VELOZ WEBINAR — V2G, V2H, V2WTF?

Tuesday, August 23, 2022 | 10 – 11 a.m. (PT) | Virtual

WEBINAR SPEAKERS

- Jacob Mathews, Ford Motor Company Manager for EV Standards and Regulations
- Jeni Reynolds, San Diego Gas & Electric Director of Clean Transportation
- Nikolas Runge, InCharge Energy Director of Product and Service
- Randal Kaufman, Black & Veatch Sales Director of Transformative Technologies
- Russell Vare, Flex Power Control Director of Sales and Marketing
- Moderated by Munni Krishna, Veloz Strategic Partnerships Director

WEBINAR TRANSCRIPT

Munni Krishna, Veloz Strategic Partnerships Director (00:00):

Good morning, everyone and welcome to today's Veloz webinar "V2G, V2H, V2WTF?" My name is Munni Krishna and I am Veloz's Strategic Partnerships Director and your moderator for today's session. In today's webinar, we'll be discussing the exciting world of vehicle-to-grid and vehicle-to-home integration. I should mention today's webinar is the last of our 2022 series. So be on the lookout soon for our 2023 lineup. If you have any ideas on topics, please don't hesitate to reach out. I'll throw my email ID in the chat so you can reach me. On today's webinar, we'll be digging deep into the topic of vehicle-to-grid and vehicle-to-home integration with presentations from each of our speakers followed by a panel discussion, but first allow me to tell you a little bit about Veloz!

Munni Krishna, Veloz Strategic Partnerships Director (00:48):

Veloz believes that the future is electric. All vehicles are electric. All people, corporations and agencies who want or need a car or truck can and do choose electric and all energy that powers these vehicles is carbon free. Veloz is led by a high powered, diverse and well-networked group of action leaders from key sectors and Fortune 500 companies, public agencies and non-profits uniquely able to accelerate the shift to electric vehicles (EVs). There is no other organization like it, and you certainly don't want to miss out. We invite you to explore membership on the "Join us" page at veloz.org.

Munni Krishna, Veloz Strategic Partnerships Director (01:24):

I also want to take a moment to give everyone a sneak peek at our latest California EV Market Report, being released tomorrow, presented in collaboration with the California Energy Commission and the California Air Resources Board. We're showing exponential growth in 2022 with just under 80K electric vehicles sold in California this quarter. Q2 of 2022 surpassed Q2 of 2021 sales by over 17,000 vehicles and surpassed Q2 of 2020 by over 55,000 vehicles, showing how rapidly consumer demand for EVs is increasing. Another area of the market showing large growth is the number of different makes and models available to purchase. We jumped from 84 to 115. New models are hitting the market at increasingly accessible prices and helping to drive the transition to electric transportation forward. Sign up for our newsletter on veloz.org to receive this information quarterly. And this is going to get released tomorrow.

Munni Krishna, Veloz Strategic Partnerships Director (02:22):

All right everyone, we have a full roster of expert speakers today that are going to take you through individual presentations, followed by a full panel discussion. And, like I said, before doing so I want to take a moment to frame today's conversation. With fast moving consumer adoption of EVs, the growing demand of energy presents a unique challenge for the grid. However, the question we are exploring today is what if those same electric vehicles were part of the solution? Let's talk about some of the acronyms you'll hear today. V2G stands for vehicle-to-grid and is a technology that enables electricity to be pushed back to the power grid from the battery of an electric car.

Munni Krishna, Veloz Strategic Partnerships Director (03:02):

This type of setup uses bidirectional charging stations to push and pull energy to and from connected vehicles based on the demand for electricity at any given time. This electricity can be used to power houses, buildings, ultimately anything that can get connected to the power grid, bringing value to consumers, businesses and, of course, helping grid operators to optimize the demands of the grid as more intermittent renewals come online. vehicle-to-home or V2H is very similar to V2G. But the electricity is used locally to power a home instead of being fed into the electricity grid. This enables the EV to function a lot like a regular household battery system to help increase self-sufficiency during power outages, offset peak electricity rates, etc.

Munni Krishna, Veloz Strategic Partnerships Director (03:48):

Today, our robust panel of industry experts are going to be discussing the technology behind bidirectional charging, innovative pilot projects that are setting the stage today and the steps for necessary adoption. So, let's jump on in! Our first panelist today is Russell Vare, director of sales and marketing at Flex Power Control. Russell, if I can welcome you onto the panel and have you start sharing slides, that would be great.

Russell Vare, Flex Power Control Director of Sales and Marketing (04:13):

Excellent, good morning. Thanks so much for the introduction! Russell Vare with Flex Power Control. Flex Power Control was founded in 2015 by automotive engineers and we have a 10-kilowatt vehicle-to-home system coming to market next year, which I can share more about. But staying with this topic of V2WTF, which is brilliant by the way, I thought I would kind of step back for a second and show what is V2X, for those of you who are less familiar with this topic.

Russell Vare, Flex Power Control Director of Sales and Marketing (04:45):

It's really just energy storage. So, if you're ever like, what are the use cases? What are the value streams? You can always look at stationary energy storage as a way to kind of understand that. There's kind of two key differences. One is that you need to access that vehicle battery through a charging station.

Russell Vare, Flex Power Control Director of Sales and Marketing (05:01):

So, there's some technical and regulatory aspects there. And then second, you actually need to have the vehicle parked with a state of charge to be able to use the storage. So, you might ask, "Well, why would we bother if it's just like stationary storage?" And the reason is because the amount of EVs that we're going to see in our garages and parking lots. This is from Bloomberg showing the demand for batteries. And if you

look at that chart from passenger vehicles and commercial vehicles versus stationary storage, there is just a massive opportunity there.

Russell Vare, Flex Power Control Director of Sales and Marketing (05:36):

Especially as we think about how we integrate more renewables, intermittent renewables like solar and wind to our grid. If we just tap into a small number of these EVs, it can really provide a lot of value. So that's the big picture. Diving down a little bit to how is vehicle-to-home different than these other aspects, these other V2Xs.

Russell Vare, Flex Power Control Director of Sales and Marketing (06:00):

I think the biggest one is emergency backup. Most customers are really expecting to be able to back up their home with their car in an emergency or in a power outage. And so, you do need to have inverter that can be grid forming, meaning that it can operate when a home is island-ed. So that is a little bit different than just bidirectional charging. Not all bidirectional charging can do that functionality. So that's critical. Second, if it is in a blackout, can you turn on the system? So, is there a separate battery that's included?

Russell Vare, Flex Power Control Director of Sales and Marketing (06:33):

A lot of vehicle-to-home systems do have that including the Flex Power System. And then how is it connected to the home? The US is actually unique in that our homes are 240-volt, AC split phase. So that's when you're looking at what kind of products can I use and what works. You can't just take a three-phase system for a building, a commercial building or import a different product from another country.

Russell Vare, Flex Power Control Director of Sales and Marketing (07:00):

It is important to kind of recognize that the US does need specific things for our buildings here. And then finally, V2H doesn't exclude V2G. Sometimes these terms aren't always that helpful. So, if you have a charging station or a bidirectional charging station, that's also grid synchronizing or sometimes called grid following, and you have an interconnection with the utility, you can export. And so, it is possible to do V2G as long as there's a reason to do so. And we're starting to see that now. There's programs like the Emergency Load Reduction Program that are offering payments for that.

Russell Vare, Flex Power Control Director of Sales and Marketing (07:37):

So, we are starting to see that become an opportunity. Where we are today in the market is that there's more and more vehicle manufacturers who are either offering this commercially already or doing research behind it. And there are now much bigger batteries.

Russell Vare, Flex Power Control Director of Sales and Marketing (07:54):

When I did my first vehicle-to-grid project 10 years ago we had a 24-kilowatt hour Nissan LEAF battery. So, we have much bigger batteries with much bigger opportunity now. In terms of kind of where I see the industry challenges of how do we get this now to scale? I think one is the business case. Does it make sense to spend the money on a bidirectional system? And I think this is where vehicle-to-home is a little bit different, right? We're competing with generators or stationary batteries or other backup home systems.

Russell Vare, Flex Power Control Director of Sales and Marketing (08:29):

So as long as it's competitive with other backup generators there is a business case for a customer. Interconnection was a challenge, but it's really been solved in a lot of ways, especially at least for DC vehicle-to-grid systems. And that means, is the inverter inside the charging station? Is the interconnection point with the utility the charging station instead of the vehicle?

Russell Vare, Flex Power Control Director of Sales and Marketing (08:53):

And California has cleared that. And there's been many interconnections across the country when you use the charging station. So, I think that that has been resolved. And then charging stations have been a challenge, but we are getting there for DC charging stations. So, Tesla, their position is clear. CHAdeMO has been able to do it for a long time, but in North America that standard is starting to fade. And then the CCS standard has not been capable of bidirectional charging until very recently.

Russell Vare, Flex Power Control Director of Sales and Marketing (09:24):

This year we're seeing updates to different protocols like the DIN standard and ISO 15118-20 that's being ratified. And these are all starting to be aligned. And so, I think that that challenge that we've had for a while is now going to be resolved this year. And we'll see a lot more commercial products on the market very shortly. And so, I'll just end with a quick commercial on Flex Power Control SPIN system, and happy to chat more on the Q&A. Thank you.

Munni Krishna, Veloz Strategic Partnerships Director (09:58):

Thank you so much, Russell. It helps so much to set the scene and help to explain this pretty complicated topic. Next up everyone, we have Jeni Reynolds, director of clean transportation from SDG&E. Jeni, you are up and ready to go. Jeni, looks like you're still off camera and on mute. We are ready for you whenever you are.

Jeni Reynolds, San Diego Gas & Electric Director of Clean Transportation (10:25):

[inaudible 00:10:25] muted. And I'm trying to figure out how to get on camera. Give me one second.

Munni Krishna, Veloz Strategic Partnerships Director (10:31):

Take your time.

Jeni Reynolds, San Diego Gas & Electric Director of Clean Transportation (10:37):

Can you see me now?

Munni Krishna, Veloz Strategic Partnerships Director (10:38):

We sure can, Jeni.

Jeni Reynolds, San Diego Gas & Electric Director of Clean Transportation (10:40):

All right. And is my screen up so that you can see the slides?

Munni Krishna, Veloz Strategic Partnerships Director (10:43):

It sure is.

Jeni Reynolds, San Diego Gas & Electric Director of Clean Transportation (10:44):

Perfect. Thank you. And thanks for bearing with me as I get my technology up and running. Russell, what a great segue to sort of my presentation. My name is Jeni Reynolds. I'm the director of clean transportation for San Diego Gas & Electric. And I've been asked to share a little bit about our recently launched [inaudible 00:11:06] battery flowing now school bus pilot here in our region. And so, I'm going to walk through it. And I think what Russell just talked about really gives you a lot of the alphabet to help form the sentences that I'm about to explain. So, let's get to it.

Jeni Reynolds, San Diego Gas & Electric Director of Clean Transportation (11:22):

So, this really started five years ago when San Diego Gas & Electric really thought about what is the future of this energy transition that we're all in. Whether you want to be in it or not, we're all transitioning to this clean future. And with it, we need to find various ways to retain power, to share power, to do an energy exchange. And so, San Diego Gas & Electric absolutely thought vehicle-to-grid, which is to Russell's point where the electrons go from the battery, have an interconnection with the utility back to the grid and going back and forth.

Jeni Reynolds, San Diego Gas & Electric Director of Clean Transportation (11:55):

We knew that that was something for customers [inaudible 00:11:58] find value from either a cost driver or a resiliency driver. And for us, it was a really great way to sort of expand the resiliency of the grid. So, when we formulated this idea and we went to the commission and filed our application, the first thing that became clear is that we needed really good partners.

Jeni Reynolds, San Diego Gas & Electric Director of Clean Transportation (12:15):

And so, my project participants are listed on the slide, but I can't stress enough that when we're in this space together, nobody can go it alone. Not the utility, not the technology provider and not the customer. And so really think about vehicle to whatever you're going to do as a collaboration with a lot of key stakeholders. And so, we found ours, first Cajon Valley. Which was the customer. We also found the OEM [inaudible 00:12:42] retrofit Lion Electric, which helped make the school buses electric. Which was really key obviously. And then sort of the brains of the operation Nuvve, who really has that software in the energy exchange to help the customer sort of play with the grid.

Jeni Reynolds, San Diego Gas & Electric Director of Clean Transportation (12:56):

Most customers, their job isn't energy, it's in this case, Cajon Valley, educating kids. So, the right technology provider to allow you to do that energy exchange is really important.

Jeni Reynolds, San Diego Gas & Electric Director of Clean Transportation (13:07):

So, we all came together and we put together this pilot. It took about five years and there is a lot of lessons learned. I'm going to go through those lessons learned in just a moment. But what I can say is that all of the work and effort that went into putting this pilot into action was worth it because really the best is yet to come. And so, when I say that, I talk about the data. So now we have this pilot. It's launched, it's operational, and we are going to learn so much. We are going to learn about what drives the customer, how to

exchange, what's working, what's not working? And over the next year, we're going to be able to share these findings with everybody, right?

Jeni Reynolds, San Diego Gas & Electric Director of Clean Transportation (13:48):

Doesn't matter who gets there first because we're all going together. And sharing of these findings will help us inform new pilots. It'll help you and others maybe do pilots and think about things outside the box and we keep getting better, right? We keep pivoting and getting a little bit better. But I wanted to share a few things that we have learned to help you maybe inform some decisions when you're thinking about doing a vehicle-to-grid pilot. One is the operational cycle of the vehicles in mind. So, school buses have a great operational cycle. And what I mean by that is that they run in the morning and they're stopped basically before the peak period of energy, four to nine.

Jeni Reynolds, San Diego Gas & Electric Director of Clean Transportation (14:24):

And so, they're stationary at three o'clock and that's when they can provide back to the grid that power. And really finding vehicles that have that operational cycle at the beginning is really helpful. Trying to change operational cycles from a business can get very complicated.

Jeni Reynolds, San Diego Gas & Electric Director of Clean Transportation (14:39):

So, it's good to find those that naturally align. In the future I think we'll find ways to get all businesses kind of aligned with vehicle-to-grid and benefiting them. But for now, this is probably the best customer to focus on. Charging is not plug and play when it comes to the equipment and the vehicles. And so, I would say really strong partnerships and that's what got us through it, but really taking the time to work that piece out. The technology is nascent and new and the connection and the exchange of electrons with each other sometimes can be a little bit more difficult in getting that together than you would first think.

Jeni Reynolds, San Diego Gas & Electric Director of Clean Transportation (15:18):

So, plan it out and prepare for a lot of planning and working together. I will say on the next slide, when I talk about things we still have to work on, Russell mentioned the Emergency Load Reduction Program. And so, El Cajon Valley did sign up for that. So, if there's an emergency and the [inaudible 00:15:37] has an emergency and SDG&E is asking customers to give energy back onto the grid. They can get compensated at $2 a kilowatt, which is a really good program and really a nice way for a customer to benefit from this energy exchange.

Jeni Reynolds, San Diego Gas & Electric Director of Clean Transportation (15:52):

And finally finding ways to streamline Rule of 21. At least for us Rule 21 is our interconnection agreement. And again, vehicle-to-grid, the difference that Russell explained is that you have to play with the grid. And if you play with the grid as the utility, you need an interconnection agreement. And so, I think we're all working together to smooth that process out and make it easier for customers and utilities and stakeholders. But it's definitely something that... We wrote the first one for our region.

Jeni Reynolds, San Diego Gas & Electric Director of Clean Transportation (16:17):

And it was hard, but we're getting better. And I think that that will be an area to improve together as we work through this. Finally, where are our continued places to innovate? And what are the questions that we hope this pilot will help inform? Well, the first barrier is sort of that lack of compensation. The emergency load program is great. It's a demand response program, but it happens once in a while, or actually we hope it never happens, right? Because it's when the grid is really stressed. So how do we compensate customers when it's just normal business? And right now, SDG&E has a vehicle-to-grid pilot rate in front of the commission and we're waiting for approval, but it's those compensation mechanisms, excuse me, that need to be formulated and proven out really to make vehicle-to-grid, whether it's a business or a home, be advantageous to customers.

Jeni Reynolds, San Diego Gas & Electric Director of Clean Transportation (17:11):

The other thing is the funding. El Cajon Valley really found grants and a lot of state funding. And then obviously our incentive program. So, this was a very low-cost initiative for them. And I think a lot of customers who want to jump in this space are going to find barriers with money. And so luckily the Federal Government, the state government and your local utilities often will have programs to help, but really look for those dollars because customers are really going to need that to help them sort of jump into that space.

Jeni Reynolds, San Diego Gas & Electric Director of Clean Transportation (17:39):

And then finally the cost of vehicle-to-grid equipment. We're trying to think about some ideas about how to encourage customers to buy bidirectional chargers, even if they're not going to use them right away. Because once you install a charger, you don't want to kind of rip it out and put it back in. Because we're convinced vehicle-to-grid is going to be a solution for a lot of customers, but the price point again is a barrier. And so, as a utility and as technology partners, we need to work together to find funding and make customers who are really comfortable choosing that type of technology.

Jeni Reynolds, San Diego Gas & Electric Director of Clean Transportation (18:11):

And that's all that I have to say. So, I look forward to the questions later. Thank you.

Munni Krishna, Veloz Strategic Partnerships Director (18:17):

Thank you so much, Jeni. Most of us choose to go electric as adults. And it's exciting to think about the fact that SDG&E is starting a whole new generation of children that are going to be able to go electric from the time that they go to school. All right, folks. Next up we have Nikolas Runge, director from InCharge Energy. And Nikolas, I've got your slides coming up right here.

Nikolas Runge, InCharge Energy Director of Product and Service (18:44):

Thank you very much, Munni. Yeah. Thank you. Sorry, team. But I do have some technical difficulties. I hope that you can see me and hear me and thank you Munni for guiding us through this here. If you would just jump right directly to the next slide. My name is Nikolas. I'm the director of product and service at InCharge Energy. We are a turnkey EV charging solution provider who basically provides really everything to the fleet managers of today.

Nikolas Runge, InCharge Energy Director of Product and Service (19:17):

Yeah. When it comes to providing the right hardware, taking care of the installation, also doing the O&M then once the machines are in place and are actually charging vehicles. And this is all connected to our software system that will also play a role here at some point later. Where we are not having our OCPP back. And of course, what's the needed asset management behind. But also, we have everything connected to our service team as well as also then connectivity to telematics as well as, and also to a certain grid operator here.

Nikolas Runge, InCharge Energy Director of Product and Service (19:55):

And yeah, Munni, if you could go one further, please. I think I can now jump over those definitions. The only thing that I would like to mention, add to the WTF piece of that panel, we also should not forget V1G or smart charging as it from my perspective should be called. It's not bidirectional, but it does have quite some positive impacts also on the grid.

Nikolas Runge, InCharge Energy Director of Product and Service (20:24):

Munni, please go ahead. A little bit about the history. And we also heard about, from Russell already, quite some things here. Yeah. So, we do have bidirectional charging already in place on the CHAdeMO side for quite some time. We had in the meantime in between a couple of proprietary implementations here, AC level two, discharging of vehicles. Yeah. DC, discharging of vehicles. Until we now finally come into a time where we actually do have aligned standards that actually do help us. That do right now also discharging F150s. Yeah. Other big passenger vehicle OEMs have announced that they're going to discharge or to enable discharging their vehicles based on the CCS standard. Munni, if you could click one further.

Nikolas Runge, InCharge Energy Director of Product and Service (21:25):

And that brings me into a little bit of the protocol standardization when it comes to the EV to EVSE communication. Yeah. Which is one of the basics that we need to master first and need to get interoperable in order to get all these partners together on one table and working properly together. Yeah. Right now, the [inaudible 00:21:48] 8-20 standards is released. We have a bidirectional implementation on the DIN spec. And then that is kind of related to that. The J2847-2 is also right now being put in place.

Nikolas Runge, InCharge Energy Director of Product and Service (22:05):

So, we are there on a very, very good, good path in order to solve that interoperability issue. The communication between vehicle and EVSE.

Nikolas Runge, InCharge Energy Director of Product and Service (22:16):

Munni, please. So why are we right now talking different standards? Yeah. Well, there are like usual, when you are putting something new into place, there are different ideas. There are different parties that have to come to the table that have to agree on a joint path that they want to march on forward. Right now, we do see two that are crystallizing out of the many there. And that is [inaudible 00:22:48] dash 20 that has updated security standards. Does support multiple V2G certificates, but is not that quite compatible with not all, but with most current vehicles that are in the market.

Nikolas Runge, InCharge Energy Director of Product and Service (23:04):

Now, on the other hand, we have the J2847-2. That is based on existing CCS implementations, which means that we can put it into place right now and enable current vehicles in the market to discharge their batteries.

Nikolas Runge, InCharge Energy Director of Product and Service (23:28):

Yeah. You were right with the pointer, please, move ahead. Thank you. On the EV and EVSE integration site, what needs to be done to make a vehicle and to make a charger bidirectional. Now on the vehicle side, it does require quite some software changes for the protocol updates. It also does require quite some intense validation by the vehicle OEMs. I'm sure that we hear later something about that from the [inaudible 00:24:06] side. On the EVSE side, we do need bidirectional power modules. Not all power modules are enabled for bidirectional electron slow if you will.

Nikolas Runge, InCharge Energy Director of Product and Service (24:18):

We do need to get the inverter certified. And that is something that Russell already mentioned also earlier. Not every charger can be used for the vehicle-to-home use case. Yeah. Because we need additional equipment here, which is very important.

Nikolas Runge, InCharge Energy Director of Product and Service (24:38):

Munni, if you could go one further. So, we are currently trying to answer those situations with our own hardware in order to at least solve and be ready from an EVSE and technology provider side. Where we are seeing ourselves as the hardware provider, as well as the ones that are communicating with the charger. So, we are right now putting into place a 22, a 44, and a 66 KW bidirectional CCS charger that is also capable of CHAdeMO of course. First, we are right now working on the 2847-2. And then at the next step, we are working on the [inaudible 00:25:27] dash 20 to get that implemented. We have at this point a unidirectional 30 KW machine, but also bidirectional CHAdeMO machine. Munni.

Nikolas Runge, InCharge Energy Director of Product and Service (25:42):

So, speaking of connectivity, and that goes into the direction that Jen was talking about. Yeah. There is a lot of interaction needed between the grid operators, the utilities and the charger at the end. Meaning that a charge point operator that is managing the charger needs to be able to pass these signals through. And the vehicle-to-home/building case, it is very important that the charger is somehow connected to the building and can therefore then react to the local grid event here. Yeah.

Nikolas Runge, InCharge Energy Director of Product and Service (26:20):

Munni, if we can go on further. Speaking of the implementation, and that is the other piece that we are trying to work on. In order to enable the utility of the grid operators to send signals to the CPO, there is currently a standard in place that could be used with open ADR, which we do not see that often. There is right now a lot of custom integrations that we have to go through.

Nikolas Runge, InCharge Energy Director of Product and Service (26:55):

That our software team is then [inaudible 00:26:58] under in order to make things happen. So there needs to be very, very badly, a common standard across North America when it comes to the communication

between utilities and CPOs/down to the EVSE. And then to wrap it up. The overall V2G challenges that we currently see as InCharge is on one hand as I just spoke about, the V2G capable chargers to be tied into the utility grid via a standard. That is jointly used across most people. Then also that limited incentives that are right now, I think do not really incentivize the people to actually bring their battery as their assets that are being utilized for that. That are under wear and tear, to bring them into those grid events and let them participate on them.

Nikolas Runge, InCharge Energy Director of Product and Service (28:08):

And then I think that they're also not yet a 100% well defined schedules of those grid events that work around the use cases of the people. So, we also do need to find a solution for that. So overall, we do need to solve all those challenges that I try to show here in order to make renewable energy actually become a real success. Because they do need that in order to be always available for us. So, thank you very much.

Munni Krishna, Veloz Strategic Partnerships Director (28:51):

Thank you so much, Nikolas. Really appreciate that. It's really critical for all of us to understand where we are in standards to know where this technology is today and where we're going. So next up we have Jacob Mathews from Ford. Jacob, you are on the screen and we are ready for your slides when you are.

Jacob Mathews, Ford Motor Company Manager for EV Standards and Regulations (29:09):

Okay. Thank you, Munni. Hopefully you can hear we well here.

Munni Krishna, Veloz Strategic Partnerships Director (29:13):

We can hear you perfectly.

Jacob Mathews, Ford Motor Company Manager for EV Standards and Regulations (29:15):

Okay. All right. So, I'm sharing my screen. Hopefully that's coming across. Hello everybody. My name is Jacob Mathews and [inaudible 00:29:24] mentioned I'm the manager for EV standards and regulations at Ford [inaudible 00:29:27] company. I want to take a quick minute, two minutes and just talk through what our company's focus is. And then we'll get into our intelligent backup power system that many of you have heard about.

Jacob Mathews, Ford Motor Company Manager for EV Standards and Regulations (29:40):

So just to let everybody know, at Ford we're fully committed, leading in electrification, and we've committed over 50 billion spending through 2026. You already heard about our plan. We are setting up in Kentucky and Tennessee and major investments in Michigan, Missouri, Ohio, et cetera. So, we're fully all in on electrification. And we're anticipating that 40% to 50% of our volume or sales is going to be in electric by 2030, and perhaps even more globally.

Jacob Mathews, Ford Motor Company Manager for EV Standards and Regulations (30:23):

We also have this charging network that we've deployed. Obviously as we sell more electric vehicles, we need to have a charging system that's robust. And today we have over 70,000 charging connection points throughout North America through partnerships that we have with various [inaudible 00:30:43] operators.

So just quickly talk about our approach to vehicle-to-grid. And as the former speakers already talked about V1G, et cetera. We won't get into that too much here, but clearly, we view VGI as a critical element in creating the value that EVs can bring. And they can be a resource to the grid. And of course, as the other speakers mentioned, we need to be able to figure out how to incentivize the operators so that we can spur on more EV adoption.

Jacob Mathews, Ford Motor Company Manager for EV Standards and Regulations (31:19):

And again, we want to explore what are the potential value streams for equity-based programs here as well. And so, we have been doing a lot of V1G pilots across the US, and we're also now getting into V2H with our new product. And we'll talk about that next. So, our home backup power solution that we have essentially is an inverter that allows us to have about 9.6 kilowatts power that can be taken from the vehicle to support the home during a power outage.

Jacob Mathews, Ford Motor Company Manager for EV Standards and Regulations (32:03):

This schematic here sort of shows you that you have a home integration system, labeled C. And I have another picture in the next slide. I'll talk more about it. But essentially in our partnership with Sunrun, we're able to take solar, integrate that with our inverter and take the DC out of our vehicle and integrate that as well to provide home backup solution capability for our F-150 Lightning customers.

Jacob Mathews, Ford Motor Company Manager for EV Standards and Regulations (32:35):

And this is more of an overview of sort of what that system looks like. So, at the heart of this is of course the Ford's Charge Station Pro that can charge the vehicle at about 19.2 kilowatt [inaudible 00:32:54] circuit. And then of course, allowing discharging of approximately 10 kilowatts in DC to an inverter and going through a fully isolated system, if you will. So, our phase one of our system that we are presumably providing to customers is simply a replacement for a backup generator, if you will.

Jacob Mathews, Ford Motor Company Manager for EV Standards and Regulations (33:17):

So, when the power is not available from the grid, we're able to provide that capability coming through the vehicle, through an inverter, a transfer switch. And of course, the critical load panel that is installed for heating up the 9.6 kilowatts of AC power going into the house.

Jacob Mathews, Ford Motor Company Manager for EV Standards and Regulations (33:41):

And so, some of the barriers that we see for VGI, right? So, we got to get the basics right. You have to have a lot of infrastructure in place. We've got to support multi-unit dwelling and disadvantaged communities. We've got to have communication scanners that promote interoperability. We have to educate the customers about the benefits of EVs in general. And so that's one of the barriers. The other one of course is lack of EV specific rate structure. Now, in California we have lots of other... And also, some of the other areas that are coming up with EV rate structures, but it's not quite widespread yet. So, we need to make sure that there is a way for us to maximize value to the EV owner with rates that are preferential and provide incentives.

Jacob Mathews, Ford Motor Company Manager for EV Standards and Regulations (34:35):

And we're talking about not only for charging, but also perhaps for providing some discharge capability, perhaps in the future for V2X. And we see of course, regulatory issues for customers and the grid. The biggest one of course, is formatting an interconnection. And the prior speaker talked about Rule 21 and California obviously being ahead of all the other states, have sort of streamlined that a bit. But our product is being deployed nationwide and not every state has that quite well defined.

Jacob Mathews, Ford Motor Company Manager for EV Standards and Regulations (35:11):

And so that's one of those, the challenges that we're dealing with in terms of getting permitting and interconnection resolved for our customers who are buying this system. Now, in the very initial stage our product is, as I said, is a backup generator. So, it's easier. But as you get into further down the road, when we talk about V2G or even operating in parallel, then interconnection will play into this equation.

Jacob Mathews, Ford Motor Company Manager for EV Standards and Regulations (35:42):

And we need to make sure that all that is easily understood and streamlined so that the customer buying the product doesn't have to wait six months to get this thing working. So that's a bit of a challenge. And of course, the bigger thing of course is the rate and incentives for enabling the EVs to perform as a grid resource. And it's a delicate balance. I mean, obviously we're going to be providing some energy back either to the home or to the building, potentially the grid down the road. But what is the incentive for the customer? And when we solve that or unlock that equation, then purely that will lower the cost of ownership and help EV adoptions.

Jacob Mathews, Ford Motor Company Manager for EV Standards and Regulations (36:28):

Those are the things we are sort of seeing as a bit of a barrier at the moment, but nonetheless, there are a lot of work being done in that space. And of course, getting regulatory approval and funding for large pilots and programs. That's important because that will allow us to have some learnings and be able to tease out what the value is for the end customer. So that's sort of where we're at. I think that's... Yeah, we'll have some more conversation during our Q&A, but back to you Munni.

Munni Krishna, Veloz Strategic Partnerships Director (37:10):

Thank you so much, Jacob. So, everybody in the audience this week, we got to... The Veloz team got to hang out with the Lightning F-150 and I got to say it is a beautiful car, Jacob. Thank you so much for telling us more about it.

Jacob Mathews, Ford Motor Company Manager for EV Standards and Regulations (37:24):

Sure.

Munni Krishna, Veloz Strategic Partnerships Director (37:25):

All right, everybody, our final presentation for today comes from Randal Kaufman, sales director of transformative technologies at Black & Veatch. So, Jacob, if you want to pull down your slides, and Randal we are ready for you when you are.

Randal Kaufman, Black & Veatch Sales Director of Transformative Technologies (37:39):

Thank you very much Munni, and great... And I know everybody wants to talk to Jacob and get that vehicle on order. So, I'll go really quickly. Let's see, there's my share screen share here. So Black and Veatch, for those of you who are not so familiar with our company, we have been around for over 100 years. And I think one thing we're going to do a little differently here is, you've heard about the technology today. But what we do is deploy the technology.

Randal Kaufman, Black & Veatch Sales Director of Transformative Technologies (38:23):

So, we do the infrastructure. Like I said, we focus on mission critical or human critical infrastructure. We've been around for 100 years. Consistently ranked top in the industry for design and implementation. We focus on power, water, telecommunications, renewable energy, EV charging. So, we have broad range of disciplines that we're experts at.

Randal Kaufman, Black & Veatch Sales Director of Transformative Technologies (38:57):

Have been doing for a long time. We have relationships with utilities all over the country and globally. And really our mission is to deploy human critical infrastructure and build the world of difference. So, in this space for fleet electrification, we've been at it for a while. We have experience doing medium, heavy duty, charging depots, transit depots, on route charging.

Randal Kaufman, Black & Veatch Sales Director of Transformative Technologies (39:21):

We do public charging, DC fast charging for passenger vehicles, both public stations and private fleets. And also, all the complimentary power infrastructure. So, deploying solar panels or battery energy storage to support these sites. So, bringing this all together for vehicle-to-grid or vehicle to X is this what I'm presenting here is this idea, this roadmap for resilient, clean energy for multiple use cases.

Randal Kaufman, Black & Veatch Sales Director of Transformative Technologies (39:57):

So, in this ecosystem, in the middle here in the core, this is where the vehicle-to-grid, or vehicle to X plays a part, both for resiliency, stability of power for any onsite generation. If there's a utility outage to provide some resiliency for those occasions, but also the monetization as my colleagues on the panel have been discussing, despite the challenges, there is an opportunity to monetize the energy with the vehicle-to-grid, vehicle to X technology. But also, tactical resiliency.

Randal Kaufman, Black & Veatch Sales Director of Transformative Technologies (40:28):

The school bus application is great. Many school districts have a designated school site as emergency operations center. So, it makes a lot of sense for school buses that are idle much of the time, if they're fully charged with batteries, they can mobilize to different sites and provide power for any communications, any healthcare services, things of that nature. So, there's a great opportunity with vehicle-to-grid or vehicle to X technology use cases. And we'll look forward to your questions, comments, and a great discussion on the matter. And for additional information, feel free to visit our website and contact our company for support in your planning, design, and implementation of these technologies. Thank you very much.

Munni Krishna, Veloz Strategic Partnerships Director (41:19):

Thank you so much Randal. And if I can invite all of our speakers to come on camera now. We're going to start our panel discussion. And we'll start today with Jeni Reynolds from SDG&E. Let's go back to the school district project. That was so exciting to hear about. And this topic is about the V2G and its value being a complicated one to explain. How did SDG&E demonstrate the value of this type of project to school stakeholders? Were the key decision makers motivated by reduced energy bills, clean energy angle, new technology? What was it?

Jeni Reynolds, San Diego Gas & Electric Director of Clean Transportation (41:52):

Yeah, a little bit of all of the above. So, we were fortunate with Cajon Valley as a customer. They saw this new technology as the future. They are actually a very proactive and innovative school district just in general, outside of these technology projects. And so, they saw this as a way to be sustainable, but obviously operational costs, right? Fuel costs. So, fuel switching from gasoline to electrons, that's a huge cost savings. Although we don't, and we've talked a lot about it on this panel about sort of the incentive mechanism, which isn't fully flushed out for customers yet.

Jeni Reynolds, San Diego Gas & Electric Director of Clean Transportation (42:23):

For customers that have demand rates like our business customers do, there is a possibility of peak shaving. So, it can reduce a little bit of your cost from a demand. If you use it in the right way, you have to have the right software. And then obviously to participate with our demand response programs.

Jeni Reynolds, San Diego Gas & Electric Director of Clean Transportation (42:39):

So, I would say as a school district, I think they saw themselves as a thought leader, a way to expose their kids to the future energy transition. As a utility, we find that customers' biggest barrier though, to doing these projects like us is funding. And so, we were fortunate with Cajon Valley that we were able to secure some grants and some funding, and to allow them to be sort of first to market. That said, we have about five or six other schools in our area that are looking to do the same thing and they've gotten buses and we just got to put bidirectional chargers out there.

Jeni Reynolds, San Diego Gas & Electric Director of Clean Transportation (43:11):

So, we're really excited, although this is the first, it won't be the last. And like everyone said here, vehicle-to-grid is a great resiliency play. It is a good play for customers from a cost standpoint. And for Cajon Valley, it wasn't too hard for them to see that value proposition and decide to do it.

Munni Krishna, Veloz Strategic Partnerships Director (43:27):

Awesome. We are anticipating. This is the first of its kind so we can't wait for the white papers that come out about this. And the research. Jeni let's stick with you. SDG&E recently announced that you're a signatory to the Department of Energy's MOU for the Vehicle-To-Everything Memorandum. It's going to bring together cutting-edge resources from a lot of folks. What inspired SDG&E to become a signatory? And can you tell us about any tangible steps that are being taken by the action group?

Jeni Reynolds, San Diego Gas & Electric Director of Clean Transportation (43:53):

Sure. So being inspired to join a bunch of really smart people in the same room at the same time talking about new technology is not hard. What inspired us was the idea that we would bring all these partners and collaborators together. I think I mentioned during my presentation, you can't go it alone. And as a utility, we want to be there for our customers, because the more we understand the technology, the more we can utilize it, the more we benefit our grid and our customers.

Jeni Reynolds, San Diego Gas & Electric Director of Clean Transportation (44:19):

And so, we don't want to get left behind. We want to make sure our customers are right there. So, joining the Department of Energy and being part of this working group is just invaluable. And so, we [inaudible 00:44:30] access to analytics, [inaudible 00:44:33] access to thought leadership that we might not have collaborated with. And in terms of next steps, the working groups. So, the working groups are coming together.

Jeni Reynolds, San Diego Gas & Electric Director of Clean Transportation (44:40):

They have ideas that we're working through. Customers are there and there's a lot of collaboration. In fact, there's also, and I got to look at my notes, the EVGrid Assist tool that they're actually launching too and that transition to help inform customers making this. So, there's a lot of great stuff going on with that working group, I think. Some, which I can't talk about, but a lot of good things to come, as you said. So, I'm here as a beacon of hope for the future. We can do it; we can do it together. And look at your utility as a partner, not as an obstacle because it takes everyone to get through it. And most utilities are going to want to be part of this solution.

Nikolas Runge, InCharge Energy Director of Product and Service (45:14):

And that is also something actually Jeni, to actually say something towards what you just mentioned with the collaboration. We also do see that a lot of utilities are super proactive in this. They really want to be part of that. And I mean, obviously they are one of the most important partners also in that. So, we really do also appreciate SDGs, SDG&E's leadership here. So that is something that has become better, I want to say. In the past years when it comes to that.

Munni Krishna, Veloz Strategic Partnerships Director (45:48):

Awesome. All right, Russell, let's pick on you a little bit. Right now, there's no consistent set of regulations for vehicle-to-grid integration. Every state has its own mix of rules or honestly a lack thereof. In your perspective, what's needed to standardize integration? Is it federal regulation? Should it stay with states? And where are we at in that process right now?

Russell Vare, Flex Power Control Director of Sales and Marketing (46:11):

I think the most important aspect of this is the interconnection piece when we talk about regulations. And this is the thing I think most people, when they're first learning about this subject, get confused on the difference between the AC vehicle-to-grid when you're interconnecting with the vehicle, and DC vehicle-to-grid when you're interconnecting with the charging station.

Russell Vare, Flex Power Control Director of Sales and Marketing (46:31):

And so, there's a lot of confusion of which plugs work where, and what's allowed and not allowed. I think for simplicity, when you're interconnecting a charging station, there's pretty clear rules. The PUC clarified that in California, it's working in other parts of the country. And you're right. There's maybe some differences around the country, but I haven't really seen any opposition to interconnecting a charging station. When you're talking about a vehicle, Nikolas had a good slide showing some of the different ways that this has been implemented in the past. And I think it is a great, really exciting solution to have an interconnection with the vehicle, but it's going to be a little while longer.

Russell Vare, Flex Power Control Director of Sales and Marketing (47:07):

So, I think from the regulatory standpoint, at least on the interconnection piece, it's at least pretty clear for interconnecting a charging station.

Munni Krishna, Veloz Strategic Partnerships Director (47:18):

Well, so we've got a high-level question for you. Last week the Inflation Reduction Act was signed by President Biden and they're looking to see that the EV section significantly improves adoption nationwide. What's the opportunity for V2G and V2H with this influx of vehicles and how are companies like Flex Power Control preparing for this future?

Russell Vare, Flex Power Control Director of Sales and Marketing (47:38):

Yeah, I mean, I think that getting all of those EVs and charging station... EVs on the road and charging stations deployed that are going to be funded through this legislation is going to be the biggest opportunity to have more batteries that we can work with. There's some specific funding for resiliency that may be a good fit for kind of backup power use cases with EVs. But I think really to make V2G scale is finding a way to value that for the customer.

Russell Vare, Flex Power Control Director of Sales and Marketing (48:07):

We talked a little bit about the different ways today. There was an [inaudible 00:48:12] report that [inaudible 00:48:15] from [inaudible 00:48:15] that showed values like $400 to $1,400 per car per year, but that's value. That's not payment, right? And so, if there is value for the grid, how do we figure out... It's really not like an incentive program from the Federal Government, but it's really a state by state look at how we can value EVs as storage. So, I think that there's a lot of opportunity with that legislation, but there's still more work to be done on how to value that for the end customer.

Munni Krishna, Veloz Strategic Partnerships Director (48:47):

Right. In talking about legislations that affect EVs, Jacob, this week, the California Air Resources Board is hosting another hearing on ACC II. It's an important ZEV regulation that includes battery warranty and durability requirements. What are the implications of CARB's proposed battery requirements on V2G and the relevant technologies? I think you're on mute there, Jacob. Let me see if I can unmute you.

Jacob Mathews, Ford Motor Company Manager for EV Standards and Regulations (49:24):

Okay. I had lost my controls there. Can you hear me now?

Munni Krishna, Veloz Strategic Partnerships Director (49:27):

We can hear you perfect.

Jacob Mathews, Ford Motor Company Manager for EV Standards and Regulations (49:28):

Okay, great. That's a great question I was going to say Munni. We've been working with CARB for some time and discussing the impact of battery warranty and durability. And actually, we're thankful that in the latest 15-day notice period, CARB actually made some edits that will make battery durability provision more achievable for the industry. At least in the early years.

Jacob Mathews, Ford Motor Company Manager for EV Standards and Regulations (49:55):

Clearly as our customers use these vehicles for various V2X purposes we'll have to study the impact of durability. I don't want to get into too much detail here, but there are lots of factors that impact battery life. And our present lithium-ion batteries, they'll degrade as you use them or as they sit idly at high temperatures or elevated temperatures. So as industry, we need to develop some methods that we can inform the customer on state of health of battery and keep track of vehicle usages and such.

Jacob Mathews, Ford Motor Company Manager for EV Standards and Regulations (50:36):

But yeah, certainly I think CARB... We totally agree with where they're going. They want to make sure that the marketplace will adopt technologies that are reliable. And so, we stand behind that and we have to sort of figure out how to communicate the implications of V2G to the customer. And then at the same time balance out the warranty and durability requirements. So hopefully that answers your question.

Munni Krishna, Veloz Strategic Partnerships Director (51:08):

Sure does. Randal let's now go to you for a second and let's take it back all the way to the grid. In a world in which every single vehicle is electric and plugged into the grid, from a heavy-duty infrastructure side, what's needed to make this work? And where do we have to invest the funding and what policies are needed? I think you're on mute too, sir.

Randal Kaufman, Black & Veatch Sales Director of Transformative Technologies (51:33):

Yeah. I got the same sticky mute button. Thanks for the question. And from the technical perspective, I like the slide that Jacob showed with the different components. One thing is your critical load panel. Really identifying which loads, which circuits are important to feed onto because otherwise it would require so much battery for everything. Refrigeration units take a lot of [inaudible 00:52:01] current. They can drain batteries really quickly. And things of that nature.

Randal Kaufman, Black & Veatch Sales Director of Transformative Technologies (52:04):

So really identifying what are your critical loads is a place to start from the tactical use standpoint. And then from the policy and the colleagues here on the panel, they hit all the challenges. I mean, what is a common communication standard? What is the common utility accepting the electrons on the system, balancing the grid. What about the payment?

Randal Kaufman, Black & Veatch Sales Director of Transformative Technologies (52:29):

How much is it worth? And it's a big question because there's one thing, is the actual energy when it's needed from the grid standpoint. But what is the value of your critical load? What is your displacement? If you have a standby diesel generator or the typical standby VRLA UPS batteries. If you replace that, I call it active resiliency, meaning you're constantly using your energy on a day-to-day basis for your operations.

Randal Kaufman, Black & Veatch Sales Director of Transformative Technologies (52:56):

And then if there's an interruption somewhere, then you're already using that energy. And then it's just, you're switching components to just isolate which loads are the most important. So, there's definitely a lot of work to be done in the space, but truly believe we can use the energy of the sun for both powering our transportation, but also our mission critical loads for our daily lives.

Munni Krishna, Veloz Strategic Partnerships Director (53:23):

Awesome. Thank you, Randall. Niko, the news out of InCharge Energy, it's getting to the point where you guys are just synonymous with fleet charging. That's how many projects you're doing. So, we want to pick on your experience with fleets nationwide. When it comes to fleet providers, how can they best prepare for V2G integration? What's the value proposition to them? And for those of them in the audience, what's a good first step for them to take as they explore the topic?

Nikolas Runge, InCharge Energy Director of Product and Service (53:54):

Okay. So, what do they have to bring with them? So, number one, they have to bring with them patience. Because as you know we heard from Jeni, from Russell, Jacob, Randal and myself, we do have to get all together at one table and really figure out, at least at this point in the market we have to figure out what is the right solution there. Yeah. So that will take some time.

Nikolas Runge, InCharge Energy Director of Product and Service (54:19):

We then have to see how the local utility is being ready for that. And how we do receive the signals from that. Is the vehicle that they are right now choosing the right one? So, there are a lot of little pieces to the puzzle to bring together. So that usually takes some time. So that's the most important thing is patience. When it comes to the value proposition... Well, let's talk about my most favorite topic right now.

Nikolas Runge, InCharge Energy Director of Product and Service (54:47):

School bus charging. Yeah. School buses are being parked over a very long period of time specifically during the summertime. There are actually a lot of times, not necessarily used at least not all of them. So that brings it to a point where the fleet operators and the owner of those assets can actually... We are always approaching it from a total cost of ownership, at least reduce the TCOs by participating in grid events and getting a monetary benefit out of that.

Nikolas Runge, InCharge Energy Director of Product and Service (55:21):

And that is usually something that can turn the tide 100% to V2G application here. So that is something that we are seeing a lot right now. And I think the last piece was a good first step. Well, see what your use case is. Yeah. Does it make sense? Do your daily routes provide you enough capacity in the morning to actually participate on grid events? Everything always starts with the use case, with an analysis of the dwell time.

And then the routes that they have to drive. And then again, yeah, engage your local utility that you are part of.

Munni Krishna, Veloz Strategic Partnerships Director (56:10):

Fantastic. All right, Randal, you have the last question today. We've talked a lot about the benefits to the consumer, to the driver. We want to look at this from, want to pick your brain about the grid perspective. What role does V2G technology have in stabilizing grid volatility?

Randal Kaufman, Black & Veatch Sales Director of Transformative Technologies (56:29):

Great question. Thanks. And of course, I'm sure Jeni and SDG&E have a complimentary perspective, but as we're moving towards renewable energy, solar generally just powers when the sun is out. Wind just powers when the wind is blowing. Sometimes they're both going. Sometimes they're neither. And they change. If a cloud comes in over the solar, you can have a drop in that production immediately. So, stabilizing these renewables is a really important role. And I think that's just the starting point. There's other things as well, that happen on the grid. Other events. There could be the wind event could cause disruption in some of the circuit's availability.

Randal Kaufman, Black & Veatch Sales Director of Transformative Technologies (57:14):

So that could be a little bit more of a dramatic, instantaneous effect. You have power quality issues as well that go along with that. So, the perspective is local for the site, regional or district for an area, and then grid wide. There's a many different places where the impact... There could be a benefit. Along with the monetization as Nikolas and my colleagues have mentioned for total cost of ownership and use cases.

Munni Krishna, Veloz Strategic Partnerships Director (57:43):

Great. Well, to all our speakers, I want to thank you so much. I know that it's a lot of work to get ready for a webinar, and we made you do presentations. So, we really, all of us at Veloz and our audience want to thank you. You are welcome to go off camera. I've got some final closing remarks, and then we're going to let everybody get on with their day. And Matt, if I can get our final slides up.

Munni Krishna, Veloz Strategic Partnerships Director (58:05):

All right, folks. Please mark your calendars for our final 2022 Veloz summit of the year. It's going to be on December 14th. We've got more information coming soon. Look out for the newsletter. That's where you'll get the best info on that. The team here at Veloz is so exciting to be launching our new Electric For All campaign this fall called, Myths Busting Myths. For those of you who don't know Electric For All campaigns use humorous concepts to educate Californians about EVs and inspire them to go electric.

Munni Krishna, Veloz Strategic Partnerships Director (58:34):

This year, we hired a troop of mythical creatures to help us debunk some critical myths about EVs. And we caught this quick image of Mr. Sasquatch leaving our film set to give you a quick sneak peek of what's coming next. For more information about the campaign, as well as upcoming events, industry newsletters, and much, much more, please subscribe to our e-blast at Veloz.org. And don't forget to visit us at electricforall.org powered by Veloz.

Munni Krishna, Veloz Strategic Partnerships Director (58:59):

Please share, follow, and tag us on our social media platforms. We love to hear from you. And finally, we encourage you to become a part of the Veloz revolution by contacting me on the email address shown on the screen. I want to thank our speakers again one more time. And of course, the Veloz team for all of their help putting together this webinar. A recording of today's chat will be posted soon. So, look out for that. Thank you to everyone for joining us today and have a wonderful rest of your week.