Sonja Berdahl (00:00:01):

On behalf of the U S department of energy office of electricity's advanced grid research division. I want to welcome everyone to our discussion today on grid infrastructure, investment requirements for electrification. My name is Sonya Bertel and I'm the co-leader of this project and a senior project manager at the national renewable energy laboratory. Today, we are talking about some of the infrastructure investments that may be required to accommodate electrification across the many sectors of our economy. On our panel. Today, we will talk about both distribution level and transmission level investments and provide perspectives from both rural and urban areas. We also want to invite you to participate in this discussion because there are many people on the call today. I'm going to do a quick review of the format of our discussion and tell you how you can participate. First. Everyone should mute their microphone and turn off their camera.

Sonja Berdahl (00:00:59):

Your voice is important to us and we encourage you to participate. So please use the chat box to post questions or comments. We will monitor the chat box and either ask you the, ask the question for you or ask you to turn on your camera and microphone and ask it directly to our panel and our group today. If you'd like to speak and we encourage you to do that, please use the hand icon to virtually raise your hand or turn on your camera and raise your hand physically. So our moderator can call on you. Madeline crowds is my colleague had an RA who was handling everything behind the scenes today. If you have any questions about using teams, please ask her through the chat feature and please be aware that this session is being recorded and we are going to make the slides and the recording available on smart grid.gov. Now, next I want to introduce you to my co-leader Jared leader, who is a senior manager of industry strategy for the smart electric power lines, who many of you know SC, but Jared is going to give you a brief overview of DOE initial initiative for introducing our panel today. Jared,

Jared Leader (00:02:13):

Thanks Sonia. And welcome everyone. I see a lot of familiar faces and names. So welcome back to our virtual discussion series on a stakeholder's guide to electrification. Before we get into our esteemed panelists and discussion of today I wanted to give a brief overview of what voices of experiences is dating back to 2011. Following the recovery act smart grid program, voices of experience was launched to provide a forum to exchange ideas and learn from colleagues. So today we're really going to be focusing on sharing insights and best practices. And that's the theme of all of the voices of experience projects. They, you know, it's a, it's a, in a sense it's a non-technical forum about a technology. So electrification today, we're going to be talking about grid infrastructure investments. So there's going to be some technical aspects, but really we encourage you to speak up and share your learning, share your insights.

Jared Leader (00:03:11):

And ultimately we're going to be developing multimedia, you know, platform to share industry insights. Education's digestible content deliverables out to the industry on the right hand side, you see some of what we've done in the past. And Raul and Sonya has been working on this project with the DOE since its conception. I, at SIPA, I've been working over just last two years with Sonya and Enron. I've had the pleasure to work with the microgrids for resiliency project and also the stakeholder guide to electrification. I highly encourage go to smart grid.gov, follow the links to voices of expense, to see all of these resources. A lot of these still get a lot of traction in the industry even dating back to when it first

was conceived. So I highly encourage you to do that. No let's shift gears to today and this initiative around election vacation.

Jared Leader (00:04:07):

So Maddie, if you can please go to the next slide. Electrification means a lot of different things to a lot of different people. So it was an obvious choice for us to pursue as a voices of experience, to hear from the industry on what is electrification and why are industries and sectors electrifying. We started this conversation by convening an industry strategy industry committee group consisting of utilities, commissions, regulators, government agencies, research advisors, and non-profits. So thank you all those of you are serving. But we've, we convene them earlier in the year to understand some of the hot topics around electrification, but really to look into where are the gaps in education? What are the challenges that industry members and subject matter expertise are seeing around electrification and how can we develop a platform to educate and share insights out to the industry?

Jared Leader (00:05:14):

So part of this is this virtual discussion series where we're going to be collecting data and information. And as I mentioned, another part is to put content out to help educate one of that pieces of content that we've already developed with the support of the industry committee, a steering committee, this infographic around electrification to set the kind of record set set, set the stage a bit of the stakeholder's guide to electrification, talking about what is electrification and why these different industries are electrifying. And you can see that I encourage you. This is on smart grid.gov. You can download it. And, and we're going to be talking primarily today about how these different sectors are electrifying and what does that mean for the grid for the electric grid and the infrastructure and the investments required to meet this new load from electrification.

Jared Leader (00:06:14):

So you go to the next slide, we will show our steering committee members with representation all across the country and in different, in different aspects and different stakeholder perspectives. We really try to get different perspectives to the table and to carry that forward to today's discussion. We may call on specific individuals to get your perspective. So don't be shy and please speak up we're looking to get all sorts of perspectives from stakeholders around this topic of grid, infrastructure investments, and, and requirements to meet the growing demand from electrification. So if you go to the next slide, please this is our second to last discussion. We hope that many of you have been able to join us since the middle of June for our different topics. But they've been great and we're going to be developing briefings for all of them.

Jared Leader (00:07:13):

So please stay tuned from S mark gerd.gov to learn more. I mentioned what we're discussing today next week, we're going to be discussing the impacts of electrification on the natural gas industry. So again, please keep your comments and questions geared towards the discussion on around grid infrastructure investments and electrification. And with that, I get the honor to introduce the moderator for today. And the moderator is Keith Dennis vice president at NRA ACA the rural electric cooperative association. And Keith is a member of our steering committee. He's participated in several different of these discussions. And thank you very much. Keith Keith brings a phenomenal perspective here to the subject today as not only working with the electric cooperatives and especially the rural electric cooperatives in the U S but Keith also is a sits on the board of the beneficial electrification league and beneficial

electrification is something that's come up time and time again in these discussions. So we're grateful to have Keith as our moderator moderator today. So Keith, take the floor, please.

Speaker 3 (00:08:31):

Thank you. I'll just start off with a couple of big picture things that I usually start off with of course electrification originally a hundred years ago, more than that really changed our economy. If you think about before that we were all in rural areas, didn't have light bulbs and were washing dishes and, and enclosed by hand the national academies of engineers calls the electrification one of the most significant achievements of all times engineering achievements of all time. And now when people describe the grid, they describe it. It's the largest, most complicated machine that's ever been made by humankind. So as we're tinkering on this big machine, as we always do, we're wondering, you know, is it time to invest again? And I really liked the word investment just because I have a positive connotation of investment.

Speaker 3 (00:09:23):

I don't think of investment in my life as a cost. I think of it as something that I'm really doing for positive reasons, investing in my education, my child, or my healthcare. But there is such thing as a bad investment and there's such thing as a good investment. And I think one of the things that we need to look at is how do we make sure that our investments are good investments? And, and for me I think there a little foreshadowing here, every time I speak, but it's really about making sure that the electrification we're trying to do is beneficial. Making sure that it's about improving the quality of life, just as it's always been about improving the quality of life making sure that overall it's saving people money that it's helping the environment and that it's making the grid more robust and resilient.

Speaker 3 (00:10:13):

And so there's a couple of different scenarios and uncertainties you can think about when we're thinking about how to invest are we trying to invest in a grid that can electrify all the electric vehicles, all the vehicles in the country so that they can charge whatever they want all at the same time, or are we looking to invest in a grid that may be has more flexibility where, where where vehicles and homes are, are using energy at different times when, when we really you know, are maximizing the, the, the optimizing that, the outcome. So those are all questions that I think we're going to get to. And we have a really, really a couple of really good speakers today to, to do that with us. And first up is, is David who's, the director of strategy and technology for Encore electric delivery in Dallas.

Speaker 3 (00:11:06):

Prior to this role, he was he had senior roles in classified intelligence and defense systems, public education, finance, and economic development. And the one thing that, that I read here in his bio that just blows my mind as a futurist, he has written 25 novels that seek to inform that discussion on how rapidly transforming technology is changing the nature of human relationships in an increasingly immediate world. Many one who can write 25 novels. It's just amazing to me. So I'm so glad to hear his thoughts on on grid infrastructure investments. So with that, I'll turn it over to David.

Speaker 4 (00:11:44):

Thanks, Keith. I appreciate the opportunity to be here with you today and chat a little bit about electrification, because I spent a lot of time thinking about the grid and how we're going to do that. Can you bring up the first slide please? Mattie, as Keith said in the Dallas area and this picture I think is symbolic of what we stand for because without us, the lights aren't on in Dallas. So this just gives you an

idea of the, kind of the size and scope of what we're dealing with. Encore is a transmission distribution, only utility in Texas. She means we don't generate, and we don't actually sell any power, but we deliver the power to 3.7 million meters across north Texas. And that's a significant number. One of the largest transmission distribution utilities in the country and from information we've gotten in the past, it appears that Encore actually transmits more electrons than any other major utility in the country. A lot of that's because of the air conditioning has required to live in Texas. But that's another story we'll talk about that later. Can you add the next slide?

Speaker 4 (00:12:56):

First thing we want to do is to talk about the investment categories that we're dealing with here in north Texas transportation electrification is the one that we see that potentially has the most impact on us in terms of the investments that we have to make in order to be able to serve that. And we've identified four different segments of the transportation electrification space, even though most people only really talk about the first two, but we see air mobility and actually locomotives as becoming significant loads for us in our service territory. And we'll talk a little bit more about that in a couple of minutes, but we also wanted to talk a little bit about premise electrification, and we break that out by the commercial industrial, governmental side of that, and then also the residential portions of that, and just the, the choose the we have to deal with there.

Speaker 4 (00:13:42):

Now it's the last session that we had for you know, voice of experience was on resiliency. So I'm not gonna spend a lot of time about resiliency, but want to point out that that is one of the areas that we spend a lot of time trying to figure out how do we create that resiliency, that high reliability, because as our customers provide greater and greater technological requirements in their, their service loads, we have to find ways to try to improve power quality to all of those requirements. And just as a classic example of how we deal with that a few years ago at the Dallas Fort worth airport, some of you may have had the privilege of flying through there when the open terminal D which is international terminal, and what ended up happening was they put in a baggage handling system that every time there was a momentary would shut down, not a good thing.

Speaker 4 (00:14:36):

We had to spend a lot of time trying to go through how to improve the resiliency and reliability of that particular aspect of the, of the grid that we have at the DFW airport. And currently we have three separate substations that serve the airport. So we have a lot of redundancy on the site, but even with redundancy, we were still experiencing momentary outages that were wreaking havoc was the baggage handling system. So that's part of the reason why we focus on that. And we've had some very painful and free public lessons about resiliency. So we're in rebuild liability here. So we are highly focused on those areas. Next slide, please, fleet electrification, as I said, is one of the things that we're spending a lot of time on, and we'll talk a little bit here about some tools and some other things that are important there.

Speaker 4 (00:15:20):

But for us, if you look at the map on the left, you see part of the reason why fleet electrification is important to us. We have some major interstate highways that pass through mostly the Dallas Fort worth area. And as a result of that, we've identified that there are approximately 24,000 separately owned fleets in our service territory. And that we've had inquiries from customers indicating

requirements for charging loads as high as 40 megawatts for a single premise. Now, most of the work we're doing currently with customers showed that our distribution center loads are probably going to range somewhere between two and a half to six and a half megawatts for electric fleet charging. But that 40 megawatt load requirement was a real wake up call for us. It was a single premise, the, the, the warehouse itself that they were going to work out of only had a current load of a little less than 150 kilowatts.

Speaker 4 (00:16:19):

For us, it was, we, we did some in a quick analysis, identified that we had about nine megawatts of capacity available at the substation that served that particular location. So we could, we could actually accommodate about 10% of their load requirements right off the bat, so that, you know, if they brought the trucks in, we were not gonna have a problem. The issue was when they made this inquiry, the trucks were still not available. So we still had some time to address it. But that was one of the things we started realizing was that there's a significant requirement for electrification at each and every individual warehouse that we have in our service territory, depending on the sizes of the fleece that serves them. So that got us starting to look at our PR our overall system. The second picture you see in the center, there is an aerial view of the Alliance quarter, just west of the Dallas area, north of Fort worth.

Speaker 4 (00:17:11):

You see, as an airport there, which is a privately owned airport and the area is developed by the parol company. Many of you probably have heard of Ross Perot. This is something that he developed for the money he got from selling EDS to general motors on a number of years ago. And as a result he's built out is one of the largest congregations of warehousing and other facilities in the country. I believe that they have somewhere around 50 fortune 500 companies that have representation in their facilities here. And they, they have intermodal facilities. They include rail as well as air, as well as trucks and, and post delivery and on the, over the road types of transportation. So in this area alone, we have, as you can see a lot of trucks that we know are coming in, out of there on a daily basis, the map to the right of your screen shows the clusters of logistics centers in and around the DFW area, Dallas Fort worth 30th just north of the gold section there, you'll see a spot that's the DFW airport.

Speaker 4 (00:18:18):

So we have a huge section south of the airport, and then west of the airport, the gray up on, on the upper left is the Alliance quarter that you're seeing the picture of from there. And a lot of the next slide, please, okay, we've identified for fleet. Electrification are listed on this slide and we won't, I won't spend a lot of time trying to go through them individually. But one of the things that I wanted to call your attention to was the EBU offerings by vehicle class that I have there to the right. You can see identified eight different classes of vehicles. And one of the things that we've identified as we go through this is that each and every one of these different classes has slightly different charging requirements, depending on particularly, depending on how the owners of the, of the vehicles and the fleets are going to use them.

Speaker 4 (00:19:02):

So we've had, we've been doing a lot of work in terms again, of segmenting our market here that we're working with. And the, and the, the, the requirements that are run a half looking at how do we serve each and every one of these different types of fleets. And you can see those issues around fleet lubrication. One of the most important ones for us was the early wake-up call that relationships with

customers is an issue. Most utilities have key account managers for their major accounts for Encore. We assigned a key account manager when a customer has a minimum load of one and a half megawatts. And since many of these distribution centers only have a load of about 150 kilowatts, some less, some, a little bit more you get into a, an Amazon warehouse, for example, that's more like a half a megawatt, but still significantly lower than the potential for the fleet, like vacation requirements at that individual site.

Speaker 4 (00:19:55):

And going back to the picture of the Perot locations, one of the things that we identified there was clearly the, the proximity of these facilities to each other is where do we find the land to build additional substations? If we get to the point where we started finding, we have to build new substations for every three to five buildings in that space, because of the kinds of sizes of the loads that they're gonna be putting into place. And that also brought us to the realization that this could happen to us much quicker than we think, because for us, in some of our substations, we may have five different warehouses on the same substation, again, because the relatively small loads, but if all five of those warehouses decided to bring in 10 trucks from the class eight variety and start wanting to charge them immediately very quickly, we're now at 50 vehicles.

Speaker 4 (00:20:43):

And that 50 vehicles could hit us with up to 10 megawatts of load for the first delivery of trucks, knowing that you're going to be building yeah, out multiple iterations of these trucks every year. A lot of the trucks are leased by third-party companies like Ryder and Penske and people like this. So consequently, what they do is they change out a portion of their fleet every year. If you try to modernize it, keep the fleet and reduce their maintenance requirements. But what that means is that if they put in 50, 50 trucks, the first year based on 10 trucks alone, even us, even if the sites only have a hundred trucks each, and by the end, there'll be putting in more like a hundred trucks a year across the five fleets, which could be 20 megawatts in a single year added to our substation requirements to serve those facilities.

Speaker 4 (00:21:26):

So you can see that this becomes problematic, but predicting in terms of the potential loads that we're going to have to be dealing with. So for us identifying something, you know, land acquisition for substations, okay. Rights of away are a big piece of what we're doing at the present time. Just trying to figure out how would we serve these facilities if in fact people start electrifying their fleets. And, and here in Dallas, we have one of the OEMs is here at Peterbilt. The bills he's class eight, Lahren class 4, 6, 8 trucks, and the larger ones that require the most for electrical charging apartments. And they've started delivering their first trucks already. First class four truck was delivered in Anchorage, Alaska, interesting enough, just in the last 60 days, but they have all other orders and they have other other trucks that they're starting to be delivered as we speak they actually not renovated final checkoff facility to be an electric somebody's line.

Speaker 4 (00:22:24):

So they're, they're moving in. They're expecting, they're going to be putting trucks out on a regular basis, was increasing production over the next several years. Yeah. Can we come in back again to the reliability and the resiliency issues? Those becomes significant for the, these fleet owners because of the fact that if they can't charge their trucks overnight, or they can't track their charge, their trucks on the

highway. And given the fact, there's not a lot of infrastructure built out there for these large trucks along the highway, they have to charge at the Depot with the chart Depot loses power overnight. They have to have some means of trying to address it. So in every single conversation we have with a customer now, fleet charging resiliency becomes a part of that conversation and they want, I don't know how best to try to accomplish that in Texas.

Speaker 4 (00:23:06):

And every state is going to be somewhat different. How you do that. But here, and we'll talk about that a little bit more in a few minutes, probably we'll, we'll come back to battery charging battery augmenting they're systems. Now a piece of that is the managed charging because in Texas, we don't, I have a lot of flexibility around demand charges like you see in California, and some other places where they're doing demand, charge holidays and things of this nature because of the fact that we're a transmission distribution, only utility cost cost drives are are terrible process in Texas. So consequently, we don't have a lot of flexibility around charging people for the services they get. So for us, we pretty much have to tell them, manage charging use. The thing that you have to focus on is how can you reduce your coincidence peaks to be able to reduce your advanced charges and software and other types of systems can help them do that.

Speaker 4 (00:23:57):

But the thing I wanted to really talk about here at the end is on this particular slide is the changing business needs that we have to learn from a utilities perspective that we've never had to worry about in the past. Almost all of our loads have been stationary to this point. And we haven't really had to worry too much about the customer's business tempo business operations. But when we get into a fleet management system where we're trying to charge a fleet, all of a sudden we have to worry about, okay, they bring in a truck this year that has a certain size battery three years from now. They bring in a truck that has a battery that's X plus 50%. Now they're charging requirements that they have currently won't meet that. So they have to start looking at the upgradability of any charging infrastructure they put in today, which means that they really have to look at building out the infrastructure above and beyond the current needs because of the fact that the OEMs has changed the vehicles that alone can change the requirements.

Speaker 4 (00:24:51):

But again, it comes back to their operational tempo you know, where the delivery, who their customers are at these customers change significantly during a relatively short period of time, the customer's charging requirements can again changed significantly and the capacity that they need to be able to charge it and meet those requirements may change and may have to move from overnight charging on a level two charger to a DC fast charger, to be able to meet their charging requirements. And that again, bumps up the charging requirements. So one of the three key lessons that we've learned so far is we have to understand our customer's business much better in order to serve them for charging their fleets than we've ever had to in the past, from the perspective of electric utility, we wanted the next slide, please.

Speaker 4 (00:25:40):

One of the things that Encore has done as part of trying to get ahead of this particular equation is we, several years ago, we started building what we refer to as our strategic growth tool. And it's in Tableau. And you can see an image of it on the slide there, where we went through our entire system and put

into our, our display in our data system information on every substation and every transformer across our entire system. And we have approaching 1200 substations across our sub our system. So we have a lot of data in here, but we weren't willing to just take what is today and be able to take that out and sit with a customer, say, this is what you need, because as I just mentioned, their requirements are going to grow over time. So we had to be able to figure out what's going to happen on these particular feeders and substations and transformers over the next five and 10 years.

Speaker 4 (00:26:27):

So we took our strategic growth tool. We had developed and started layering in some information specifically about large facilities and the fleece that we're able to identify at these facilities so that we can actually go out. And now with this tool, we can at any given in our system or with where a customer says, they want to put a fleet in place, we can go out and we can look at the capacity available today by transformer, by substation, anywhere within a 5, 10, 15 mile range of the facility and identify how can we best serve that customer from which facility, where do we have the, with the capacity requirements that they need it. An example of how well is to us workforce is the Dallas area. Rapid transit system recently came to us and said, they want to start electrifying more of their buses. They currently have seven electric buses on their system, but they were looking for en route charging. So they asked us to look at various depots, you know, passer boarding sites throughout their, their route system in Dallas and identify those substations close by. And how can we add an route charging at each of we started out 10 locations that they wanted to provide this charity using this tool.

Speaker 4 (00:27:48):

You got put on mute somehow. Not sure how that happened, but we're back. So for dark that we were able to identify using this tool, how to be able to charge the the buses as they were running the routes throughout the day from multiple different substations and be able to show them how we could make sure that they had the capacity to meet their, their requirements as their system built out. So this is just the, one of the things that we've done with the green fleet tool, several or utilities have looked at it and are building similar capabilities, but Encore is very open about wanting to share the information about how we built this to help other utilities. If you're interested in looking at this kind of an approach. So can we want it, the next slide, please, shifting down to personal vehicles.

Speaker 4 (00:28:36):

One of the things we're dealing with right now is, is the problem with load forecasting for the ISO's here it's ERCOT. Part of that, what we're finding is particularly on the personal vehicle side, there's, there's a lack of visibility and data about where the load is going to start growing up around personal vehicles. We've been able to use that green fleet tool again, to be able to identify using some zip code data that we get from these to the council of governments here, about where the cars are registered to try to cluster where we think things are going, but we can't get down to, you know, the, the feeder level information that our ISO is really looking for. So we're right now looking and talking with Eric out about the possibility of all of the utilities in Texas, working together to do some independent studies, to try to come up with a forecasting methodology that would be appropriate out to 10 years in the future.

Speaker 4 (00:29:25):

But, you know, that's one of the things from a utility perspective is going to be a big issue is even though you may have a very small penetration of vehicles today, the ISOs want to know where does the, where are these low starting to appear and be able to track them and build them into their forecasting

requirements for us, we've, we've identified some of the internal analysis that we've done, that we can expect point upgrades for clusters vehicles occur on individual features, but the internet analysis tells us that until we get about 25% penetration on a feeder, we don't have significant upgrades. It's replacing a transformer here, a small transformer, but no major reconductoring or other major things that we have to deal with there. But the issue is we are following the personal vehicle space, our vehicle to home opportunities. That's a Ford F-150 lightening will provide, because again, this, this will provide reduce loads in some cases, but they're unpredictable reduce loads in what we call EEA events, where we have energy emergency events and have to take action to reduce load quickly.

Speaker 4 (00:30:23):

So we're trying to figure out how can, how can we as a T and D utility figure out how to, you know, take advantage of the capability of the fourth one light, one 50 lightening. The, the largest battery in that is 198 kilowatt hours. That's a big battery that can maintain a house fully operational for about three days, or we'll reduce load up to a week or more. Another issue we have around the personal vehicle side is maintenance of the public charging infrastructure, because the fact in Texas is to fuse because we cannot own it as a T and D. The current owners don't maintain these things. So we constantly have customers calling us and saying, where can I go charge my car? I can't get from a to B because the public chargers out there don't work. So we're trying to work with our commission to try to figure out how do we put in regulations that will hopefully improve the maintenance of public charging infrastructure so that people can reliably expect to be able to charge their vehicles. And then it comes back to educating the complete ecosystem of all the players in our system around what are the impacts going to be around electric vehicle charging. Next slide, please.

Speaker 4 (00:31:27):

Now I talked specifically before about other transportation. The air mobility is the regional passenger EasyJets and locomotives. You say all that stuff, years and years away, it's not air mobility. Some of you may have seen there's a company out there by the name of Joby J will be, why did their first test with PATLive passengers this week, they flew their helicopter, approximately a hundred miles on a single charge. And I understand that that's well below its design capability. But that vehicle is already passenger flying passengers, get in test situations, and they expect that they're going to have air mobility, taxi service, and operational in parts of the country in 2024. So we're working with a number of, of air mobility folks trying to understand what's the charging requirements going to be for these types of, of, of of vehicles.

Speaker 4 (00:32:20):

And one of the things that's already been identified to us is they intend to land these things on the tops of buildings in the downtown areas of our cities, not day one, but you know, probably before 2030. So how do you get capacity to charge on the top of a very tall building in your downtown area? They, the OEMs have near the air mobility manufacturers have identified this horse. They have given us no clue even about what the loads are going to be yet. Not sure that they really know for sure. Because again, battery chemistry and everything is changing here very, very rapidly in this space. And there's still four years away from deployment. So they're not willing to commit something it's only gonna be X number of kilowatts or megawatts that we have to be able to get up there. But that's, as a problem that we have to be able to try to figure out is how do we bring that kind of capacity to the tops of tall buildings in our downtown areas, the regional passenger Egypt's the recent articles about the fact that United airlines and Envoy, which is one of their regional airlines, airlines have now committed each to buy a hundred regional jets.

Speaker 4 (00:33:25):

The image you see there is is the one from the European air manufacturer Airbus that's an aircraft that they are in design phase right now. They expect to have it delivered late. This decade there's a Danish manufacturer. That was the one that United and Envoy have already placed their orders with. So those are coming and our discussions with the airport folks is how do you charge an aircraft like this? So it can fly 250 to 500 miles in less than an hour at the gate. So we now have identified you to do that. We may have some system protection issues or challenges that we have to try to figure out, to try to provide those kinds of charging capacities, where you have passengers boarding aircraft at a large integrated airport, where you have air operations going all the time.

Speaker 4 (00:34:17):

So those are the kinds of things that we're trying to deal with in that space. And then we come back down to electric locomotives. You see a picture would probably look a motor this currently operating in the California region. It's actually owned by a train company that's railroad that's here in the Dallas Fort worth area, which we have a good working relationship with that particular locomotive. You see, there is a two and a half megawatt battery on it. Well, that particular railroad has already informed us that they have contracts, which will push them out to a 16 megawatt hour charging requirement that will be here in Dallas at that Alliance airport facility that you saw the pictures of, and that, that they expect that that train will be here probably now 20 27, 20, 28 timeframe, not that far in the future. So we have to figure out how to be able to manage charging for those kinds of loads.

Speaker 4 (00:35:09):

Even though it's the point that this is mine going back to the operation requirements, we don't know how they're gonna use the train, how long it will be available to sit here, to charge or exactly how we're going to use it. Interestingly enough, and talking to that same railroad when we had the the winter storm here in February, that took power down for several days, we started talking to them about the use of their existing diesel locomotives. Actually it's their turbine driven locomotives. And the fact that they are actually can be major generation sources. So we're having conversations with them about the possibility of them being able to bring their turbine generator locomotives to places where they can actually hook into their grid for resiliency purposes. Next slide, please.

Speaker 4 (00:35:55):

Premise left electrification. I'll come back to Steven's question here in a minute premise electrification, and we're really focusing again, commercial, industrial, governmental. You know, these are just some of the things that we're looking at in those areas, and the slides will be available. I understand after we're done here, so I'm not gonna spend a lot of time talking here, so I'd rather get to your questions. And the residential part of the thing we're dealing with there is really focusing on how do we improve reliability, resiliency when you have hybrid residential situations where people are worth more and more people are working from those homes. And part of that goes into the predictive maintenance and system modeling and things that we're doing, trying to figure out how do we ensure that Encore doesn't cause an outage because of the fact that we're taking line off offline, or have a failure of a subdivision at a substation are, or a transformer blow out.

Speaker 4 (00:36:42):

How do we get more of that equipment replaced early enough so that we can ensure that we have higher reliability? We're doing a lot more work around distribution automation during the middle of a

ten-year program to add da across our system. Again, trying to find ways to be able to reclose without sending trucks out again, reducing significantly our SAIDI and our safety numbers, so that we can improve the overall electrical experience of our customers. And I scanned, can you move to the next slide? I think that may be the last one. If there's maybe one more, okay. The challenge for utilities, this was just the summary this last month, the things that we see are the major issues for utilities today around electrification, the right skill sets to develop the right tools, like the tool we identified there. I had two interns in our program develop that with a larger group of people, but they did all the real work of developing that tool for us.

Speaker 4 (00:37:32):

And one of them, we hired both of them. One of them is now the new construction management person responsible for fleet electrification. And he uses that tool almost every day when he's, when he's here. And the ability to test those the tools, the methods and the practices before we, we actually have to do a large scale deployment on them. The analytical tools to predict where new, large loads may occur and develop long range plans to serve. That's what we're spending a lot of our time on now at Encore, early investments in land, and right away to serve those large loans for us, that's a paramount concern because we have so much growth going on already in those, those areas where these logistics centers are coming in, that were struggling to keep up with the loads there that exist there today. And we started adding the, the electrification of fleets into that.

Speaker 4 (00:38:17):

It becomes even more significant problem for us educating all stakeholders in the process. Utilities must follow you. Guinness is talking with the customers and for what we found by doing a survey of a number of our customers using a third party, a consultant by name of Westman row was that we've. We talked to a number of customers who the person who runs the fleet doesn't even know who the person is responsible for electrification on their company is. And in many cases, the person who manages the electric relationships is in some other city for a lot of the companies that have large fleets. So part of our role has been trying to figure out how to introduce people within the same company to each other, so they can start jointly planning on how they're going to electrify their fleets. And then the flexibility from commissioners in ISOs and how utilities will plan for and execute the advanced preparations and adjustments that mobile loads will require again, just because the truck comes in and charges at one location today, and deeds has requirements there.

Speaker 4 (00:39:11):

It doesn't mean that truck won't charge someplace else tomorrow. And as we get more and more roadside charging in place, that will be a greater and greater challenge for us because the loads will not be consistent. They'll be much, much pickier. And as customers requirements change because of your vehicles or customers, those loads are going to change again. So we're constantly going to have to monitor what our customers are going to, or we are doing in order to best serve them and ensure they have adequate capacity to meet the requirements. So I get you to stop here and start answering some questions. Keith, how do you want to proceed? You want to do that, or you want to go right on to

Speaker 3 (00:39:49):

Seems like you saw some not questions on the side. I'll start with a question for you. And then we'll, we'll move on to Christina. You know, you mentioned this, this customer who had a 150 kilowatt kilowatt load and wants to change the two to 40 megawatts, which is a big deal. At the same time, you

know, every, every load out there was a new load at one point and, and there's customers would probably come to you all the time. They want to add, add, add a load. Maybe the planning process is different. So I'm kind of wondering, what's the difference between I think you highlighted some of this, but what are the key differences between these, these new loads versus other loads? And, and is there a big difference in expectations like the timeline to add a load when it's a building versus I want to add charging, is it something that's more immediate? I mean, what's the, what's the big difference between all of the electrification we've done in the past and this kind of project,

Speaker 4 (00:40:47):

But they're the closest analog most people use is the data centers had. I hate to say it now, the cryptocurrency folks, because they come in with massive loads and want them done almost overnight. And they have to again, have the high reliability, particularly the data centers for this. The difference is that the people who come in to do those are professionals. They know what they're doing. They understand electrification, they understand electrical loads. So for the utilities perspective, the people you're dealing with understand what the issues are and how to deal with utilities, because it's doing this stuff all around the country. When you start talking about electrification of transportation, the people you're talking to have absolutely no idea how to work with utility. For the most part, we have, we have some very large companies that have climate pledges that are the, the leading edge people on this.

Speaker 4 (00:41:31):

When we start talking to those people, they have somebody who has worked through this. Mostly most cases we find in California before they come to Texas. So they, they understand what they're doing and how to approach it. But as I said, we have 24,000 fleets in our service territory, less than a thousand of them are from large corporations. So canceling those, those are the largest fleets we have, of course. But again, once you get past that highest tier of, of professional look for electrification people at major corporations, everybody else you're talking to has absolutely no idea what you're talking about when you start talking about kilowatts vs. Megawatts. and then you start talking about, well, you know, we have to have and for us, you know, we'll, we'll put a, a transformer drop a meter at, at a location, then you have to take it from there.

Speaker 4 (00:42:20):

And they kind of look at you and say, what, why do I have to do that? Well, it's because now it's on your premise and we can't deal with them. So a lot of it is just the education part of it, because you're dealing with people beyond that first tier, who haven't done this before, and really don't know what you're talking about because it's a brand new thing, and they're not really sure they want to do it because they're not sure it's going to make money and it's going to be reliable. And they have a lot of questions about it. So a lot of the issues that we as utility have to deal with now is, again, that education we assurance, you know, pointing to projects that have been successful in the past, getting them, talking to their peers who are successfully running electric fleets and introducing people to each other.

Speaker 4 (00:42:58):

You know, I I'm sure that when I think my, my work at the end of the utility I'm going to become a professional matchmaker because, and spend some time introducing people to each other. But that's, that's, those are the kinds of issues that are different here. And again, the local people, you know, I got 150 kilowatt load and everything works fine. You know, if I have an issue, I call so-and-so and it's gonna take care of, it's not, and it's a local electrician. It's not the utility in most cases. And now we started

talking about, well, if you're gonna drop a new substation, just for your building, you're going to have to have some electrification people who can, if you're gonna take primary voltage, be able to deal with that. And cause you're not gonna own the equipment behind the meter and not us. And then people look at you and start scratching your head saying, why would I ever do that? All right. So it's explaining all of that. Well,

Speaker 3 (00:43:49):

I'll do two questions. I'll ask one question and then I'll put Steven on and then, and then and then move on this, my thread, the needle a bit with some, some other of the questions on the side here. So when you're, when you're talking about a big charger, I, it reminds me of when you have like an oil boom or something like that, you're, you're worried about building something and then having it be stranded when, when there's a w when, when they move, you know, when they moved their warehouse or whatnot. And, and so you also, at the same time probably have to make some investment decisions and folks are talking here about, you know, are you adding generation capacity? Do you add solar at these places? How do you balance that sort of long-term planning and short-term requests? Like, is there a balance, do they pay for some of this is, you know, how do you, how do you balance that to make sure it's not a stranded cost on Encore and, and, and your rate base?

Speaker 4 (00:44:43):

Yeah, for us, everything that is behind the meter is the customer's cost. We can't go behind the meter in Texas because we're a competitive state. So we only own the infrastructure up to the meter, but for us, it's the kind of thing where if we just drop in a large transformer and then, you know, reconduct your line to be able to provide load to a place. And then a customer moves out of there. And the guy who comes in is all diesel and doesn't need electrification. That does become a stranded asset for us. So we do have to deal with that. So part of our discussions have to be analysis of the customers who are coming in and understanding again, how are they gonna use it? You know they established from, are they going to be around for a long time then to balance off making the investments that are prudent?

Speaker 4 (00:45:26):

And then if they, if the customer says, no, that, you know, they're not going to be here for very long, then we have to work through with them. Maybe there's a better way to do this, which might be a regional Depot kind of thing. So you're not tied to this facility, but you can still access it if you move anywhere in the region and having those kinds of conversations with people, rather than just saying, well, we really, in Texas, we can't say we won't serve you. We have to serve them. We have an obligation to serve on the pure, but we can say to them, if this is your plans, you might be better off building your capacity to charge at a regional location rather than at the site, and then bring the trucks over and build it out that way is that it's those kinds of discussions with the customers to try to make sure you're meeting their charging needs.

Speaker 3 (00:46:13):

Okay. Last question, and go to Steven, if you're able to deepen McDonald, if you're able to ask the question.

Speaker 5 (00:46:19):

Yeah. Hi. Thanks. Thanks Dave. So yeah, no. So you're spot on, you kind of touched on it a little bit, you know, but what is Encore? What's the regulatory environment appetite, you know, what are you guys

focused on, you know, to really unlocking the behind the meter conversation, right? So you can only do as well as you can with the insight and information you have. So if you don't have, or have the need, or even have the want to start to focus on bringing in behind the meter assets, to the analysis, to the planning and effort, you know, you guys are going to be in a miss and a lot of, a lot of future going forward. So how, how are you guys approaching that? What you guys thought on that you know, cause there's tools, there's stuff out there to do that. I'm just wondering what's the appetite.

Speaker 4 (00:47:06):

Yeah. And, and in fact, when we have the conversations with the customers, we have that conversation we're in front about what are your short term plans? What are your long-term plans for potentially bringing in, bringing in battery storage? And are you going to put rooftop solar in at some point in Texas, or if they're a small wind turbines you could get though generate enough power and offset some of their loans, just we try to work through with them, what are their thoughts and plans know, that's the kind of thing, you know, given the, depending on how they want to use their resources, they may want to export from the site back into the grid and make some money selling ancillary services, or being able to address EA type events with the emergency generation. So we have all those conversations and we'd, we make sure that the people within our company were responsible for interconnects and things are part of all those conversations and the people who are, are our der experts get involved in those conversations early on.

Speaker 4 (00:48:01):

And we even have our energy efficiency, people coming out and having conversations with them. And we're looking at ways of trying to provide energy efficiency, incentives to companies that are putting in managed charging systems where they're willing to lock the system so that they can't use certain chargers at certain peak hours of the day. So we're looking at, we're working with integrated teams across the company to bring in the right people, to have the conversation with the customers, make sure we, again, thoroughly understand what their short-term long-term plans are. And then we build that back into our, our planning analysis when we do the full full system plan for that particular site

Speaker 5 (00:48:44):

Thing, you know, how, how active is Encore really focused on, you know, changing the market contract.

Speaker 4 (00:48:50):

We are able to change the market construct is Encore. That's really up to the public utility commission and there's proceedings going on right now, where they are taking testimony on how they may do that. We will probably provide some suggestions to them of things that Encore might be able to do to help out in that process. You've already done a number of things to try to change some of our procurement processes so we can make sure that we do more predictive maintenance, get things out there ahead of time. So that the few system failures that actually did occur because of the storm or things that we can avoid, if there's another extreme event like that. But again, a thrill market failure that occurred here is beyond our ability to directly influence. So we're, we're an observer just like everybody else. Not most of them. Okay.

Speaker 3 (00:49:40):

Do, I'm going to go over to Christina now, Christina, if you could turn on your your video. Christina is the transmission development manager for Georgia transmission corporation electrical engineer with a

background in distribution, transmission generation operations and supply chain. She's responsible for the integration of renewable technologies, electrification and distributed energy resources. She also serves on the industry advisory board for Florida state university college of engineering and Tallahassee, and is active in stem education for middle school students. And I'm really looking forward to her her presentation based on what we were talking about in the warmup yesterday. So Christina, I'll pass it over to you,

Speaker 6 (00:50:19):

So thank you very much. Good afternoon, everyone. If we can go to the next slide, maybe do we have the next slide up please? Or am I frozen? Can everybody hear me?

Speaker 3 (00:50:38):

I can hear you. I don't know how we're doing the slides here. Let's see. They should be in dancing, dancing.

Speaker 6 (00:50:52):

Are they advancing? I'm stuck. They did advance for me. So the advanced for you, but they didn't advance for me. Oh boy. Let me look.

Speaker 3 (00:51:06):

I just personally, I see just that beneficial electrification that's

Speaker 6 (00:51:09):

Yeah, that's the only one I see as well. Let's see. I see me. Okay. All right, so let's go back. Okay. There we go. So I thought I would start with just a few Georgia transmission statistics. A lot of people probably don't know about Georgia transmission. And so GTC is one of the largest transmission cooperatives in the country. We own approximately 3,400 miles of transmission. We go from 46 KV to 500 KV and also we own 742 transmission and distribution substations. We have about 3 billion in assets and our load is approximately 9,800 megawatts annually. So we covered the state of Georgia and we work alongside a Georgia power. So I just thought I'd throw that out there because a lot of people may not actually know that there's a transmission provider here specifically dedicated to the co-ops of Georgia. Next slide.

Speaker 6 (00:52:20):

So what we're going to talk about today is really the the impacts to the grid. This is exactly where I sit and it comes in the forms of beneficial electrification, but also what we're doing in terms of EVs and fleet conversion. There's the building building envelopes that we're seeing right now, there's the Evie fleets, which include the last mile and residential charging. And then we're going to touch a little bit about indoor agriculture, which seems to be, we're kind of on the cusp of that and what are the implications next slide. So building electrification so this is a data center that we recently energized. It's a million square feet. It's probably approximately going to be 200 megawatts of build out. It's a new one, 15 KV, 13 breaker, and a half dedicated substation. So it's actually on the customer site.

Speaker 6 (00:53:10):

The thing that is most compelling here is the lead time from, for the time of notification to ready for service is 12 months. I typically a substation. If any of you all are in this this area 12 minutes is, is a very

fast track substation. And the reason this is important to us is because this is a true impact to the grid. This is a substation large, substantial. We have a customer, a customer requirement. We have obligation to serve. And we also, in the state of Georgia, we have what is known as customer choice. So any customer over one megawatt can actually choose their energy supplier. So we actually won in a competitive bid this particular or facilitate next slide. So I thought this slide is very interesting because a lot of people don't know that the original ups fleets from 1920s and thirties were actually electronic.

Speaker 6 (00:54:06):

And so I feel like ups is taking this evolvement. It's like, this is kind of how we started in the twenties and thirties. And now we're going back to our roots with this electrification of their fleets. This is one of their last mile vehicles. They actually finished up their alpha and beta testing and we're starting to see things Ching across the country. Next slide. So in the rest of the charging market, one of the things that we're really looking at is focusing on the home. I think we all understand that there is going to be an impact from residential charging. But what we know is that the residential charging about 78% of people who have electric vehicles, they're going to be doing their charging at home. The goal for me and my EMC's is really to have an understanding where we can increase KWH sales without increasing KW demand.

Speaker 6 (00:55:02):

And that, that fine line allows us to make sure that we're not having to put more infrastructure in place to handle the load. It, it really helps set us up in a space where we're not having to change out distribution poles and transformers and lines and things like that. And so that really is going to have to deal with managed charging. And when we get into the managed charging space, that really is going to require consumer education and consumer interaction. Next slide. So I'm going to talk just briefly on this concept of indoor agriculture and commercial revitalization. One of the things that we're hearing a lot of is this inter-agency collaboration where you're seeing like the department of agriculture and the department of transportation and the EPA where they're wanting to understand how they can collaborate and do some sort of revitalization specifically in rural areas.

Speaker 6 (00:55:59):

And one of the things that is quickly bubbling up is this concept of indoor agriculture. And I think the reason for that is I'm sure if, if any of you all live in any type of rural area, you may have an old facility, maybe like an old food lion or Piggly wiggly or something, or an old Walmart that has gone out of business. And this concept of indoor agriculture is quite because you can take a facility such as this, which is probably about 180,000 square feet. And it actually equates to approximately 900 acres of our blind. And there are so many things in terms of benefits that you can look at from a facility like this, it's reduced carbon emissions from interstate traction, trucking, significant water reduction. But it also frees up lad for other renewable initiatives by moving the, the facilities indoors.

Speaker 6 (00:56:56):

Another thing that we're looking at is from the department of justice. One of the things they look at is food security for underserved areas. So, but with an indoor agriculture facility, I'm special linking it to commercial revitalization. There's a lot of benefit to utilities, so we can see increased revenue. There's a good demand side management part of this because with plants, you know, the plant really doesn't care if it's 10:00 AM or 10:00 PM, they just need sufficient hours of light. And so from a demand side management the load looks very attractive. Again, we speak to area revitalization and then under the department of treasury, there are these opportunities for carbon biting participation. So I do see, I do

see this coming to fruition when I'm, I think we're in the infancy stage, but I think we will mature very quickly. Now I'd like to let me go to the next slide.

Speaker 6 (00:57:54):

So here's where I think that we really need to have this open and honest discussion. So managing the risk. So here's where I see the risks we've got transmission system overload is, is the big risk. When these, when these large loads come online, you ha you, you you heard David say earlier that, you know, when they looked at their facility, they only had nine megawatts. The customer has a need of 40 megawatts. That is the transmission. So if system overload that we're speaking to the increased demand charges, if you're in a space where you have demand charges whether it's a, a ratchet or whether it's a singular year, these demand charges can be very significant, especially if you, if they occur on your system, peak lack of lead time. This one, I think is one where I truly believe is going to be for, at least in my space is going to give us the most heartburn, our lead times to build transmission facilities, to order equipment, things like that.

Speaker 6 (00:58:52):

The customer is much more nimble in terms of bringing their facilities online than we are to react to those facilities. And I do believe that that's where we probably have a lot of work that we need to do is this lead time the many of us have outdated. Pgps our PGPs are not really set up to handle these types of progressive loads. And so now to me is the time to think strategically on how we should be able to set up those PGPs for the future so that we can react to the lows. We also have these other two, which I think we, as a in the utility space, we really need to understand, and that's lack of associate knowledge not just the associate knowledge with respect to our own industry, but now we need to learn about other other industries. You know, I have a fleet manager on staff.

Speaker 6 (00:59:45):

I need to get my fleet manager much more up to date on Evie fleets, so that she is a resource that I can then tap into to go and talk to other fleet managers that way they're all talking the same language. And then there's this other one, which is increased staffing requirements, which is basically do I really have enough stuff on my, at my facility to go out and meet with customers and start initiating those conversations. So there, there are these things where we may not even have the right staff here at the building, so we may have additional staffing requirements. And I think that's something that all of us really need to be thinking about. So now let's get a little bit into say the opportunities. So one of the things that we're doing here at GTC is we're beginning to start looking at a potential locational hotspots.

Speaker 6 (01:00:39):

So we're looking across our grid and we are trying to understand where are the facilities, who is who, which one of these facilities is most likely to pull the trigger on a commercial fleet, or which area is most likely to be subject to urban revitalization. And then we're working across different platforms within the company. We're bringing in the environmental services department. We're bringing in our GIS people, we're bringing in the bulk transmission planners. And we're having these open and honest dialogues to think about. Can we physically plot where we think these hotspots are going to be so that we can be prepared? The reason I think this is very important is when you bring planning in and you say, I have a hotspot in this area, it helps them because if they have a project that they're wanting to do, now we can make some really good decisions.

Speaker 6 (01:01:34):

For those of us in the transmission world, we may have a transmission line that we're going to upgrade from 3 30, 6 to 7 95. We may then decide, you know, we've identified that this is a locational hotspot. So we may go from 3 36, go pass 7 95 and go up to say, maybe 10 33, I think on the distribution side, it's the same conversation. If you have one OD in the ground and you're thinking, you know, we may have to do some upgrades here. Do you go to four OD or do you bypass that and go straight to million? Same with transformers. If you have a 25 MVA and you you've gone ahead and you've specked it out and said, we're going to put in a 25 MBA transformer, we may want to consider going to a 50 MBA. A lot of times when we're already there doing work, we're already going through the supply chain process.

Speaker 6 (01:02:22):

That incremental cost is not that significant. So I think it's very important for us here is to really identify our locational hotspots and then work with our planning department to see if there are projects that are already on the books. One thing in this other area, which is managed customer demand profile, it's much easier to, to manage your customer's demand profile at the beginning before they develop habits. So I'm a residential Evie driver, and I am totally guilty of the minute I get home. I plug in my car and I do it because I don't want to be concerned that I forgot to plug it in. And I get up in the morning and it's not fully charged, but that's a habit that I've already developed. And so what we have to do in the utility side is we've really got to get in with our customers.

Speaker 6 (01:03:12):

And we've got to manage that, that demand early. We've got to educate our customers. We've got to make sure that we have a rates in place or whatever those touch points are so that they don't develop these, these habits review construction lead times. For GTC, usually a new substation with, with Outland is about a 24 month. From the time we have the project to ready for service, we have 24 months to get that done. And in the example I gave you, we had to do that in 12 months. So really getting into your processes and figuring out what is our normal project lead time and what are these accelerated lead times and see where you can overlap some of those items or take some of those items out of your schedule so that you can meet some more, some of these aggressively times I put this one on here as well, considering consider supply chain blankets talk to your supply chain folks, know what your lead times are, know, understand what is your, where is your risk?

Speaker 6 (01:04:17):

Is my risk on my poles? Is it my wires? Is it my transformers? Talk to your supply chain people. Is there a way I can put in a blanket in place so that I can actually take some of the bidding process out because I already have a two or three or four year blanket in place for a particular piece of equipment understanding where you can become more nimble is going to help you meet the requirements for some of these customers create or update policies. I really can't stress this enough. I'm working on the policies now puts you in a strategic place. If you wait until these loads come up and you're just reacting, you're, you're going to waste time. You're going to waste effort. You may not document everything, all the decisions that you made. So by updating and creating new policies now, while you can still have the time to do it, it puts you in a better strategic position.

Speaker 6 (01:05:10):

Review. Your rates are the rates that you have, the rates that are going to be applicable to these new types of load. Can you structure rates so that it really not really, I wouldn't say encourages the customer

to say charge off peak. It encourages the customer to consider the way they're using the electricity. And then this last one is really creating the appropriate customer touch points. I think David did a really good job talking about his matchmaker, but we're really finding that the engineers and the marketing people surprise, surprise, don't really speak not only the same language, but I've seen them in the same room. And they're like, I didn't know you were working on that. And I'm working on that. And they have no idea that each of them is working on the same thing. And so it really is not only introducing the right people within the organization who are making the decisions, but also creating sufficient touchpoints between your organization and the end use customer so that you can be a part of that collaborative process.

Speaker 6 (01:06:18):

I think of everything that we've heard today, I just cannot stress that creating those appropriate customer touch points is so important because if you don't even know that the customer is doing something or they don't even know that they need to contact you because they're doing something that is a recipe for disaster. So I know I went through that really fast, but I wanted to make sure that I left sufficient time for us to have open it up for questions, because I think that this is a really compelling part when we're really thinking about how these new customers and how these new loads are going to affect the grid.

Speaker 3 (01:06:55):

So, Christina, let me start off with a question here. There's sort of tension on this. One is one is, you know, kind of being risk averse to the all the challenges of adding new loads and the other is being bullish. And, and, and it looks like from what you're saying is you competed for a data center. You wanted that to come here, you showed at the very beginning of your presentation, indoor agriculture said, look at the possibilities here. And I know, you know, there's a lot of economic and, and economic development that that folks want to have in their area. So do you see, is it, is it more of an opportunity for electric vacation for, for getting new people to the area? Or is it more of a, of a challenge? Is there, or is it just depends on the situation because I'll tell you, I hear, I hear some people's instinct is like, oh my goodness, it's going to be, sky's falling. And others are saying, Hey, you know, let's get out there and get these people to our community. It's just like having a new Walmart. It's just like having new developments. We want to have, we want to have more folks in our territory. So H how do you see that balance?

Speaker 6 (01:08:05):

So I see the balances. It really depends on where your state is. So we have it here in Georgia. We're really blessed with, with a very, very strong transmission and generation sources. So we, we, we work when I say we, I mean, the transmission companies, we definitely work with economic development closely. We want to make sure that we're bringing the customers to Georgia. So then it's like, well, can we serve those customers? And what we've done a really good job at is identifying for customers where you can go on our system. And typically when a customer contacts us, we may come up with a list of several sites and say, well, based on what you've told us here is a list of sites that would be good for you. And so we have a GTC has done a really good job. We have a very good sighting methodology where we can actually identify for our customer highways.

Speaker 6 (01:09:03):

We can identify infrastructure. We can identify whether it actually has a railroad head on a facility. So I would say that we're aggressive in trying to get customers to come to Georgia. But we do it in a way that I think is, is strategic because we do talk, you know, because we are on this, what we call the integrated transmission system, and it is the transmission backbone of Georgia. And we call all these facilities with Georgia power. It gives us a lot of flexibility. And so to the customer, it is transparent in terms of the electric provider from a resiliency standpoint, because, you know, Georgia power and GTC and the municipalities all will provide up to that point. The same level of reliability when you get down into the rates is when it really starts to change between the different organizations. So I would say from that perspective, Georgia as a whole has been very aggressive in going out and getting these customers to come to Georgia, where the risk I think is, is when we start talking about the new technologies.

Speaker 6 (01:10:10):

So, you know, the, the fleets we have an inland container port here. And so that inland container port is really from like Savannah up to like Cobb county. So, you know, understanding where might the way points be between Savannah and Cod county, that as an inland container port may have to say charge along the way. So then the question comes, you know, do we contact, or we do, we, do we partner with someone like C Corp and say, you know, where would you charge along this corridor leading through the state of Georgia? And then in terms of like the indoor agriculture, I think that this is me, I'm a futurist, right? So I think that that is going to be one of those big opportunities. And, and, and it may not be, but I, I love the concept, right? I love this idea of taking something where we can control the water, where we control the light.

Speaker 6 (01:11:04):

I mean, think of if you have an indoor agricultural facility and it's all containerized, think about the lack of pesticides that you have to use. Think about, if let's say one of the trailers did become infected, you've only lost, you know, one container, you haven't lost all of your acreage. And in Georgia, one of the things that, that I have to be cognizant about is there is a romanticism, is what I call it around feeling the land and growing things in the dark. I mean, there is, there is, you know, this is an agricultural state. And so moving from that idea of taking what you've used to using in the earth and moving it to an indoor facility, that people feel a certain way about that. So now we have to look at all of the benefits of it, you know, less water, you know, this inter-agency collaboration you know, eliminating some of the food insecurity by having the produce where the people live.

Speaker 6 (01:12:08):

So these are things that I think they're coming, and so we need to be ready. But the whole thing that I think is so important around all of this is managing the load because we, you know, when you say, well, how do we, we don't want to overbuild. We don't want to be bullish. Well, a part of not being a part of, you know looking at being bullish is, but how can we manage the load so that we're not bullish so that we meet the demand, but we don't overbuilt because we definitely don't want to overbuild. And I think, I think the way you manage that risk is managing the load, getting in there and going back to the same thing we used to do in the nineties demand side management. You know, we, I remember we used to have CNI reps that were very involved with the commercial industrial customers that were very much involved with all of the DSM. And I think we need to bring all of that back now, where we have people who are CNI reps who have those touch points with the customers who educate the customers and say, you know, could you shift your operation to this time? Could you, because that is what we don't want to do. We don't want to build facilities that we really don't need.

Speaker 3 (01:13:20):

Right. Well, and I'll also mention that every, I know appre has a big indoor ag project, and, and for instance, they do soda grown up in Minnesota. And and so that up a good, a good place to check out the container. Amazing. You hear these stats? I can't remember stats off the top of my head, but how far food travels to get to the plate? Exactly. Just getting it closer to the location. It's amazing. I, I think that's a fascinating, it just brings to my mind about how, you know, if you're proactive about this, you can attract data centers, you can attract jobs, you can attract things. And if you're difficult that could have impacts for your community. You know, and I, I don't always think of that part of it when you, when you think about this stuff, but having someone like you there you know, like you said, to be able to manage the relationships seems pretty key.

Speaker 3 (01:14:12):

We could probably bring David back on if you'd like you both mentioned sort of the infrastructure around vehicle to building. And, and, and I think this goes into, there's a question on the side here about transactive energy, and you talked about rates. What are, what are the investments in making that happen and how, how are you justifying? Or are you just saying, well, someday it would be nice if people charged off peak like, are you making, are you able to justify an investment now? Are you, you know, when do you jump off into that?

Speaker 6 (01:14:48):

So I, I would say, you know, it's interesting because one of our one of our EMC's the way they did it was very simple. They just said, any electricity that you use from midnight to five in the morning is free, or I think it was 11 to six in the morning, it's free. They just said, you know, up to so many kilowatt hours, I mean, that you think about from a, from a personal standpoint, if you have an electric vehicle, I mean, at that point, I may actually open up the manual and figure out how to make sure that the charger doesn't come on, you know, till 11 o'clock and it was a whole house, right? So it was like anything in the house from 11 to six is free up to like so many kilowatt hours. So that is a very passive approach.

Speaker 6 (01:15:36):

There was no additional equipment installed there, there was, you know, so I don't think, I think that if you sit down and you look at your rates, especially on the distribution side of the house, you can come up with something that, that educates your, your, your residential people who are looking at this in a way that they create good habits. So for myself, I was on a time of use rate. And at the time my local utility said, well, we could put a new meter in for your electric vehicle. Well, by the time I had the charge, the cost of the meter and all of those line items associated with the meter, it really negated any savings in my mind from actually having an electric car. So I don't think that was the best program. So I put my house on a time of use rate, and I actually did save money, but then I'm an engineer, right?

Speaker 6 (01:16:28):

So I'm in there, you know, and I'm looking at everything and I'm a, I'm a little geeky, right? You can't spell geek without double eat. And so for me, I don't see how that's applicable to the average person, but if I'm on a rate where they say, Hey, everything you use between 11 and six is free, I'm there, I'm going to figure that out. And I think that's very attractive. Or you may say, if you have an Evie we're going to, and you charge off peak, we're going to just give you $50 a month. It's clean, it's simple there, you know, no fuss, no muss. So I think, you know, for the early adopters, like myself, we're going to be

down into the numbers, but for the people who come after, it just needs to be clean and simple and easy to use and understand. Hey,

Speaker 3 (01:17:14):

And how about, how about you? I know you were talking about the F-150 and that, and having a big battery in the driveway. Is that something you invest in, in communications to, to try to signal that into the market? Or are you just talking about the same thing? It took a passive some sort of passive agreement with the with the customer to make sure that they're, you know, doing the right thing.

Speaker 4 (01:17:37):

Well, for the, the Wyckoff one 50 approach, again, there's, there are none in the marketplace today. Our conversations with the Ford folks are that they're only be 20,000 worldwide next year, point 20 to a hundred thousand the year after that. So part of the issue there is we have some time to try to figure out how we're going to do that. But we're already raising that as an issue with our ERCOT folks here in Texas, about how, how do we appropriately insent and manage that component of resiliency that we may have going forward. Again, a lot of our focus is, is really come out of the February storm event. So our focus has really been much more recently about how do we ensure that that kind of event does not occur in Texas again. And given the fact that much of the failure was on the generation side, and we have nothing, no influence there because we cannot generate by Texas law. We're trying to find ways that we can take advantage and incent people to do things. And we're looking at, at, at our energy efficiency folks about, is there something that we can do on that side that we can, can put something in, in, in place that would ensure that we can use those credits for an energy efficiency program in the state of Texas?

Speaker 3 (01:18:54):

Well, I'm wondering, you're looking at some of these comments over here and hearing what you're saying is, is there a technology barrier to what we want to do here? If you got, if you were electrifying 50% more of the economy, so you're taking over gasoline and some propane and some, is there a technology barrier or is it just mostly, you know, people talking to each other, having the right signals, changing the markets a little bit is it like a star wars thing or we have all sorts of, you know, instantaneous communications or is it really just logistical? And the technology's there, maybe Christina, if you want to take a step, I think

Speaker 6 (01:19:32):

It's a little bit of both. And here's why, you know, we S like I said, you know, we spent a lot of time in the nineties doing demand side management. I mean, many of us may have had the rates where, you know, our local utility, they controlled our heat bump and they controlled our pool pump, and they did all these fancy things. So that, that was the, that was the early nineties. We're still trying to control load. I mean, so we may be more sophisticated in terms of how we communicate to the load. Now we've got, you know smart thermostats, but unfortunately I think we've pushed a lot of these technologies because they're not seen as new and innovative, but they're tried and true. I always say, I want my toaster to toast toast, and I wanted to do it well. And sometimes I think we, because we have smartphones, we were like, oh, but we wanted to do all these things.

Speaker 6 (01:20:24):

Well, it's not a Swiss army knife. You know, we want, we want really clean solutions. So I do think that there are things that we can take that we already know how to do. One of the things that I really encourage. My, my associates here at GTC to do is, is there equipment that we already have that we can use? Do we already have an established supply chain for a specific piece of equipment? And how can, because what I'm noticing is that my manufacturers they're already thinking ahead and they'll say, oh, well, our, our, our equipment that you already buy can do this, this and this. I, I just didn't know. And so I think sometimes it's understanding the equipment that you have and the capabilities of that equipment. And I think that's really key, you know, get down into that supply chain and say, well, what, what do I already have in my arsenal?

Speaker 6 (01:21:17):

And maybe I'm just not using all of the things that it can do. I mean, it is like my iPhone in that way, because there's a lot of things by iPhone can do that I don't use, but I have the iPhone. So I do think that it's a combination. There are some things that I think that we have gaps on that we can fill, but there are a lot of areas that I do consider that we have the technology. We're just not utilizing the technology to do what we need to do, but David May have a different opinion, but

Speaker 3 (01:21:48):

Yeah, innovation, innovation versus deployment. Do we need to innovate, or do we need to deploy what we have?

Speaker 4 (01:21:55):

We actually did both. Encore has, has run a micro grid operations center south of Dallas for the last five years. We built a immigrated micro grid that has solar. It has propane turbine generation on site. It has a, a large Tesla battery. In fact, we had Tesla battery, number four that came off their manufacturing line in, in, in California back in 2013. And one of the lessons that we learned there is that the technology is changing around DER's and how you control them and manage them, and that deploying of software driven electronic systems versus the tried and true mechanical systems is a brave new world. And utilities have not really learned the lessons around that yet. So we're moving very quickly now to try to move those, those lessons across our systems.

Speaker 4 (01:22:51):

So as our customers start deploying micro grids and more and more DER's, we've, we've learned the lessons about the reliability, the life useful life of software-driven electric electrical, or electronic systems. I was mentioning to, to Keith just before the session that I spent most of the morning, trying to get my computer back online this morning, because software got corrupted and I got it back online just an hour before we got on the phone call. So if my laptop gets cooked, gets corroded, and I've got a system out there somewhere in my substation that the software gets corroded. I had the same problem. It's going to fail. And, and as utilities we're used to having, you know, we have some transformers in our system that we went and looked at a few years ago. We had one that was, was really old. It was put in into service in 1918.

Speaker 4 (01:23:38):

So it looked at the one that was put in service next to it. And it was it was a relatively youngster. It went into service in 1920. Those two transformers are still operating today because there's no software, there's no bugs in them and there's going to be no hackers coming from Russia or China or wherever

else to take those transformers down. But that's not the system we're deploying today. Our distribution automation systems that we're deploying more and more, have more and more software in them. And as our systems become more, I'll use the term fragile because of it. We have to become smarter about how we deploy those kinds of systems and build up redundancies and other things that will make sure that we don't incur reliability issues because we're trying to modernize our system.

Speaker 3 (01:24:24):

Right. Right. Well, I appreciate that. And, and you know, you both have such good perspectives on it. I think we're supposed to wrap up a couple of minutes to give Sonia a minute, just to say some words farewell, but excellent conversation. I really enjoyed it. So thank you so much.

Sonja Berdahl (01:24:43):

Yes. Thank you, Keith. And, and I am, so I apologize to everybody who put comments and questions in the chat box. We had some great questions in there that I would have loved to ask our panel today, but we are sadly out of time, I do want to just say three things that kind of jumped out at me. These are not maybe the key things from the presentations, but this is what, what jumped out at me is that air mobility and indoor agriculture and probably other emerging technologies and economy economies will mature much faster than expected. And the utilities know this. They have leg time that they need in order to build the infrastructure to support those things. So that's a key challenge in the industry customer and customer engagement in education is key as it always is with all the past, I don't know, 10 years that I've been working on grid, modernization initiatives, customer engagement, customer education, stakeholder education, always bubbles up as a key issue, challenge, et cetera, that utilities are continuing to evolve in.

Sonja Berdahl (01:25:52):

So in this case, the advice from this panel came, know your customer. You need to know your customer's business, like never before and make those connections with the right people at at the organization. And then I loved what Christina said is that our challenge is to meet demand without overbuilding our system, and a key to that is managing those loads and to educate your customers early and often on how they use electricity so that they can make informed decisions as well. So great discussion. You guys thank you for being here and presenting today and for everybody who joined in our next discussion we'll be the last in this series for this summer. And it's called impacts of electrification on the natural gas industry. And we have two gas utilities from either coast one from Sempra out in San Diego and the other from national grid on the east coast. And that will be next Thursday, one o'clock to two 30 central time. I hope that you can join us. As we said in the chat box we are working on getting all of the recordings and the transcriptions of the recordings and the the slide decks that were used on smart grid.gov. When we have everything available, we'll be sending out to everybody who participated in these so that you can go back, review, share them with your colleagues, et cetera. Again, thank you for joining us today and enjoy the rest of your day.