

Transcript for #100. Accelerating Decarbonization at the Intersection of Transportation and Energy
Apoorv Bhargava, CEO & Co-founder, WeaveGrid
August 28, 2023

Tammy Klein (00:01):

Hi, everyone. Welcome to the show. Today, I'm so pleased to have with me Apoorv Bhargava. He's the CEO and Co-founder of WeaveGrid and we're going to talk grid integration for electric vehicles, for utilities, for consumers, what the company is doing. I'm super excited to get into this topic and for you all to learn more about this company. Apoorv, welcome to the show.

Apoorv Bhargava (00:44):

Thanks so much for having me, Tammy. It's a real pleasure. Appreciate being here.

Tammy Klein (00:48):

It is my pleasure as well. So, I kind of gave some teasers but for the listeners who may not be familiar, can you talk about what WeaveGrid does, how you guys came to co-found the company, what gap were you seeing out there in the EV space in particular that wasn't being addressed and, and how you're working with those three areas that I talked about just a few minutes ago: utilities, OEMs, and consumers. Tell us more.

Apoorv Bhargava (01:17):

Absolutely, absolutely. Happy to dive into it. I think for my co-founder and I...we had come from the two sectors that are sort of at the middle of this sort of maelstrom that is happening right now. I had worked mostly most of my career prior to graduate school in the utilities and energy sector. And John Mako had worked primarily in the automotive sector. And we both had an understanding of the other one too. But I think we primarily kind of cut our teeth in those sectors. I think what we both shared was a passion for driving decarbonization across the industry and across the economy. And we knew that we wanted to be working closely with these industries. Electrification kind of provided that perfect moment. And I think in late 2017, early 2018, when we started devising this company, what was sort of apparent was that EVs were starting to come. There were early models. You had, especially Tesla and Nissan, really kind of taking pole position. I used to drive a GM Volt, Chevy Volt. So you had those vehicles too coming along. Really great, great products there, but it was still the early days. And I think we hadn't seen a lot of those announcements from every major automaker. We were seeing signs and China and Europe for sure, but at least here in the United States. I think the fundamental question was, you know, how quickly are we going to transition and are we going to transition to a non-electric future? And of course, there's many different fuel choices and many different options you can have. But, very quickly since we started the company has become, I think, much more obvious is that light-duty vehicles are headed down the electrification pathway. So when we were getting started, I think the premise was, "Look, how do we build a system? How do we ensure that 280 million cars, 280 million light-duty vehicles that exist on the roads today in the United States, how can you imagine a world where all those go electric given the constraints and realities of the electric utility industry and the utility electric grid?" To just put this in context, each of these industries has been operating for just about the same amount of time. About 120 years is the length of the automotive industry's history and also the utility, electric utility industry's history. And so with those two sorts of parallel journeys, you've got this macro trend of decarbonization pushing each of them. One from centralized fossil fuels to much more renewable-centric and clean energy-centric. The other one from ICE internal combustion engines to EVs. And simultaneously, as you've got decarbonization happening at the physical systems level, each of these systems is rapidly kind

of running into one another because now you have these 280 million vehicles that are going to depend on the electric grid for the fuel that they need.

(04:13):

And vice versa. In order to keep that electric grid reliable, you also are going to need those 280 million batteries on wheels to provide some sort of value, or at least some sort of cost avoidance to the electric grid that they are going to be pulling power from. And that's a lot, that's a huge transformation. And really what we kept asking ourselves was, are these two sectors ready to have that interaction, to have that handshake? And we realized that the physical sectors will come together at the pace that they will come together at, but there's actually an opportunity to take advantage of the huge megatrend underlying both of them as well, which is digitization. Right. And that there was a way that we could actually leverage the digital technologies underlying every vehicle increasingly, and also every utilities, IT and OT systems where we could bring together the digital spheres to help accelerate that physical sort of transformation that's happening. Yeah. And that's really been the premise. And so it's been how do we accelerate decarbonization at the intersection of these two industries, right? Taking advantage of all the digital technologies that each of these industries has been investing into.

Tammy Klein (05:26):

So what's been the market reaction shall we say from these three sorts of customer or three users? Pieces that we talked about, users, consumers, utilities you know, the automakers and even regulators. I mean, regulators are trying to figure out how to make this happen like carb and, and other states and now the federal government. So what are you hearing from customers?

Apoorv Bhargava (05:54):

Well, I think the good thing is, as a business, what you hear is what you get. And so that's like one of the best, the purest forms of feedback. It's like we were really apprehensive in the early days. We were unsure if the market was ready. And, you know, there's still a lot of regulatory questions and just like reimagination that needs to happen in order to take, especially on the utility side. An industry that has been very static, very sort of like flatline growth. No real dynamic growth happening there and now have to move into a regulatory motion and hence an operating motion at a utility level that is much more used to growth and change. I mean, the CEO of PGE last week said this is like we have to move from a 'keep the lights on and just operate as needed to a growth motion.' And I think that's a huge cultural shift for utilities.

Tammy Klein (06:52):

Absolutely.

Apoorv Bhargava (06:53):

I think to your question, the feedback has been great because I think the core technology and the core innovation of WeaveGrid was figuring out how do we optimize, right? How do we understand, predict, and then optimize that charging that's happening as today it's only about 3 million vehicles. But then tomorrow, again, we're going to a hundred x that. How do we do that at scale? And how do we ensure that we can keep a clean, affordable and reliable electric grid while doing so? And I think really critically ensuring that it respects the mobility needs first and foremost of a customer. because that is the most critical thing any customer that buys an EV is not buying it because they wanted a battery. they're buying it because they wanted a car or a truck or whatever. And then the battery has value on top of that. And, so respecting sort of the constraints, but also the value that you can create for the customer, the OEM, the utility. I think that's been sort of the secret sauce of WeaveGrid, which is building

technology that allows for those connections to be made. And then being able to create value and split the pie between those different stakeholders as it makes sense in the relevant regulatory structure. it's just a very simple way of saying, we make sure that you can optimize all that charging, but at a very simple level, rather, but at the same time, it is a very complex thing to build technologically and partnership-wise.

Tammy Klein (08:27):

Right. So I want to ask you, and you kind of started to talk about this a little bit, but what kind of trends are you seeing out there both in California, which as you very well know, has one of the largest EV adoption rate in the country and in the US generally when it comes to EV grade integration. What are you seeing out there and, in your view, is the grid really ready to support this massive scale-up of EVs, these 280 million vehicles that we potentially will be seeing in the coming years?

Apoorv Bhargava (09:07):

Yeah, I mean, I think if we zoom out to the whole country, obviously at a policy level and at an infrastructure level, there's been a ton of conversation about public charging. And I think whether it be the evolution of all the automakers moving towards NACS, the North American Charging Standard that Tesla introduced, or, you know, increasing amount of public charging investment, I think that's very critical. You need to make sure that customers feel safe and secure for the generally, five to 10% of time that they're going to acquire fast charging. But the truth is, and I said it in what I said about fast charging, 90% of charging still happens at home. And I think when you kind of split the, split the pie between charging infrastructure and grid infrastructure, the truth is like charging infrastructure is the tip of the iceberg that everyone talks about, but the grid infrastructure underlying it is actually the much, much bigger issue and frankly, a lot less clear how we go develop all of that and build it as quickly as needed. And also, I think, you know, there is an opportunity, and this is why WeaveGrid exists, to actually reduce that grid infrastructure cost by orders of magnitude. the way I think about the question you asked though about is the grid ready? Is not that the grid will, that the grid is not capable of handling? And, maybe we should dissect the word grid here for just the listeners Because everyone talks about the grid as if like, it's this one monolithic thing that it's just, big G grid. The truth is the grid is split into several different components. These are terribly complex machines with markets in some places and centrally regulated and vertically integrated utilities in other places. But there's generation, transmission and distribution, the three components of the electric grid. And I do not think there is zero evidence to suggest that EVs are going to create any problems for the generation and transmission system. Those are the big parts of the grid. You know, you've got your power plants and those high-voltage transmission lines going through the country. It's just not going to be challenging. I think the challenge is why at that local distribution level, the part that we generally ignore, but actually see more than anything else, when we think about the electric grid, it's that neighborhood, that cul-de-sac transformer, the wires that come to your home, all of that.

(11:33):

And ironically, that part of the system is incredibly vulnerable to high-powered charging, but, but vulnerable mostly from a cost perspective because you know, utilities are in the job of maintaining reliability. And so they will of course, like ensure that, you know, the system is as reliable as possible, but, there's an opportunity to actually optimize that charging. And that's really what WeaveGrid does such that it is solving for not just the cheapest time that the power is being produced, but also solving for, you know, just fitting in more vehicles within that constraint of your local network. And by doing so, you can actually bring down that cost of the grid infrastructure that would be required to support all

those vehicles. And so the simple answer to your question is, yes, the grid can handle it. The more complex answer is the grid can handle it as long as they're willing to bear some cost.

(12:28):

And I think there is an opportunity to reduce that cost by four to five x using technologies like WeaveGrid and so the biggest, I think proof point though, in California, and I think California really is the canary in the coal mine as it goes towards electrification, there was a really good study down that was released a few months ago under the auspices of the California Public Utilities Commission- the CPC. And what that study said is if you're looking just at distribution grid spending, and distribution again, is where the biggest cost of electrification is going to show up across the three investor-owned utilities in California, PGE, SSGE and SDGE we're looking at about \$50 billion worth of spending...

Tammy Klein (13:11):

Wow.

Apoorv Bhargava (13:11):

...in the next decade to accommodate all those EVs. And, unfortunately, you know, that's not money that we should be spending because there are alternatives to making sure that that doesn't happen. But those alternatives don't happen by sort of just hoping that customers take the right actions because customers don't know what the right action is. It is a far more complex problem than just charging your car at 11:00 PM. Well, that's not actually, that's not solving the issue. It's actually making the problem worse. And so you have to be able to automate that charging and make it into a much more flexible resource. And, that's really where WeaveGrid comes in.

Tammy Klein (13:48):

Well, it seems to me also that what you all are developing, I mean, especially with the coming of, or eventual coming of vehicle-to-grid, I mean, what you guys are doing is just going to be utterly critical for managing that and making that happen. Can you talk a little bit about that?

Apoorv Bhargava (14:10):

Yeah. So WeaveGrid is actually a signatory to the Department of Energy's MOU around Bidirectionality and V2X. And it's been a core part of our strategy. But I think it's been very much a let's crawl, walk, run towards that future Based on how we see the technology coming about. And, the broad term in the industry is VX Vehicle to X, where X is kind of everything. Now the question is where is the power going when you start dispatching electrons from the battery in the car? And, how do you do so in a way which again, really gives the customer comfort that this vehicle is going to still be available for me to drive to the hospital in the middle of the night if I have an emergency or go to work the next morning, take my kids to school. But I think foundationally, in order to get to a place where you can start using the vehicle as a bi-directional battery, even occasionally, In the very, very, stressful moments for the grid or something where that extra power could be really helpful, you need to have a layer of trust built with the customer, the driver and I think the first trust layer comes from, again, back to that framework of crawl, walk, run, it comes from being able to manage people's charging and automating it such that they feel good about the fact that, okay, my power company, my automotive company is doing this on my behalf. And by doing so, is still ensuring that I actually can meet my needs 100%. And that's sort of the beauty of automation, is like you can really take customer's needs in account and then build your algorithms to kind of support those constraints.

(15:53):

Yeah. It's the building blocks that then take us to bi-directionality. And I, I really do think the first place we'll see Bidirectionality is we are seeing it already, is really in this sort of use case of vehicle to home. So, you know, in that moment when the power goes out, how do we then allow the vehicle to send power back to your home to power your fridge or your conditioner or whatever in an outage instead of having another backup battery. And, and I, I think that's very, very valuable because ultimately reliability is extremely valuable to customers when it comes to the question of vehicle-to-grid, I think it's going to require really extreme events where customers can be compensated highly for basically what a few electrons from their car could give to the grid. And so you're not going to see it for daily dispatch.

(16:44):

I think that would be odd to be doing that. I also think we should be very honest about the state of technology in even batteries. Every automaker has a very different place in their journey with batteries, right? Some batteries are extremely reliable, some are a lot less reliable. So, we ought to be careful about creating blanket terms about technology. I think it's all the technologies on a maturation kind of spectrum. but yeah, so I think WeaveGrid's really kind of building that foundational layer that is now enabling a lot of our automotive partners, a lot of our utility partners, to ensure that as, as they're activating bidirectionality in V2X you know, we have built the requisite data and comms and, and control schema to allow for that to happen in the safest way possible, such that we can create more customer value. And again, back to the sort of three pillars, keep the grid reliable, affordable, and clean.

Tammy Klein (17:40):

Right. So I want to talk to you about charging as well, you know, what kind of trends you're seeing. We talked about EV scale now I want to turn to charging. And what kind of trends you're seeing, with charging. How do you see technology evolving over time and how do you see, what do you, how do you see WeaveGrid's role within that evolution?

Apoorv Bhargava (18:06):

Yeah, so I think, let's start with WeaveGrid's role. We see ourselves as an ecosystem enabler, which is to say that the charging ecosystem is going to have a ton of different players. You're going to have utilities, you're going to have automakers, you're going to have ChargePoint operators, you're going to have, you know, obviously the other third party players, whether it be your Hertz and DHLs and others. And so there's just going to be a whole ecosystem of anybody working in the transportation or electric industry, right? Again, the coming together of these two industries means that every player in those two industries is going to have a perspective or desire to play in that space. I think what's really critical though is that it's hard to build bridges, technological relationship, partnership, and I think data bridges between these different industries and these different players in the industries.

(18:58):

And so it requires somebody who can kind of build for the ecosystem. And that's sort of where we sit. We sit as if that is that shovel layer helping a lot of those players. So as I kind of look towards the broader charging industry though, you know, I think again, we're seeing a ton of investment, whether it be through the bipartisan infrastructure law, the IRA et cetera, going into public charging infrastructure. I think this is one of the challenges though, is that there's so much of a conversation about public charging that we still forget the fact that that, you know, I think about 80% of charging still happens at home. I think when you add up multi-family and workplace charging, it's going to create about 90% of total charging demand even over the next 10 years. And of course, that's going to keep changing and percentages are going to keep changing.

(19:46):

But you realize very quickly that residential really is where the vast majority will be a residential workplace and then some amount of public. Now, the, the, the sort of back to that iceberg construct, the charging infrastructure dollars that are flowing in today are, I think rightfully, you know, there are some good targets around reliability and so forth around the charging infrastructure. But, where the supply chains to get all the relevant grid infrastructure components, whether it be transformers or conductors or all these other things up and ready for this, that part is still, like, I think there's still a lot of open questions. And then I think just sort of the basics of like processes, right? Utilities didn't need to interconnect in a sort of steady state. They didn't need to interconnect so many different requests in a steady state, it was like, okay, I got a new, I got a new commercial building being built, so I'll make sure I get that Walmart set up in the next, in the next year.

(20:50):

I got some time. But, increasingly you've got fleets coming along where somebody can buy an all-electric fleet overnight, and the power requirement could be the equivalent of a huge commercial building for that same fleet. And it's just like, that's not something that we're used to doing in the utility sector. Because you've got to now suddenly be able to figure out, how do I get half a megawatt of power to it, and again, this goes back to the problem on the distribution system. How do I get half a megawatt of power on my local distribution network for a fleet for a delivery company? When they can buy that in six months, and I can't build that for another five years.

Tammy Klein (21:28):

Well, and then I might need to get it approved by the POC because I need to get it approved by the POC. And then it's like, yeah, you've got this ever-lengthening timeline. I do think that one of the most critical issues right now is that there's the technology pieces. You talked about effectively de-siloing all of these entities that have been running parallel paths in the auto utility space 120 years. and never the twain shall have met until recently. But I think the other bugaboo that's really out there is simply the regulatory processes also have not adapted to the fast pace of change that, you know, that utilities and others in this space desperately need to make all of this happen.

Apoorv Bhargava (22:18):

100%. We need to get to a place where I think regulators, you know, utilities generally make rate cases. rate cases happen for utilities once every three years, generally. And we need to get to a place where regulators can ask utilities what they're seeing. And I think they will continue to do their job, of course, of regulating. But of course, I think I just kind of do it at a much faster clip. I mean, I just think about it as we've all kind of lived through a very rapidly dynamic environment in our lives, sadly, which was Covid where every day the data changed so quickly. And that was that exponential growth was something we all experienced. We saw one zip code and the next zip code, and then the next zip code and a hotspot, hotspot, hotspot growing.

(23:00):

And I think it's very similar, sorry to such a morbid analogy, but like, it's such a similar thing with EVs where day by day you've got these hotspots growing all over the network where people are buying cars or installing chargers. And, you know, instead of having a dynamic approach to allowing that permitting and building those extra, that extra capacity and so forth, we've got a very static process. And so two years after something has, has, has already occurred, we're saying, well, why is that so different from what you said three years ago? And it's like, well, it's a rapidly changing environment, and then you look forward, and again, unless you're forecasting in an exponential way, which is not something that we

traditionally do again, there's a question of, well, is this prudent or not? And so we just need to shorten the time cycles within which we're asking for data regulating the decisions. And then kind of going back and testing the market again, I'm a chemical engineer by training. So for me, this is sort of the classic sampling problem, which is you want to sample faster when things are changing much more rapidly. You don't need a sample as much when things are static. And I think this is a moment where we all know it's highly dynamic, so let's take advantage of that. Let's create those regulatory sandboxes. and so I'm totally with the way I think this is going to be one of the biggest challenges, which is how do we ensure that we can proactively spend, and I think importantly, proactively manage, I mean, a huge part of what we created is doing is saying, look, if we believe there's a couple megawatts worth of extra load required in area, what if we could proactively through smarter management and so forth ensure that we're only talking about a few hundred kilowatts of peak extra load. I mean, that just radically changes the economics for what we are trying to deploy.

Tammy Klein (24:53):

And everyone gets assurance, the utility gets assurance and sort of that economies of scale. The auto gets, you know, assurance. And they're going to need that. because they're going to have to demonstrate compliance in one way, shape, or form <laugh>, whether it's exactly ACC two or, or it's the CO2 pending rule from EPA or the new CAFE standards. and then consumers just want to make sure, just as you indicated earlier, that, "Okay, can I drive my car, you know, <laugh>, right? Is it the power am I going to be charged? When can I charge? Is it going to be there? Can I use my car?" And to have that sense of security,

Apoorv Bhargava (25:35):

And I think exactly. To have that sense of security and trust and to know that actually I can do all of those things rather than even having to ask those questions. I think one of the things we often talk about internally is that rather than even having to ask those questions, the customer should always trust that their vehicle is available and it's on incumbent on us to do the work to ensure that that vehicle is ready and available for them to use while balancing the needs of the grid and the automakers and so on and so forth. And so, you know, in that simple example I gave of like, instead of having to install a few megawatts worth of substation upgrades and only bringing it down by an order of magnitude, I mean, look, there's, there's millions of dollars of savings there too that can really flow back to the customer, can flow back to the utility and other customers and can throwback to automakers. And so, you know, I think building those business cases is also so critical because then it should, it should really feel like a win-win for everyone.

Tammy Klein (26:29):

Yeah. So we've been talking a little bit about these kinds of opportunities and challenges. We've been talking about how you see the trends in both EV scale-up and charging, but how do you see the landscape evolving, let's say over the next 10 years? And then how do you see with WeaveGrid evolving right along with that?

Apoorv Bhargava (26:54):

Yeah, I think one of the biggest open questions to me in the landscape right now is who owns public charging? Like, that just feels like a really big open question mark. I mean, I know you've, it's had some guests from other public charging companies before, and the economics right now are, are so unclear for some of the networks. And yet now you've got the automakers investing in their own networks. You've obviously got Tesla suddenly having changed the game entirely with opening up the supercharger effectively to everyone.

Tammy Klein (27:31):

The fuel retailers are like, "Hey, wait a minute, we want to get in on the space fuel... Why should utilities get to own the charging and the utilities are like, "Wait, we might want to own charging. We might need to..."

Apoorv Bhargava (27:44):

Exactly. Yeah. And there's some really big open questions there. And, and, and just to be clear, like WeaveGrid doesn't play in that space, but it is something that we think a lot about just from a, well, who all do we need to interact with to ensure that the customer is getting the best experience and also is right, is getting that end-to-end journey fulfilled properly. And, I think it's still super unclear where that goes. I think hand in glove with that though, to your point about CAFE standards and so forth, I am still unclear. You know, we work a lot with a lot of automakers, and I will say, you see the strategies playing out in their product portfolio, you see it playing out in their charging strategies. And, I think it gives us a very interesting benchmarking insight into how different automakers are, are proceeding.

(28:32):

I'll tell you I'm still very unclear on some of the OEM's strategies on if they really think that there are different ways to game the next 10 to 15 years because it's just not clear what everyone's strategy is. and so we of course respect them all and we want to work closely with all of them, but, at the same time, you just see these like very different approaches. And so whether some people are fully focused on BEVs, some people are fully focused on PHEVs, some people are focused on both. I mean, all these different strategies leave me just kind of like buying tubs of popcorn and saying, okay, I want to see what's going to happen over the next 10 years. Because it's and it's, it's, it's cool to be living in that moment as clearly like this massive transformation is happening.

Tammy Klein (29:23):

So, you know, and you mentioned bipartisan infrastructure law. We have the Inflation Reduction Act. There's a whole slate of policies in California and the others in many other states at this point. Do you see the need for other policies that need to be set at either federal, state, or local level to really spark EV scale-up? Is it enough being done in your view what are the biggest gaps that you're seeing right now, especially those that would touch on what you all are doing?

Apoorv Bhargava (30:04):

Yeah, I mean, I think we spoke about it a little bit earlier and I would maybe reiterate that point, which is that I think on the federal side, there's a lot going on. I think, you know, some states have a ton going on, but the sort of automotive regulations live in a different part of regulatory silo them from utility regulations and I think how utilities are and their regulators cope with this impending demand growth from EVs is going to be really driven by, I think what license they're given by regulators to design the requisite programs and the requisite strategies to handle all of this, right? How much can they do proactive investments? How much can they go out there and really engage with a customer on charging management programs? I mean, that's that kind of stuff, it needs to happen faster because I do think the firing gun has started on the federal level, I would say beyond the firing gun. I mean, we are well into it at this point whether it be huge amounts of money going into battery factories and this and that. I will tell you my worry, and it's the worry I've had for five years, which is why we started the company. My worry is that the conversation is so dominated by critical minerals and the need for labor unions and the need for manufacturing capacity and this and that, that we are forgetting the fact that when we start cranking out 10 million vehicles a year in this country, forget getting to a place of having 280 on the road

we will find the grid is not ready to handle it. And that we have not built out the requisite grid infrastructure and of course, the corresponding charging infrastructure to support it, but really importantly, the grid infrastructure. And I think that is going to be a huge failure moment where we forgot that supply chain, you know, finding, yeah. Finding bottlenecks in supply chains isn't just looking upstream. It also means looking downstream. And the grid, in my view, is one of the biggest downstream risks to large-scale electrification.

Tammy Klein (32:06):

Yeah. Yeah. Yikes. Ouch. <laugh>.

Apoorv Bhargava (32:10):

No, I'm optimistic. I'm obviously optimistic because I'm building a wonderful company around it. So I think there's a ton we can do to make that, make that happen.

Tammy Klein (32:19):

I wonder if that realization, I mean, I hope it comes sooner or later because in my view, you don't want the public and other stakeholders to say, "See, this didn't work. We need to do something else. And we've spent billions and billions of dollars, tons of people's time, you know, so on." And so not, you know, sort of dancing around this, but not quite addressing it. So that's, it's kind of my fear as well, to be honest with you.

Apoorv Bhargava (32:47):

Yeah. And I think, you know, if, I was actually reflecting on this a little bit. It's like, if the question was just the difference between cost more, cost much more cost and time was exactly the same, I think we wouldn't know what the right answer is. In some sense. We would just kind of say, okay, well, you know what, maybe we, maybe the treasury can't afford to spend more dollars, is, you know, it, it's like you don't, your cost optimization alone is an exciting value proposition, but it isn't enough. I think time optimization and given the goals we have in ourselves to decarbonize the economy, I think that's the bigger question mark for me. And I think that's where I think about grid congestion as a real, as a real big question mark, because look, again, back to the anecdote we were talking about, if we were talking about needing five years to set up the requisite sort of infrastructure, the substation that will support a fleet depot well, I mean, five years like that's just too long. And so I get it, I have a ton of empathy to be clear for the folks trying to do that work. I mean, that's why I sell, and I partner with them so closely, but it's, it is, this is the tragedy is like if it was just, oh, I can snap my finger and spend 20% more and it's still going to get done overnight. Yeah. Maybe not much of a big deal. Maybe it's like five years plus also it's going to cost me 20 to 30% more. That's hugely problematic.

Tammy Klein (34:16):

Well, on a lighter note, last question. What excites you most about the space and why? You've talked about your enthusiasm and commitment to decarbonization, but what keeps you going? I mean, you've just started this company, it's only a few years old. The startup area, you know, I'm sure has both opportunities and challenges. You're creating something with your partners and colleagues. So what keeps you going? What excites you most?

Apoorv Bhargava (34:53):

Oh, I just love how dynamic the space is right now. It's not every day you come to work, and you realize, oh God, there's something completely new and different happening in a part of this. And it's so fascinating to be in the crossroads in a moment where you've got these 220-year-old, like just lines of

industry. These two really massive sectors going through a massive transformation in front of your eyes. And you're living it, you're living it, you're helping it make it happen. And every day there's new questions and conversations happening, and it's just so dynamic and, and nothing feels like it's going to, like, it's all settled, like none of the answers are. And so I love creating in that space. I love playing in that space. It, it's, it's, it's great. And so, you know, I remember of course Clayton Christensen's "Innovator's Dilemma" I'm like, there's so many times when I feel like I'm like, instead of reading that book, I'm living that book <laugh>, when I see it in front of my eyes, <laugh>. And I'm just like, this is the best thing ever.

Tammy Klein (35:56):

Apoorv, thank you so much for joining the show, talking to us about what WeaveGrid is doing and sharing your views. I'd love to have you back as the company continues to progress.

Apoorv Bhargava (36:07):

My pleasure. And I'd love to be back. Thanks so much. Tammy

Tammy Klein (36:10):

<laugh>. Thank you.