Welcome, president and executive officer, Electric Power Research Institute, Arshad Mansoor. And welcome back, chief executive officer, PG&E, Patti Poppe.

[UPLIFTING MUSIC]

OK. Oh, you're going to have to sit closer to me, Arshad.

I will.

Hi, everybody. How you doing? Good, good. All right. Well, I have Arshad Mansoor with me. I'm so happy to have him. Arshad, you're globetrotting. Where were you from-- where did you fly here from most recently?

The Gulf Region, Abu Dhabi, Dubai, Qatar.

This guy, he's a busy, in-demand kind of guy, just the kind of guy we need leading EPRI. It's really amazing. So EPRI is the Electric Power Research Institute. Maybe some folks who are joining us today are not familiar, Arshad. Why don't you tell us a little bit about EPRI?

Yep, sure. And we say it's EPRI. It's like KFC. We don't call it Kentucky Fried Chicken.

Yeah.

So we were born out of a blackout. That's not a nice way to introduce a company, 1965 New York City blackout, to keep the lights on, to work with initially US utilities, US power companies to de-risk technologies so you can adopt that scale. And if technologies you already have adopted, make sure you're operating them reliably. So that was our mission. Now, we're in 40 countries, working with 400 power companies and, really, teaming up with national labs, teaming up with universities to continue to shape the future of clean energy. And so that's where we are today. We're still doing the same thing, but at a broader scale.

Well, let's take a few minutes here, Arshad. I mean, you have such a great vantage point. You see all of the things happening in our sector from a lot of different directions. You have an incredible research team. I feel like people cannot imagine. It's the collective R&D for all of the utilities. We're all solving the same problems. We don't have to solve them individually. Solving them together is the most cost-effective way to do it, but you've got incredible scientists, and you've got an incredible platform from which to see the future of energy. What are you thinking about the build-- about how we are building and the building of the energy system of the future?

Well, first, our secret sauce that you don't know, your team is part of our team.

That's right.

Southern California Edison's team is part of our team. So our intelligence, our knowledge comes as much from our members and advisors as we have with EPRI. And I'm proud of the EPRI team as well. I see some ex-EPRI people sitting right there, or EPRI alums. So there's a lot of changes. One fundamental change that is driving us now, with all the work that we're doing, is we have built this system, I don't know, a hundred years ago, I don't know. Whenever we built it. We built it a long time ago. And somewhere, I read that it is the engineering marvel of the century.

I agree.

I've read that, too. But it's built on a premise that I will be able to forecast my load, and I will be able to dispatch my generation. That's the fundamental-- I can tell you what my role at 12:00 PM would be, and I can get my generation ready. I'll dispatch it. Over the last 10, 15 years, what we have seen, today in the US, I think we have around 250 gigawatt of wind and solar.

So we now have to forecast generation because you don't dispatch generation now. You forecast wind and solar. And now we've got to figure out how to dispatch load. So we've got to bring to this system a complete reversal of thinking process that should be part of the system, not the entire system. How can load be dispatched, and how can we better forecast generation?

So that is one of the key things is, you do what you're doing for the last hundred years. We still will have a lot of dispatchable generation. But if it's just dispatchable generation, meaning forecasted load, and load cannot be dispatched, we're going to put pressure on electric price and on rates.

Well, that's exactly what I was talking about this morning. So when this comes to large load, you've been implementing or introduced a new group called DCFlex. You kicked that off earlier this year. Tell us a little bit about what is DCFlex.

Well, two weeks ago, not earlier this year.

Oh, yeah. [CHUCKLES]

Two weeks ago, it was launched. Interesting story, San Jose had something to do with this launch, March 18 through 24 this year. You know what happened in San Jose, March 18 to 24, anybody? Anybody? NVIDIA, developers forum, the new Steve Jobs, Jensen stood up with 18,000 people. And it was dubbed or it was called the AI Woodstock. If you're not old enough to know what Woodstock is, we're not going there.

And same week, 18 to 24, what was happening in Houston, Texas? Anybody? What's happening in Houston, Texas, March 18 through March 24 this year?

Beryl.

CERAweek.

Oh, CERAweek.

CERAweek. What was it called? What was it dubbed as? Super Bowl of energy. Another 10,000, 15,000 people. I was at the Super Bowl of energy. We got folks here at the NVIDIA forum. Folks over there in Houston, we're talking about AI and doesn't know jack about AI. Folks about in San Jose, we're talking about power and energy. And I hate to say it to Silicon Valley, you guys didn't know Jack about what you're talking about. So you needed somebody to bring these two groups together.

Ah-ha.

That's where the journey started. There was a White House event. There was all these things. So we were able to bring-- as collaboration, we collaborated with electric companies. Why can't we bring hyperscalers? Why can't we bring data center developers? Why can't we bring markets?

So we brought them together, just two weeks ago launched. It's going to have more than 100 people. The power of being together is this. And why we're doing this? Can we do data center in a different way than we have done in the last 20, 30, however long we have been doing data center?

Yeah. So data centers use a lot of power.

Yep.

People are a little nervous about that. Can this rickety old grid handle it? How does DCFlex work? What are you thinking about when you bring all these people together?

The first thing we're thinking about is-- and this is kind of completely contrarian of what you would think. You would think, I need to invest more on the grid. I'm already investing in wildfire and resiliency. I'm already investing in getting grid ready for electrification. So, I mean, grid investment has gone up. Electric rates maybe go up, going up. And you will need to invest more for data centers.

And we are saying is, if you can do the investment for data center, you will actually provide rate relief to all of your other customers, because electrification of EVs and electrification of heat pump takes time.

Data center, once you're done, you've got 100 megawatt load right away. The more electricity you have, you take the cost, and you distribute it to a bigger pool. I see-- and then, can you do it in a smart way? 1% of the time, 87 hours, is what we need 15% of the grid for. I got 15% of the grid ready just to supply demand for 87 hours a year.

So if we can say to the data center, hey, can you back off or can you back down? Just typical demand response. Can you do that through computation? Can you do that through your backup generators running on hydrogenated vegetable oil, which-- sometimes some people call chicken fat, but I'll say hydrogenated vegetable oil? But more importantly, can you not even have a backup generator? Why do you need a backup generator?

Let's put a couple of peakers right at the fence, whatever the boundary is. And the peakers are going to be grid assets. But the peakers are designed so in case-- California grid will never fail, but in case there is a grid it emergency, I'm going to just configure the peakers as a microgrid and provide backup power to the data center so the data center doesn't even have a diesel.

These are new ways of thinking, not technically impossible. Our goal through DCFlex, initially US and then globally, is do 10 large-scale projects, learn by doing, and then work with NVIDIA on their reference architecture. This becomes a reference architecture for future data centers three years from now, reference powering architecture for data center.

Well, listen, you are singing my song, Arshad. What you're talking about is so simple and elegant, and it seems so hard, but we're definitely going to do it. I'll make just a couple reinforcing points to what you just shared. So today, when we power a new data center, it's expected to have on-site generation as backup. And yet, at the same time, in California, for example, the Cal ISO still requires that the system be equipped on the other side of the meter, with that same exact duplication of power to serve peak plus 18%.

Yup.

So society is building it twice. We understand the reason why, but it doesn't need to be that way. So to optimize the grid, the most affordable grid is an optimized grid. This is what you're standing for. And your researchers with all of our companies are helping figure out, how do you island, then, that on the other side of the meter, out by the fence-- I love that-- out by the fence so they can serve the grid, serve all customers every day, and serve that data center in the rare, unusual occurrence where we need to island that facility and make sure that they have dedicated power as well as their computing variation that they can manage.

If you can do the compute variation geographically or scaling down with the new Blackwell chip, fine. Go do it. But that's you guys. Hyperscalers would know if you can do that. By the way, this changes every day. So if there is anybody, and you don't see your name, and I know you joined this morning, my apologies. Oh, yeah, Microsoft raises his hand. They will be.

So this is changing every day. This is only two weeks old. I fully believe this will be the largest initiative in terms of collaboration that EPRI has formed in our 50-years history. We haven't gone global yet. We're talking with Gulf. We're talking in Europe. I could see more utilities and more companies outside the US that are being part of this because this is the power of what EPRI is built on. I don't care EPRI has 1,500 experts. The experts are really all around the world.

We just have to capture that expertise, learn by doing, and put together-- I love the reference architecture, playbook, guidebook, design book because right now, if you ask a hyperscaler, why do you need diesel generators? Because that's how we have done that for the last 20 years. So that's why we are excited. It's two weeks old, and we'll be doing good work.

Well, and one other point about this, this whole idea of raising the belly of the duck, flattening the load, this is the exact kind of application that can fully utilize our existing assets. And I have to share with you, Arshad, my CFO taught me some very complicated math yesterday, but I think this is a smart crowd, and so I'm going to try it out. I promised her I was going to try it out on this affordability front.

And I talk a lot about growing the denominator. And my comms guys tell me I can't talk about the denominator anymore because nobody knows what that is, but OK, so here's the way my CFO taught me yesterday to talk about getting more utilization out of your existing assets.

If you have 10 friends, and you pay $100 for, let's just say energy to keep the analogy straight, you've got 10 friends, and you're paying hundreds bucks. It's $10 a piece. But if all of a sudden, now you only have five friends-- help me with the math, everyone-- it's $20. You just doubled the price. So what we really need to do is grow those 10 friends to 100 friends, so it's $1. So we're trying to get more friends in our denominator to lower the cost of energy.

So I'm hoping 10 minutes after this session is over, everybody go to LinkedIn. And I'm putting pressure on our team. I know our comms team, best team in the world. You'll see a LinkedIn post about this. You know what the title of the LinkedIn post would be?

What?

"A Rising Tide will Float Every Boat." And rising tide is a rising electricity use.

OK, good.

We've got to get the tide rise quickly with this thing.

It's our chance. It's our chance.

Yeah. So, it's a rising tide will float all the boats.

Beautiful. And so in addition to that, you and I, I hear, rumor has it, we've only got 3,000 people here. I know they're not going to tell anyone what we're about to say, but we're going to share a little secret.

Yep.

We're going to pre-announce a little thing that we're actually going to officially announce in December.

December 4.

There's a secret project.

There's a secret initiative--

Tell us about the secret project.

--that is being cooked. And I will be in Manchester, UK, at Kraken's Technology Center. And Patti will be in DC at Deploy24. And we would be launching Mercury. Mercury is not a metal. It is a metal. Mercury is not the first planet or something. It is. It is, by the way. And Mercury is not the Greek God of communication.

Mercury is what Bluetooth did, actually, in Silicon Valley in 1998. In 1998, Eriksson formed a consortium called Bluetooth Special Interest Group that led to what is Bluetooth now. So you can buy any headset, anything, anywhere, and it just connects. In order for load-- so data center flexibility is like a 500 megawatt flexibility.

What we want to do is-- you should go into your home anytime. You should have a Samsung phone, I don't care, iPhone. You should go in. You should be able to see, I got a refrigerator that can do whatever frequency response, but I can get money. I have an air conditioner. I have a level 2 charger. I have all that.

We have worked CEC, California Energy Commission, LBNL, PNNL, EPRI, I mean, you name it. We've worked on standards for the last 20 years. We just have to pick the right one. We've got to create testing process. We've got to create certification process so that we are not relying on a vendor or a technology provider that decides, hey, US is not a good business. I'm going to move out because all my juice boxes are out there, and who's going to do demand response with that?

And just doing API across three clouds and saying that I take my phone, and I see my level 2 charger on my air conditioner come up. What happens if one of those APIs people goes bankrupt? We cannot scale to demand flexibility for, I say, residential unless we solve this. You need a testing criteria. You need a global certification criteria. You need a Bluetooth.

And so Bluetooth's sign would be-- if your level 2 charger has a Bluetooth sign, which means it's got hardware, software, interoperability. We have to do that as an industry. Otherwise, we will be doing pilots and 100 megawatt, 200 megawatt. We want to do 10 gigawatt, 20 gigawatt of demand response.

Exactly.

And why this is important? Money goes back to the customer.

Yeah, in fact, in PG&E's service area, we've done-- well, in California in total, but we definitely have adopted these virtual power plants. So we have 50 megawatts of Tesla Powerwall virtual power plants that we can call on a peak day. And 50 megawatts is a nice number, but it's not a great number. It's a fine number.

What the reality is, we have 17,000 customers who have Tesla powerwalls. That's 680 megawatts of capacity. Point being, you can do one data center, and it's easy. It's like one line on a spreadsheet. But getting those 17,000 customers to participate all of a sudden makes this new grid dynamic. It makes it digital. We can actually optimize demand and deliver energy to the grid when we need it from a variety of resources, utilize energy when we want to that fills up the belly of the duck and utilizes this grid more. But it's going to require some sort of standards so that we can scale. And it feels kind of wonky. Maybe it's not that exciting, but it is essential.

It's like Bluetooth. If you don't feel Bluetooth is exciting, imagine if you had to-- and companies are doing this. Companies are, they hire engineers every time you do an API. Every time you change an API, you've got to change it. So it's almost like, if you scale up, you got to just have a room full of software engineers that you got to hire. That's not the way to scale up load flexibility. And this one puts money back. So do your math. Anybody do your math. You got a water heater. You don't even care when the water heater is on or off.

Well, I do care.

Well, as long as you get hot water.

Yeah, exactly.

Well, in California, why do you need hot water? Well, it's cold. It does get cold here.

Ask my husband.

Three to four years' time. You get paid for the whole water, the value of flexibility in a water heater. And this system is moving where flexibility and capacity and ancillary service is where the value will come from. I'll give you one last factoid. Spain-- go and fact check me-- Spain, this summer, May, wholesale price, 32 euro a megawatt hour.

50% of that wholesale price was not energy. It was not capacity. They're over capacity because they got a lot of nuclear and a lot of wind. They are poor on ancillary service. Half of that 32 euros a megawatt hour was ancillary service. Looked at the PGM capacity pricing last time. That's where the value is coming. Energy will be plentiful. Capacity and ancillary service will be scarce.

Who's going to provide that? Well, one way to provide that. It cannot be just all gas turbines providing that. It has to be batteries. It cannot be just all large 100 megawatt batteries.

Exactly.

It has to be our water heater. Then you put the money back to the customer. I always say, if you are a mean-adjusted income, you should get a free water heater. No reason why you should be paying for a water heater. Now, I should be, and you should be.

Yeah.

So that's what it does is it makes the water heater, name it, air conditioner or batteries or PV a resource for the grid. But you cannot do that unless we solve this. Standards have been developed. This is not a new standard development activity. This is picking the right one, creating global testing certification process. So any of you in the philanthropic world who wants to help us, this will help the world. This is not a utility DCFlex that only five hyperscalers and 20 utilities are helping. This will help the world.

I remember last year at this Innovation Summit, Elon Musk was on the big screen, and he forecasted that energy demand was going to go by 3x. And people kind of snickered. This was just a year ago. People kind of snickered about that. They're like, OK, whatever.

It turns out he was right, again. And energy demand is growing. And if we can make sure that we don't grow the peak 3x-- this is the chance of our lifetimes, to make sure that we have these technologies. EPRI is just leading from the front. Arshad, you're leading from the front. My theme for the day is, let's do this.

I don't have that.

Let's do it. Thank you, Arshad. Thank you so much. All right.

[APPLAUSE]