



## **"THE FUTURE IS FAST: HIGH-POWERED CHARGING AND LONG-RANGE EVs"**

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### **OPENING REMARKS**

**Munni Krishna, Veloz:** Good morning and good afternoon everybody. Welcome to today's digital dialogue. It's called "The Future Is Fast: High-Powered Charging and Long Range EVs." For those of you who do not know me, my name's Munni Krishna and I am Veloz's head of business development. Today I have the amazing privilege of both welcoming you all to this conversation and the distinct honor of moderating the panel discussion. Veloz is a national nonprofit, and we're comprised of 35 members from across the EV industry who are both in the private and public sector, working together to advance transportation electrification for consumers and businesses around the country. The best way that I can say this is that we achieve it through a mix of industry facing and consumer facing programs, such as our National Electric Vehicle Education Campaign, active today in all 50 states, industry-wide Strategic Communications Working Group, policy education efforts, and a whole host of other initiatives, which help to highlight successful and replicable EV programs, including today's Digital Dialogue.

And before we bring on this incredible panel that we've assembled, let me quickly share both the topic and the goal for our discussion about the high-power charging solutions and long-range EVs that are transforming our global transportation landscape. Our panel's going to deep dive into the technology shifts that brought on highly efficient charging infrastructure, and in less than a decade took us from 24-kilowatt fast chargers to megawatt capable multi-modular systems. We'll also discuss the engineering solutions that we've utilized to produce long-range commercial buses and trucks, as well as the developments which resulted in 500 mile plus passenger EVs that you can buy today. Honestly, when your best option not so long ago was just 75 miles total if you drove under 65 miles per hour and were on completely flat roads. And these aren't concept cars, right? They're mass market. In fact, just last week, BMW announced their new i7 with 450 miles of range.

But throughout this conversation, our panelists are really going to unpack how their companies are successfully communicating this ever-evolving and sometimes really complicated landscape to move the needle on EV adoption with consumers and fleets. Quick note, we are going to be taking questions directly from the audience after our moderated panel. So drop any questions you have into the Q&A box at the bottom of your screen. Don't forget to include who your question is aimed at and we'll take it from there.

### **SPEAKER INTRODUCTION AND MODERATED PANEL DISCUSSION**

- Munni Krishna, Veloz, Head of Business Development
- Patrick Duan, BYD America, SVP of Operations and RIDE Mobility, Co-CEO
- Dario Pagani, Autel Energy, VP of Marketing and Communications
- Ross O'Brien, bp pulse, Network Commercial Director
- Daniel Witt, Lucid Motors, Head of State and Local Policy

**Munni Krishna, Veloz:** But with that, please now join me in welcoming onto Veloz's virtual stage, the folks that you came here to hear from today. Patrick Duan, SVP of Operations at BYD America and Co-CEO of RIDE Mobility. Dario Pagani, VP of marketing and Communications at Autel Energy, Ross O'Brien,



Network Commercial Director at bp pulse, and last but not least, Daniel Witt, Head of State and Local Policy at Lucid Motors.

My friends, thank you so much for joining me today. So let's start with this. The companies you represent are globally renowned. They're household names. But to help orient our audience to the particular lens that you're bringing to the conversation, I'm going to have each of you briefly introduce yourself and describe your role and the work that you lead. So Dario, let's start with you. And full disclaimer to our audience, Dario and I go back to the Mesozoic era of charging working all the way back in 2014. So talk to us about what you're doing today.

**Dario Pagani, Autel Energy:** Hey, thank you for having me, Munni. So I'm Vice President of Marketing and Communications for Autel Energy. My role is pretty self-explanatory on the marketing side, so anything from the go to-market to consumer education to any kind of customer interactions and experience. However, I do wear a couple of other hats, one on the policy side of one of the industry alliances part of the house. So I'm really excited to be on this great panel and share a little bit of what our vision is.

**Munni Krishna, Veloz:** Beautiful. Patrick, let's move to you. And while you introduce yourself, you've got to explain to us how you get any sleep as both an SVP of one company and the CEO of another.

**Patrick Duan, BYD America + RIDE Mobility:** Thank you, Munni. I'm hanging in there. So while BYD has been playing a leading role on advancing battery technologies and consumer EV deployment around the world, you definitely see a lot of news. But in the US, we've been focused on large industrial scale battery energy storage and solar projects. And also now under a new brand, which is called RIDE Mobility, we're dedicated to the design, manufacture, and deployment of heavy-duty battery electric commercial fleets, including city transit buses, coach buses, electric trucks, and school buses. And since 2013, we have deployed more than 2000 electric buses and trucks across the US.

**Munni Krishna, Veloz:** Wow, that's huge. Okay. So no sleep at all, I think is the answer there. All right, Ross, you're up next, my friend. What's the life of a Network Commercial Director like these days?

**Ross O'Brien, bp pulse:** Thanks, Munni. Thanks for having me. Great to be on this panel. I'm probably more excited actually to hear the answers of all the other panel members. So it's a good one to be on. Network Commercial Director, what does that actually mean? So effectively, my team runs the fast-charging network for bp pulse in the US. So every day I'm very lucky to get to work with an incredible team and our mission every day is to run a network that is safe, reliable, and as simple to use as possible. There's a real problem to solve out there, and that's what we're trying to do.

**Munni Krishna, Veloz:** Awesome. Very, very cool. And Daniel, you're last in this round of questions, but I think we should start by saying a huge congratulations on the news last week. And I know we're going to get to it later, but just had to say that. So the stage is yours is my friend.

**Daniel Witt, Lucid Motors:** Thank you. Yeah. Well, hello everybody. My name is Daniel Witt and I'm the Head of State and Local Policy for Lucid Motors. Lucid, of course, is one of the newer manufacturers on the market. We're known for our state-of-the-art vehicles, our industry-leading efficiency, and are gradually trying to bring that to a broader audience and bringing it further down market. So in my job, I spend a lot of time still evangelizing electrification, certainly discussions on charging pervade. But yeah,



that's a bit of a day in the life. This is my second tour of duty with an EV manufacturer, so I have the blessing and curse of having been around this industry since 2011.

**Munni Krishna, Veloz:** Daniel, I think I'm going to have to update my business card to say EV evangelizer. I love that phrase.

**Daniel Witt, Lucid Motors:** Exactly. Yeah.

**Munni Krishna, Veloz:** All right, gents, let's start out today with deep diving into the vehicle side of the conversation. And Patrick, I'm going to go to you first. Your K9MD electric bus is an astounding range, right? Topping over 200 miles, and that's powered by a lithium-ion phosphate battery. Talk to us about what's going on that's making this battery perform so well, why it's so durable, why it's dominating the market.

**Patrick Duan, BYD America + RIDE Mobility:** So for us at BYD, we have spent decades focused on lithium iron phosphate or LFP battery technology, and we believe it's the safest and most reliable chemistry by far for both transportation and energy storage. And I'll explain that. So LFP offers several key advantages. So first is definitely safety. LFP is highly thermally stable and does not release oxygen when overheated. And this significantly reduces the risk of thermal runaway, and we can refer that to thermal explosion compared with nickel-based chemistries. And then longevity, LFP batteries provides a much longer cycle life and much better degradation performance, especially under demanding conditions, for example, like deep charge and discharge cycles and high temperature operation. And then lastly, so BYD, you've seen the news, BYD's latest LFP battery innovation, which is called Blade battery. And that addresses this LFP chemistry's historical drawback of lower energy density with a cell-to-pack architecture and blade geometry design. So the combination of LFP thermal stability and blade battery, the heat distribution design, we believe that enables a faster and more aggressive charging possibility, which we believe we'll discuss in more details shortly.

**Munni Krishna, Veloz:** Wonderful. Gosh, you guys, I had to remind myself I'm a moderator here. I was just learning along with that question. Daniel, my friend, we're here to talk about long-range EVs. Lucid has the longest-range EV on the market. So I've got to ask, what is driving this extreme efficiency? And importantly, do you think there's room for even more range in the future or have we hit the limit here?

**Daniel Witt, Lucid Motors:** Well, yes and no. There's absolutely more room for increased efficiency. We're demonstrating that ourselves by introducing the next iteration of our drive unit, moving from Zeus to Atlas. Atlas is going to be utilized first in our next platform of vehicles, the mid-size vehicles, Cosmos and Earth, which we'll debut later this year. And that we've communicated that we anticipate an even greater efficiency than what we've already achieved, which is closer to five miles per kilowatt-hour and getting that all the way to six miles per kilowatt-hour. So what does that mean in reality? It means that you can achieve longer range with the same size battery packs, or you can utilize different chemistries like what Patrick was just describing with LFP, which historically have had lower energy density, but then we can extrapolate that to achieve the desired ranges of consumers. At the end of the day, there's still an open question about exactly what parity looks like between EVs and internal combustion engine vehicles, and most of that's going to be based on consumer perception.

So we've settled around this notion of 300 miles of range, but there's no saying that that is going to fit in a one-size-fits-all approach. And we think that efficiency is not only the responsible way to go about



building a wider set of electric vehicles, but it's going to give us the most flexibility if and when any sort of other consumer preferences ultimately emerge.

**Munni Krishna, Veloz:** Awesome. Fascinating. Well, keeping with vehicles, but let's move to the charging side of it. Ross, bp pulse's Gigahubs are really built to serve those higher battery capacity vehicles. So that inherently makes us curious about your siting strategy. Where are they? Are we talking highways, metro areas, a mix of both?

**Ross O'Brien, bp pulse:** It is a little bit of a mix. Yeah. And I'll start by saying we love Lucid's. When they come and charge, we can see when they're charging. Huge batteries, and then also that charge curve, we really love it. So please keep that up. And then Patrick, on the BYD front, I think globally across Asia and Europe, because bp pulse is global, I think what you're doing there is excellent. And I think really driving forward on the vehicle side, it's seriously impressive and the whole industry needs that. So I think a quick step back then, Munni, before the network. So bp pulse, if we think globally, it's a global charging provider. Core markets in China, Germany, the UK, and the US. The US is kind of the last of those four to be built out, kind of follows in line with EV adoption. And the prime purpose of bp pulse is to make charging helpful, which I think we've all been in the industry long enough. We've probably known that in the past it hasn't been helpful. So we're here to change that.

And then how do you see bp pulse show up in the US? You're going to see us probably in three ways. One is using our existing fuel locations so people are kind of comfortable and know about them. We've got plenty of those across the US to pick from. Then we'll knit those together. So the main metro areas, we're going to knit together across the highways. For those that are interested and keen, they might have known we bought a company called Travel Centers of America a few years back, and that kind of enables the highway strategy.

And then the third one, which is more of an off the side play is our hub strategy. I'm sure we'll chat about these. These are exciting sites typically on third party real estate, and they're located next to the biggest demand centers we can find. And the nice starting point is airports. You've got huge demand localized into one place, and it's a big driver for rideshare. We love rideshare drivers, and they as well have been politely underserved in the last few years. And again, we've seen that as a bit of a gap and a problem to solve, and that's one that we're doing.

**Munni Krishna, Veloz:** Yeah, really appreciate that context, Ross. Dario, do not think I forgot about you. And I'm going to pick on your communications brain a little bit here because I'm wondering, what are your thoughts on what's most important when it comes to public fast charging for drivers with long-range EVs versus some of these older generation EVs? And how do we talk about that when it comes to reliability, speed, location? Talk to me, my friend.

**Dario Pagani, Autel Energy:** Yeah, that's a great question. When you think about when we first started in the industry, obviously the big word, the big buzzword was range anxiety. And range anxiety was induced by small batteries and slower charging opportunities and infrequent charging opportunities when you were out and about. So when you think about where we are today with larger batteries, faster charging speeds, larger opportunity and larger array of opportunities for you to stop and get a quick charge, as a manufacturer, my mind has to go to reliability first, mostly because when you are experiencing a charging site for the first time, more often than not, you are exposed to a couple of factors. Is that first engagement, that first charge that you try the attempt? Is that going to succeed? Is that going to succeed as the first try? And secondly, what kind of experience you're going to get.



So is the charger working? Am I getting the right speed for my need? Am I stopping for 10 minutes? Am I stopping for an hour? Am I stopping for an hour and a half, two hours? So the overall speed ceiling is very contextual depending on really what I'm trying to accomplish as a driver. However, that is entirely related to whether the station is actually working or not. And speed, it can be speed of charging and speed of charging. However, it can also be speed of diagnostics from a manufacturer standpoint if a site or the charging station is experiencing downtime. So when you think about uptime, it's affected by the charger working, it's affected by the payment method working, the connectivity working. And when and if the charger goes down, how quickly am I diagnosing the problem and how quick they can actually get somebody to the site to resolve it?

So it's speed in all senses, right? Speed is not only contextual, but it applies to many areas of operation. And from a manufacturer standpoint, our foundation is in all diagnostics. So in component level diagnostics, and when it comes to stations, we treat that exactly the same way so that when we do have to communicate with a service provider for a truck roll, before they even roll out, they understand exactly what is wrong and it will only take that one truck roll to get it back up and running outside of actually the interoperability layer, which we'll address a little bit later, a little bit later. But yeah, I would say reliability first, I would say location second, and then speed, which again is contextual as now becoming an expectation, but thankfully we have many options there.

**Munni Krishna, Veloz:** Wow, fascinating. I don't think anyone's ever articulated it that way. Speed of charging is dependent on speed of service. That's so fascinating, Dario. Leave it to the comms person on our panel to give us a tidbit like that. Now, before we move on, Daniel, I want to come back to you. At Veloz, we're in the middle of a National EV Education Campaign. So I've got a big question for you - what do you think the impact to overall consumer confidence has been as longer range EVs are hitting the market?

**Daniel Witt, Lucid Motors:** I mean, honestly, I think the whole reason Tesla was successful in the first place is because they could demonstrate that they had a 300-mile range vehicle when everybody else had an 80-mile-range vehicle. And that was 10 plus years ago, but it really set the precedent for 10 years prior to this latest generation of EVs as the standard bearer and due credit to them if we're ultimately setting the market and being that first mover. I think now you do have people that are looking to either replace their ICE vehicles entirely or to add to their repertoire of vehicles, and they are looking to make more direct comparisons with what they're giving up when purchasing one technology versus the other. At the end of the day, when we're thinking about the consumer audience that we're tackling, and again, this is shifting as we move from a more expensive sedan product to an SUV product and very soon to a more mass market product, we are trying to resolve and anticipate what those comparisons might be such that it's just a more favorable experience overall.

One of the things that's worth noting is that at the end of the day, you want the car to just work. You want the range to be there when you need it, but there's so much else that goes into a car these days. And that's frankly why the cost of vehicles is going up is because we're putting in more features on the inside of the car that frankly have nothing to do with range. It's just a product of what the consumers are seeking right now. One of the benefits of EVs has been that because they've been at a higher price point up until now and are coming down in price, a lot of features have been available to consumers throughout the history that weren't necessarily available in internal combustion engine vehicles. So there's a certain expectation, and we haven't even touched on it yet, but of course, ADAS features are taking on an even a larger picture with consumers. That is something that is not distinctive to EVs by any



means, but is going to play such a huge role, I think, in overall adoption of the technology, the EV technology.

**Munni Krishna, Veloz:** Great. Yeah, really, really thankful for that. Guys, let's move to the other side of the coin, and that's going to be the ultra-fast charging. And Ross, I want to come back to pick on something that you referenced, which is you're charging hubs at bp pulse that are adjacent to airports. Does this mean that you're serving people that have been in an EV for the first time because they're renting one? Is this rideshare drivers? And how do you successfully and quickly educate someone on how to charge, how fast it's going to be? What the heck is going on here? Talk to us.

**Ross O'Brien, bp pulse:** I think it's a definite problem that the industry needs to solve. And I think if you take yourselves... Everyone put themselves in the shoes of a driver. So an EV driver, you bought your first EV and maybe you're a rideshare driver to really heighten things up here. So you've bought your first EV, you're out on the road and you need to charge. Now, if you're a rideshare driver especially, this is a pretty important time. You need to figure out where to go, and this is your business, right? This car is your business. So we've all had this experience. You find a site, it's miles off your route, you eventually get there and either all of the chargers are broken or they're all being used. And then you get there, it's probably raining. You haven't got a canopy, so you're getting nice and wet.

You're trying to charge, you've got to download an app that you probably don't want to download, or you're trying to use the payment terminal that's probably bust. And then if everything eventually does work out, you're probably still pretty annoyed at how much money you had to pay for it. It's not a very good experience, and that's not for everything in charging, but I think that's probably how it has been for a lot of people coming into this new. And we get one chance at a first impression. My team is always sharing, we get one chance at a first impression and it matters because if we can do our job well, we won't just keep that driver within the EV ecosystem. We're also going to help their friends, their family that they're now going to go and talk to and say, Yeah, it was easy, it was great. You should definitely get an EV too. Why not? So I think we've all experienced that poor experience, but getting the right experience and getting the quality experience out there is key to helping with adoption.

And then like I said, I've got an amazing team of people that I get to work with and they are obsessed with the consumer experience. So what does that really mean? It's everything, right? It's how are drivers finding us? Is it easy? Is the language simple and clear? Is the language in the language that people speak? Is it clear to direct to a site? Does the app work seamlessly? Is labeling on the charger good? Does the screensaver on the charger actually tell you what you want to do? There's so many components that go into it. Have we got the support 24/7? So we're trying our best to make that first experience as seamless as it can be because we know that the stakes are really high, not just for that one driver, but for all the drivers that they're going to go and speak to. So there's a little bit of everything, but I think having that obsession with the consumer experience that I know a lot of these groups do is really important for this industry right now.

**Munni Krishna, Veloz:** I really appreciate you on that, Ross. My dad's got a lot of family out in Leeds where you've got a new hub up and it rains there constantly. So that is a very salient experience for them. Dario, let's unpack this topic even more - as a charging OEM, how do you guys think about the question of how fast is fast enough? And with that in mind, responsibility of... fiduciary oversight's important here. What do you think about guarding against under building or over building our nation's fast charging network, chasing off what Ross is saying about how much effort it takes to get it right?



**Dario Pagani, Autel Energy:** Yes. And Ross' words definitely resonated with me from a user perspective as well as from an OEM's perspective. So how fast is fast enough? I don't think it's a single number. I think it's a function of use case, dwell time and site economics because also, as Ross knows, the CPO, the charge point operator's perspective is very, very important in this equation because if we're not providing a charge point operator with a viable business opportunity and actually providing that high level of service to the drivers, then we really don't have an infrastructure. So when you think about corridor charging with, again, the speed ceiling getting higher and higher and higher, but then you transition into more urban environments, the retail environments, fleet environments, then again, speed is very contextual to dwell time. And what we focus on as an OEM, as a charging OEM is flexibility. One is flexibility, one is modularity of deployment, which just really leans into each other a little bit.

So when you think about under building, obviously there's no cure for under building. If it's not there, it's not there. However, if you start from a modular approach and you think about, again, contextually to what the use case is, who's stopping by to charge, how long are they going to be there realistically? Then you think about as bigger and faster charging opportunity vehicles are going to stop by, am I going to be able to expand on this infrastructure, whether it's from a storage standpoint or a maximum speed of charging standpoint? And all of that is a software layer, obviously.

So a lot of this is controlled from the software layer, not necessarily from the hardware layer, to where we can set different types of policies and different type of power-sharing and different type of interaction with the actual energy storage, which again, is going to lean heavily into how the site economics work because again, we are going to have to mitigate for that peak demand and demand charges and whatnot without, again, impacting the driver experience because driver stops by expecting a certain type of experience, again, by the CPO on the other hand as a site to run as a business, which has to return a certain profit for an investment. So we have a keen eye to both audiences at all times.

**Munni Krishna, Veloz:** Really appreciate you. Yeah, we can't bankrupt ourselves doing this thing, right? So hear you on that. Patrick, everything we've talked about is going to be so different when it comes to you. And I want to pick your brain on en-route charging for battery electric buses. It's such a different landscape. What's trending as a predominant technology between 450 kilowatt pantograph charging? Your buses accept 300 kilowatt wireless charging. I'm reading about megawatt plugin charging sessions on BYD buses. What are you seeing as the future here?

**Patrick Duan, BYD America + RIDE Mobility:** You definitely did your homework, Munni. That's a good question. I think en-route charging for buses definitely operates quite differently from other applications, especially comparing with a consumer. And translate agencies or public transportation agencies, they typically prioritize reliability, which is uptime and total cost of ownership. And then lastly, operational simplicity, that's important to those customers. So with these priorities in mind, what we've seen is that first of all, Pantograph overhead charging has emerged very fast as en-route option for a couple reasons. First off, it's fully automated. So no driver or operator interaction is needed. And it has also demonstrated some very strong performance as larger scale fleet scale and it supplies pretty sufficient power. It's a conductive system and most current implementations that we've worked on typically operate at or between 300 to 500 kilowatt within that range, which delivering enough power during layover time to keep vehicles or buses in service.

And we've also integrated wireless charging technology, to your point. And the beauty of wireless charging is that enables a more luxury and streamlined urban view of the city or infrastructure. And it's a more seamless user experience because there's no much visible infrastructure. And lastly, megawatt



charging, that's the future. That significantly increases the charging power. It's very promising. They're not dominant yet because I would say number one, the grid and utility constraints or concern because megawatt charging could place a substantial load on the grid, especially if there's no energy storage to buffer the demand. And then secondly, battery, much faster charging that requires batteries being capable of handling much higher C-rates. That's important. So overall, I would say megawatt charging is, or faster charging is definitely the future for as we're talking about commercial EV, particularly for depot charging for the customers, but it will require a greater utility readiness and advancement of higher C-rate, higher charging rate battery technology.

**Munni Krishna, Veloz:** Yeah. Wow, Patrick. I mean, I think about this all the time. I have a lot of sympathy for our poor utility planners across America that all of a sudden were begging for these huge transformers from out of completely nowhere. So I hear you there. Gentlemen, when preparing for today's discussion, we have this funny realization that all four of your companies have significant international presence. So indulge me here. We're going to take a quick trip around the globe. We're definitely going to relate it back to the North American market. Obviously, that's where most of our audience is, but we're going to go a couple different places than we've been today. And Daniel, I'm going to start with you here. Just last month, Lucid announced a really major expansion of your distribution footprint in Europe, and you've got a new partnership with a German retailer. What's the decision behind expanding your direct-to-consumer approach? Does that relate here? And would love to hear your perspective on how to reach consumers in different areas and how that relates back to our landscape here in America.

**Daniel Witt, Lucid Motors:** Yeah, I think it's actually really interesting. In Europe, there isn't the same prohibitions that there are here in the US regarding utilizing different forms of distribution in tandem. So in Germany and in Europe, the decision was quite easy for us. We were looking for a way to save capital while also expanding our footprint and providing better access to a variety of countries. This partnership ultimately enables us to do that. Unfortunately, that's not something... You can have your cake and eat it too there. The mixed food metaphors, unfortunately here, that's not even a consideration. They could frankly get some of the pie if there was an openness to doing that. But the direct sale issue is a bit of a third rail issue for a lot of OEMs and the franchise dealers here overall. So we're sort of stuck in a level of stagnancy, which here detracts from the ability for companies that are fully invested in EVs to reach the widest possible audience. In turn, in Europe, they're getting that advantage.

**Munni Krishna, Veloz:** Great. Awesome. Ross, every day there's a new energization from your team. And I almost miss the fact that the last one that I just saw was in Melbourne. And that really leads me to ask, since we're looking at Australia, how does the overall EV market outside of US North America compare to the one that we have here? How does it inform what you're doing here? What are the differences, similarities, and how does that work for your team?

**Ross O'Brien, bp pulse:** Well, that Melbourne site looks lovely, doesn't it?

**Munni Krishna, Veloz:** Oh my gosh, it is gold-

**Ross O'Brien, bp pulse:** Maybe we should all go and check it out. We should do a site visit. I think it's funny because all the regions are, on one hand, incredibly similar. And then on another hand, they're very different. I think the underlying piece that's similar is that EV uptake, I think the direction is clear. The level of uptake varies across the regions. China, for example, is incredibly high with adoption. The UK and Germany are pretty far along and the US is just starting. And then you look at places like Norway



and you can barely find a fuel vehicle anymore. It's pretty impressive. So I think there's similarities and differences. I think where we see the biggest differences in the US versus other markets is factors like multifamily housing. Places like China and central cities within Europe, there's a lot of that. And in the US, maybe there's a bit less.

That's what we typically find. How many people have access to home charging? That's usually the dream. If you buy an EV, you can access home charging. That's the unlimited energy glitch. But if you haven't got that, you're going to need public charging. The utilities, how it's set up, how it's structured varies massively across regions. And they're kind of a sovereignty sometimes dealing with them. And they do have a large amount of control and influence over how projects get put through, both from a speed point of view and a quantity point of view. So working with them, it varies massively. And then as well, can't ignore it. Governments play a role as well across the regions. So we're operating in Australia and New Zealand, we're operating in Europe, China, and the US. Those governments have very different priorities, goals, and directives, and they all play out in different ways, different subsidies, different grants, which are very helpful. And then also other things that may not be as helpful, but they all kind of culminate.

So I think there's plenty of similarities, plenty of differences. But the benefit, which Dario, Patrick, and Daniel will know well is that having experience of those different markets does give you the best chance to put out the best offer in that region. So the US being one of our last markets to enter, we've had plenty of lessons learned from other regions, and that's why the team here can benefit from that. And when we do go out and build, we build, at least unbiased, we build great sites, we build them in the right places, and we're putting out a consumer experience that's really beneficial and different. And one, if I can cover, I didn't cover it earlier. Patrick made a great point around some of the experiences even with wireless charging.

I think the real exciting vision for EV charging is that it's actually better than fuel charging. You can just pull up and charge, and today you can plug and charge. You don't need to think about paying. And in the future, however far away it may be, you could just pull up. And how exciting is that? That's kind of a completely different experience. And I think we have the chance in the industry to not just battle the narrative of should we go EV or not, but turn charging and the whole experience into a reason to buy an EV, as opposed to today, sometimes it can be a reason not to buy an EV. I think we have that chance.

**Munni Krishna, Veloz:** Ross, I love what you're saying here, right? Let's punch up. Let's not make it equivalent to the gas experience. Let's make it better.

**Ross O'Brien, bp pulse:** Why not?

**Munni Krishna, Veloz:** I like that. I like that a lot. So Patrick, let's chase off of what Ross is saying here about how to move from market to market. I'm sure you saw this question coming a million miles away, but the Blade battery demonstration that just happened in China, I mean, less than 10 minutes to go from 0 to 97% state of charge. How do you roll that out across different markets and what has been the impact of that demonstration?

**Patrick Duan, BYD America + RIDE Mobility:** How much time do I have?

**Munni Krishna, Veloz:** I mean, listen.



**Patrick Duan, BYD America + RIDE Mobility:** So I'll throw out some numbers about the recent announcement or introduction of BYD's flat charging technology that can charge an EV from 10% to 70% in just five minutes, and from 10% to 97% in about nine minutes, and also perform very well in extreme cold weather from 20% to 97% SLC in about 12 minutes. That's at minus 30 degree Celsius, which is minus 22 Fahrenheit. So a lot of numbers, and technically this capability is driven by two major innovations I will say. I'll become a little technical. So first off is the blade battery technology. We just talked about a charging rate. Battery is important to achieve faster charging. Battery is part of the definitely key of the puzzle. And BYD's latest Blade Battery technology supports rates up to 10C. That means like 10 minutes, 10C without excessive degradation. And then the second is the charging system is the flash charging system. The charger can deliver up to 1.5 megawatt of power.

And also, importantly, it's integrated with battery energy storage, and this acts as a buffer to the grid. And this is helping avoid the need for major grid upgrades. If we talk about project, that's important. So I think in practical terms, most drivers probably won't charge to 97, 98% for data use. However, achieving 80% from 10% to 80% in about five minutes, I think that's a game changer, especially for those who don't have access to home charging. Like here in the US, a lot of apartment condo owners or their home, they don't have a home charging. This would be a solution or game changer. And lastly, I want to mention, I think BYD's approach is notable because it's paired with a deployment plan, including we announced 20,000 flat charging stations initially in Asia. At the same time, we're installing about 3,000. We plan to install 3,000 flat chargers across Europe by early of next year.

**Munni Krishna, Veloz:** Gosh, as a former construction person in charging, I wish your team all the best of luck. I know how that looks. Early morning interconnections and late night Gantt charts is what that looks like. Dario, I want to keep on this topic, but really unravel a thread that you started about the overall ecosystem this takes. And this month, Autel had your own live demonstration in Thailand, 960kW charging with BYD cars, mind you. But I think that's more than just the EVSE. So talk to us about this collaborative ecosystem between the charger, the software, the service partners, and is that model that you demonstrated in Thailand ubiquitous to every market?

**Dario Pagani, Autel Energy:** Yeah. And a lot of what I'd like to lean into is really the real life condition that we have to operate into. So we are working across different geographies. You mentioned Thailand, but we have the same sister operating in Norway, for instance. So you can think of very different environmental condition, very different local realities when it comes to partnerships and utilities and whatnot. The reality is that the real challenge is not to make it happen one time under perfect conditions. It's about to make it happen at all times in all conditions with different partners and different teams and different utilities and different applications. And doing that while remaining as open and interoperable as possible, because one of our foundations is working across different interoperability realities with the software layer and the energy management layer and the storage layer and things of that nature.

So making it happen at the same level of efficiency, the same level of experience across all of those different variables, that's really where Autel shines, I believe. And it's funny because as a hardware OEM, obviously our focus is on environmental testing and interoperability and all of that. However, when you think about all of these different variables, software really is really the main orchestrator. And we lean heavily into our main software partners to make sure that all of those decisions and all those variables are taken into account when customizing and designing a system for a specific use case for a specific customer.



So when we go and talk to Ross, obviously we're not going to do the same system for him as we're going to do for an autonomous vehicle hub, for instance, right? It's going to be very, very different. And having that level of flexibility and ability to work across all of those different variables is really key, especially because when you go to a 960 kilowatt type of system, when that goes down, it's just not an inconvenience. It's a major disruption. There's a reason why you want to charge that thing in 10 minutes. And if that happens in 30, which is 20 minutes, could be a minor disruption in other applications. For that one it's a pretty major disruption. It pretty much voids the whole goal. So again, speed is contextual, same issue happening across different applications could mean something very, very different for each application. That's why that flexibility, the modularity, the interoperability capability is really what anybody at this point should be looking at when looking at the hardware, the software, and the interoperability layer.

### AUDIENCE Q&A SESSION

**Munni Krishna, Veloz:** Awesome. Thanks, Dario. Guys, our audience, they've got a bunch of questions. I've only got time for a few, but Daniel, I mean, your billion dollar investment news, man, is all over our audience Q&A. So I think everyone wants to say congratulations, but the question, the pattern I'm seeing is, are these new robotaxis going to be long-range too? Well, how does that work?

**Daniel Witt, Lucid Motors:** Yeah, I mean, I think there's certainly the opportunity for that. Well, there's a couple different veins to this. So we do have this partnership with Uber and Nuro that's going incredibly strong. We just announced an expansion of that agreement to include this forthcoming mid-size vehicle, and so that's based on our existing vehicle platforms. We also showed a concept vehicle that's a two-seat vehicle with a large trunk because what we understand from our partners is that most ridesharing is one or two people only, or sometimes it's carrying a lot of luggage to an airport and so on. So there is an opportunity here to make this as efficient as possible based on the driving dynamics that are ultimately going to occur. It's still, I think, an open question about exactly what that range will be, but certainly our partners are going to be able to assist with helping us dial that in so that frankly, we're not spending too much on batteries in order to achieve a range that's not necessary to achieve the desired service results.

**Munni Krishna, Veloz:** Fascinating. Really interesting. All right, guys, for some of these, they're general, so anyone feel free to jump in. And I'm real shy, so I guess I can talk too. But our good friend, Beth, at Minnesota DOT's got a great question. She's wondering with high-powered charging in rural areas with limited utility service, and a lot of these areas are connecting one metro to another, what are some ways to mitigate the lack of power, the higher cost that it takes to bring that power in?

**Daniel Witt, Lucid Motors:** I can share my thoughts on this.

**Munni Krishna, Veloz:** Oh, our vehicle guy jumped in first.

**Daniel Witt, Lucid Motors:** Yeah. Well, we make long-range electric vehicles, and actually the utility of this in rural landscapes, it answers the question. If you have a long-range vehicle that you can charge at home, you probably don't require utilizing a fast charger nearly as often. And so what I would say is we think about fast charging as being a critical component to the charging ecosystem. It absolutely is, but I think the statistic is something along the lines of 70% of Americans live in a single-family dwelling, and there's a higher portion of that in rural environments. So we should be emphasizing level two and charging at the home to deescalate the importance of fast charging in those landscapes. And Ross,



Dario, please feel free to jump in with more educated perspectives on the actual charging piece of this. But I think that there's a companion element here, which we hadn't spoken about that I just wanted to offer.

**Ross O'Brien, bp pulse:** Fantastic. Well, I will jump in because I completely agree, Daniel. I think start with the vehicle to offer you what you can, and then rural doesn't seem so rural if you've got the range. I think in some cases where you will need fast charging, I think a couple of specifics to answer Beth's point would be around most CPOs are probably not going to look at rural areas and think, aha, that's where I want to build. It's probably going to be lower down on your list. So I think you've got a challenge of, are people even going to build there in the first place? And then if they are, to your point, how are you going to get past the power constraints? I think some solutions that CPOs play around with is around off-grid solutions. If you really can't get from the grid, but you know the utilization is there or the demand is there, the need is there, there's plenty of off-grid solutions, whether that's utilizing batteries with load management or maybe even fuel cells, we've seen that creep into the market.

I think there are solutions out there. Obviously the big one, if we think about providing charging where maybe the economics don't stack up immediately, you have to also look at some support from a credits perspective or a funding perspective. But then to Daniel's point as well is how can you provide, I suppose, the minimum to make sure that the consumer need is met while still applying all of your resources in the most high demand areas where actually you really need it? So a bit of both maybe.

**Munni Krishna, Veloz:** Fascinating.

**Dario Pagani, Autel Energy:** Yeah. And at the end of the day, the modularity of the solution is also going to help because we may only need to start with 60 kilowatts perhaps in the beginning, but adding power modules as you go or adding hardware as you go. And sometimes, I mean, we have had experiences in rural Alaska recently to where we still deployed DC fast chargers with the help of local CPOs and local utilities. So those collaborations are definitely key. And I know there are some rural cooperatives that are extremely forward-thinking when it comes to electrification. So again, those partnership and collaborations are probably going to be the key element to make it happen.

**Munni Krishna, Veloz:** Cool. Patrick, a lot of our audience is picking up on the topic that you brought up about standards and MCS, and they're asking what is the status of the rollout of the megawatt charging system? Is there standardization? What do you see as the barrier? And a funny question that I'm getting is, how similar is MCS to flash charging?

**Patrick Duan, BYD America + RIDE Mobility:** That's a great question. What I would say is the BYD flash charging, it's more of technology than a standard. Definitely it needs to be homologated when it arrive at a market. So in the US, what we believe the future megawatt level standard is still MCS, but I think talking about... Part of your question is about deployment. I think what we've seen as one of the biggest constraint in the US by rolling out a mass rollout of MCS chargers is definitely utility readiness and also the utilization of battery storage because we believe battery storage is the solution. Even to the earlier question, I think definitely we should not forget about what either a home battery storage or even industrial battery storage could do to reduce the impact to the near-term utility. So for us, MCS, we believe that's a standard in the US and how to roll it out quickly, I think we should get the utility ready, especially by utilizing battery energy storage as the buffer to reduce the impact to the grid.



**Munni Krishna, Veloz:** Great. Now you guys, I'm going to send this transcript to every utility nationwide and just say, uh-oh, it's coming, you all. Guys, I've got one last question for you before I finally let you off the hook here. And I think it's in response to something we've touched on, but does range and charging speed have the same implications with autonomous EVs as it does with passenger and commercial EVs? And I know that is a broad question, so feel free to say that's maybe a little too high level to answer here.

**Dario Pagani, Autel Energy:** I think, again, we would need to define what the autonomous application is because obviously we are moving towards multiple autonomous applications. And when you think about a vehicle, it could have a very small route, it could have a longer route, and that will dictate what they need to do when they come back to the depot to charge and get serviced and whatnot. So I would say that, again, it's contextual. You're going to have to look at what the application is for the autonomous vehicle. But overall, again, those are not applications that we are unfamiliar with across whether they're driver-centric vehicles or they're autonomous.

**Munni Krishna, Veloz:** Great.

**Daniel Witt, Lucid Motors:** Yeah. And I'll just double click on that point by pointing out, we have announced that we're on a pathway to level four autonomy for our personally owned vehicles, but we also have this partnership with Nuro and Uber, which is around level five autonomy. And so we are looking at both the commercial and consumer applications. In level four, as we're talking about consumer applications, the expectation is that their preferences won't differ greatly from what they have with having to drive their vehicle right now. So we anticipate still a need for longer range vehicles in that consumer segment. The commercial segment, as I alluded to with the previous answer, that's still a bit of an open consideration.

**Munni Krishna, Veloz:** Well, guys, it's patently obvious how much work you have on your plates, how little rest you're getting, and it is so much more meaningful to us in that context that you would so generously share your time with our audience here today. I'm going to finally let you off the hook with a big, big thank you, and I'll let you exit the virtual stage so you can get about your days and all that construction that you've got going on, Patrick, Ross, and Dario and Daniel. Thank you so much, guys.

**Patrick Duan, BYD America + RIDE Mobility:** Thank you.

**Dario Pagani, Autel Energy:** Thank you all.

**Daniel Witt, Lucid Motors:** Thanks all.

**Ross O'Brien, bp pulse:** Thanks, Munni. Thanks, everyone.

## CLOSING REMARKS

**Munni Krishna, Veloz:** Wonderful. To our audience, before I let you all go, I just want to encourage everyone here to sign up for Veloz's newsletter. We've got a lot going on this year as we continue to expand both our programs and their impact nationally. As you'll see on the screen, Veloz has grown both of our leadership teams and membership pretty significantly. So there's lots of new content from new voices coming up soon. So even if you are in that subscription list, please do share with your colleagues. Heads up, later today, we're actually going to be releasing our quarterly California EV M



arket Report. This always includes a national outlook from the bright minds on our communications team, including a roundup of state incentive actions that I know is going to be really interesting. I will say, keep your eyes peeled for the next great evolution in our Electric For All Consumer Education series coming up this week, next week.

It's nothing short of a good time, as well as we'll be unveiling this year's CEO Spotlight. And all I can say for now is that we did a little bit of teasing in this conversation, so it's something you really don't want to miss. At Veloz, amplifying the achievements of our member organizations is our favorite work. And if you're not already a member, we invite you to explore becoming one by visiting the Join Us page on our website. And with that, not to make this an Oscar speech, but my final thank you is to each and every single one of you in the audience today for the hard work that you do every single day to advance EV adoption. Every one of us here at Veloz stand on your shoulders. Cheers and let's Veloz everybody. Thanks. Have a great rest of your day.