Welcome Senior Vice President, Electric Engineering PG&E, Joe Bentley, Senior Vice President and General Manager, Electrical Services and Systems, Igor Stamenkovic, and Senior Vice President and Chief Product Officer, GE Vernova, Sean Moser.

[MUSIC PLAYING]

Well, good morning-- so delighted, so delighted to be here at the Innovation Summit and, frankly, to be here in this wonderful city of San Jose. When you think about this, Darrell made the comment, it's a really an exciting time. And it really is an exciting time when you think about that.

I've got two of my esteemed colleagues and partners as we're imagining the energy system in California. And you think about that. We need to do that essentially reimagining our system planning. And everyone in the industry is watching what we're doing-- so pretty excited about that.

Let me start with a couple of fun facts just to let you know. When you think about California, we're heading to a point in about 10-plus years that we're going to double the renewable generation in California. Think about that.

165gw, 7,000, or 7 gigawatts a year for 10-plus years, 7,000 megawats. That's where we're going. That's pretty incredible.

Why? We talked about that-- data center load. We think about EV charging, fleet charging, semiconductor, logistics. I've been in this industry for four decades and have not seen this level of growth. That's a wonderful problem to have, a wonderful problem to have.

Let me throw out another data point just to let you think about this. Over the next 20 years, California is going to need to build about $50 billion of transmission to support this clean energy goal that California has. Think about just $50 billion of transmission. So when we think about the exciting times and we think about the opportunities that we have, guess what? System planning has to be at the forefront of that.

So let me introduce my colleagues here. And I've got Sean Moser, Vice President Chief Product Officer for GE Vernova, right next to me and Igor Stamenkovic, the Senior Vice President and General Manager of Eaton's Electrical Services and Systems division. So, Igor, let me start with you.

So give me a little bit about what's going on at Eaton in terms of-- we're talking about innovation. We're talking about AI. Tell me what's going on at Eaton these days.

Thank you, Joe. And thanks, once again, Joe and the whole PG&E team, to create this event. It's just like one of a kind. And it's great to be part of it.

At Eaton-- Eaton is a $24 billion company that prides itself as a manufacturer and technology provider for the power management solutions and the utility. And also, behind the meter industries, is one of our greatest passion and part of our business. It's a most exciting time to be in the industry.

And we already heard that. I mean, sometimes I have to ask myself, do I really get to do this every day and then get paid for it-- in addition to it? And I think that, when we take a look into all of these major trends coming in at us, AI and the data centers that are really requiring tremendous electrification, EV charging stations that are really decarbonizing transportation, and then you put on the top of it, also, reindustrialization of the US and building so many new plants across the nations, it is just incredible.

Where Eaton is now is, historically, we have been growing 2% to 4% year over year. And over the past five years, we have been growing 10% to 15% year over year. And it seems like for the foreseeable future, it's going to continue like that.

So it's very exciting. And it's also terrifying. You get into this growth mode that you have to deal with personally. You have to bring along your workforce. And you have to absolutely reinvent how you make decisions, how you go about that, what business processes you're going to use, and how you're going to change all of that.

And what we are finding out is that digitalization as an enabler for AI. And then AI is really helping us change how we work every single day so that we can really sustainably grow and support all of the stakeholders and our customers.

Yeah, that's great. That's great. So Sean, being the chief product officer, you got a lot going on these days--

Yeah, for sure.

--and in a very exciting time. So tell us a little bit about what's going on at GE.

Yeah. Well, so first of all, GE Vernova is a new company, old company, the original big tech company, maybe-- and that helped build the grid the first time around. But now GE Vernova is a purpose-built energy-only company that kind of spun out. So that's been super exciting. And then my job is I run the software group within that, in terms of the product portfolio.

And we're reimagining how you manage the network. So where Eaton's focused on behind the meter, we're focused on the network itself and how you manage that network. And so our journey for the last few years has been, how do you re-architect all of this old control room software? And how do you build a modern network management stack for a modern network?

It's the largest network in the world. It serves more people than the internet by a lot. But you still have almost a billion people that don't get power.

And you're in this really interesting time, where the whole use of that network is changing. And the threats to that network are changing. And so for us, it's been, how do you re-architect that software? How do you focus on the data layer, because that's the essential component, so that you can then deploy the AI?

Because there's no way we'll be able to manage this or plan around it without that level of scale. So it's pretty exciting, very exciting. It's fun.

So Sean, when me think about this-- so as we think about at the edge. So we got this influx of distributed resources. So we've got battery systems. Obviously, we've got rooftop solar. We've got one- and two-way EV power flows. As you think about our system planning and the tools that we need to be able to really do the planning at the grid edge and help support upstream, tell us what you think about those planning tools, what we need in the future.

Well, so that would be one interesting thing. So I'm going to be probably the dumbest electric person in the room. I've only been in this industry in this role for about four years-- but coming from a lot of networks in the pass defense, supply chain, financial, the internet, and so on.

First thing is, the way it's architected-- you've talked about upstream and downstream a little bit. We don't think of it that way. We think of bulk generation as an edge, just like we think of the PV kit on a house as the edge.

So for us, thinking about it as a single network that's got some long-haul components and some short-haul components is really a priority. Because you can't balance one direction. It's not like, well, I need to demand response manage that thing down there. You're trying to balance all supply against all demand on a minute-by-minute, second-by-second basis.

So that's a really different model. It requires us to think differently, to process differently, to deal with a lot more data. And you're also thinking, the days of transmission thinking of distribution as static, predictable load, those are long gone. And distribution thinking of transmission as a never-ending pool, that's long gone.

So we tend to think of these as much more integrated as a requirement. And you don't know everything you need to know in a single space to make the right decision. So now you're crowdsourcing data.

You're pulling across T&D. You're pulling from the public space. You're pulling from people's usage. And so that's why this kind of broad ecosystem of people that work behind the meter, people work in distribution, transmission, and everything all have to be pulling together.

That's great. That's great. So, Igor, what do you think, in terms of--

Well, so future planning is incredible. We have a track record of more than 25 years being in the planning. And I can say that, in the first 20 years, the degree of change is way smaller than the changes that we've seen over the past five years and what we are expecting to see happening in the next several years.

I think that, when we take a look into, what is the problem we are trying to solve-- so first, you're talking about the DERs that are really bringing tremendous complexity to what used to be one directional way of planning and making decisions. I think that, in addition to DERs-- and Sean already mentioned in front of meter and behind the meter-- we have a lot of smart loads.

Like Eaton recently launched smart breaker that can absolutely be controllable. And utility can absolutely either shed or curtail anything that is in the home or in any commercial or industrial behind-the-meter customer, so that you can really then play. So in a way, you can use-- DER philosophy is now enabled with the smart loads, as well.

Then you have that scale. I think that the scale of doubling or tripling the amount of loads, then I think 10x of adding smart devices is just creating such a problem that any small inefficiency, any small gap that, in the past, you wouldn't even notice, now it's completely magnified and can create a lot of problems.

And then the last but not the least, this tremendous change management in how we address all of this, we have to worry about the workforce. Many times, when you make these changes, we have to worry about the workforce that stays behind. And we have to create really an environment in which they can come along, they can collaborate, they can be upskilled, and they can all have individualized training and onboarding in order to participate and be fully engaged. So when you think of that whole problem-- that statement that we are trying to solve-- we are seeing that one technology is not going to solve all of that.

I think the digitization and AI is a huge part of that. We are also seeing that collaborative innovation that co-simulation and the digital twins that are using much more augmented and virtual reality in order to enable the workforce to do more-- in which you automate many of the workloads, workflows, and standardized so that people can really focus on the more creative stuff is all part of the solution.

Yeah, that's great. So obviously, we've talked a lot about AI. Satya talked about it. And Daryl was talking about it. This is about AI.

As you think about the energy space, I mean, we have a tremendous amount of data, a tremendous. And we're only using a fraction of this. So, Igor, when you think about this, what are the kind of no regrets use cases that we'd say, let's just go do it, OK? Patty, open up. Let's just do it. And then think about, OK, then how do we really think about long term in those use cases? So help us with, how do we think about AI in the future?

Absolutely. And I love that just-do-it approach. And I know that we are going to make some mistakes. And I think that's OK. If we are transparent with the stakeholders, and we say, hey, we are piloting, we are trying out, let's learn together. We can do a lot much faster and sooner.

I think that what we are seeing-- well, first of all, all of the data that we are seeing is-- we absolutely have to clean it, cleanse it, and make sure that it is accurate and that we are all working from the same sort of data that is accurate, and that any new batch of data that we are bringing in is also cleansed. I don't think that is one-time work. I think that it is iterative. And I think that we always have to have that on the top of our mind.

I think that what we are seeing is low-hanging fruit is really auto-generated and scripted and suggested scripting, where we can absolutely standardize the workflow. And we can really create very meaningful onboarding and upskilling for the workforce in order to really streamline their day to day. We just heard from people from Microsoft, some of the things in which they are way more productive-- and just try to see how you can apply that on the regular, day-to-day jobs. And I think we are going to see massive improvements.

We are doing that in Eaton today. For example, I have more than 1,000 field service representatives working across the country supporting our customers with their electrical systems. And we have been using AI, where our hypothesis 18 months ago was that they are going to save 30 minutes per week, per person. And we nailed that down. We nailed it down.

And I think that now we can even go to the next step and do it even more. I think, long term, definitely physics learning is going to really enable us to do phenomenal things. Like, probably out there, very abstract is instantaneous power flow, where you don't have to calculate anything. And you can get good enough power flow analysis in order to really make much faster hypothesis and maybe even decisions. I think applying that on each asset behind the meter, in front of the meter and being able to really understand the safety aspect, the cost effectiveness aspect, the maintenance aspect of it is really going to help us to really optimize both holistically, the whole network-- to Sean's point-- but then also to zoom in and get the most out of those assets, as well.

Yeah, that's great. Absolutely. And we need all the help we can get. Sean, I'm going to give you a curveball. Because I think the audience would love the little kind of session we had just behind here when you talked about the analog telecom system and where we're going. That was such an interesting discussion. Replay that for us.

Yeah. I mean, I think the thing that's interesting to me is any network that you're talking about, whether it's sort of Roman roads or shipping, supply chain, anything like that, it gets to a point where it's stressed out. And so if you look at the closest analog that most of the people in the room are used to-- and by the way, I think most of you in the room are too young to actually remember a pre-internet world. So you're going to have to forgive me.

I remember.

There was a pre-internet world. And the internet actually runs on the telco network. And the telco network was being stressed. There were new loads.

Banking was dropped onto the system in the '60s. That started to break it. Television was dropped onto it. That started to break it.

And so everybody got in there. And they tightened the screws. And they tried to make it work better and so on. But that was incremental.

The internet broke it for real, like shattered it, destroyed it, but also funded its reinvention. I think, right now, we're looking at electrification. We're looking at load growth, just the per capita.

So you're not only seeing 300% growth of energy consumption, as Patty was referencing. But per person, it's going up about 600% or 700%.

Wow.

Because the population growth isn't growing at the same scale. So you're looking at per person consumption is driving real stress. But AI as a workload really kind of destroys it. A single data center isn't 100 megawatts anymore. It's a gigawatt. It's 2 gigawatts.

So you've got your peers or here in this jurisdiction where the request exceeds the actual municipality. Like, it's not even close. And people see that as a threat. They see that as a problem. It's not.

That's actually the workload that funds the recreation. That's a huge opportunity for us. And so getting back to some of the questions-- because I think, what do you do with that, then? How do you actually use that?

Because you're going to have to build more transmission lines. You're going to have to build more distribution. You're going to have to build better redundancy in the network than we have at the distribution layer, especially. You're going to have to put more storage cache in the network. You're going to have to do those things.

But how do you pay for that without the ratepayer doing it. AI does that. Hyperscale does that. It's a rounding error for $1 trillion company to help fund that improvement. And then that improvement benefits society, both in the AI tools that they receive, but also in the improvements that they get in infrastructure that was necessary for that to happen.

And then, how do we, as a community, use AI? Well, where do you put that load? Where's the best place to put that load?

Absolutely.

And I think this gets back to the planning opportunity. For us, you're dealing with so much data that a normal operator can't process the data they have now. If you ask them to then get beyond their scope, to look at every potential generation, device, long-haul, short-haul transmission, distribution, all of it. That's just too much information.

But AI can help with that, AI planning, and not doing a point-in-time study but continuous simulation. That's where we have to push to. And that's where AI can add value-- is not just, hey, where am I going to need a charger in the next 10 years? But where do I need a charger now, in the next minute, and the next minute, and the next minute? And being able to do that continuously, I think that's a huge, huge unlock for us.

Wow. As Patty said, that truly drives those 10 people to 100.

That's right.

It does increase the denominator. And AI can pay for it. That's outstanding.

Absolutely.

So, Igor, we think about this. Co-simulation, co-optimization of the T&D assets and modeling is getting a lot of hype right now, a lot of buzz. But you think about that. I mean, being an old transmission planner in the day, we do have tools and systems that are planning the transmission system. And we do have the tools on the distribution system-- and not that they're mutually exclusive.

But as you think about co-simulation, what are we going to need to do to make sure that we're passing data across those tools and applications to really do that end-to-end planning that we need from essentially the generator to the customer premise? And how do we think about those tools in the future?

So I think that is the only way forward, actually. What we know is to truly get the most-- and that's what we heard today. To take the most out of the grid, you have to optimize and take benefit and leverage from every single asset, every type of the load, every type of the distributed generation in order to really maximize and make it fully utilized, and highly productive, cost effective, sustainable solution. And you can only do that if you co-simulate.

Now, co-simulation is nothing new. We've been using it for 20, 30 years now but mostly in the PhD students. So we have to absolutely remove it from early adopters using it and make it more mainstream. We have to make that collaborative approach much more working. Those software solutions must work together.

I think, using the AI to help with how the plugs in are connecting, how the data are interchangeable, and then validated, and then used in a proper way, and then using AI to really upskill the workforce so that it's really not, you need to have a PhD in order to use a co-simulator-- and I think we'll get there.

And if I can add to that-- because I think that's an important one, too. And it is a great use case for AI. How many people have done a POC of something here? Everybody has.

So day zero it works, yay! POC. Day 100, nobody's using it anymore. And the reason is because you had to do so much work to get the data in a perfect place to get the POC to actually do the thing. But then you can't maintain that data the same way.

But I think the opportunity here-- first of all, looking at things like data fabrics and how those actually can pull all that data together instead of creating data monoliths that age immediately-- but secondly, using AI for data validation I think is an amazingly usable thing. Like, that's something that can be done immediately. And it actually adds a huge amount of value.

Find the gaps. Find the things that don't make sense in the data. Go figure out why it doesn't make sense. Go find a better source of truth. And fix it.

That's well within the scope of something that AI can do and does do every single day. And I think that's another really powerful short-term unlock for all of us.

Yeah, I think for us, too-- as you think about 70,000mi of service territory here in Central and Northern California, and we think about the data quality and the asset registry that we have, really using AI to really help us with that and continue to cleanse that data, to give us better information to be able to make those decisions. Sean, you're kind of like a startup to some degree but within a big company.

Yeah, 240 days.

Yeah, that's pretty awesome. So you think about-- there's a lot of startups in the space, in this planning space. And for us, I mean, we're a big company. We get inundated with a lot. Give us some advice. How should we be thinking about working with these startup companies?

And the Innovation Summit is a great example. Because last year, we said, hey, here are problem statements. These are our pain points. And focus on these things.

And it's not just us in PG&E. It's the entire industry. And so, how do we think about making sure that we focus and working with the startups in a collaborative way to get great outcome without diluting, essentially, the outcomes we're trying to achieve?

It's a really great question. And the answer, from my point of view, kind of living in Silicon Valley, and being here for a while, and going through that is, the thing that kills a startup is a customer like a PG&E. And it's not--

I resemble that.

Not because of any ill will but because your problem is so juicy and so important. But utilities, quite frankly, act as if they're all very, very unique. That's one of my observations coming in.

An interesting thing that I love is, every single utility, when we give them a product, asks us to modify or customize the data model under the product. Why? There's zero value in that. So the thing that happens is a startup has, hey, I can solve that problem.

Well, it bends them to your will. But if you're not aligned with how a Southern California Edison, or a Dominion, or a TVA, or an anyone else wants to solve the same problem, you start to pull them apart. And so I think the best thing we can do to take advantage of the startup community is, quite frankly, align on our side-- so the large, big suppliers, as well as the utilities, to help them do it one time and not do the same thing five different ways.

That actually would unlock them huge, I think. And that would be a really powerful thing for all of us, because we can't solve all the use cases. We're not here to do that.

That's great advice. Any final thoughts about that?

Yeah, I completely agree. Nobody has a monopoly of innovation. I think that there are so many problems. And you guys are very good in already stating some of them, that we all have to chip in. And we have to find a way how to work together in order to commercialize them. Because that commercialization is really-- takes patience. Let me put it that way.

That's awesome. So in closing, as you think about system planning and you think about the tremendous opportunities we have in this space, give me one word that in your mind codifies this opportunity. So, Igor, what's that one word that you would say?

Reinvent. Reinvent yourself. Reinvent what you do and how you do it.

That's awesome.

I would say, constant. Like, when we think about planning, planning shouldn't be a point-in-time event. Planning should be a constant. It should be a continuous activity.

I think, my belief, looking at how this has happened in every other industry, is you'll do less operating and more planning. Things will move upstream. And so this can't be a thing we do once a year. And we print it out. And we put it on a shelf. And we admire it. This needs to be just a constant act.

Yeah. Mine is grateful. I'm grateful for the partners that we have. We cannot do this alone.

We need everyone here to help us on this journey-- grateful for 28,000 coworkers of mine and grateful for this incredible opportunity that we have in front of us. And thankfully, I've got some great partners to help us along the way.

So with that, how about round of applause for our panel? Thank you. Thanks.