founded on the principal that we need an alternative that doesn't have those 3 attributes. We can't give up on range, but we need a new solution. We started with a new cathode material that is low cost, accessible and won't combust. However, as we searched available

chemistries, we found that many materials did offer enough power, which is why they were second place in the market.

As we examined the issue, we realized we could add value through battery systems engineering through a combination of advanced hardware and software. But, most importantly, we architected a new type of battery called a hybrid battery. This hybrid battery relies



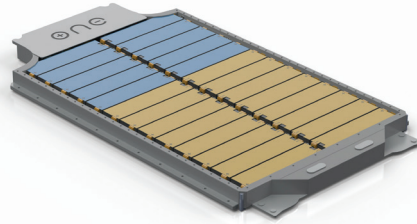
upon two sets of chemistries. The first is for daily use and has high durability, and the second is for longer trips with much higher energy density. We believe that this system can double an electric vehicle's range which is what differentiates us from the market.

**Q: There's a lot to unpack. You mentioned that cost is key. I'm under the impression that as electric cars proliferate, the cost will go down due to volume. Is that not accurate?**

**A:** It's true as volume goes up, cost will go down. But, the costs are also intrinsically linked to raw material costs, and we can't escape from that. However, there is a limit to how much battery cost can go down that is going to be linked to material costs. LFP chemistries can reduce the cost by 5:1, possibly 10:1.

**Q: Is range still a consumer concern?**

**A:** 30 years ago, electric cars were a novelty. However, now electric cars are a second car. You will always have a car with a combustion engine when you really need to get somewhere. I want to help spur innovation and create an environment where the electric car is the only one you own. It's important to recognize that even EVs which are rated at 300 miles by the



EPA on a charge, that's not accurate in the real world. You can actually see a 50 percent reduction in the real world. Trucks and SUV face an even greater burden. If we can double the range of electric vehicles, then we can fully eliminate range anxiety.

**Q: In layman's terms, where are we in terms of energy density versus where you're hoping to take us?**

**A:** If you look at a typical platform, the space for an electric battery is pretty similar regardless of the type of vehicle. Most cars within a class have comparable lengths and widths. You also don't want a car to be uncomfortable to step into, so you can't increase the height much. The volume of a battery is fixed, and it's between 300 liters to 500 liters in a truck. Tesla, Volkswagen and GM have all announced 230 watt hours per liter, which gives you an energy density. To get to the remaining 75 to 100 percent of late adopters, you would need 450 watt hours per liter.

The first line of defense we have is to increase battery efficiency. Most batteries are around 32-45 percent in terms of volume by cell. That low fraction is linked to the chemistry being volatile. That is because of the relationship with safety. We use a safer chemistry that allows us to use a more efficient design. Second, we remove much of the anode materials which gives us more space for cathode material. When we combine those two, we get a battery system that exceed 450 watt hours per liter.

**Q: What is the state of your prototypes?**

**A:** As a young start-up, we had a goal of materializing a prototype. We have working prototypes in our lab and are moving quickly towards a validation point. We have a first customer in the commercial truck industry delivery market, which is a rapidly growing segment. It's a very commercial market, so we see the opportunity for a fast return on investment. That'll be our first product to market.

**Q: How well suited are larger vehicles for this type of battery?**

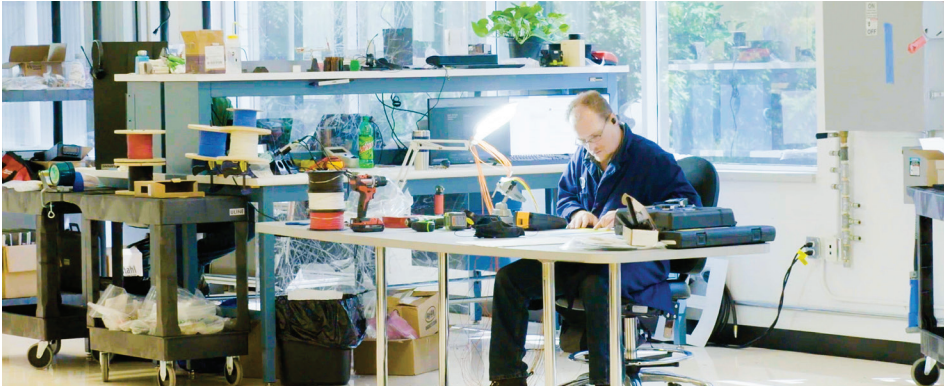
**A:** Larger vehicles have a larger burden. The average numbers associated for top speed with the EPA are very low (around 55 miles per hour). However, a truck is much less efficient. If you go 85 miles per hour, you can get less than half the normal range, which causes the market to be very anxious. Since many vehicles have a locked in amount of space for a battery, we have been laser focused on improving volumetric density.

**Q: How big a challenge is it to move away from nickel cobalt?**

**A:** If you philosophically talk to 8/10 battery engineers, there's a broad consensus about the future of nickel cobalt, so it's an uphill battle. As part of the







industry, I've seen the journey take place. But, we're seeing only 1% of adoption. We've also seen the challenge of safety. As the market has grown, we've seen the aforementioned problems become exacerbated. However, even school buses need long-term range sometimes.

**Q: What is it about your chemistry or package that makes it safer?**

**A:** We are selecting cathodes that don't liberate oxygen. We can prevent the very root of oxidization.

**Q: Are performance and safety perpetually at odds?**

**A:** We are starting with a chemistry that is safer, but then relying upon that safety to expand range. We looked at the problem differently.

**Q: Can you elaborate on the power of machine learning and AI to improve safety and range?**

**A:** A unique problem started to emerge as we put together our two chemistries. Our secondary battery is similar to a gasoline range extender in a Chevy Volt, but we have a battery sustaining the

first one. However, this posed a unique problem to our battery management system. We now have to manage two energy sources. We can use machine learning alongside data collected to transfer energy from the secondary battery to the main one to ensure that the battery is able to constantly perform. For example, a flat environment and a hilly one requires different energy delivery plans.

**Q: Is this why trucking is a good first application? Because it's predictable with routes?**



**A:** Not necessarily – we don't think we need too much specificity ahead of time. We want to anticipate migrating energy from one battery source to the other. We just need to know something about the customer's usage to optimize it.

**Q: What did you learn in your previous roles?**

**A:** Wonderful opportunity to grow at Ford, which gave me automotive experience, shaping my future. One of my early lessons learned was around safety and the commitment to ensuring one designs a product that meets all the requirements. A123 opened me up to a greater number of OEMs and showed me how to serve a diverse range of needs.

**Q: One year Down the line, what do you want?**

**A:** We'd love to launch a successful factory and have customers who are leveraging. We want to create a product family that can stay in that same factory and be successful.

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