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CALIFORNIA ENERGY COMMISSION

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	)	re: California's Economic Outlook

IEPR COMMISSIONER WORKSHOP ON

CALIFORNIA'S ECONOMIC OUTLOOK

REMOTE VIA ZOOM

WEDNESDAY, FEBRUARY 26, 2025

10:00 A.M.

Reported by:

Martha Nelson

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P R O C E E D I N G S

10:00 a.m.

WEDNESDAY, FEBRUARY 26, 2025

SANDRA NAKAGAWA: Good morning, everyone. We are going to get started here.

Thank you for joining today's Integrated Energy Policy Report or IEPR Commissioner Workshop on California's Economic Outlook. I'm Sandra Nakagawa, Director of IEPR at the CEC. This workshop is being held as part of the CEC's proceeding on the 2025 IEPR.

Today, we are doing a remote workshop using Zoom. This workshop is being recorded and the recording will be linked to on the CEC's website shortly after the workshop. Additionally, if you'd like to follow along, the schedule and slide decks for today have all been docketed and posted on the CEC's IEPR website.

Throughout the day, there will be opportunities to ask questions of presenters. We'll have a few minutes after each panel to take audience questions. But please be advised, we may not have time to answer all the questions that are submitted.

If you'd like to submit a question, we use the Q&A feature on Zoom. You can also take a look at what's been submitted in the Q&A and upvote a question by clicking on the thumbs up icon. Questions that receive the most

upvotes are moved to the top of the queue.

Additionally, attendees can make comments at the public comment section at the end of today's workshop. Please note that we will not be able to respond to public comments today, and those are limited to a maximum of three minutes per person, with one person per organization allowed to comment. Written comments are also another way to engage with this workshop, and instructions on how to provide those can be found in the workshop notice.

The due date for those written public comments is March 12th at 5 p.m.

I'm now going to turn it over to Vice Chair Siva Gunda for opening remarks from the dais.

VICE CHAIR GUNDA: Thank you, Sandra.

Welcome, everybody. Good morning.

Looking forward to this workshop today. I want to begin by thanking the IEPR team for, you know, always a professional job to getting us all together to discuss these important elements. As most of you who are joining, as we develop the forecast, the economic demographic variables and the forecasts that form a fundamental basis into the assumptions that we put into the forecast, it's really important to really capture some of the upcoming or emerging issues that could impact the economic issues in California.

So we have a number of different topics that we are going to talk, you know, take a high-level view on understanding different economic projections for the state, but dive deep into the World Cup in 2026 and 2028 Summer Olympics and how that might impact the state in terms of economic impacts both locally and at a statewide. And finally, looking at the uncertainty that we started really spending time in last year, which is the data centers being an important part of the future growth.

So I'm really looking forward to hearing and learning from the experts on the panels today. I want to give a big thanks to the staff who judiciously work on putting these workshops together to the Energy Assessments Division where much of this work happens. So, I want to stop there and welcome everybody and look forward to the conversation today. With that, I said I do not know if any other principals are on the call right now and are be joining soon.

SANDRA NAKAGAWA: It looks like Commissioner McAllister is here, and then Natalie Lee from the California Air Resources Board.

VICE CHAIR GUNDA: Great. Awesome.

So, Commissioner McAllister, I'll pass it to you.

COMMISSIONER MCALLISTER: Thanks, Vice Chair. I really appreciate it.

Also, I've been looking forward to this and we live in kind of unprecedented times right now. And definitely, you know, the sort of trauma in the LA area, the fires and all these upcoming events, which are tremendous opportunities for the state, all of which will be driving economic activity, so looking forward to hearing about that from the first panel in the afternoon.

And also, you know, California has a huge federal footprint in terms of federal investment in defense and national labs and many, many investments at the federal level, so uncertainty around that, you know, could be really affect our economy. So that would be interesting to broach some of those topics. Obviously, it's early days, and so, we don't know what the future holds or what policies will be relevant that are going to impact California, but I think at least knowing what the -- which levers and which sort of trends will affect our economy more than others, that would be helpful.

So I'm really looking forward to -- this is the foundational -- as the Vice Chair said -- foundational and resource platform on which the forecast is built, with sort of the undercurrent of the economy really does move markets around all of the things that we -- or just activity, economic activity, and all the things that we do in the Energy Commission, certainly, and other agencies.

So looking forward to hearing the high-level conversation and digging in where appropriate to some of the more sector-specific topics.

But I'll stop there and really just thank the IEPR team, and all of the staff, all the subject matter experts we have at the Commission. It's such a -- just a blessing to be able to have these conversations framed in such an intelligent and informed way.

And we'll thank the panelists for coming and presenting their knowledge as well, just really commit to this opportunity for all of us to learn. So, appreciate that, and I'm happy to pass the mic to Natalie.

Thank you, Natalie.

MS. LEE: Good morning, everyone. Thank you, Commissioner McAllister, Vice Chair Gunda. It's such a pleasure to be here with you again, and a pleasure to represent the Air Resources Board.

I want to thank the staff as well. Thank you for your support for my attendance, and for kind of your tireless efforts year in and year out in the work to update the IEPR. The process is never ending -- I can appreciate that -- and you've always been so, so great at fostering collaboration between the agencies.

And the Energy Commission, Public Utilities Commission, and CARB have a long history of collaborating

on critical energy, climate change, public health, air quality programs. Today's workshop is, you know, one effort in a longstanding and very effective partnership.

So I'm also looking forward to the presentations today. For CARB, it's the state agency charged with developing the scoping plan to look at an economy-wide plan for achieving our carbon neutrality and emissions reductions goals, you know, really staying tuned in and current on economic considerations and what's happening with the demographics of the state, and where we see changes anticipated in the future is absolutely critical.

And I certainly echo the comments of Vice Chair Gunda and Commissioner McAllister that, you know, it is unprecedented times, and I feel like we're often saying that. It is a constantly evolving space. California is a large, complex, wonderful place to live, do business, and, you know, provide public service. But, you know, that public service has to consistently, constantly stay in touch with current reality.

So very excited for today's workshop and hearing the perspectives of the presenters, but also the feedback from workshop participants. You know, I find these really great opportunities for you to bring new topics and new considerations forward for us to take into account as we move forward in all of our work.

And I always want, as we're looking forward, to take a moment to recognize and celebrate our success to date. We have two decades of consistent success, decarbonizing the economy, achieving our public health and air quality goals, advancing and accelerating those goals, and always looking to improve. And at the same time, growing the economy, developing new green businesses, deploying new clean technologies. And, you know, I think we're poised to learn today the challenges and the opportunities of the future and update our efforts to make sure that we're meeting those needs, meeting those opportunities.

So, again, I want to be brief and just thank you for the kind invitation to join you. Very excited to be here. And thank you to all the staff, presenters, and the workshop participants here today.

VICE CHAIR GUNDA: Thank you so much, Natalie. Super nice to see you, but also have you on the workshop that is here.

With that, I'll pass it back to Sandra.

Sandra, would you kind of kick us off the rest of the day?

SANDRA NAKAGAWA: Of course.

We're now going to go over to Stephen Lai. Stephen is a Data Integration Branch Manager at the CDC,

and will be doing our first presentation, setting the stage and talking about the purpose of today's workshop.

Over to you, Stephen.

MR. LAI: Thank you.

Good morning, commissioners and stakeholders. Thank you all for joining us for today's California's Economic Outlook Workshop. My name is Stephen Lai, and I'm the manager for the Data Integration Branch in the Energy Assessments Division.

We'll go to the next slide, please.

Today's workshop kicks off our 2025 Integrated Energy Policy Report, also known as the IEPR. This is a biannual legislatively mandated report, which includes forecasts for electricity and natural gas demand, as well as transportation. The forecasts are used in various proceedings, including the California Public Utility Commission's long-term procurement planning process and the California Independent System Operator's transmission planning process.

The Energy Commission's full demand forecast is done biannually in odd-numbered years. Recognizing the process alignment needs and schedules of the CPUC and the California ISO planning studies, the Energy Commission provides an update to the full IEPR forecast in even-numbered years.

The forecast includes demand cases designed to capture a reasonable range of demand outcomes over the next 10-plus years.

This specific workshop provides us with a glimpse of what is occurring throughout the California economy that can impact our forecasts. We have various impact inputs that we take into consideration in our models, such as economic and demographic impacts, electricity and natural gas rates, self-generation, climate change impacts, efficiency programs, and EV adoption.

Next slide.

The California economy has consistently ranked as the fifth-largest economy globally, and continues to outperform other states. Economic activity serves as the primary factor influencing our demand forecast.

As you can see, we have two charts. The left chart illustrates electricity consumption, which correlates closely with per capita income, while the right chart depicts employment trends, which also show a significant relationship with electricity consumption. Economics remains a crucial factor in the development of our forecast.

Additionally, demographic trends are significant indicators. It is essential to analyze shifts in demographics, particularly in relation to economic

conditions, as these shifts impact various components of the forecast, including the adoption of electric vehicles, the implementation of energy-efficient homes, and progress towards decarbonization.

I would like to give a special thanks to Nancy Tran for submitting this workshop, along with Quenby Lum (phonetic), Mubeena Parveen, Brian Yeung, Jenny Chen, and Heidi Javanbakht and her team for their contributions to the organization of today's workshop, as well as to our moderators and panelists for their voluntary participation.

I would like to present the moderator for the first panel, Zhiyun Li, who serves with the Climate Conference and UCLA Anderson Forecast.

Thank you.

MS. LI: Hi, everyone.

Today, I'm very excited to be the moderator for a discussion on California's economic and demographic outlook with our panelists. We're going to have a high-level conversation.

So first of all, let me extend a warm welcome to our panelists. We are very grateful to have a distinguished group of experts with us to share their insights on this important topic.

To start our discussion, I'd like to invite each of our panelists to briefly introduce themselves and please

share your name, affiliation, and a little bit about your expertise related to today's topic.

Shall we start with Jerry Nickelsburg?

MR. NICKELSBURG: Thank you.

Good morning, and thank you for the invitation to be here. Thank you, Zhiyun.

I am also with the UCLA Anderson Forecast. I'm the faculty director there, and this is my 19th year there. And we do economic forecasting in the U.S. and California, as well as policy analysis, and we teach at UCLA in the economics program in the business school, the Anderson School.

MS. LI: Thank you, Jerry.

Next, Somjita Mitra. She's a chief economist at the California Department of Energy.

MS. MITRA: Hi, Zhiyun. Thank you so much. I'm actually at the California Department of Finance.

MS. LI: Oh, sorry.

MS. MITRA: So, good morning, everyone. I'm happy to be here.

I'm the Chief Economist at the Department of Finance, and my unit, we're responsible for the official economic forecast for the state of California that goes into both the governor's budget and the May revision of the budget. And we also do ad hoc economic research, provide

policy support, and major regulations reviews for departments and agencies that are submitting regulations that have a fiscal or economic impact on the state.

Thank you.

MS. LI: Thank you, Somjita.

Next, Nancy Wallace. She's a professor from UC Berkeley.

MS. WALLACE: Good morning. Thank you very much for having me today. I'm really looking forward to this discussion.

I'm a professor at Haas, as Zhiyun just said. I am chair of the real estate group here. I'm also co-chair of the Fisher Center for Real Estate and Urban Economics. I mostly focus on mortgage and housing markets, and we have a very five-year-long now initiative looking at the effects of wildfire on both of those markets.

MS. LI: Thank you, Nancy.

Walter Schwarm?

MR. SCHWARM: I'm Walter Schwarm. I'm the Chief Demographer for the state of California. So at the Department of Finance, we provide the official population projections for the state and counties, along with estimates and various other things in my shop, and do very many things like that. So the underlying demographics that will underlie your forecast come from me or my shop. So

thanks.

MS. LI: Thank you, Walter.

Tom Jackson?

MR. JACKSON: Hi. Yes, I'm Tom Jackson. Yeah, I'm happy to be here today. I appreciate the invitation.

I'm a Regional Economist with S&P Global, our market intelligence division. So I do regional economic forecasts, including for the state of California, along with other states. You know, I'm part of a team that covers all states and then metro areas within the states. I've been doing this for about 20 years now, I guess.

And yeah, so we are one of the providers of economic forecast information for various departments of the state of California.

MS. LI: Thank you, Tom.

So now I'll open the floor to questions about California's economic and demographic outlook, and after that, there will be a 15-minute discussion between commissioners and panelists. Finally, we're going to have a five-minute audience question and answer.

So my first question is, there are many new and different policies coming out of Washington these days. And people are talking about their impacts on the national economy and on California economy.

Can you talk about what will be their impact,

like the anticipated tariffs or immigration restriction on California's economy?

MR. NICKELSBURG: Is that for me?

MS. LI: Yeah, you can go ahead.

MR. NICKELSBURG: Okay.

MS. LI: I know you have a report on that.

MR. NICKELSBURG: Right. And actually we have our latest forecast coming out next week, next Wednesday. So we've been working on that.

But before I start, our moderator is very modest. So Dr. Zhiyun Li is an expert on climate change, on disasters and insurance, and is the Mercury Insurance Climate Economist here at the UCLA Anderson Forecast. So now you're properly introduced.

And that was a way of deflecting the question because it's such a huge question. Things are coming out of Washington really fast, and that's part of the idea is to restructure the U.S. economy in kind of short order in the first 100 days. That was promised in the election campaign. And that is what's happening.

I think there are three important things that we need to think about at this point in time. But what Commissioner McAllister said, I think, is right on. The timing of these is critically important when they happen. Do they all happen at once? Do they happen in sequence?

The three important things are immigration policy, tariff policy -- and by tariff policy, I mean, really trade policy, because there are non-tariff barriers to trade that are being considered -- and disruption in government, and let me just take a moment to comment on those three.

Tariff policy, entirely within the purview of the powers of the executive branch. And so, you know, there are laws on the books that allow the president to impose the tariffs that he's said he's going to impose. We have an additional 10 percent on China. There's more coming. There very likely will be tariffs on aluminum. There are now tariffs on steel, and -- I'm sorry, on copper. There are now tariffs on steel and aluminum. Copper is coming.

And, you know, the evidence that we have from the 2018 tariffs, 2017-2018 tariffs, the evidence that we have from the Smoot-Hawley tariff increases in the 1930s -- Smoot-Hawley in 1930, but also other countries -- is that the U.S. economy will pay those taxes. They are basically a sales tax, and a sales tax based on where the good was manufactured.

Not really different from what we have in California, where we have a sales tax on goods based on the functionality of the goods. So we don't have it on food, for example, but we have it on other things.

So that is going to increase prices in the U.S. That means increased prices kind of on critical goods, so it's going to squeeze household budgets, and is going to cause a contraction in spending, and we're going to have more inflation out of that.

The second is immigration policy. And again, this is entirely within the legal authority of the executive branch. And we are going to see, as promised, increased deportations. Importantly, it's hard to ramp that up. Right now, the run rate is 180,000 a year. And during the Obama years, it was many more than that. So even though they're preparing military facilities and so on, it could take a few years before we start to get very significant deportations.

What's important for us here in California, is not whether or not individuals are -- for the California economy, let me say, so I'm just strictly speaking about that -- it's not whether or not individuals are detained, it's whether they show up at work. And so if individuals, because they work in agriculture, or they work in construction, you know, which are sort of easy targets of opportunity for being detained, don't show up at work, rather stay home to avoid being in those places, that has the same impact as if they were detained. And so we can expect a direct impact on our agriculture industry, on

construction, on leisure and hospitality, on healthcare, on kind of all of these sectors that at least over the last 18 months have been fueling the growth that we've seen in California.

The third area is disruption in Washington. And I think this is very much an underappreciated area when it comes to the impact on the economy, and when it comes to the impact on California's economy. When you have the kinds of possible resignations, possible firings, possible reorganizations, you don't have clear lines of authority, you have people hesitant to make decisions. And that kind of disruption can be massively important.

When one thinks about countries that have all the capabilities of being fast growing and wealthy countries -- and sort of the poster child for this would be Argentina. In 1910, Argentina was one of the wealthiest countries in the world. But because they did not have a stable governmental framework for economic activity, they languished. And I think we can expect that kind of languishing to happen here, even though there's not clear executive authority for the kinds of executive orders that are coming down for the reorganization of government.

And then just one final comment, which is going back to tariffs. Some of the tariffs are for negotiation purposes. You know, and you think about well, tariffs were

put on or threatened to be put on Mexico, then they were withdrawn. Now they're being threatened for the 4th of March, but President Scheinbaum has said she thinks that there's going to be an agreement with President Trump and that they won't go on.

What's important here, if this is just a negotiating tactic, is that business can't decide whether or not they're going to pay the higher prices. So if you have long lead time items, you're going to cut back on your orders because you do not know what the cost of those items are going to be, and that's going to impact US manufacturing. So all of those kind of combined, say that we have a lot to keep our eyes on. But we don't know a lot yet.

MS. LI: Oh, thank you Jerry for your insight, for your comments on it.

So you mentioned, like, tariff policies and immigration restriction can increase import costs and contribute to inflation. We're already seeing it in California economy. So can you talk about how higher -- because higher inflation could have broad economic implications, can you talk about how will that affect things like social equality and potential growth of California's real income?

MR. NICKELSBURG: You know, for California

governments, I think the important thing is that this inflation is going to shift spending away from taxable sales. If people are paying a lot more for food, they're spending -- and if gas prices go up, they're spending less on vacations, less on taxable things, more on non-taxable things. So, you know, that's one of the implications of higher inflation.

But, you know, we're going to get higher inflation from a lot of other areas as well, right? When the labor force shrinks, wages go up.

And so, you know, we have an issue of affordability of homes in California. If you don't have the construction workers, you can't build more homes. And if you have to pay more for the construction workers, the homes just become more expensive.

MS. LI: Yeah. Makes sense.

So will tariffs impacts be different by household income category? And will they be regressive? Like you mentioned, like the tariff may impact the different households.

MR. NICKELSBURG: I'm going to leave that for Somjita.

MS. MITRA: Thanks, Jerry.

Yes, tariffs do tend to be regressive. Some of the, you know, the lower income households, you know, some

of the goods and services that they pay for -- the goods that they pay for that are, that may increase if there's a pass through from the sellers, they're going to have to pay more if they're not able to really have an easily available substitute.

There was an analysis on the 2018 tariffs by the previous Trump administration, by the US Tax Foundation, that found that there was a 1.34 percent decline in after tax income for the four lowest income quintiles, which doesn't maybe sound like a lot, but it's a lot when you are kind of living paycheck to paycheck, and every dollar needs to go somewhere. So that will have a definite impact on especially our lower income households that are already, you know, really struggling to make ends meet.

MS. LI: Yes. So can we talk about a new executive order?

So in January, Donald Trump issued a new executive order titled Unleashing Alaska's Extraordinary Resource Potential to Maximize the Development of Alaska's Abundant Natural Resource. And how will that impact oil and gas prices and decarbonization goals in California?

MR. NICKELSBURG: Okay. No one's jumping in, so I will.

Probably not much at all. The last -- well, you know, in 2020, when no one was buying gasoline, Wall Street

basically stepped in with the extractors of petroleum and said, you have to do a better job managing the rate of return. And just because oil prices go up, or just because costs go down due to more lax regulation, doesn't mean you should build a new drilling rig and start drilling. And so the oil extractors have said, this is great, we like it, but we're probably not going to do anything different than we're doing today.

And when you think about, you know, where can you get inexpensive petroleum from, inexpensive in the sense of the cost of getting it out of the ground -- so Los Angeles, and you know, we can't imagine that happening. The North Slope of Alaska, you have to build pipelines, you have a lot of infrastructure you have to put in place. These things are going to take years.

What will happen in this deregulation is we will see more natural gas going from the U.S. to Europe, because natural gas prices in Europe are many-fold what we have in the U.S., and that means the natural gas prices are going to go up. And where that impacts California is on the natural gas fired electrical plants, as well as the consumption of natural gas by households and by businesses. So that'll be an increase in cost.

MS. LI: Yeah. That makes sense.

So for all of these policies, we are wondering

what industries in California will be impacted the most by this combination of new policies?

MS. MITRA: I could take that and then everybody else can jump in. So, you know, really looking at the tariffs and immigration, you know, construction and agriculture are heavily immigrant-heavy industries that rely a lot on heavy immigrant labor, whether undocumented or documented. And so they're going to have an impact because there's going to be deportations, uncertainties, like Jerry mentioned, people not wanting to show up to work. So that's going to have an immediate impact on the labor supply and in those industries, and because the likely labor shortages would mean, you know, the costs will have to rise for the -- they are going to have to, you know, increase wages to attract people. And that's going to translate into higher prices for people that are, you know -- buying construction already has a huge impact in terms of costs.

You know, I know Commissioner McAllister mentioned the wildfires and how much of a rebuilding effort it's going to take in Los Angeles area, in Southern California, just to kind of house all the displaced people and then building. And if we are dealing with those two effects of increased demand for housing in a short limit, as along with the issues of deportations and then tariffs

on steel and aluminum, a lot of -- 7 percent of our construction inputs are reliant on foreign inputs.

And if you're and then a huge supplier of our steel and aluminum is China, lumber from Canada, inputs from Mexico, and all of those costs are going to increase for construction. And so we're going to deal with increased costs, a lower supply of labor, and so that's going to translate into really higher prices across the Board.

MS. LI: Yeah. The housing affordability issue will be more severe in the next following years.

So yeah, as we continue our discussion, I'd like to shift our focus from the potential impacts of the new policies to the economic and demographic outlook for different regions and industries within the state. So, you know, California is shaped by a diverse mix of industries and regional dynamics, each responding differently to shifting economic conditions and policy changes.

So I'd like to ask our panel: so over the past year, which regions within California experienced the greatest growth and decline? Looking into the future, which industries are driving growth in the state and which are expected to slow down or decline because of, you know, the policies we have just talked about?

MS. WALLACE: Well, I can contribute in terms of

the Bay Area being the slowest growing region of the state.

And just reflecting on some of these comments about these policies that hasn't been mentioned is just this decision about the indirects for the university system. So we are used to a 60 percent payment on every grant dollar, and that supports our graduate students. It pays for the buildings in the university system. The university system in California is a major employer. This is going to affect how many graduate students we can admit. We're already seeing contractions in major departments.

And very importantly for the Bay Area, San Francisco in particular, the medical schools are massively affected by this. And so understanding this very quick decision based on perhaps unclear understanding of how basic research is done in the United States and the multipliers on that research is going to have a very serious effect on this state. We have some of the major medical institutions in the world here, and cutting back their ability to fund themselves with grant research from the national institutes or other departments as they all start cutting back with arbitrary rules is going to make planning very difficult, and if they actually are enforced running these institutions, nearly impossible.

So that's from my vantage point, an extremely sobering view coming from Washington with very quickly

made, very poorly explained, massive changes in terms of how basic institutions are funded.

MS. LI: Yeah, so cutting grants, grant cutting can be a big problem. How about immigration restrictions? Will that also impact California and the student population? And will there be regional differences, like for the immigration restrictions?

MS. WALLACE: That already has started. The hostility between these trade negotiations I think is dissuading especially many Chinese students coming to the universities, and obviously we have the H1Bs, which is still not totally resolved. And this talent migration is an important flow of both ideas, talents, and the multipliers of the inventions that come from these people. It is very short-sighted in terms of very arbitrary rules, so we're already seeing big changes in this. Obviously, because the campuses are spread across the state, the multiplier effects in all kinds of industries from agriculture to technology to medical research are going to be very severe.

MS. LI: Thank you, Nancy.

So shall we talk a little bit more about the technology sector, because that's a very important sector in California?

So Tom Jackson, I know you have expertise in this

area. Can you talk about how that will impact the AI-related job and how will that impact the high-paying jobs for future Californians?

MR. JACKSON: Well, thank you.

Yeah, I think in terms of AI, part of the issue with talking about AI-related -- you know, I think sometimes we talk about AI as if it's a new thing, but to a large extent, it's really not. You know, it just depends on how you define it. I mean, really many sorts of automation that we're already seeing are a form of artificial intelligence, right? Whether it's ordering kiosk, a lot of the phone menus that respond to voice, you know, a lot of that stuff arguably is AI, but certainly we're entering a new phase of that.

Yeah, it's a little bit hard to name industries that won't potentially be impacted by that. I think certainly any tasks that can be, you know, pretty routine, repeatable are fair game.

Really even agriculture. I grew up on a farm, so I'll try not to go off on too much of a tangent about agriculture and just, you know, the technology changes that have always occurred, but even things like really recognizing, you know, being able to automate, you know, berry picking and that kind of thing has really taken off.

But part of that too is that it's one thing to

kind of have that technological ability, but then the more that you increase labor costs, then the more you incentivize the research to go in that direction and really develop that into commercialized technology.

Certainly other -- one that kind of emerging more recently is really the defense industry and especially, you know, emerging opportunities for a lot of these technology companies as kind of shifting emphasis of defense strategies basically, being a lot more than that being on, you know, AI-related, you know, potentially unmanned vehicles, that kind of thing.

So it's all over the place, but I think in terms of -- again, in terms of labor demand, that's an issue. And again, the more things that drive up labor costs, the more you're going to incentivize technology, you know, really on competing directly with even some lower wage jobs, but it can hit a lot of different areas.

MR. LI: Thank you for your insights.

So will you expect the technology sector in the future to slow down or decline because of that, because of, like, labor costs or these policies coming out of Washington?

MR. JACKSON: I think in terms of the technology sector, not necessarily. I think things can shift, but, you know, to the extent that it increases demand for new

discoveries, new investment, new products, certainly on that -- you know, from that standpoint -- it's kind of interesting as we've talked about things coming out of Washington.

I think one interesting thing that has happened even over the last few weeks is I think it's really raised a lot of awareness of how much of the economy -- you know, how far-reaching federal spending really is, you know, directly or indirectly. So I guess maybe it's one of those things that we already knew, but when you start to see things, you know, so many different sectors saying, hey, wait a minute here, you know, it was still an eye opener beyond the dollar amounts.

So in terms of the technology sector directly, you know, it can potentially open more opportunities for that sector specifically, again, just depending on where, you know, some of the other economics lead.

MS. LI: Thank you.

MR. NICKELSBURG: I think to a point that Nancy made earlier, the key to this is H-1B visas. If our tech sector is going to grow and really drive the California economy as it has in the past, we need a lot of H-1B visas.

That did not happen during the first Trump administration, but there was not the same relationship with the tech industry that the current Trump

administration has. So I think that's an open question. Do those H-1B visas come in large quantities to California's tech sector? So that's something to watch.

MR. SCHWARM: I'll jump in for half a second with the technology. Thinking further, though, to Nancy's point here, overall technology, yes, but biotechnology and biomedical things, that's going to be impacted by the factors that she talked about, because that's really not tech. That's universities as an incubator for those tech, and, yeah, everything she talked about in terms of taking away the 60 percent is going to really fundamentally change the ability of those firms to even start.

MS. LI: Yeah.

So the healthcare sector and technology sector will be impacted. As Nancy mentioned, the technology sector is mostly concentrated in San Francisco area, so that's also going to have a regional impact on that.

So how about other areas in California economy, like other regions like Los Angeles?

MR. NICKELSBURG: In terms of med tech, it's also very large in San Diego, in Orange County, a little less so in Los Angeles, but it's not insignificant in Los Angeles.

And the funding of the universities, when you count the number of research universities in Southern California, it's an amazingly large number.

MS. WALLACE: Absolutely.

MR. NICKELSBURG: So that's going to be negatively impacted, to be sure.

MS. LI: Yeah.

So we see that it will also have an impact on construction sector. So let's shift the topic and talk more about construction.

So much of the basis of California energy demand tends to focus on a residential housing type, such as single family and multifamily dwellings, commercial space, usage, and location. So what do you see as the most likely combination of new, short, and long-term construction, like single family, multifamily, commercial space, and location?

MS. WALLACE: I think the conversation about migration policies and deportations are absolutely going to hit that industry. I mean, last year, we only produced a little over 109,000 housing units, and we have a goal of 2.5 million, so there's a huge gap already. And with the gap in construction -- and then add to that to tariffs, and Canada is our primary source of softwoods for building multifamily units, and everything we build is nearly out of this wood. So the effect of tariffs on wood products from Canada and plastic products, building products from Canada, are going to have a huge effect on the costs of construction in California, which are already

astronomically high. Our cost indices in the state are higher than anywhere in this country, and these tariffs are absolutely going to push these costs up. So the cost of unit housing construction is going to remain a huge problem.

And then to Jerry's point, I believe, will construction workers even come to sites? This is already a problem. It was even before these threats were made. And so the labor market for this state, really ever since the great financial crisis, has been very fragile of anything related to housing construction.

MR. SCHWARM: Yeah.

I think it's notable that we survey, of course, municipalities and see what they've constructed over the slightly different time frame, but it's 120k basically over a different time frame from last year. But permits for last year are under 100,000. And this is the interest rates that are on top of this.

MS. WALLACE: Exactly. Agreed.

MR. SCHWARM: Nothing that we've talked about so far with tariffs and everything else suggests that the Fed is really going to be lowering interest rates anytime soon because of inflation, so, you know, obviously there's an overlap in permits. And, you know, we produced 120 even though we only permitted something like 104 the year

before. So it's not one-to-one, but eventually that will have an issue.

Then to your point about multifamily. Yes, a lot of the more, you know, two-, three-, four-story multifamily are stick-built. But when we get to larger multifamily in terms of apartment buildings and various other things, those are steel and concrete and various other things, which are also going to be detrimentally impacted by the tariffs and higher costs.

And similarly, right after the great financial crisis, we lost a bunch of construction workers. And we're not talking about necessarily undocumented construction --

MS. WALLACE: No, I agree.

MR. SCHWARM: -- legal construction workers to areas that just recovered sooner, like Texas and various other places. And they're still building 268,000 units last year compared to ours, or 300,000 in other places. It's going to be really difficult to bring them back when there's still such -- you know, there's still a commensurately higher demand over there for housing than it is here for some of those more skilled or at least legal construction workers in the United States.

MS. LI: Thank you for sharing that.

So affordability issues seem to continue throughout California in the next few years. So which

regions do you expect will experience the most housing affordability issues?

MR. SCHWARM: It's going to be coastal, right?

I'll let you go, Jerry.

MR. NICKELSBURG: Yes.

I mean, Walter, you said it. So it's the Bay Area. It is Los Angeles. It's Orange County. It's San Diego.

It's also going to be the Central Coast. So coming down from Santa Cruz County to Santa Barbara, you know, that's where you're going to have the greatest impact of demand for housing. And in Los Angeles, you know, we lost, what, 12,000 homes, and homes were already very expensive and you take that supply out of the market, so, you know, that's certainly going to be the case.

What is interesting -- I mean, we're a panel of doom and gloom, I think -- but what is interesting is where factories are being built in California and where you're seeing more home construction is inland California. And so we've seen factories going up in Lathrop, in Mojave, and in the Los Angeles high desert in southern Riverside County. We're seeing homes going up in those areas as well.

Where you have that land and that less expensive land, you're going to see less in the way of affordability issues and potentially more population growth.

MR. SCHWARM: The Central Valley or coastal-adjacent Central Valley is certainly a place that is going to grow as well because it's still an opportunity. The land is still cheaper there.

And, you know, if we look at a longer period out, even with climate change and et cetera, there are still ameliorating pieces there. And from an agricultural perspective, there's still reasons why that should remain relatively, you know, a sort of powerful academic -- sorry, agricultural area, even when other parts of the country because of changing climate start to lose their advantages. I mean, water is one key aspect that kind of fits in with that. So yes, it's coastal, but there's some bleeding into at least closer Central Valley counties and some other areas.

Rule out the North Coast either, Jerry. I mean, some of it's a little bit too remote, but.

MR. NICKELSBURG: Right.

MS. LI: Yeah. So the demand is still increasing, but as you mentioned, the climate is also a factor that's influencing this.

So the recent fires in the L.A. County destroyed more than, you know, more than 10,000 residential and commercial properties.

Can you talk about how will those natural

disasters impact our housing supply and construction labor costs?

MS. MITRA: I think, you know, like I think Jerry mentioned, like 12,000 homes and these -- especially in the Palisades fire, those are some of the most expensive homes in the country. And when they go offline and then the time to rebuild and that just, you know, what happened during that, the people who lost their homes, they ended up pushing into Orange County coastal cities, up North Santa Barbara coastal cities and, you know, pushing in demand for their homes. They're making it more expensive, even already expensive, but even more expensive comparatively. So that's an issue.

It's going to take, I think by some estimates, it's going to take, you know, at least five years for any rebuilding to kind of finish, you know, to get back to where we were. So we're looking at a minimum of five years disruption in already a tight housing market in Southern California. And I think that's just going to have an issue.

I did want to talk a little -- or mention zoning. Some of our restrictions are zoning restrictions. Even if we wanted to build in certain areas, we have the ability, even if notwithstanding tariff issue or immigration issue on construction labor, zoning is kind of, has kind of

handicapped a lot of the abilities to build where we would like to. And so that is something I think is exacerbating our affordability issues because with all the best of intentions, if you're hitting against zoning, you're not going to be able to build as much as you would like.

So I think that is something that has to be really thought about carefully.

MS. LI: Yeah. Thank you.

So how will the recent ADU regulations affect the housing supply and the prices, and will that also improve housing -- will that improve housing affordability issues?

MS. WALLACE: I'm not that optimistic that the ADU is going to be a major factor. In some of the cities, the older cities that have larger lots, perhaps, and then enabling perhaps use of garages to be retrofitted, but as a major source of housing, it's not.

What might be a major source of housing is the many large malls especially in the Bay Area that have to be repositioned. And there we can build multi-story housing, 19-story apartment buildings in fire resistant areas, because they're mostly BART and highway-accessible places where we actually can build a lot of housing. But hoping that ADUs are going to make a dent, it's just not credible. I mean, where you look at the available land, it's just not credible as a major source.

MR. SCHWARM: Of the 120K I talked about, ADUs represent 21 percent of those as far as our survey would suggest. How many of those 21 percent are being used for housing and not a not a room and everything else like that?

MS. WALLACE: Work from home. It's a major phenomenon still.

MR. SCHWARM: Yeah, it's a very good question.

MR. LI: Will changes in zoning help with the housing affordability?

MS. MITRA: Well I think it's zoning but also public interest in housing and the need for recognizing housing that's being built near you, the multifamily. I think there's still a perception of people wanting a single-family home with a white picket fence and a yard and a pool, and, you know, there's just limited land for that. And so I think public perception and interest, even if we have zoning, a lot of times it comes up against local opposition against building more.

And so, you know, I think there has to be a concentrated effort by everybody to say housing near you isn't going to affect your home values. It's going to make it easier for people to commute, pay property taxes that's going to benefit -- provide the services that you need in your communities, lessen probably traffic because people don't have to drive in from an hour or two hours away to

work in your cities and neighborhoods. So there's just a lot of ancillary factors to think about.

But I think encouraging more zoning and encouraging more building is definitely a step in the right direction.

MR. NICKELSBURG: You know, I think we want to be really clear about this affordability issue. As Nancy mentioned, to get affordability -- let me first start by saying California has always been more expensive than elsewhere. And that's because the demand for California housing, the demand to live in this wonderful state, is not a demand just from Californians, it's from all over the country and all over the world. It's why Angelinos always, you know, wished for a cloudy day when the Rose Parade was going on, because people in a polar vortex would say I'm moving. That demand is still there.

And so to drive down the kind of the differential, that California premium to what we experienced let's say in the 80s, we need millions of more homes. Right now, as has been pointed out, we're building a little over 100,000 a year. Even if we go up to 300,000 a year, we're talking about a long-term solution, nothing that we're going to see anytime soon in terms of affordability.

And if we were to go from 100,000 to 300,000, we

need something like half a million more construction workers. And where do they come from? So if they come from out of state, they need a place to live, right? And they need to get here, we need companies, developers.

The supply side of this, ignoring CEQA, ignoring Coastal Commission, ignoring zoning, if you took all of that away, we're still a decade away from achieving this with really good planning. So we can ease the situation, but to see affordability as an issue go away, we're not going to see it anytime soon, and I think we have to be realistic about that.

MR. SCHWARM: Let me do my usual doom and gloom.

And don't expect the death of the Baby Boomers at any point in time to fix this issue, right?

MS. WALLACE: No.

MR. SCHWARM: We are so far in the hole that if you expect that, then fine, we fix the issue in 2055 or 2060, but I don't think that that's a realistic time frame to try and fix this issue.

MR. NICKELSBURG: Yeah, I'm glad you gave that time frame, Walter, because I was hoping you weren't rushing us.

MS. LI: Yeah.

So can you talk about some potential solutions besides zoning to address the housing affordability issue

in California?

MS. WALLACE: Yes, I think transit-oriented, mixed-use development, using these malls that are not economic anymore. I mean, the old style, you drive your car in a 1,000-acre parking lot. No, I'm exaggerating. But we have at least seven 70- to 100-acre malls that are in the throes of being redeveloped.

And the good news is that the communities are actually working closely with the mall owners. There's been quite a lot of recent capital deployed into these sites, and are very open to redevelopment, mixed-use, sort of using parts of the mall for various kinds of tech, building a lot of housing. Most of these malls or many of them have BART access, so we can build it off the transit infrastructure that's already there, and we can build -- what we need is workforce housing. Housing for younger people and people that are working, that are policemen and nurses and teachers and all the people that we need to house and currently are not housing, and do it reasonably affordably. Of course, affordability with the current construction costs with the tariff on Canadian wood is going to be a very challenging object to deliver.

MS. LI: Yeah. Thank you, Nancy.

So yeah, so Jerry just mentioned that there will be a huge demand for housing in California. But recently,

climate migration has been a hot topic because, you know, for many residents and businesses affected by disasters like wildfires, they will have to decide whether to rebuild or relocate.

So do you have any insights on how will that change the economics or demographics or, like, housing issues in this region, like the regions impacted by those disasters?

MS. WALLACE: So it's going to be very severe. And the market that has not yet really awakened to this is the municipal bond market.

So how do we fund the universities? We fund them off municipal bonds. Where are the universities located? Every single one of them is in a WUI. What's the cost of insuring those positions? And this is sort of a comment back to the zoning discussion. And where is growth going to happen? The cost of insuring in some of these new peripheral areas is going to be very high.

And so the insurance for the infrastructure, I'm talking about the hospitals, the schools, the libraries, the revenue bonds that build new downtowns. And Paradise was a very big wake-up call because that was a revenue bond that was at risk. Its downtown was funded by a revenue bond. And the entire downtown burned.

So the municipal bond market is awakening to this

danger, it's very similar to what's going on in the homeowner's insurance market, and lots of infrastructure in California is funded through the municipal bond market. So costs there are also going to increase.

MS. LI: So what's --

MR. NICKELSBURG: I'd like to hear Walter's take on this. A lot of the migration that has occurred over the last five years has been to parts of the United States that are going to be most severely impacted by climate change.

MS. WALLACE: Exactly.

MR. NICKELSBURG: Florida, Texas, Arizona, Utah --

MS. WALLACE: Yes.

MR. NICKELSBURG: -- even Idaho, where Boise is in Idaho, not all of Idaho.

As that becomes less and less livable, do you see migration to places that are relatively more livable like California? Or is that migration going elsewhere? What are your thoughts on where the climate migrants are going to be going?

MR. SCHWARM: Right. I was going to jump in anyways, Jerry, but thanks. With the caveat about the insurance --

MR. NICKELSBURG: Sure.

MR. SCHWARM: -- because there is a huge issue of

insurance on this.

But nevertheless, coastal areas -- and this is just purely the coast -- and maybe even to a certain extent Central Valley and parts of California do get more water, more other things, just by being relatively close to the coast than other places in the United States. We should see climate migrants to California, because we will still be a place, we've got sea level rise, we have some of the increase of fires, we have these changes in the severity of things, which will impact affordability, general affordability pictures. But once again, given that we should still be a nice place to live, people will move here.

Will the flow -- we've had net outflow of people to other states for years, and we'll get to, I'm sure you'll eventually get to my question, to this question, but I'll go ahead and do. Partially that's because of immigration, but that's partially because we're moving to other places. Now, might that slow down as other places become less, you know, wonderful to live in, or less ability to live in? If Texas starts -- Arizona already, but Phoenix has had 100 days of temperatures over those things -- if that starts to become like the Middle East, and Phoenix now sees days and days of 120 or even 130 degrees, I don't know that Arizona is the place that

everybody wants to go anymore. You're going to see people making that decision to come back to California if they can, and there will be the individuals that have enough, you know, money to do that.

So I think there are -- and this is why I say the North Coast has some potential there. I know it's very remote, but there were remote wild places elsewhere that eventually got developed, because it is true the North Coast area is about the most climate resilient place we have in California, except for the fact that perhaps tsunamis, sea level rise, and various other things, but elements of it at least have good potential. But we are talking about the longer picture here, not the next 10 years, 20, 25, 30 years from now.

MR. LI: Okay. Thank you.

One takeaway is that there won't be, as other people expected, a lot of people moving out of California because of disasters.

Yeah, so I want to get back to our conversation on insurance. So Nancy just mentioned insurance cost is a big problem.

Can you talk about what kind of mitigation strategies can government do or insurance companies do to mitigate this problem?

MS. WALLACE: So you should have predicated that

the wildfires are not going to go away anytime soon. So the wildfire severity is definitely not going away anywhere anytime soon. Maximum temperature has now risen dramatically in the last two years in the western states.

And now, just a little pushback on the North Coast good news story, is the Diablos have become much more dangerous. And so, they're becoming much more similar to the Santa Anas. And we saw the result of the Santa Anas in the Southern California fires. So, it's about the Nevada Basin. Unfortunately, California is very connected to the Nevada Basin, which is very, very hot. And these wind phenomena are really making places that we hadn't thought of as other than hundred-year kind of disaster events, like the North Coast, be actually quite vulnerable to wildfires.

So, in thinking about insurance, I think thinking seriously about what's happening to State Farm right now is a wake-up call that all of us really need to attend to.

Right now in California, State Farm insures 800,000 homes. It's asked for a 28 percent increase. It's been denied. Its loss ratios are well over 100 percent. So, it's paying out about $1.29 for every dollar that it brings in in premium. And if it's downgraded, which could happen because of the lack of ability to cover its capital reserves, it will not be able to insure with property and casualty insurance those 800,000 homes because the mortgage

market requires that you have a qualified bond market as an insurer and have adequate capital, and so we will lose a major insurer, yet another one. And the other insurers, Farmers, the other major insurers are in very similar situation.

So, we have to really think about mitigation for the houses. And I -- one of the things that's lacking here, there's a lot of discussion about homeowners hardening their homes. Hardening home is an expensive proposition. It usually involves a new roof, often double pane glass. We're talking twenty to fifty-thousand dollars. Most people don't have this. We need mortgage -- second lien markets to allow people to afford this mitigation. And very likely, we need to be more creative about who's providing that loan market, maybe even tax assessed loans, especially because given the Southern California issue with the water mains and water pressure, it's likely going to involve infrastructure that's going to have to be tax-assessed and funded that way.

And I think that's what the conversation should be, creative ways of creating these capital markets to enable people to respond -- nobody wants to live in a house that burns to the ground -- and to reduce the likelihood that the homes all burn to the ground when we have these fires.

MS. LI: Yeah. I agree. Sometimes not because of people's perception about their welfare risk. They really want to mitigate, but they don't have money to do it.

MS. WALLACE: There's no market for them to do it. Right now, there is literally not a market.

In fact, the government-sponsored enterprises, Fannie and Freddie will not allow these liens, because what they're afraid of is having long amortization so that the liens are not due on sale. They want second liens to be in due on sale, and that means that we can't provide long amortization periods that we could with a tax assessment lien, not PACE, but redesign because PACE obviously for residential was a disaster. It's been very successful for commercial real estate in the state.

But we need to enable people the wherewithal to mitigate, and right now we don't have it. And it's probably going to involve subsidies for certain communities that are nowhere close to the ability to respond. But because wildfire is an externality, we should all want to invest in those communities and help them mitigate.

MS. LI: Yeah. There's externality issues, and we need some innovation to incorporate climate risk into the market and the mortgage market. And also there is a lack -- because insurance is always, is usually one year,

but the mortgage is like 30 years. There's like inconsistency between that and climate race is also long-term.

MS. WALLACE: Those rules last a long time. So you want a 25-year mortgage or something like it.

MS. LI: Yeah.

MS. WALLACE: So I think mitigation is the future and I think we can be creative and actually solve these problems.

And just a tiny comment to the Florida, Texas issue. Miami passed a Miami Forever bond, $400 million bond, which is kind of laughable in terms of responding to its sewer crisis. At least in California, we are thinking about these things. Much to the Bay Area's credit, we are building levees. We are going to issue large municipal bond. So 5 million for SFO to build a levee at the base of the runway, and the Embarcadero is going to put in a $15 billion new levee. And I think it's thinking in the future, the longer term, in how we build the infrastructure so that we can grow and be safe has got to be part of our culture.

And I credit the Bay Area for -- since the floods three years ago with excessive rains, really addressing the levee system, at least in Northern California.

MS. LI: Yeah --

MR. SCHWARM: I mean, I think we are at least attempting, we have at least attempted mitigation and to a certain extent fires are one of the easier things to mitigate, but the climate change piece, they're at least sort of doable.

I don't know how you mitigate from incredible floods or more hurricanes because --

MS. WALLACE: I don't, I agree with you.

Luckily, we don't have hurricanes to the degree. It all depends on El Nino, whether or not El Nino and La Nina are going to give us hurricanes. But right now we think not.

MR. NICKELSBURG: And one of the advantages that California has is that, excepting the Bay Area and the port area and Alamitos Bay in Southern California, most Californians live sufficiently above the ocean.

MS. WALLACE: Yes.

MR. NICKELSBURG: And the Bay Area is addressing it with levees, but also with restoring wetlands and the other things that bring back the natural barriers. So those are kind of all positive, but it seems that wildfires are our most serious climate risk at this point in time.

MS. WALLACE: They are.

MS. LI: Yes. Thank you for sharing your insights.

So yeah, my next question is, so we have talked about these potential impact of policies and the wildfire impact. So given all these factors, what do you expect California's population growth to be in the future? For example, over the next five or 10 or 20 years?

MR. SCHWARM: I mean, slow. I mean, that's the key thing, right? I mean, to a certain extent, this isn't just, oh, the affordability issue is causing slower growth. This is related to everything.

And by slow, I mean, okay, maybe two-tenths of a percent per year for the next five to 10 years, slowing down after that. And most importantly, these are, of course, based on the latest projections.

To get to the very first question or the latest thing that Jerry pointed out, this does require a modicum of immigration, particularly through, say, post-1938 to -- sorry, 2038 to maintain growth. That's the period, you know, 2038, 2039 is approximately when natural decrease starts, at least the current levels of fertility. And I don't, you know, I don't see them changing. In other words, I don't think they're going to go much lower than they are right now, so 400,000, 375,000 births a year. So there's positive pressure there. It nets out to about 100,000 new Californians every year due to natural increase up until about 2040, in which case the death of the older

cohort starts weighing down more heavily.

So at that particular point in time, we continue to grow, at least under the current projection, all the way into the 2060s. But that's based on immigration and immigration levels that are approximately the levels that we had prior to, you know, or maybe through the first two years of the Trump, last Trump administration. If we get more restrictive immigration and we get to the levels that occurred in 2019, then growth will slow even further and potentially even sort of stagnate in the 2040s already. It'll bounce.

And, you know -- and this is California-wide. This doesn't mean that the Bay Area and Southern California and et cetera won't still be growing, because once again, this goes to the places, these are nice places. They've done their work, assuming we can fix the fire issue, but they've done their work to keep themselves relatively nice. California is still going to be a place where people will want to move to.

It may mean that there are other parts of the state that really start to see slower growth when it comes down to that. Mechanization in the Central Valley may mean that we don't need as many -- or mechanization slash AI in the Central Valley, may mean we may not need that many people there to pick vegetables and to tend to trees and do

all those other things, and that may see a slowdown then if we don't have other push. I mean, who knows what happens there? So slower, right? I mean, slower than last decade, to a certain extent, slower than the decade before, but that's consistent with the national projection as well, which is also for slower growth. Same reasons: fertility slowdowns and sort of immigration issues to a certain extent.

MS. LI: Thank you.

So how will wildfires impact the demographics of the regions you talked about?

MR. SCHWARM: With pure demographics, actually it's sort of the same thing that we see over the affordability issue, right? We have fewer younger individuals living in California because they can't afford it. We get an older population and we get a richer population. Wildfires, once again, we talk about, you know, Pacific Palisades. Yeah, all of those homes are going to be rebuilt. Well, you know, probably. It's a really desirable place to live. Individuals who live there or because it's desirable, there'll be people with money, they'll buy them.

On the other hand, you know, if we go across to the other side of Los Angeles, yes, those will also be rebuilt, but will the same people be living in them? And

that's a really good question. Probably not, because they had the advantage of either a generational home or something that was built 50 years ago. And now under new cost pressures, under new various other things, you're going to end up with homes that cost more and you're only going to end up with a population there that's going to be different. It's going to be wealthier, probably older, because those are the individuals at least that can afford to buy real estate in California.

So that -- I mean, there you go, right? I mean, we end up -- it's one of the things that drives the sort of some of the coastal areas to having an older population than they did previously. It's not just because of fertility, it's because the migrants coming to those areas are older. Even the ones coming for jobs are older.

MS. LI: Thank you. Yeah, that's very helpful.

And with that, we conclude our discussion about California's economic and demographic outlook today. Thank you all for your insightful contribution and active participation, and there will be a 15-minute discussion between you and the commissioners. And after that, there will be a five-minute Q&A section.

Thank you so much for your taking the time to join us, and I look forward to further conversations on this topic in the future.

MS. MITRA: Thank you.

MR. NICKELSBURG: Thank you.

MR. SCHWARM: Thank you.

MS. WALLACE: Thank you.

MR. JACKSON: Thank you.

COMMISSIONER MCALLISTER: Really appreciate all of you. Is Vice Chair Gunda on? Maybe I'll just kick it off. I don't see him appearing on his camera. I know he had to be in and out a little bit.

But I really appreciate the discussion and the questioning. That was great. I mean, clearly a lot, much, much more we could talk about.

I had a few questions I've just kind of noting down along the way here. I put one of them in the chat, I think, just to the panelists. And you started to answer this a bit, but I definitely appreciated the point on the H-1B visas and kind of that being an interesting kind of component of the economic drivers, particularly in the Bay Area and other kind of tech regions of the state.

I was wondering about the sort of down towards the lower end of the labor market, wondering how immigration policy -- how you think immigration policy and the potential mass deportations, it's just hard to handicap how much that will actually happen, but certainly the rhetoric is such that we can expect something to happen.

So I'm wondering how you think that will impact the economy? I mean, the point on automation displacing some of that need for that labor, notwithstanding kind of how, what are your reads on how that might play out?

MR. NICKELSBURG: Well, so to, for seasonal workers, which would be agricultural workers, there is a guest worker visa program on the books that can be used and has been used for tourist destinations, for example, in the past. So it's an active program. And, you know, possibly we get something like that to mitigate the impact on our agricultural industry.

But, you know, most of the places that -- most of the sectors that are going to be affected are populated by permanent workers. So you think of construction of leisure and hospitality of health care in a very big way in health care, and we have no provisions and I have heard no discussion out of Washington about bringing back those who have been detained and deported on a permanent basis. In fact, just the opposite has been said. So that means that we're going to have a shortage of workers there. It means that the costs are going to go up. And as others have said, and I think Tom really emphasized this, that there will now be a higher labor cost relative to capital costs, and that creates an inducement to automate and an inducement to innovate, to just use a smaller amount of

labor. But that takes time.

And, you know, if we get a setback in Medicaid, which looks like the only way that Congress is going to meet the budget guidance that they just passed, that just further exacerbates, for example, the health care sector.

COMMISSIONER MCALLISTER: Anyone want to comment on that? I just want to comment on that, on the labor piece. I want to ask about health care.

MS. MITRA: I wanted to touch a little bit. I think both Nancy and Tom and all of you kind of mentioned, you know, we have the immigration issue, and in terms of how it's going to affect international students, how it's going to just affect -- you know, even if you could immigrate and you had nowhere, you know, despite all these restrictions, you were somehow still going to be able to -- like, some of the considerations are, would you want to come to a country -- I mean, California is more welcoming, but to a country that's kind of, you know, kind of wanting to shut the doors on immigration. Or maybe you want to consider moving to another country that might be more welcoming, you know, the European Union for scientific and medical research, or, you know, some other parts of the world.

So you might decide, I'm not even going to -- you know, because today they're going after farmworkers, maybe

tomorrow they're going to go after me. So do I even bother? So that's something to think about.

About, you know, AI has been one kind of the bright spots in our tech sector that's kind of been stagnating for the last couple of years. Two thirds of AI companies, their founders or co-founders are immigrants. And so if there's some long-term changes in that, like do they up and leave and go again, European Union, Canada are maybe more welcoming. So that's something to think about.

And some of the impacts if immigration, you know, declines or people who -- you know, leisure and hospitality, tourism is such a big component of our economy, especially in California. You know, if people are -- you know, if policies are kind of less welcoming to immigrants, do you -- you know, why should I spend my dollars on visiting a country that doesn't seem to want people like me? I'm going to go somewhere else.

So I think these are all kind of things that may have an impact, and not just on the direct immigration, but some of those ancillary impacts that I think are going to have, and we will see how that plays out in the next few years. So that's something to think about.

COMMISSIONER MCALLISTER: Thanks.

MR. SCHWARM: I think I would point out that, you know, even though the H-1B program is technically a

temporary program, the vast majority of H-1B recipients go through the three years and another three years and become green card holders. So it is one of the primary ways that we build an immigrant -- you know, a well-educated immigrant labor force in California as well, right? You get 58 percent of all immigrants having a bachelor's degree or higher in California. The H-1B visa pipeline is part of the reason for that. So it's not like they just go back to wherever they came from. Many of them stay here and are actually, you know, fully sort of resident individuals.

COMMISSIONER MCALLISTER: Okay, let's -- I wanted to really have two other things I want to talk about, a little bit about housing and a little bit of health care. Maybe I'll just build on the health care for now.

I guess, you know, okay, demography being destiny, not sure we all believe that, but the Boomers were brought up. And I guess I'm wondering sort of in terms of the health care industry and that driving a sector of economy and what the timing for that looks like. Do you kind of have a sense for -- you know, especially like if that waiting pool gets squeezed, that's going to do in-home care, that's going to take care of all those aging Boomers, like how do these varying streams that we've been talking about potentially play out in the health care economy itself?

MR. SCHWARM: Well, I'll give the demography and then I'll let --

COMMISSIONER MCALLISTER: Okay.

MR. SCHWARM: I mean, the last of the Boomers turned 65 in 2029. So that is it now. That is it now doesn't fall off a rock and right after that, you know, we, but the large pool is pretty much done by 2030, 2031. So that's -- they've got a whole bunch of people over 65.

That's less of an issue. The biggest issue is when people start turning 75 or 80, because that's when they start needing health care at increased levels. And certainly when you get into the eighties, that's where the mortality schedule really starts to hold, starts to bite. And you're starting to be -- you know, you do need healthcare about that. And so the earliest Baby Boomers are going to be turning 85 in basically 2035, and it's accelerating from there. So that's about when you start.

So, you know, once again, right, we've had Baby Boomers turning 65 plus now for the last, you know, sort of 15 years or so. It's when the earliest Baby Boomers and the individuals past that point start, you know, turning 80 that we should see a greater demand for healthcare. So it's about 2035, 2036, 2037, somewhere.

COMMISSIONER MCALLISTER: Okay. Interesting. So --

MR. SCHWARM: It's a little bit of time.

COMMISSIONER MCALLISTER: Yeah. In terms of the forecasting period that we're talking about, like, you know, we'd like to look out as far as we can, but the forecast itself, you know, is a 15-year horizon, really. So we're sort of talking about the last five years on the horizon that things might really start to shake.

MR. SCHWARM: Correct. The only other thing I point to that is, you know, we knew already and we've seen it already with the, you know, sort of the vanguard of the Boomers. There's no way to have the Boomers have the same type of retirement or the same type of -- you know, in terms of nursing homes, in terms of skilled care places, we just -- we don't have enough and we will not be able to build enough to put everybody at the same rate that we did with the previous generation into these places.

So it's -- you know, the conclusion was we should do this with home health. We should do this with aging in-place. Those jobs are among the low wage jobs, or at least traditionally among the low wage jobs, lower wage jobs that immigrants have been drawn to -- you know, drawn to. And so immigration policy does figure a little bit into whether we can even do that.

COMMISSIONER MCALLISTER: Great. That helps a lot.

But my last question, I wanted to talk a little bit about or ask Nancy really, you brought up the malls and these seven projects that are happening to kind of reshape land use in a way that promotes kind of all of our state's goals and mitigate some of these problems we're talking about. And that's really -- that's great to hear. I think it'd be great to know a little bit more about that, but I wonder if there are other examples of kind of innovations, you know, examples of success that are helping mitigate or sort of successfully getting new housing built.

And I guess a corollary to that is a question about, you know, there've been several bills passed over the last few years, Senator Scott Weiner and others that really have focused on housing and trying to kind of break down some of the barriers at the local level that have impeded infill and other housing development projects. I'm wondering if you have a take on sort of how that's working and maybe what else could be done.

MS. WALLACE: Yeah, well, to your first question, I think the other area where there is some optimism is just innovation and how we build housing, especially wood housing. There are a number of, you know, smaller unit housing that actually are quite amazing, and there are some dedicated initiatives up here that I'm well aware of that are part of the small redevelopment issue of building very

quickly multi-story wood construction CLT properties. Now they can go 14 stories and these properties can be built within a year. So, I mean, to see an apartment building like grow over several weeks is pretty remarkable.

What the building -- the bigger problem is getting through all the permitting issues and the CEQA issues. Just speaking for the University of California, Berkeley, we were sued under CEQA and it turned out that under CEQA there was a decision that university students were pollution because they caused noise. And we finally -- that was overturned by the California Supreme Court in June and we're going to build a thousand units.

So it is also regulation. And I think that Somjita has discussed this. It's being able to go through the permitting process in real time and then forecast what the cost will be when you're really ready to build. So I think the combination of thinking of mixed use transit oriented larger -- working closely with cities, because they're concerned about their economic base, and keeping younger people here, especially out of this manufacturing function of university students and the intellectual property that they can infuse into the economy. If they have nowhere to go, they're going to go elsewhere.

And that's part of the goal of these redevelopments at these malls. It's very focused on a

younger population looking at manufactured housing or people coming out of the university system, having housing and then places where their new companies can actually function.

And I think that's creativity, and we need to be more in that vein. And obviously Scott Weiner is working hard on the regulatory side. I credit that. CEQA is a very big thorn still, but we even -- the university survived that and we are going to start building. I mean, the permits are being issued right now.

COMMISSIONER MCALLISTER: Amazing. Great. So feel free to comment on any of that stuff as we go forward before we wrap up, but I want to give Vice Chair Gunda a good opportunity to ask his questions.

VICE CHAIR GUNDA: Thank you. Thank you, Commissioner. Sorry, I had to step out just for a second when I lost the cue position. Thank you.

It's always great to kind of hear your questions.

I want to begin by just saying thank you to this panel. Really, really helpful and a knowledgeable kind of conversation on how to think about this.

So I want to pivot a little bit to more the implications and the push and pull on the economics a little bit. So I think maybe a couple of questions and then, you know, whoever wants to kind of answer this. I

think the two kind of threads of questions are, as we think about energy -- you know, for the case of forecasting, obviously the inputs from all this dialogue will become a part of the forecasting, but it's an iterative and interlinked, right? Between, you know, what the forecast says implicates the energy system, which also implicates the economic growth.

So I think the first question is kind of just thinking about how do you see the uncertainties around energy infrastructure impacting and having kind of a feedback loop and how are you kind of looking at that, both from the electrification goals, but the broader energy transition away from hydrocarbons and such.

Second, I think given the importance of the -- you know, I think Nancy, the last point you were making about the importance of kind of some of the cities looking at their finances and such, you know, we've had some really big initiatives from the governor on like the governor's Jobs First Initiative, for example, the 13 regions of focus. Could you kind of say how the energy system need to think about as we think about economic growth at that regional level? Right? So it's both of them are like around that feedback loop and how do we kind of support each other best to transition, but also have that economic development, which, you know, which will then go into our

forecast again.

So I just want to plug that and see if any of you have some answers or comments.

MS. WALLACE: So I have a small observation. So I sit on the -- we have a serious energy problem on our campus. We need a lot of electricity, like a lot. Major universities, we're like a medium sized city with much higher demand. And even before this decision about the indirects and putting caps on it for all kinds of grants, NSF grants, Department of Energy grants, all kinds of engineering, science, computer science are huge users of power.

We have been very stressed by resilience. I mean, the fact that our power structure is not resilient. And a lot of our planning has been focused on how do we guarantee just like Google or any of the other tech firms, that we have power every second of every day, because of all the experiments that are going on, all the lab sciences that, I mean -- even those of us, we've talked about AI a lot, when the computers are unplugged, and this has become a big problem when we have power shutdowns, everything stops, and you lose a huge amount, even if you spend endless hours doing backup, because it all has to be brought down, it's not there.

And so this has become a major, major risk. And

even before these Trump cuts happened, one of the biggest issues was we couldn't write grants that enabled us to reinforce or to support our power availability. It wasn't something anyone was interested in funding. And that's pretty scary for the major universities, and it's very scary for the tech world.

And most of them have alternatives, you know. They have access to Bonneville, they have wind farms in Kansas, they have whatever. And the universities are thinking about, you know, large solar installation in Kings County or somewhere else, but our options are much more limited than tech firms. But even they are -- resilience is everything. And taking that away is quite scary for people that are not used to having absolute certainty that there would be power every day, every second of the day.

VICE CHAIR GUNDA: But Nancy, sorry, I'm sure others want to comment, but just to follow up quickly: from the modeling, from the experience that you look at this, is there a real value add from economic growth by kind of both creating resiliency, but clearly communicating resiliency?

MS. WALLACE: I think the answer to both of those questions is definitely yes. For us, it's absolutely existential now. Power is everything, and thinking of how to make it resilient is super important for us.

MR. NICKELSBURG: So we don't have any modeling

at this point of the inducement that energy infrastructure provides to economic growth. But we do know it's critical. And, you know, broadening what Nancy was saying to the state, the power grid in California has to be rebuilt. Long lines need to be underground because we have so much wilderness, and that's expensive.

We need redundancy. The more we go to renewables that are dependent on both time of day and seasons, we're going to need storage facilities.

And so it seems to me that if you're looking out 15 years or further, that California is going to have to invest heavily in new infrastructure and energy, and absent that, that would put California at a competitive disadvantage to places that are doing that. I don't know that anyone is really doing it. You know, Texas has certainly isolated themselves from the national grid.

MS. WALLACE: Their grid is broken just to begin with.

MR. NICKELSBURG: Yes. Yeah. So -- but, you know, having said that, you know, you do have fairly reliable hydroelectric power in the Tennessee Valley Authority and in the Columbia Gorge area and so on.

So as a competitive disadvantage, you know, letting the current system kind of limp along is going to be problematic for economic growth and prosperity in the

future.

VICE CHAIR GUNDA: You know, I can have a long dinner with all of you to just keep talking about it. I just want to ask one maybe, you know, kind of question I can ask is like as forecasting and all this is like really going into planning, planning towards an objective.

So if the objective were to sustain and ensure economic prosperity in California in a meeting, you know, that prosperity, health, happiness, well-being, what are some of the key elements from your modeling you think we should focus on to ensure that that kind of continues? Right? I mean, what are the things we need to solve?

And, you know, one is forecasting, one is like then feedback, like what do you solve for? How do you create the conditions?

MR. NICKELSBURG: That's a hard question.

MS. WALLACE: Very hard question.

I mean, we've been in some ways thinking about this because we've been working on wildfire.

And back to Jerry's point about the grid, we now have put all the grid into our models. It's a huge component of what we think about in terms of the spread of this risk, and what's really at risk. And getting back to power, the lines and the high-tension wires and having hoods over them or some kind of protection, again, has

become a big part of our climate modeling to understand why certain areas of the state are so vulnerable right now. And I do think, getting back to Jerry's point, that the grid is what from our vantage point, a major, major source of concern.

MR. NICKELSBURG: You know, I think also the amount of uncertainty that we have today -- and it's liable not to go away, at least in the near term as you're doing your planning -- argues for not just having one forecast, but, you know, but looking at -- or having one forecast, which is most likely, but then having the planning put together in such a way that if you're, you know, if the actual economy ends up being out towards one of the tails, you know what you're going to do in that case. I think that's more important today than it has been in the past.

MR. SCHWARM: Yeah, I'll second that because, like I said, I mean, California's continued growth really is reliant on having solid immigration. And this is not just in the next five years, but, you know, even within the planning window that you have to deal with.

And, I mean, sure, fine, Trump can do things, he can break a few things, et cetera. If he's somehow elect, you know, we elect somebody new in 2028. But remember, it took two or three years again before the immigration system was sort of healthy. I mean, that is not even the right

word. It was broken and it didn't get better, but it got to sort of a normal level. I'm talking about a legal immigration system. And we see that it would probably take that again.

So you're already talking about almost eight years or nine years into the thing where immigration levels would be lower. Logically, therefore, growth levels would be lower, and that's barring any of the other economic changes or any of the other, you know, sort of -- this is just from the physical immigration side. You've got to think about the draw as well, which is the economy -- if the economy tanks it, if various other things go on, and if there's no desire to move here, then once again, you've got a different picture versus maybe that's what finally gets everybody together to fix the immigration system, which has largely been broken for the last 15, 20 years or whatever.

And we do get actually the levels that we will need in the future to maintain a labor force and, you know, and actually continue having economic success without resorting to 100 percent automation, which would be a huge energy draw.

VICE CHAIR GUNDA: Thank you so much. I don't know, Somjita or Tom, if you had anything to add there.

But, you know, I really think this panel has been amazing. Just kind of like hearing like, you know, from

our perspective, I think the energy industry economic is all kind of connected, and it's a feedback loop on how to plan in a way that we support the economic growth and kind of really understand the realities of the transition, the energy. So I think, you know, love your perspectives.

And I'll give the last word to Tom or Somjita, if you have anything to add other than that, I'll pass it back to Sandra.

MS. MITRA: I think, you know, Nancy, Jerry and Walter kind of said what I would also have said in terms of looking at, you know, what the needs would be.

You know, university energy use, and immigration, looking at the industries that were likely going to require AI use or other uses, and how we're going to transition that and then kind of thinking, you know, like the best -- best-case scenario, worst-case scenario, and kind of, you know, creating a couple different routes, depending on which way a lot of it is. So much of it kind of depends on that federal policy uncertainties that we're dealing with right now, which makes your job extra difficult in the next short time period.

So kind of just trying to think through, you know, worst-case scenarios, best case, and then how we can navigate the happy medium.

VICE CHAIR GUNDA: Thank you.

MR. JACKSON: Yeah, I don't, we don't have too much to add there. Yeah, certainly just all the different policy uncertainty.

And I was thinking really, you know, at the beginning, we were talking about, you know, tariff policy, you know, it's partly, you know, what tariffs get enacted, but if there's constant uncertainty, that's a problem too, especially, you know, from a -- from a planning horizon standpoint. You know, so many of the affected industries, you know, have long capital planning horizons, and to make capital allocation decisions with, you know, with so much uncertainty -- I mean, we know that just, you know, regardless of what actually happens, you know, if there's always that uncertainty in itself, basically, imposes a tax on growth.

VICE CHAIR GUNDA: Thank you. Thank you so much.

Commissioner McAllister, I don't know if you had any further questions.

COMMISSIONER MCALLISTER: I don't. Thanks.

I've been appreciating yours. I wonder if Natalie has any questions.

MS. LEE: No, I have really ben enjoying the conversation on some of the key topics that Commissioner McAllister, you and Vice Chair Gunda have raised, and I know that you do want to save some time for participant

questions. So I'm happy to defer that time and enjoy the conversation at this point.

VICE CHAIR GUNDA: Thank you, Natalie.

Sandra, how do we move to the next session here?

So thanks again for all that.

SANDRA NAKAGAWA: Okay. Thank you, again. We're going to move on to Q&A from the Zoom. So Taylor Harms is our Residential Sector End-Use Modeler here at the CEC, and Taylor is going to moderate about five minutes of Zoom Q&A here.

Over to you, Taylor.

MR. HARMS: Okay. Thank you very much.

So far we only have one question in the chat right now.

How can California mitigate any effort from the federal government to disadvantage, i.e. targeting California in terms of tariffs, worker visas, and embargoes on taxpayer funding of programs underpinning California's economy?

MS. MITRA: Great question.

Well, to start, I think, like I said, there's a lot of uncertainties about what has been proposed, what is actually going to get enacted, and the levels of how people can anticipate. There's like, you know, program cuts that the state can step in. You know, the cuts, the Medicaid,

you know, how much the state has flexibility in the budget remains to be seen, and how much of it we can fill those gaps if there's cuts in the Department of Education. So those are just, you know, everyday support things. In terms of looking at how we can kind of help mitigate some of those impacts, there's only just so much the state can do.

We are -- I think it was said at the very beginning -- we are the fifth largest economy, so we are kind of, you know, we have a position of strength in a lot of ways to help kind of mitigate the worst of those impacts. But in terms of like tariffs, if that's going to impact imports at the largest ports that are in Southern California, you know, those are things that we kind of just have to think about what is going to be the most impactful effect, and then try to mitigate those and just try to have -- you know, focus on those the most, I think.

MR. NICKELSBURG: You know, I think in terms of targeting California, there's a real difficulty that any administration in Washington has, because, you know, a state-specific target is likely not going to be upheld by the courts. And many, if not most of the programs that Washington has affects all states, and disproportionately states that have been sort of big supporters of this administration, at least in some programs.

I think Medicaid is the one that looks the most vulnerable, and that California has been fairly aggressive about its expansion in Medicaid. But California also has limited resources, so I'm not sure there's -- I mean, this is a political decision, not an economic decision as to where you put those limited resources. But, you know, that can impinge on California.

SANDRA NAKAGAWA: Alrighty.

I'm not seeing anything else in our Q&A, so I want to thank all of the panelists and our facilitators, and thank you, Taylor, for moderating the Zoom Q&A portion as well.

We are now going to take a break for lunch.

The Zoom will remain on, but we'll be muted, and we will plan to resume at 1 p.m.

Attendees are welcome to remain on the Zoom, or you can log off and log back on using the same link.

Again, we'll be restarting at 1 p.m., and thank you again to the first panel, Stephen, dais, and all facilitators for this great robust discussion this morning.

(Off the record at 11:52 a.m.)

(On the record at 1:00 p.m.)

SANDRA NAKAGAWA: Good afternoon, everyone. We're going to get started in just a minute here. Oh, thank you for joining today's IEPR workshop. It is on

California's economic outlook.

I'm Sandra Nakagawa, Director of the IEPR at the California Energy Commission. As a reminder, this workshop is being held as part of the CEC's proceeding on the 2025 IEPR. The workshop's also being recorded, and a recording will be linked to on the CEC website shortly after the workshop.

If you'd like to follow along, the schedule and side decks have been docketed and posted on the CEC's IEPR website. We'll also have some opportunities for the audience to ask questions of presenters. After each of the panels, we've set aside a few minutes for audience questions, but please be advised that we may not have time to answer all the questions submitted.

In order to submit a question, you're going to want to use Zoom's Q&A feature. You can also take a look at the questions that have been submitted and choose to upvote a question by clicking on the thumbs up icon. Questions that receive the most upvotes are moved to the top of the queue. We'll also have a segment at the end of the day for public comment. Please note that we will not be able to respond to any of the public comments today, and public comments are limited to a maximum of three minutes per person, with one person per organization allowed to comment.

I'm going to see if Vice Chair Gunda is here to make any opening remarks from the dais to kick off the afternoon.

VICE CHAIR GUNDA: Sandra, I'm here.

No comments from me yet. Just a big thanks for the morning session. Super helpful discussion on just the economic demographic trends and looking forward to the rest of the afternoon.

So without any further delay, we should jump into the agenda.

Thank you.

SANDRA NAKAGAWA: Alrighty.

Since we don't have any other remarks from the dais, I'm going to introduce Matt Cooper, who is an Energy System Planning Coordinator with the California Energy Commission.

Matt's going to be moderating our next panel on the economic benefits of California hosting the FIFA World Cup in 2026 and the Summer Olympics in 2028.

Over to you, Matt.

MR. COOPER: Hi. Welcome, everyone. I'm Matthew Cooper, Energy System Planning Coordinator in CEC's Demand Analysis Branch. So I work on the annual forecast of electricity and gas demand.

This afternoon, we're going to discuss

California's role in hosting some major global events, particularly in the Los Angeles area.

California has a rich history of hosting some of the world's biggest sporting events. The very first Super Bowl in 1967 was held at the Los Angeles Memorial Coliseum. And since then, the state has welcomed multiple Super Bowls, most recently one at Levi's Stadium in the San Francisco Bay Area in 2016, and one at SoFi Stadium in the Los Angeles area in 2022. And those are actually also the venues for the very next two upcoming Super Bowls. Levi's Stadium will host in February 2026 and SoFi Stadium in February 2027.

Beyond American football, California has also been a key destination for global soccer events. Los Angeles made history by hosting the 1994 and 1999 FIFA World Cup finals at the Rose Bowl in Pasadena, and now the city is preparing to co-host the 2026 FIFA Men's World Cup alongside other cities in the U.S., Canada, and Mexico. Our three countries won a joint bid to co-host the tournament.

According to the current schedule, the San Francisco Bay Area will host six matches, and Los Angeles will host eight matches, including one of the quarterfinals. And those same two venues, Levi's Stadium and SoFi Stadium, will be used, although I believe without

the sponsor names, that's unallowed.

So the biggest events of all probably are the Olympics. Los Angeles is no stranger to the Olympic stage. The city successfully hosted the Summer Olympics in 1932 and 1984, both leaving a lasting legacy. We can still see the Olympic rings at the Coliseum. And so now in summer 2028, Los Angeles will once again take center stage as the host of the Olympic and Paralympic Games, which will involve a large number of venues around the area.

And as some of the panelists brought to my attention, there are even more sports tournaments coming. The NBA All-Star Game will be in Los Angeles next year, and this is all in addition to the growing number of local sports teams and other entertainment events that are regular and ongoing.

So with this impressive track record, what does the future hold for large scale events in California? A panel of experts is here to explore the opportunities, challenges, and long term impact of these gatherings for our California economy.

So panelists, I'm going to ask each of you to introduce yourself. And if you like, you may also give any brief opening thoughts or share any particular connection you have to this topic.

SANDRA NAKAGAWA: Matt, I'm going to just

interrupt you really quick.

Kelly is having some difficulties joining. So maybe we want to start with intros of the other two panelists. And we're working on trying to get Kelly online.

MR. COOPER: Great. Thanks, Sandra.

So let's see.

Mark, would you like to introduce yourself first?

MR. ESGUERRA: Yes. Thank you, Matthew. And thank you, CEC, for hosting this meeting. My name is Mark Esguerra, I'm the director of Southern California Edison's Transmission and Substation Engineering Organization. I also have been leading a lot of our planning activities in terms of getting the grid ready.[

Before I go into any other comments, I first would like to state that there is a possibility that I will be discussing topics related to open rate setting proceedings at the CPUC. I'm not aware if there's any CPUC decision makers that are in attendance today. However, if there are any CPUC decision makers here, please let me know at the conclusion of this panel so that SCE can take the appropriate steps to comply with ex parte rules governing conference presentations just like this. Thank you.

MR. COOPER: Thanks, Mark.

Stephen, you should go next.

MR. CHEUNG: Thanks, Glenn.

Good afternoon, everybody. Stephen Chung, I'm the CEO and the president of the Los Angeles County Economic Development Corporation, as well as the World Trade Center Los Angeles. We're a nonprofit organization here in Los Angeles that was created by the L.A. County Board of Supervisors 43 years ago. Our focus is on economic development and making sure that we have competitive industries for this entire region, and one of the most important industries for this entire region is the sports and entertainment sector, so very excited to be here.

Looking forward to the conversation. Thank you.

MR. COOPER: Thanks, Stephen.

Kelly, I see your video just in time here. Can you hear us?

We were just asking to introduce your name, affiliation, and just any opening remarks or anything you want to share initially.

MS. LOBIANCO: Thank you so much.

Hi, everybody. I'm sorry. I'm having a little bit of technical difficulties, but I'm Kelly LoBianco, director of the L.A. County Department of Economic Opportunity. We are the county's economic development agency. So we oversee the county's public workforce

system, our Office of Small Business, and hundreds of programs and services and community partnerships and capital development projects.

We are very much right now in the seat of fire response and recovery, and also looking forward to major events of our future. So I'm excited for this very dynamic conversation and how we look towards the Olympics, look towards infrastructure investments, and also make sure we're securing our current communities in that.

So thank you.

MR. COOPER: Great. Thanks to all three of you.

So we're just going to go through a few questions. Kind of the four major areas are general economic and labor impacts, infrastructure impacts, grid impacts, and then wildfire impacts.

So to start, just generally, what are the impacts of major sporting events on Los Angeles or California's economy? And you can answer that qualitatively or quantitatively.

And the follow-up question I'll just include right now is how much of those impacts will persist after the events have concluded?

Anyone would like to jump in first?

MR. CHEUNG: If you don't mind, I can start that conversation.

The LADC actually conducted a report with the Los Angeles Sports Council. In fact, this is our third year doing such a report to start tracking the trend. This is really looking at the sports and entertainment sector and in terms of the economic impact and the jobs impact for this entire region. I do want to note that this is giving you the context, because we actually haven't looked at specifically for each one of those events what that can look like. Hopefully, that will be coming soon.

But just in comparison so that you have a bit of a scope is that last year, the sports sector here in Los Angeles generated over $11.7 billion in economic impact based on the sports teams that are located here. These are the professional sports teams.

We have a couple here in Los Angeles: the Sparks, the Lakers, the Clippers, the Rams, the Dodgers, the Kings, you name it, right? We have 11 professional sports teams. Combined together, the economic impact is about $11.7 billion. When it comes to jobs that are supported by this industry, whether it's direct and indirect and induced jobs, it's now accounting to about 83,000 – sorry, 83,880 total jobs. And this sector supports about $8.9 billion in wages for our local economy, and it also generates about $704.8 million in state and local taxes. So, this is a major sector for us.

And the reason why I gave you that caveat early on is because this is just looking at the professional sports teams and their spending and their events, but not the major events like the Olympic Games, FIFA World Cup, or when they're not playing, Taylor Swift coming to town and having the Eras Tour.

So, these are all the potential impact that we can have on this entire region. But that $11.7 billion, hopefully, will give you at least an understanding in terms of the scope and the size of what we're talking about.

MR. COOPER: Thanks.

MS. LOBIANCO: I'll jump in there, too. Thank you for that, Stephen.

Yeah, some of the -- we've been looking at available data on Games past and present. And a recent study by Beacon Economics did share that the Games could have an $11 to $14.2 billion economic impact, essentially due to the multiplier effect that every dollar spent circulates throughout the economy, driving other economic activity. And then you also hear sort of, Matthew, to what you alluded to, is that are these short-term gains -- how do these gains compare to the economic activity that's already happening in a vibrant ecosystem like L.A. County, regardless of an event like that, and do we really have the kind of community benefit that we seek?

And so, I think part of that is in our commitment. So, the County of Los Angeles, we're currently in the process of doing an economic impact analysis -- so, what is the potential that could come from the L.A. 28 Games, the Olympics and the Paralympics? And what are the commitments that we want to set, and what are the KPIs that we want to set and ensure that we maximize community benefit?

So, when -- we're the Department of Economic Opportunity. We want to use this as an opportunity to do everything that we've always wanted to do with a timeline of three and a half short years to get it done. We want to make sure that the Games here in L.A. are the biggest and most progressive Games out there. We are a competitive bunch here in L.A., and we want to make that true. We want to make sure that with those, you know, potential $11 to $14 billion in economic impact that Beacon projected, that we optimize community benefit from those dollars so that our local small businesses, our nonprofits, our local workers, all are able to reap the benefits of the activity that starts right now for the Games.

You know, whether it's connection to volunteership, to temporary work at the venues and around the mobility hubs and the fun zones, to making sure that we have a pipeline of talent into what sort of Stephen

described with all of those teams that are here and all of the major events that are coming. We really are a sports entertainment capital.

And so how do we leverage this moment to build up the kind of diverse supply supplier ecosystem, the local hire opportunities for the workforce that we need to not just activate the biggest and most progressive Games, but the sports entertainment capital of the world, FIFA, Super Bowl Games and beyond?

MR. ESGUERRA: And Matt, I'll jump in just from an energy infrastructure perspective on the impact there. Definitely when we take a step back, we're looking at really interesting, exciting time with the growth of technology. I think the next panel gets into data centers and the growth of AI, but just electrification and a lot of the clean energy climate goals are moving forward.

And here at Edison, we're seeing a tremendous growth, not only in L.A. County, but even outside L.A. County. And what we see in those situations, it serves as a great opportunity on how we can rebuild in these areas and strengthen to add the additional capacity that's needed.

And in a lot of ways, the work that we've identified to support a lot of these Games, not only for FIFA and for L.A. 28, a lot of it's already in our plans,

but it's now being accelerated to align. So when you think about the long lasting impact, some of the things that we're looking at for L.A. 28 will have a lasting impact in terms of providing that additional grid enhancement to service those electrification needs that our communities are really transitioning towards. So we see great opportunity there.

From our side, when we look out to 2045, we're seeing a tremendous grid build out along the way. And so that acceleration, what we're doing in the Games just really moves along in that path, and there's some adjustments. For example, when you look at our transmission grid, our large backbone grid, we're expecting -- we're projecting it to grow about four times the capacity that's been needed compared to previous years. And in our distribution side, it's almost like a 10x growth.

So tremendous amount of growth as we're building out to meet the electrification needs, we're accelerating some of those needs and adjusting them to help align with the needs of these major sporting events that we believe will have a long-lasting impact.

MR. CHEUNG: Matt, if I can add one thing to what Mark is saying about the legacy and the next step, right? As you're talking about the grid infrastructure, it also

capacitates us to start thinking about new technologies and new companies that will be building out of creating solutions for the Games, whether it's about sustainability, whether it's about renewable energy solutions. So one of the things that we really wanted to look at is what happened over in Paris, what happened over in London when they hosted the Olympic Games.

And what we saw is some of those companies from their local region that can deliver that kind of solution for them, whether it's environmental sustainability, whether it's other services, you can now export that product and that service to the next game. And it's not just the Olympic Games, it's also FIFA World Cup, there are other international Games. So combined together in terms of economic impact, this is going to be a huge game-changer for California.

MR. COOPER: Thanks, guys. Yeah.

Thanks for all those insights. What about the impact on labor demand and employment? Do you have any numbers or anything else you could share in those areas specifically?

MS. LOBIANCO: With what I have, some of that we're in the process of defining right now. I don't want to steal Stephen's thunder, but I do have some LAEDC numbers to share. Should I go ahead and throw them out

there?

See, we work in partnership all the time, even now.

So major sporting events impact on labor demand and employment in the region. What we have, thanks to an LAEDC report, is about 10 billion of total economic output, which is 71,000 jobs from professional sports events in the region in 2023, and then there's also 1.8 billion in economic output from collegiate sports, almost 13,000 jobs. So there's -- right there, you're looking at over 80,000 jobs from, you know, from just sort of like day to day being the sports entertainment capital of the world, as I mean. And we are anticipating 15,000 athletes coming in for the Games and hundreds of thousands of visitors.

We've got events happening at, you know, dozens of venues throughout the county. We've got mobility hubs activated. And like I said, these sort of fan zones throughout the county to ensure that there's full civic participation.

We know that our hospitality and our industry is going to be fully activated. We know that our retail industry, there's opportunities in construction leading up to the Games. I know we're sort of a no-build Games in some ways, and we're taking existing venues, but we are sort of making sure they're ready for the Games in 2028.

And there's a huge number of transportation investments as we try to reduce cars at the Games overall and make sure that this is as sustainable of a Games as possible. And so we are anticipating, you know, short-term construction surges and short-term hospitality surges for the Games. And we're going to need to be prepared for that and make sure our local workforce can tap in. Certainly, there's opportunities to activate young adults, our schools, and the broader civic participation and volunteership.

But we want to make sure that as we're thinking about the surge of workforce, like I said before, that we are working with our public workforce system. Like I said, we oversee our America's Job Centers of California, our community colleges, our labor partners in building out apprenticeships so that, you know, if we're supporting, you know, a surge in hospitality, whether it's at the hotels or the venues, that we're making sure that we're building the skills and connection to longer-term career pathways that support all of the other events in the region that will persist long beyond the Games.

And so, you know, I just think it's a paradigm shift from making sure that we have the labor force to deliver a great event and thinking about how do we have the labor force to be a region that has a sports entertainment competitive edge. And together, then we are starting to

think about more permanent infrastructure to do skill-building and attraction for our labor force.

MR. CHEUNG: And as Kelly' mentioned, those really significant numbers already. Other things to consider is that, for example, you're going to need security to be across the venues, but at the same time, you're going to have a lot of these activation events, these community events. And so, you're going to have watch parties. You're going to basically have international partners flying in for an entire week or two weeks hosting the Paris and the France delegation, right?

So all these different things will actually be tapping into our regional workforce. So, whether you are an event producer that needs to basically do catering services and then basically lanyards and different things that need to be done. Performing artists, mural artists, they're all going to be hired as well. So, this is going to tap into our whole ecosystem.

But I love what Kelly was saying. It's about looking at the future, making sure that this is not just basically building up for one event. Because if we're successful, which we will be, we've seen what happened with the previous Olympic Games. There will be other events that will be coming, and we've already mentioned some of them. FIFA World Cup will look small in comparison to the

Olympic and Paralympic Games. But we will also get the U.S. Open Championship for golf, the Women's U.S. Open Championship for golf, the World Rugby Championship for men and women, more candidates sitting in 2031 and 2033.

So these are all additional events that will be coming here, and that's going to tap into that workforce, that skilled workforce that Kelly is talking about. And if we're able to have that infrastructure in place, we can actually turn this into a sustainable industry that will really drive our economy in a completely different way that we haven't seen before.

MR. COOPER: Thanks. Yeah, that is encouraging and exciting. Just in general, are there other ways we can leverage the Olympics to sort of boost Los Angeles' global reputation for other things like business and innovation?

It's a general question, but any thoughts?

MS. LOBIANCO: For sure. I mean, I think there's an opportunity here.

Well, one thing -- I'll take a step back. You know, the Games are a couple week period of time, but the activation for the Games is happening now, right? You've got countries looking in because they're going to need to find space, train their athletes, build a presence as we attract the world to L.A. County in 2028.

And we have folks coming in for the other variety

of events that Stephen mentioned. And so I think one thing -- and then we have 88 cities in L.A. County, right? And all of the venues are not just in L.A. City who has the Games agreement, but they are all across L.A. County.

And so there's coordination at the county and municipal level that needs to happen right now. And there's coordination at the county, city and country global level that needs to happen right now. In addition to that, there are businesses and investors looking to come in now to build presence in the region in advance of these major investments, too. And so I say that because I know we're talking 2028 and we're thinking about the future. But really, like, the time is now around local coordination and global business attraction and, you know, support for folks who want to benefit and enjoy the Games down the line.

Some of the things that we've been thinking about, I mean, first and foremost, like I said, we're talking about our commitments. We want to make sure as L.A. County that we set high local and targeted worker hire goals. We want to make sure that folks are who are working at the venues and all of these other, you know, Games-inspired events, you know, that those dollars get reinvested back in the wages of our local community. We want to set high utilization goals for small and diverse businesses so that, you know, the billions of dollars of

contracting opportunity go to amazing small and medium sized and diverse businesses right here in our backyard.

So some of that is the capacity building, the training and the connection to like work now, so folks are well poised for the work in the future or connection to like contracts now. So they're well poised in the future.

There's also opportunities to do place-based community development, thinking about our commercial corridors around the mobility hubs around the venues. How are we making those spaces at their best and highest use and activating them when people are going to descend upon them?

And I think there's also an opportunity for us to think about how to activate spaces in the county that are going to have traffic from the Games, whether it's the airports or hotel hubs and places where people will be. How do you support, you know, community and business and worker activation in those areas?

And then from a civic engagement and legacy perspective, how do we make sure everyone is part of the Games around L.A. County? So making sure there's connection points to the Games.

And also making sure that when people are coming into L.A. County for the first time or for the millionth time, that they don't just hit the venues and go away, you

know, airport to venue. But they also see the amazing diversity and cultural vibrancy of our entire county. So how do we get folks to different spaces of the county to enjoy all we have to offer from food and culture and, you know, like, you know, commercial activation so that -- so that people really leave? You know, I'm happy that we had, like, the experience of the Games and hopefully some good economic activity because of that, but also leave knowing a lot more about the 4,000 square miles of L.A. County.

And so I think there really is a diverse number of strategies to ensure that we can do that, and that everyone can benefit from a civic and economic perspective.

MR. COOPER: Yeah. Thanks.

Mark or Stephen, do you have anything you want to add to that?

MR. CHEUNG: Yes. This is an amazing advertising opportunity for California and for L.A. The world is going to be watching the viewership is going to be amazing. You've all seen before the game. They're going to interview Simone Biles and it's going to focus on, you know, the activities are happening in the local region. Right?

So we're going to have the national media and international media in our background for a full month -- two months with Olympic Games and then a break in two

months -- sorry, two weeks for the Paralympic Games. And before that, all these folks will be setting up their operations as well to tell the story of L.A.

So this becomes this opportunity for us to exactly what Kelly was saying. How do you sell the story of the 88 cities and the hundred plus unincorporated regions of Los Angeles? How do we let them know that we have 140 nationalities that are represented right here speaking 224 languages as the largest diasporas of most of these great places? Like, for example, where's the largest Korean city outside of Korea, where's the largest Filipino population, where's the largest Armenian population.

So these will -- these discussion points will help us generate tourism and investments in the future.

MR. COOPER: Thanks.

And Mark?

MR. ESGUERRA: Yeah. And tying it on the energy side, just the opportunity here, I can echo what Stephen mentioned, but from the energy side, I'll add the sustainability aspect of it. Right? It's definitely a shared priority for all of us.

Definitely also aligning with the vision that LA28 has to make these Games really the most sustainable in history until the next the next city tries to outdo it. Right? But it's also that vision also aligns with

California's climate commitment, as well as Edison International's long-term kind of viewpoint to enable this net zero economy.

So some things that we're focused on here in the Games is -- I think you heard Kelly touch on it, but like we are working with L.A. Metro and other organizations, particularly around their transportation needs, around how do we enable clean transportation, particularly electrification of transportation with those opportunities, as well as electrification buildings and being able to serve that load with clean power and trying to ensure that those benefits can extend to all communities, particularly those that are most vulnerable. So there's work that's been happening with the transportation sector there.

We're looking at also how does the impact that we have improve the reliability and resilience if we're going to be doing work on these circuits? How do we improve the performance of those circuits that have a lasting impact for those communities that are there?

And just right now, like, we're really trying to tighten up and firm up our supply. We're aiming to try to be by the 2028 games at least 65 percent carbon free. So we're on our path to that now. We're working on that to get our path up to 100 percent by 2045. But we'll be about 65 percent on our projection by there.

And for this summer, one things that we're proud of, we signed a 15 year agreement with Fervo. They're a geothermal energy producer, which is which can power about 350,000 homes. We believe that projects like this is going to help us really demonstrate our leadership in the state on sustainability. So this is going to be -- the first phase is expected to come online by 2026 and should be complete by 2028. And not only is it clean, but it's one of those clean, firm resources that we're bringing onto the grid to help them be ready by the time the Games come into play.

As well as we also have a subsidiary of Edison International Trio. We're working with some of the Olympic partners on some of their clean energy initiatives to be ready for the Games as well, such as advising them on, you know, some of our solar power purchase agreements, modifications to their energy system as well. So a lot of work is underway that we believe will have the demonstration that we want to show on sustainability and have a lasting impact for our communities for years to come.

MS. LOBIANCO: Thank you, Mark.

One thing I wanted to piggyback on what you're saying is, you know, I appreciate you lifting that, you know, not only like the greenest and the -- sorry, the

biggest and the most progressive, but also one of the greenest and most sustainable Games, you know. That's important. I know Paris set that bar themselves, and there was a lot that we've been learning from them, like their city officials came and shared with LA County right after, right after the Games to download with us on what went well and what we can get prepared for as our countdown clock started.

As we're thinking about transportation improvements, clean tech, clean energy improvements in advance of the Games, we also need to build up our workforce around that as well. And so the county, we're part of a green jobs regional partnership led by the Los Angeles Clean Tech Incubator, following up on a report that they put out in 2021 to set a goal for 600,000 green jobs level from a current 338,000 green jobs level by the Games. There's a lot of different ways you can slice and dice the definition of green job, but essentially we're trying to green all jobs. And so that means making sure that we have the workforce necessary for the transportation improvements that are undergoing in the region, thanks to a lot of investments at the state and federal level over the past years, and also making sure all of our current jobs are greened and sustainable as well.

And so, you know, we're going to be investing in,

you know, clean infrastructure building, clean tech, zero emission vehicles, a workforce that supports those endeavors too. And so you're going to see more and more coming out of the county, whether it's job training programs, pre-apprenticeship and apprenticeship programs with labor partners and with many of our infrastructure partners in the region to ensure that we not only are building the level of workforce, but the green workforce that we need for the Games and hitting those goals. So we can truly say we're a green Olympics.

MR. COOPER: That's great. Thank you. That's really exciting stuff.

So talking more about infrastructure, I think, Kelly, you mentioned these are no build Games. I think I'm correct in fully understanding that means there's no major infrastructure projects and no new stadiums or anything like that. I wondered if anyone could talk a little more specifically about infrastructure upgrades or projects that are being planned or that might be needed for this.

MR. ESGUERRA: I can jump in on that one there, Matthew.

So something that we've done here, we started our planning about two years ago. So really, we want to understand what the impact of having the higher demands on our grid would have. And really what we were focusing on

was really trying to identify what the long lead time materials were going to look like, because at that time, we were getting strong signals from the market that we were seeing a surge in just infrastructure development, not only within the US, but even outside the US.

And so we took a look at this. We had reached out and collaborated with LA28 as well as starting to do some work with the venues that are going to be participating and the International Olympic Committee to understand what the projected demands are going to look like. And so we were able to model those and simulate those and really assess what the impacts were, and so it's true that it's really not really a major build. We're not really -- there's not really going to be new venues. It's really more of an expansion.

Some of those venues may have additional services, service feeds that didn't exist before. And we're working with those venues there. But we've identified a fair amount of work.

And the majority of it are things that upgrades that we identified that were on our path towards the long term. And really, they were being accelerated a few years to be in time for the Games. And so a fair amount of our investments are around in that space, really just advancing some of the work.

And then there are some modifications that we were looking at to be able to further improve reliability in some of the venues. And some of the requirements that our International Olympic Committee had is in terms of, like, redundancy, reliability, because obviously the last thing utilities want to be is in the news during the Olympics. We actually don't want to be in the news. Right? And that means that we carried through the job well. So really identifying what those opportunities are.

We've stood up teams to do what we call risk assessments, really, enhanced risk assessments, to look at what are the potential failure modes on our grid and really identified where are where are those upgrades in our normal investment plan. And we found a lot of them were in our plan just moved out a few years and really the opportunities to accelerate them earlier in the timeline. And with that, you end up experiencing benefits much earlier with a longer, longer lasting impact from what we were projecting down the road.

MS. LOBIANCO: Yeah, to build them for you --

MR. COOPER: Go ahead.

MS. LOBIANCO: Thanks, Matthew.

Yeah, to build on what Mark was saying, I agree that there's the goal is to leverage the venues that we have because we have some amazing venues that are already

legacies from, you know, Games past. But certainly revitalizing them where needed for the needs of the 2028 Games. And, you know, I think we've already talked about the infrastructure necessary around airport and Metro lines to achieve the car-less Games as well, and make sure that we have the bus routes and access points for folks.

One of the things that we're also thinking about is how to -- you know, I mentioned briefly revitalizing our commercial corridors, too. So what kind of work can we do to support facade improvement or purchasing vacant property or underutilized property and supporting its activation for community use as well?

And so, like I said at the beginning, I think the Games are an opportunity for us to accelerate the work that we already want to do to support our communities and their vibrancy, and so I think that there's opportunities for us to look at corridors and to look at hubs and see how we can support legacy businesses and workforce and communities and bring in the kinds of services and upgrades that they've long wanted and needed and that can support those broader, you know, tourism and attraction goals that Stephen had mentioned.

MR. CHEUNG: Just two more quick points about maybe it's a software infrastructure, technology infrastructure, and what it's based on. So as we're moving

forward, we saw from the 2012.

MR. COOPER: I think you froze, Stephen.

I don't know if you can hear us?

MR. CHEUNG: I'll come back later.

MR. COOPER: I was excited to hear the two points.

Well, feel free to jump in again if you want to share those.

MS. LOBIANCO: I have something that maybe adds on it. I won't take the digital infrastructure thunder. I'll let Stephen take that when he comes back on.

But I think it leads to a good point around, you know, we're talking a lot about what it means to run the Games, run a successful event, and house and accommodate folks who are here to participate as athletes or participants or visitors or attendees.

But, you know, this is also the L.A. County on the world stage, right? And so making sure in a county -- and we're facing this in such a severe way right now because of the fires and windstorms, but making sure we have we're looking at our broader social infrastructure. What does our housing look like? And, you know, supporting what we have been addressing for a long time, our state of homeless emergency, and making sure we're keeping folks housed and getting them into housing, and thinking about

our broader social infrastructure to keep families healthy and safe, whether it's child care.

And I'll pass back over to Stephen to talk about digital infrastructure, too.

But I do think that sort of broader community planning when all eyes are on L.A. County is an important one, too. We want to make sure that our own communities and our visitors, you know, feel safe and see that we have a thriving county here in L.A.

MR. CHEUNG: Am I back? Can you hear me?

MR. COOPER: Yes.

MR. CHEUNG: Thank you.

So I was talking about the state of digital infrastructure. I'll skip the source and will just go straight to the point, which is when you saw what happened in Paris, people were streaming their ads, right? You're going to have tens of thousands of people that will be needing Wi-Fi connection. And so --

MR. COOPER: I think you froze again, Stephen. The irony of digital infrastructure. You might try turning off your video. Perhaps that could help.

COMMISSIONER MCALLISTER: I was hearing him --

Yeah, this is Commissioner McAllister. I was hearing him. I could make out what he said.

MR. COOPER: Okay.

Oh, really? Oh, I'm sorry. Is it just me then?

MS. LOBIANCO: I'm having some difficulties, too.

MR. ESGUERRA: Maybe while Stephen's getting on the line, maybe one thing that I will add again on the infrastructure side, like, we talked about some of the advanced planning work we're doing. But really, there's it's not without some challenges. Right? So some of the challenges that we're trying to navigate around, but definitely are looking to pull more entities to help us with it.

Some of them that really come into play is the supply chain challenges, really, like how we are able to, you know, work with our suppliers, find additional supply to be able to bring some of that long lead time material. So it's something that we're seeing a lot of U.S. utilities, not only U.S., but even internationally, we're competing for the same critical equipment. The lead times that we've been seeing is using -- some of our transformers used to take 18 to 24 months. Now it can take we're getting quotes, but a decade in some cases, not to exaggerate, with the actual construction time only really taking a year and a half to two years. And so that's one, that we're looking to try to find opportunities to navigate that and looking for help.

And the other is on the permitting and licensing

side. We're going to have a lot of work that's got to be done in a very short amount of time, although we're not building new venues. But a lot of the infrastructure is needed may trigger some of that activities and really want to make sure we have good coordination amongst all the different groups that are responsible for doing the licensing permitting.

Like one example would be like our Riverside transmission reliability project. That was identified in 2006. We're expected to begin construction later on this year, so it's almost 20 years later. And so really we want to make sure we're trying to figure out how we can streamline that process, not only from a permitting and licensing -- are there opportunities to address if there's reviews that appear duplicative, and really making sure we get a good timeline to get decisions? So -- and I know that our agency resources and budgets probably need some help as well to be able to get those activities done.

So thank you.

MR. COOPER: Yeah. A lot of work.

Stephen, third time's the charm, I guess.

MR. CHEUNG: Right. Let's hope so.

Can you hear me?

MR. COOPER: Yes.

MR. CHEUNG: Perfect. Okay, great.

So just basically folks will need the Wi-Fi connections 5G, maybe 6G connection in the future so that they can stream.

The second thing is we don't know what type of technology will be developed in the next three years. We saw in 2008 or 2012, people don't know what Twitter or Instagram was before. So who's to say what kind of technology is going to move forward? So that kind of infrastructure is going to be necessary for us to invest in now.

But the hope, and going back to Kelly's point, is how do we make sure that we're investing these type of maybe is fiber technology and connection to our most invested communities so that that can be leveraged later on to build new industries so that we can actually now attract new types of companies from digital media entertainment to South L.A. to maybe bioscience industry over to Lancaster. Right? So these are all the different things that we can do if we leverage this opportunity properly.

MR. COOPER: Thanks. Thanks. That is a really interesting point.

I was curious, we mentioned traffic a little bit and the goal of a no-car Games, sort of a mitigation plan. I'm just thinking, you know, Los Angeles is sort of famous for congestion.

Any plans or strategies to manage that?

MS. LOBIANCO: Yeah, I think that there's going to be a lot of -- I think there's going to be plans on plans to manage that.

I will just say this isn't this isn't sort of fall within my scope of work directly, but, you know, the goal is, as, as, as we've stated for, like, many years now to make sure that this is an opportunity for us to invest in our public infrastructure, whether it's our rail system and our electric buses and make sure that people are coming in on public transport to the Games and that we're reducing congestion and parking around the venues. And hopefully activating vendors and local communities and businesses and creating spaces for all that.

But there's definitely going to be. We're definitely going to have to think through the impacts on that, because business is business as usual, like, during the Games, people are still going to work. People are still moving through our huge county. And so it will be a challenge. And I think it will be one of the largest ones.

MR. CHEUNG: We've hearing that they're going to be a lot of coordination, right? For example, they're already talking about supply chain -- moving goods from the Port of LA, Port of Long Beach to the rest of the Los Angeles region, maybe in different hours to basically

facilitate movement of traffic.

I know that there are a lot of planning partners that are looking very closely at what happened in Paris, expedited lanes and different things and echoing what Kelly is saying. How do we encourage more public transportation folks going to these events using public transportation?

And then this goes back to what we were saying before. It's a sustainable future behavior that we want to change as well. How do we now encourage Angelenos after the Olympic Games to adopt public transportation as a permanent solution? For example, we saw that during the Eras Tour when Taylor Swift was here going to SoFi Stadium, there was an increase in ridership, especially from female attendees who felt safe.

And so once you have that kind of transformation, how do you sustain it so in the future you have additional ridership? Those are the things that we need to basically put in place so that it's not just a one-off.

MR. COOPER: Yeah. That's great. Thank you.

You already talked about grid impacts a little bit, but I wondered if Mark or anyone else wanted to share a little bit more about the impact on actual electricity demand during these events?

MR. ESGUERRA: Yeah. So for the electricity demand, we've been working with the different venues to

really get a read in on what their projected demands are.

We've also been working with the International Olympic Committee to look at the demand at previous Olympics. You know, what happened in Paris? What happened in the other Olympics for similar events? And they were getting projected estimates and forecasts there.

So we see that when you think of the Olympics there, you know, there's a lot of older venues that are going to be put into play, and they're going to have some additional upgrades that will go in there. But we are expecting a higher demand increase from there.

I think we're expecting roughly -- I think our estimates are around 15 percent to 17 percent of an increase in demand across the venues that are fed from Edison's service area. Obviously, the Olympics are going to happen in other parts besides the Edison service area, but that's kind of our initial estimate that we're seeing there.

So we do see it as an opportunity to demonstrate how do we improve the reliability or strengthen the reliability in those areas serving those venues, and that's something, again, we're working closely with the venue operators on what their plans are, and then what we need to do to improve our ability to make it a reliable, resilient event.

MR. COOPER: Yeah. Thanks.

That was my next question, actually, about grid reliability, and whether there was any specific consideration about load flexibility or anything like that you can share.

MR. ESGUERRA: Well, let me touch on the reliability. So there's a number of things that we've done. One, we actually -- you've heard about a lot of the Paris officials coming out here. We actually also sent two different Edison teams to Paris, one during the Games to understand how they manage their operation in terms of managing the grid. So we had some teams focused on that.

And then we also sent another team after the Games as basically -- as some of the -- they had a chance to debrief and understand lessons learned, to learn more about what are some of the lessons learned they had from preparing their grid, operating their grid, to redesigning. If they were to change anything, what would it look like? And also to get any kind of insights and advice as we start to prepare for our Games.

Surprisingly, it was a lot of great input that they shared, but there was a lot of alignment that we saw along the way. Notably, what we saw was really there was a lot of focus on the security aspect of it. So there was infrastructure security, really developing the strong

defense in-depth of adding additional security mitigations and also factoring in the work that was required to gain access and clearance to be able to do work. So really identifying, pre-identifying critical locations where you would serve as a staging ground, where there are critical substations and switching centers that you should be prepared for. But also how you can start that initial discussion to be ready for the Games where you're partnering with the federal, state, and local agencies, as well as the U.S. intelligence community to really prepare how you would operate and how you would handle certain situations there for the Games.

Some things that we've taken away, and we're taking that into our playbooks that we're building out right now, some other things that we're doing on the grid is we're -- under our current practices, we do inspections as part of a regular process. There's a cadence in inspections. But for these Games, and with coming in -- you have the FIFA coming in 2026, you have another Super Bowl 2027, and then the Olympics in 2028, we have looked at our inspection cadence, and we're doing off-cycle inspections really to be able to inspect the key facilities in advance prior to those Games to be able to identify, are there any potential risks that we need to address? And then from that, be able to also improve our asset records

and information.

So not only are we doing the infrastructure investments, we're spending time doing the maintenance and operations in anticipation of these Games coming pretty soon.

MR. COOPER: Thanks for sharing those details.

For our last topic, I want to make sure we had time to discuss the wildfire impacts. This was touched on in the morning panel, but I just want to talk a little bit about whether there is any potential competition for resources between sort of rebuilding from these awful wildfires and these major events coming up.

MR. ESGUERRA: So I can take that on there.

So it's unfortunately what happened with the wildfires. From an LA28 or a venue perspective, thankfully those wildfires didn't impact any of the venues that are in SCE's service area. So there's a silver lining there.

However there can always be the potential for some sort of resource competition, so what we're looking at is to continue to leverage all the reasonable avenues that we have to be able to secure the resources that are needed to get the work done. Really being strong and clear on our prioritization on how we get that work. We believe that there will be enough resources to be able to do all this work, the necessary upgrades, as well as we're moving

forward with activities on the wildfire rebuild.

So while we do view this as a potential -- it could turn into a competition of resources, but we also see this as an opportunity to build a stronger workforce and to really develop more high quality employment opportunities within California in this space. So the skill sets that are needed to support the wildfire rebuilding are going to be roughly the same set of skill sets that the Games are going to be looking for, at least in terms from the utility infrastructure that we're developing here, so we believe that it will be something that will be a skill set that will continue to be needed well into the future.

So continuing to invest in growing these opportunities, build the skills that will be essential in achieving these objectives.

MS. LOBIANCO: Yeah. Thank you, Mark. I appreciate that optimistic look as well. I agree that the last six weeks have been -- even a little bit more at this point -- devastating for the L.A. County community, particularly those in the fire zones who were in the brunt of the impacts. We have tens of thousands of folks still displaced from their homes, you know. We know that this is going to be one of the costliest wildfires in the state's history, if not beyond, and that while we're very much focused on cleanup -- you know, I just heard phase one

cleanups are coming to a close today and moving into phase two. That's all very promising and has moved at an inspiring clip. But the relief is underway and the recovery is going to be long if we're going to make sure that we're building a, you know, more fire resistant and economically resilient communities and allowing folks, whether it's residents or small businesses or workers, to be able to come back into those regions and, you know, see a culture and community that feels like the ones that were lost.

But to Mark's point -- and there are going to be just huge numbers of resources that are needed at the local, state and federal level for that. There just really are, and so I don't want to diminish that at all. And I don't want to diminish that that's the focus of the region right now, as it should be.

I think the point that I want to make with Mark's is that it is true that we already were starting to bolster our planning around small business development, around workforce development, to accommodate what we knew were going to be major investments in the region. So we had the bipartisan infrastructure law and the Inflation Reduction Act, like huge investments that are already secured in the region to do capital build out, to do broadband, you know, clean tech and other investments. We knew the Games are

coming, and we wanted to make sure that we could draw down on that opportunity for the community.

And so whether it's ensuring that we have a construction workforce for the transportation and venue projects, you know, we're going to need that same construction workforce in our -- to rebuild the housing and commercial spaces that were lost in the Eaton and Palisades fires. And, you know, one of the things I was just reflecting on over the last few days is we were looking at dislocated workers, you know, who were hit hardest. And hundreds of thousands of workers have been impacted by the fires because, you know, people come from across the county and work in government buildings and commercial spaces and residence.

The largest numbers were in the hospitality sector, right? And so, you know, making sure that we're supporting those -- their hospitality, professional services, transportation and warehousing, arts and entertainment, those are all key sectors that we need to make sure are thriving to be able to deliver on the Games. And so a lot of the dislocated worker efforts of our public workforce system will be targeting those areas, and making sure that we get those folks back on their feet, and that's going to be happening hopefully at a more expeditious rate than it might have been before.

The other thing I just wanted to think about with the rebuild is this isn't like any crisis is an opportunity to cut through the red tape and see how we do things faster. You are seeing executive order after executive order that are trying to do that for the rebuild.

You know, we were talking a little bit about our permitting one-stops and how, whether it's regional planning or public works or fire, trying to expedite permits for folks for the rebuild. You know, hopefully that we can, you know, take some of the momentum from these streamlining efforts for all of the projects that we have going on in the region. You know, I think, you know, never let a crisis go to waste.

And so, you know, I think we're going to be thinking about how to maintain some of the efficiencies and the goodwill and the energy to get our workforce and our communities back on their feet, and apply that to the Games and make sure that we're ready. Because it's a big deal for us and we want to make sure that folks know LA County is open for business, and is now and will be then.

MR. CHEUNG: I don't have much to add here. I think the only thing I would say is -- echoing both Mark and Kelly's points -- is how you leverage this opportunity to make sure that we have the ability to rebuild the future of our economy. Specifically, as we're looking at some of

the other fires that we've seen around the states and in Lahaina as well, we've learned that the recovery effort is going to be many, many years. Five, if we're optimistic, maybe even close to 10 years.

So getting ready for the Olympic Games actually can help us kind of create this entire workforce system, leveraging all the things that we've talked about before, to make sure that we have a resilient region beyond Palisades and Altadena, and how do we make sure that we're able to take advantage of the situation to make sure that all our communities across LA County and hopefully throughout California are able to use what we've learned to build in that resiliency, that infrastructure.

MR. COOPER: Thanks.

A follow-up on that. Apart from procuring resources and labor, do you see this rebuilding as sort of impacting the economics of the Games or these other events and vice versa? Does it sort of change the equation a little bit economically?

MR. CHEUNG: I think it's too early to tell. When there are limited resources, of course, that can basically increase competition and might drive up prices. But the staging of the recovery might actually mitigate that. I think there are other considerations that we have to look at. For example, if there are trade tariffs with

other countries, that actually might increase the pricing. If you're talking about lumber and steel costs for reconstruction, when do we basically bring that back here so that we can start getting it ready? That might have an impact.

So it's other factors that will basically interact with this recovery effort that might interplay with each other. But at this point, I think it's too early for us to really understand what that process is going to look like. So at this point, it might be more speculative as we're kind of looking at it.

Our hope is that there are a lot of resources out there. And within the last six, seven weeks already, we've seen that the LA region has been able to collect over $650 million in donations to help us with the recovery efforts. So that's great news. There's a lot of resources out there dedicated for recovery. So how do we make sure that we're not wasting this opportunity?

MR. COOPER: My last question was a bit more optimistic. I think you guys already touched on it.

It was just thinking about the unfortunate economic impacts of these fires. Do you see any potential for these events to mitigate that or help stimulate a return to growth?

No worries if that's --

MS. LOBIANCO: No, I think that that's how we have to position ourselves. I think to the earlier points, resources are always scarce, and we know right now where the resources are being directed, and I think there's more uncertainty now than there has been in other times about resources at all levels.

But like I said, I think we are -- the kinds of tools in our toolbox to activate our labor force, to activate our small businesses, to ensure that we are supporting our most disinvested communities that are going to have the hardest time bouncing back from the fires, to making sure that we are building in a more sustainable way for our future -- like, a lot of the things that we want to do to make the Games great, we want to do to make LA County great. And so I think we're still laser-focused on that.

And, you know, Stephen and I have talked a lot about this. You know, like, if you looked at other places that have had disasters, you know, there's like displacement and then there's like rebuilding. So there's a lot of there's a public information component to this too, like making sure folks feel like they can rebuild and recover in the communities that were lost. It's like a return home almost to your own communities in our huge county, but also signaling to the world that we're still here and open for business.

And so if this inspires us to, you know, capitalize on the pride that I think many of us feel, you know, as we've come together in the last six weeks, you know, keep that going because we want to sort of cultivate that same pride in LA for the Games. So, you know, one is sort of an opportunity and one is a tragedy, but I think all of it together, you know, we know what we need to do to make sure that we come back from it and that we have the most benefit possible from, you know, the eyes on LA being on the world stage in a few short years.

MR. CHEUNG: I think it's a huge opportunity to tell our story like I was mentioning before, right? It's an advertising campaign so that people don't forget in terms of the recovery effort. This is a perfect time for us to start setting the stage. These are the investment opportunities for you to help us recover. We've been talking about you want to support us. This is how you can do so.

Just because we might be out of the immediate danger aspect, the recovery effort is going to be the next few years. So I want you to commit now and we're going to come back to you to make sure that you're able to deliver on it. So if you want to support Altadena, you want to support Palisades, do so. But we will be counting on you to do so, and this is how you can do it.

And if we align those efforts, this is a huge opportunity for us to continue to be on the world stage and actually support, again, echoing what Kelly was saying, our most disinvested community sometimes that don't get the attention that they need.

MR. COOPER: Thanks. Yeah. That's a great perspective. I think that's it for the questions.

We have just a few more minutes if any or each of you would like to share any final closing thoughts before we go to questions, I'll give you the opportunity now.

If not, that was a great finish.

MS. LOBIANCO: The only thing I will share is that we -- stay in touch with, I would say, with all of us. I mean, this is going to be a sprint over the next three and a half years when it comes to the Games. We look forward to putting out our report in the next month or two around what we think the potential of the Games could be, and certainly what the county hopes to set as goals and commitments.

And from the Department of Economic Opportunity, we look forward to putting out what we feel is our -- sort of like our economic empowerment plan to reach those commitments and goals. So how do we build the capacity of our workforce, our small business community, our nonprofits, to be able to take full advantage of those

commitments to local hire and small business diversity in vending and procurement and making sure that we can realize those together.

And so I think there'll be a lot of ways for folks to weigh in with your vision on what those commitments and goals are, and also the strategies to realize them. And it's going to take all of us together to resource it and make it happen.

MR. CHEUNG: I'll just share that with Kelly then. We're supportive of Kelly. Whatever Kelly said, we're going to completely be in unison.

But that's exactly the point as well. There are going to be a lot of different folks trying to start different efforts. We need to start unifying it so that it becomes one single channel. Otherwise, you're going to have competing channels. So looking forward to working very closely with Kelly and VEO on making sure that we execute these plans.

MR. ESGUERRA: And Matt, my kind of closing comments would be SCE is committed to rebuilding better, doing better in supporting California's clean climate goals, getting the grid ready for this big jump in demand that we're going to see due to electrification.

We want to lead the charge and work with others to help us address the supply chain and permitting

challenges while ensuring that we have good reliability for not only our customers, but to be able to support these major events like LA 28, FIFA World Cup, Sewer Bowl, Taylor Swift concerts -- I think that's what Stephen had mentioned -- and that we're going to need collaboration along the way with advanced technology, proactive planning.

Those are all going to be essential for us to meet our goals by 2045.

MR. COOPER: Thanks. We need a whole other panel to talk about Taylor Swift, I think.

Thank you so much to each of you, and I'll just turn it back to the dais for questions they might have.

VICE CHAIR GUNDA: Matt, thank you.

Commissioner McAllister's here and I know he'll have a lot of questions too. But I just -- I just wanted to say that that was a really good panel to kind of hear the perspective from a local region.

And I just wanted to extend to Kelly, Mark, and Stephen, you know, just our support as you get through these, you know, last few weeks. I know it's been really hard on a number of public servants here, and as well as everybody who's working to help, you know, bring some solace to what happened there and then try to kind of do that, so just thank you for your incredible hearts and hard work in getting everything done there.

And in terms of, you know, just, there's a lot of thematical questions, but I just wanted to maybe narrow in on thinking through just the grid kind of readiness and infrastructure readiness as we go into this, and then the long-term impacts, right? I think you all kind of said this in many different ways and trying to connect the dots here.

So I think one piece, maybe, you know, you could start with Mark -- a little bit would be reflected, Kelly, by you, maybe a little bit -- but as you think about upcoming, what I would expect large load events, right, like extremely large load events, potentially -- and again, I hear that there is a plan to hopefully use that to, you know, have that growth continue, right?

But in the interim, how are you thinking about the planning side of it? Are you planning this locally for the reliability, resiliency? Is this something that has to be reflected well in the IEPR? I just want to understand, like, you know, how this event feeds into the near-term, but also long-term planning. And how should we work together on that, given that the IEPR forecast is a long view while we take some of these loads in.

And connecting to that, I think the high premium you might place on resiliency and to the extent on reliability and resiliency planning and other

infrastructure planning, how are you planning on the financial side of it, right? You know, obviously we can't put all of that on rate payers. We probably want to think through.

So any kind of thoughts and general comments would be helpful.

And I'll pass to Mark.

MR. ESGUERRA: Thank you, Vice Chair Gunda. Thank you for the question.

Maybe just a little background about how we're handling this at Edison. So some things that we've learned is that really centralizing our planning group. Edison's a large company. We've got different groups, different departments, and really centralizing. We've created what we call an advanced planning group that's really central across the enterprise, that's focused specifically on these major sporting events. That's one area, because as you mentioned, we had the laundry list of different events are occurring.

So we've got good visibility across different parts of our enterprise. And, you know, we have cross-functional teams like myself. My normal responsibility is focusing on engineering and design for transmission and substations. But I'm also the lead cross-functionally across all the entire enterprise in terms of planning

activities. So that was key. Centralize our planning activities with the understanding of what the reliability requirements the -- that are needed. And for the case of the Olympics, really looking back at the host agreement that the International Olympic Committee set forward to really spell out what are the reliability requirements we're looking for the host utility in these venues.

And so really, we took a look at that, worked with the venue operators on what their loads were, and got some demands. Understanding that using the Olympics is one thing. The Olympics is roughly -- when you add the Olympics and the Paralympics, it's roughly a four-week time frame, so it's not a permanent load shift.

But one thing that we've done, and this aligns with the work we were doing with our system planning, is looking at what the impacts of growth would be out to 2045, having a longer-range view and looking at different scenarios.

And what we found there was, particularly with the Olympics and the other venues, is that, you know, when we're looking at demand -- but I'm specifically looking at it from an infrastructure perspective -- a lot of the infrastructure that is needed to support the Games is things that are already in our roadmap. In a lot of cases, and it's not the case for every single one of them, but

generally the theme is that, hey, a lot of this stuff is needed, like we need to upgrade this station, this bank for transportation electrification. And we're seeing it probably show up in 2029 or 2030, hey, but you know what, if we get it in earlier, it could be ready for the Games. And it serves a dual purpose, and so we're trying to take advantage of those opportunities when we can.

And in some cases, there are some places where we didn't see it, like, oh, it's a little different, but maybe the growth didn't pop up in this one area. So in a lot of ways, we believe it's sort of netting out as more of accelerating activities. It's hard to make it a permanent load shift because we don't see it as a permanent load shift, but the fact that we looked longer range and looked at scenarios, that's how we're capturing it, and it's working in that favor. So that's kind of like the grid perspective and how we see it all lay out.

Now, there may be some investments that don't fall in there if there's additional reliability investment that certain venue operators are requiring, but I think when you look at the host agreement between the, you know, the International Olympic Committee and set forward with the utilities and the venues, venue operators, a lot of those responsibilities may be with the venues operators themselves to cover if it's on their side of the meter.

VICE CHAIR GUNDA: Mark, can I just ask, as you think this through, could you also just weigh in a little bit specifically on the transportation electrification part and the potential charging infrastructure and how existing PUC funding, state funding, the programs, how are you harmonizing them into this broader planning regime? It would be helpful.

MR. ESGUERRA: Yeah, so we're seeing a lot of the requests come in through applications. So some of it we've captured in our forecast that are reflected in IEPR, but again, that's a forecast. But what we're finding is that the actual -- where the rubber meets the road is when we actually get the applications and the customer moves forward, and so we're now validating like the areas, the growth areas, the high growth areas where we're seeing the growth occur with actual applications. And so then it becomes an opportunity to somehow feed that back into the IEPR to show, hey, where we're seeing the growth.

And so these areas, there's just a tremendous amount of medium to heavy duty kind of charging infrastructure. I'd say it's more in that area as opposed to light duty. So definitely seeing growth in those areas and actual applications coming in and really trying to work those into our process.

And so some cases we're able to project it out a

little earlier. Obviously our forecast, a lot of what we've seen historically is a lot of the customers or the developers, we're not really getting a five year picture because obviously they're really focused on the next six to 18 months.

And so the outlook that we're getting is more near-term, and we're really trying to get them. We've been the last few years getting the message that we need a longer-term view and sharing more information so that we can feed into the IEPR much earlier. And I think the last few years we've been trying to also work with the CEC to show, like, here's the applications we're receiving, but understand that it's coming in. They come in pretty regularly, and the picture that we saw, we're actually seeing it actually grow even much higher than what we were predicting, which we thought was big, but the applications is the truth test that's kind of validating the growth there.

Hopefully that's answering a little bit of your question.

VICE CHAIR GUNDA: Yeah. Thanks. Thanks, Mark. That definitely answers.

And I don't know, Kelly, if you or Stephen want to kind of jump in here on those elements.

MS. LOBIANCO: Thank you.

I mean, I think Mark's an expert on some of the energy elements there.

But I will sort of add a thematic plus one, which is our goal around, you know, broader economic empowerment and development for the Games is sort of that opportunism to do what we've wanted to do on an accelerated timeline and harness resources for it.

So sort of in the space of procurement, right, our county has an equity and county contracting initiative. We're trying to increase the procurement opportunities that go to local and small businesses. We know that there's going to be billions of dollars of spend by our venues by LA28 and beyond, and so we're leveraging this moment to, you know, set high goals for certifying new businesses. And we are very close to reciprocity with L.A. City and L.A. County for our small business certifications. And so -- and we're trying to lock that down within the next few months with our with our leadership at the Board and the city council and beyond.

So that's an example of where that's the kind of smoothing of bureaucratic processes and red tape that will benefit all projects going forward because it will be easier to access qualified subcontractors, et cetera.

So, you know, we're just thinking about, like, how do we how do we use the Games and meeting utilization

goals that we know we're going to set? They're going to be high to make sure that local spend happens, but leave a permanent impact on the way we do business.

MR. CHEUNG: And I would just not belabor Kelly's point. It's exactly that. But how do we also bring in the private sector and academia and philanthropy and all the other partners together to make sure that you have this infrastructure in place for the long term that we've been talking about.

VICE CHAIR GUNDA: Thank you.

I mean, I have a few other questions, but in the interest of time, I'll pass it to Commissioner McAllister and other questions maybe from the audience.

Thank you.

COMMISSIONER MCALLISTER: So that was great, really, just the discussion. I was just down -- not just, but a couple weeks ago was down in L.A. for days and looking at fire areas and talking to county and city officials and many others, FEMA and other agencies. And it was just really gratifying to see how much collaboration is already going on around the fires, and obviously the World Cup and Olympics came up, not Taylor Swift, but the big events that you're planning for.

And I just want to acknowledge the quality of the thinking in L.A. L.A., as we all know, is a global city.

It's a world class city, and it has incredible just human and other resources available to address some of these really tricky problems.

And Vice Chair Gunda's question kind of got at this, especially with respect to sort of electric infrastructure and transportation, but I guess I'm wondering, do the big events coming up, you know, including the recovery from fires and the rebuild -- you know, you brought up a lot of challenges. Do the preparations for, you know, all of this amazing amount of economic activity, do you see those accelerating any trends or like structural changes in the L.A. region's economy? It's kind of an abstract question, but you know your economic region.

And kind of trying to get a handle on -- like, this morning we talked about economics and demographics across the state, and L.A. was a central part of that discussion as well. From your kind of perspective on, you know, economic development and kind of the preparations for these big, you know, and these potentially transformational events that you've discussed, are there any sort of like -- the, you know, the ports, sort of the county with all of its infrastructure, you know, there's a big effort on, say, hydrogen, you know, those sorts of issues, those sorts of investments -- is there any sense that these big sort of organizational nodes, just these big efforts to address

these big, you know, big challenges and big events that are coming up, can accelerate or change or will change in any way the sort of structural makeup of the L.A. economy?

MS. LOBIANCO: I think so.

You know, I mean, like we've discussed, the recent fires are going to direct resources in a new way that we didn't anticipate six weeks ago. That's just the truth. And there are going to be impacts for years to come. But we know we're going to be on the world stage.

And so, you know, I'll let Stephen talk about hydrogen and ports because he's more expert on those than me, but even to the point around like our social infrastructure, like I was saying with, you know, the state of homeless emergency, like these are conversations with that timeline in mind too, right? These are urgent issues for folks every day for their health and safety and well-being.

But seeing -- knowing that we have this moment in the limelight and these challenges in our region, you know, how are we putting all energy and resources towards them so that we solve our affordability crises, that we think about accessibility and transportation in new ways, because we have a different future of work now. And like to Stephen's point around broadband and digital access, like, how are we meeting the evolving needs of a region and using this as a

bright line to run to, to make sure that we are seeing meaningful change?

I think that, you know, where it's solving a challenge or highlighting an advancement or, like I said, being opportunistic to get programs and services done that we've always wanted to do, I think you're going to see us leveraging the Games to make that happen.

MR. CHEUNG: Commissioner, I think my short answer is yes. The longer answer is -- and I apologize that my lighting, there's sounds everywhere, because Kelly and I were actually just doing a broadcast event earlier today where the governor came to the event and spoke about capital jobs first and investment in the future.

At this event, we have international representation from France, from Belgium, from Germany, from China, from a number of different international partners that are here looking for those opportunities. What they're seeing is that there's a timeline that we need to basically meet a lot of these challenges and these amazing goals of having the biggest, greenest game in the history of humankind. And so, they also want to make sure that they're utilizing this opportunity as a way for them to invest. So, foreign direct investment and these international companies are looking for partnership, like hydrogen projects. Mitsubishi for Power, for example, is

already here looking at those opportunities, right?

So, if we're able to utilize the Olympic Games and Paralympic Games as a way for them to see that there is a way for their technology and their companies to be showcased on the national platform, our international platform, they're very much willing and wanting to be a part of the solution. So, this is going to drive economic development for our region.

Going back to what you're saying about hydrogen as well: absolutely. Yes, there might be some challenges when it comes to whether we're going to get the same funding source from the federal government. But international partners are not backing away. And apologies, they're closing us down, and that's why the beeping is happening right now.

MS. LOBIANCO: I think Stephen and I are probably like 10 feet away at different parts of East LA Community College.

COMMISSIONER MCALLISTER: Funny.

In the morning, we talked about the federal posture having changed radically over the last few months. And it's roughly the same timeline as the fires, really. And I think they did a good job of talking about that sort of at the high level.

Any particular concerns in LA about changing at-

risk sort of policies? You don't want to get too far afield from energy, but, you know, a lot of money coming in for infrastructure, including for hydrogen in the region. Any -- Mark, you talked about some of the federal grants coming into those investments, I think, on both reliability and modernize.

Any concerns that we should know?

MR. ESGUERRA: So, I'd say some of the advanced technologies fell into that category that we were looking at. Obviously, the funding that we were expecting to get, those are paused. But I think there's a lot of common ground that there's a general -- it's well-understood that we need infrastructure.

So, I'd say from that perspective, in terms of building to meet growth, building to rebuild, I'd say there's no concerns there. It's really us making sure we're lined up. But some of those advanced technologies, we may have to pause on some of those until we get more feedback on the status of the funding.

COMMISSIONER MCALLISTER: Okay.

Going forward, it'd be good to keep in touch about all that. I don't know if we can help.

MR. CHEUNG: I'll just add a small element. For example, we have been looking very carefully in terms of accessing federal dollars for broadband access. And we're

going through a program called the Broadband Equity Access and Deployment Grant. So, that now is becoming a bit of a challenge based on the federal government's stance on equity. So, this will potentially have a direct impact.

Part of the economic forecast that we were talking about earlier actually identified that the state of California receives over $170 billion per year in terms of the grant funding that's coming through, so there's a question mark. We don't know what that's going to look like yet, but there are definitely concerns.

COMMISSIONER MCALLISTER: Thanks a lot. I really appreciate it. Great panel.

SANDRA NAKAGAWA: Alrighty.

If we don't have any other questions from the dais, we're going to turn it over to Taylor Harms to moderate Q&A via Zoom.

So, again, if you're in the audience and would like to submit a question for our panel, use the Q&A feature. And Taylor, over to you.

MR. HARMS: Okay. Thank you.

We only have one question so far from Claire Zimmer.

Can the CEC and other agencies and stakeholders encourage EV charging projects to install chargers for electric bicycles and e-scooters in preparation for the

events in Southern California?

MS. LOBIANCO: I'll just say I do know that there is, like, lots of mobility strategies underway to support the no-car Games, which is going to include, you know, not just the electric buses, not just the metro improvements, but also different modalities like you're describing.

And so, not to be overly confident in that, but I know that's part and parcel of some of the planning, so I appreciate that comment. Thank you.

MR. COOPER: That is not my specific area in forecasting, but I understand that that's definitely on our radar.

MR. HARMS: Mark, Stephen, do you have any comments for that?

MR. CHEUNG: No, just, I guess, to Kelly's point, we know that Metro's been working very closely. Before even the Olympic Games, we were looking at a multimodal solution as well, last mile solution. So these are all going to be on the table. The question is basically how do we build the infrastructure for a lasting impact? So this is not just for the Olympics, but for future Games.

And then when Taylor Swift and Beyonce comes back, we want to make sure that we're ready for us to all take e-bikes to go see them.

MS. LOBIANCO: And one thing I'll just add,

because I was going to say Beyonce is the next big concert that we should be thinking through, I think Eras Tour is over.

But also thinking about the activation of our current bike paths, our rivers. You know, we've been talking a lot up to our Parks Department and Regional Planning and Public Works, too, not only in thinking about our mobility hubs and our venues and commercial corridors, about how do we activate these really long pathways that help folks travel between our great cities. And so, that's also another area where we've been thinking about bikes and e-bikes and opportunities to create those sort of mini mobility hubs.

MR. ESGUERRA: Yeah, not much addition to add, but we've been working closely with Metro on the transportation needs. And so, to the extent that some of those requests come in through there, we'll cover it. As well as if there's been some individual customers that are submitting those requests, I probably haven't seen them, but that's probably with my team. And we'll make sure that those get interconnected, and that they're on time.

COMMISSIONER MCALLISTER: Thanks again, everyone, for a terrific panel. Really appreciate your dedicating the time with so much going on that we know you have, even in your immediate surroundings.

So appreciate all the dedication and look forward to collaborating.

MS. LOBIANCO: Thank you so much.

Stephen and I, we were going to be here no matter what. We were just saying we're going to make it happen. Really, really appreciate the opportunity to be here with you all today and have this conversation. And I'm really happy to be able to have such an optimistic and forward-looking conversation after what's been a really tough six weeks. So, appreciate the opportunity to do that and hope we can continue the conversation as some other plans for the future.

MR. CHEUNG: Thank you all.

VICE CHAIR GUNDA: Thank you.

SANDRA NAKAGAWA: Alrighty. We're going to go over next to Heidi Javanbakht. Heidi is our Demand Analysis Branch Manager, and she'll be leading our panel on the future of data centers.

MS. JAVANBAKHT: Hi, everyone. Good afternoon. As Sandra mentioned, I am the Manager here at the Energy Commission for our Demand Analysis Branch, which produces the Energy Demand Forecast for electricity and gas for the state.

Data centers have been a focus of ours more recently. They are an area of large load growth for the

state, and our 2024 IEPR forecast estimated about 3,500 megawatts of new data center load, peak load by 2040.

We are looking to update and refine these estimates for the 2025 IEPR forecast, so I'm really looking forward to learning from our panelists today about their perspectives on the future for data centers in the state and how they may use energy in the future, all to inform our updates for this year's forecast. So I'll ask our panelists to join and turn on their videos if they haven't yet. We'll start with some short introductions from each panelist and then move into the discussion.

And the first slide that we'll have after this one from one of our panelists is from Daniel Nelly, who is an expert strategic analyst with PG&E.

Go ahead, Daniel.

MR. NELLI: Yeah, thanks, Heidi. So like Heidi said, my name is Daniel Nelli, an Expert Strategic Analyst with PG&E. I work on the system planning team. I've been with PG&E for a few years, four years or so.

Basically, my responsibilities entail long-term demand-side load forecasting, so including things like distributed energy resources, EVs, energy efficiency, random meter storage, but also including data centers, which is obviously what we're talking about today.

So if you wouldn't mind going to the next slide,

just to share a little bit.

Awesome.

So PG&E's perspective here is over the past couple of years, we've seen a huge increase in the amount of requests we're receiving for retail transmission level, transmission voltage level service in our service area. Most of those applications we've received in the last couple years are for data centers.

And just to bring some numbers into the conversation, I included this data here. So you can see it's pretty stark. We're looking at like five and a half gigawatt hours of applications -- of requested capacity in those applications. That's capacity, not technical load impact, to be fair, and a few other caveats. This data is a little stale. It's as of early this month, but it is all active applications. And like I said, five and a half gigawatt hours.

That left table shows kind of some segmentation there, the main distinction being, like, how mature the application is, so where it falls relative to engineering studies that we perform in order to be able to solution and decide what infrastructure investments we need to make in order to bring the load on.

One other call out, you can see that it's a rather quick load ramp. So a lot of this load -- most all

this load is coming on by 2030. And so, you know, considering where we are now, looking not that far into the future, there's a lot of work that we need to do in order to move these applications along into actual projects and load. So engineering studies, like I mentioned, infrastructure upgrades as well.

And considering, you know, the associated costs with that, PG&E is really eager to collaborate and work with the data center developers and the tech companies that are building these in order to make this happen. So, you know, we want to just encourage proactive collaboration. I think working with those customers will ensure that we can bring this load on as customers want it, serving them at the lowest cost possible, which is good for everyone. And, you know, according to data centers, kind of particular reliability needs.

Yeah. We think that'd be the best for all rate payers involved.

That's really all I wanted to say, just to paint the picture and show how much interest we're getting in data centers at the moment.

MS. JAVANBAKHT: Yeah, thanks. Thanks, Daniel.

Next, we'll go to David Porter, who is the Vice President of Electrification and Sustainable Energy Strategy at the Electric Power Research Institute.

MR. PORTER: Thank you, Heidi. Appreciate the opportunity to be here with you today.

Daniel showed some interesting figures there from what they're seeing at PG&E. We're looking at this more broadly across the entire U.S., because there's significant load growth here that we've projected out by 2030 that data center growth could move to the point where data centers will consume more than 9 percent of the electricity generated across the entire U.S. That's a significant increase from where it is today, where it's about 4 percent.

So there's a lot of growth potential there, but there are a lot of challenges, too. And part of what is challenging the utilities, as well as the data centers and hyperscalers today, are exactly the key points Daniel made. It's forecasting. It's understanding what the real load impacts are from the projections that are coming from the data centers and the hyperscalers. What the timing of that is going to be is crucially important. And then another key piece of that is how fast are the data centers going to ramp up to the full capacity of each facility, because they can put the steel and the concrete in the ground, and depending on the location, much faster sometimes than utilities can provide supply to that location. The particular challenge in most places around the U.S. is in

transmission capacity.

The flower that's sitting out there somewhere, though, is that there is, based on the work that we have done as an R&D institute, there's a potential for flexibility with data centers.

I know we traditionally think about data centers as being a 24 by 7 load that has no flexibility, and in some cases for some types of data centers, that is true. But not for all. And some of the big growth is going to come in artificial intelligence-based data centers, and they inherently have the greatest potential for flexibility based on temporal, spatial opportunities, what the workload is. It's too early to know exactly how much of that we can grab, but what we did -- Heidi, if you don't mind going to the next slide.

With the opportunity that we see here and the challenges that are in front of us, we developed an initiative known as DCFlex, and some of the folks on the call today are involved as a part of this. But the key players here are all major stakeholders around data centers and data center growth and development, particularly around AI. Certainly three of the big hyperscalers are engaged, along with a couple of the major data center developers worldwide, as well as key technology providers like NVIDIA that are part of this equation. And we brought them all

together with an eye towards focusing on flexible data center designs, demonstrating the flexible capabilities in the field, creating transformational utility programs that will then be able to take advantage of the flexibility that we find with the different types of data centers, and build that into specific market structures.

And then lastly, bring some more solid capabilities to the forecasting process with some new algorithms and approaches that help cut through some of the speculation that's out there today, and then also work towards improved communications and controls protocols between utilities and the data centers so that it really does become a callable flexible load that enhances the resilience and reliability of the grid, while also improving affordability for everyone that's connected to the grid.

So I appreciate the opportunity to be here.

Heidi, I'll pass to the next person, please.

MS. JAVANBAKHT: Yeah, thanks, David.

Next, we've got Elliot James Dean, who is a data science specialist with Southern California Edison.

MR. DEAN: Hello, everyone, and thank you for having me on today, Heidi. I'm very excited to be here to talk about data centers. I know it's a very hot topic.

From my side, I'm the Data Science Specialist on

the Demand Forecasting team at Edison. So today I'm going to talk a little bit about our forecast and how SCE is building specific consideration for data center customers into our operations.

If you could please go to the next slide.

Awesome. Thank you.

Alright. So as many on this call may be aware, data center customers are not quite as widespread down south in SCE territory as they are in NorCal. However, you know, we are definitely seeing significant volume of requested capacity via both engineering studies and early stage project inquiries. So, because of this, SCE has really made a concerted effort to begin proactively planning for this influx of data center customers over the next 10 plus years, and this all starts with a forecast. So I wanted to take this time to walk through how we are forecasting data center growth in our territory, and then also provide a sense of the magnitude of what this forecast is looking like.

So our forecast methodology is primarily based on info we collect on planned and potential projects, which means it's a bottom-up forecast, much like PG&E. And just want to note that this is incremental to our baseline consumption forecast, so we do carve out data center customers specifically and forecast them independent of

commercial sector growth.

So focusing on this table on the right here, I want to start with the high-level process. So first, you know, beginning with our existing data center demand, which we've identified to be around 80 megawatts. And then, secondly, adding in the impact from planned projects and inquiries. So over the next 10 years or so, this is where we are forecasting the impact from these planned projects and inquiries to materialize, with 200 megawatts coming in the near term, so about three to four years out. These are mostly from the studies that have already gone through the engineering phase, have locations picked out of higher probability.

And then the midterm growth, you know, that is like 2029 through 2035, we've identified as about 400 megawatts. These are going to be larger customers who would like to interconnect in our service territory, but we need some time to prepare the grid, make grid upgrades to get them connected, so the timeline's a little bit further there.

And then lastly, number three here is using a growth rate to reflect long-term data center growth potential, so beyond 10 years out. This is where, you know, our current project requests run out, right? So we already, you know, have -- are assuming that we've met the

needs of the current projects that we know about, and there's likely more projects that are going to apply for a connection in our service territory, right? And so we want to reflect that impact beyond 2035. And to do this, we considered various very important kind of uncertainties that could impact what this growth rate might be in the long term.

So we've identified those as, you know, the potential for onsite generation. Are these data center customers going to be fully grid-connected, partially grid-connected with some sort of backup power that they're using some of the time, or fully, you know, off the grid? Probably not like that, but using the grid as a backup generator as opposed to their main generator source, you know, is that going to be something that materializes?

You have SoCal market conditions, high energy prices, high real estate prices, not a lot of capacity, you know, openly available, kind of, you know, the California regulatory environment as well versus some other states might be a little bit less stringent on some policies. So different things that might decrease the amount of data center growth in the long term, but of course, something that might really increase the data center load growth in the future, and that's the general advancement of AI and other technologies into the future that may bring even more

need for data centers.

So weighing all of these, we decided we did want to include a non-zero growth rate for the long term, and this is something that we encourage, you know, anyone who's looking at longer term data center forecasting to consider as well, because we do see a high likelihood that there is some sort of growth beyond the initial list of projects that we already know about today.

And this brings our cumulative impact that we're forecasting to about 1000 megawatts of data center demand in our service territory by 2045. So definitely a big increase over our existing demand, and something that we really want to make sure we're planning for.

Lastly, I would like to reiterate the point that Daniel was making earlier, and that's that we really do want to encourage collaboration with developers in terms of getting project information early, staying updated on project status. And, you know, this really allows us to take the necessary steps to put those projects into our forecast, plan for this forecast, prepare the grid, and ultimately accelerate the energization timeline of said data center projects.

Alright. Thank you.

I'll hand it back to you, Heidi.

MS. JAVANBAKHT: Thanks, Elliot.

And next we've got Helen Kou, who is the head of US Power at Bloomberg NEF.

MS. KOU: Thanks, Heidi. So thank you so much for having me here today.

So I have been with BNEF for about six years now and lead a team of analysts producing regional power market outlooks and power price forecasts. This year at BNEF, I serve as one of our global research leads for our strategic research focus area on data centers. BNEF is known for really pretty presentations, but I have no slides to share with you here today as we're still working on our upcoming data center research publication, but I am very happy to be part of this discussion.

I'll pass my time back to you for now, Heidi.

MS. JAVANBAKHT: Sounds good. Alright.

Next, we have JohnBinh Vu, who is the Vice President for transmission planning at Stack Infrastructure.

MR. VU: Good morning. John Vu, I work for Stack Infrastructure. We are a private data center developer, one of the largest in the world. We participate in all the major markets, and we're very interested here in this discussion today, right, because I think the utilities are all struggling with all the load growth. I think Dave Porter kind of mentioned it and touched on a number of

different topics in his intro here.

But we're very much interested in collaborating with the utilities to find solutions on how to enable data center growth without stunting that load growth with maybe policies that maybe swing too far to the other side to narrow the pool of speculators. And so very much interested in working on finding a solution that just works and benefits both utilities and large load users in the industry.

Thanks.

MS. JAVANBAKHT: Alright. And last but not least, we have Kushal Patel, who is a senior partner at Energy and Environmental Economics.

MR. PATEL: Great. Thanks, Heidi, and it's great to be on the panel as well. I am a senior partner here at Energy and Environmental Economics, or E3. I'm based in the Bay Area. Our headquarters are in SF, but we have offices kind of across North America.

And, of course, we've been working a lot on data centers kind of from a variety of perspectives. I think what's a little bit unique about us as a consultancy is that we work, you know, across kind of public sector clients as well as many private sector commercial clients and utilities. So, kind of seeing the intersection of large load and data centers in particular from that vantage

point. And I've been leading a lot of our data center work across the U.S., recently led a really big study in Virginia, which is the number one data center market in the world, looking at grid and customer impacts there, but also have looked at data centers and done a lot of work on that topic here in California.

So, yeah, really excited to kind of talk about it.

And, yeah, like Helen said, you know, as a consultant, I should always have slides available, but I thought, you know, it might be nice to just kind of get into it.

Looking forward to the discussion.

MS. JAVANBAKHT: Yeah. Thanks, everyone, for being here.

So I will kick us off just by touching on why California. So we may have some attendees online today who are asking, why are data centers interested in coming to California compared to other regions? We have higher electricity rates, perhaps more grid constraints that make it a bit more difficult for new energy-intensive customers like data centers. So why are tech companies interested in building new data centers in California?

And then just a couple other related questions.

What policies in California are encouraging data

center growth and which are hindering it? And then let's leave it at that for now.

And I'll pass it to whoever wants to speak first.

MR. PATEL: I'm happy to go first. It's something that we've been thinking about and talking about at E3. I think, you know, we see a lot of different data center development across the US. You know, I think the first thing to remember is that Silicon Valley has always been kind of a primary data center market for obvious reasons, given the tech companies and other, you know, kind of macroeconomic reasons -- people, businesses, et cetera in California.

I do think what's interesting is that, you know, the data center load that's here is -- and I'd love to hear JohnBinh talk about it -- it's much more serious, you know, they don't -- you know, it's not very speculative, like they're developing in the Bay Area or, you know, different parts of California because they really want to and need to, for various reasons. So, you know, as everyone knows, things are expensive in California, it's hard to do anything, you know, from the smallest ADU, you know, in your backyard to a large data center.

So I think from that perspective, that's an unknown issue. So, you know, when we've been working with data centers or other kind of folks thinking about, you

know, how real it is, like I think from our perspective, it's fairly real, especially compared to other parts of the country that, you know, there may be more speculation or more double counting, you know, just given that kind of, you know, developing effort that's necessary to reach some of the targets and goals of some of the companies.

MS. KOU: I really agree with Kushal's points there. In terms of just, like, adding on to those points. I think like actually like to level set and before like answering and adding on, like, I think like similar to the energy industry, the data center sector has a lot of specialized terminology that isn't always standardized. And I want to ensure that like, within this conversation, we have a clear starting point.

And I would like to actually define and categorize how BNEF thinks about data centers, just so that when I am talking about data centers, everyone here at least knows what I mean when I say co-location or hyperscalers.

Within BNEF data centers, we categorize them in three major sizes: retail, which is any type of data center under 500 kilowatt hours: wholesale, which is larger facilities between one megawatts and 100 megawatt hours; and then hyperscalers, which is any type of data centers between 100 megawatt hours and one gigawatt hours.

Beyond size, BNEF also categorizes data centers into just two main data center types. They are co-location data centers, which is where third party providers like Digital Realty or Equinix own and operate data centers, renting out space and power to various types of tenants. And then there are self-built data centers, which is where organizations like banks and telecoms and hyperscalers construct and run data centers for their own use.

Colloquially, when people refer to self-built data centers, they often refer to the organization's line of business. So for example when I say a cloud data center, I mean a data center facility owned by a cloud service company, of which the primary purpose of that data center is to host cloud workloads. Oftentimes, the location, utilization, flexibility of any type of data center depends significantly on a data center's size, operation type, as well as operator's line of business, whether that's telecommunications, healthcare services, financial services, or cloud services, or AI training.

That's just the landscape and how we at BNEF think about the data center landscape. It varies depending on person-to-person and consulting group and consulting group, but at least from a level setting perspective, and as I talk about data centers, that's at least how we frame things.

To answer, Heidi, your question, why California and why are we seeing data centers built in California?

Based on publicly disclosed information around data center projects, what we know is that the majority of construction and planned data center projects are located in the service territory of Silicon Valley Power Authority, where much of the current live data center fleet already exists. Of the 2.3 gigawatts of projects that we currently track -- I know my fellow panelists have a lot more visibility on the projects in their own territory -- we know approximately two gigawatts of that existing pipeline are wholesale co-location facilities, with the remainder being self-built cloud data centers by Amazon and Microsoft.

The preference of co-location data centers in California is likely due to opportunities available to capitalize on the state's vibrant tech ecosystem, as well as just the fact that there is limited space for, like, large hyperscale facilities.

MR. NELLI: I can chime in as well.

Building off Helen's point there about data center build, it somewhat depends on the type of data center. I think some of the variables we think about, like why data centers are interesting in California -- obviously, we have relatively clean electricity here, low

greenhouse gas emissions, so if you're thinking about the rest of the nation, siting in California is going to mean that you emit less emissions if you're a data center operator.

Additionally, the fiber network is very strong in and around the Bay Area specifically. That's going to offer, like, best-in-class latency, so very fast data transfer.

And then, I think this goes to Kushal's point, the tech companies are here. A lot of AI development is happening here, and so there's kind of this culture of innovation that's often collaborative. I think we've tried to help in that where we can. I think we have some specific instances of showing that we can be innovative and helping to bring this load on, and to serve the dynamic energy needs of our customers in a clean way. We just announced last fall a data center community in San Jose, so new data centers, powered with clean energy, also with like 4,000 residential units and district heating, so things like that.

Additionally, and this goes to the it's hard to get things done here point, we're trying to be innovative in terms of how we bring this load on. So we last year launched what we call a cluster study, which basically entailed studying all these applications that we have that

I showed earlier in parallel to basically improve the speed, the power that these data centers can get. And in the process, lower installation costs and expenses for everyone. And so, you know, studying these data centers together instead of individually allows us to look for efficiencies, streamline interconnection, and we've got a fair amount of load that we've brought to our application process via that cluster study and planning to continue that going forward.

I'll pause there, let others chime in?

MR. DEAN: Thanks, Daniel.

Yeah, I mean, I think, you know, we've addressed the fact that there's definitely a demand -- maybe that's not the best word, but data centers are definitely going to be built in California. They already have. They're going to continue to be built.

I think it's interesting to look at maybe the second part of the question here, looking at the policies in California that are either encouraging or discouraging data centers from building here. I think at a high level, the state understands the importance of the tech industry and it encourages safe technology development. And, you know, in terms of what that means, you know, they don't want customers paying for, like, infrastructure upgrades for these data center customers, you know, necessarily. So

there's, like, the idea of protecting customers from the extra investment that utilities are making just for these data centers.

There's also I think a general sense that we want to encourage sustainable practices. So we've seen some sort of assembly bills or state bills that deal with trying to ensure that there's low pollution and use of clean energy for these data centers.

Also encouraging overall economic development. So talking about in-state jobs, you know, making sure the money going into data centers and the AI space is staying in-state as much as possible. So all of these, there are specific bills that have addressed these different topics.

I think from the utility perspective, there's a couple policies that make it a little bit harder to meet some of these high energy demands of data centers as well.

I wanted to briefly touch on, you know, there's definitely some challenges with the T&D planning, transmission and distribution planning process. You know, on the permitting and licensing side, we heard Mark earlier talk about the need for, you know, trying to expedite this process as much as possible. We have these data center customers coming online and they want energization yesterday.

And so, you know, we want to speed that process

up as much as possible. That means speeding up permitting licensing, being very clear about how we can kind of expedite cost recovery mechanisms so we can, you know, have assurance that we can recover the cost of the upgrade, great upgrades that we're making to accommodate these data center customers.

And lastly, making sure our forecasting, you know, from the IEPR and internally is aligned as much as possible. You know, a lot of our transmission and distribution planning is predicated on the IEPR forecast. Constrained to the IEPR forecast and so making sure that we are reflecting the most up-to-date data center forecast within our territories. You know, in the IEPR forecast, you know, very important to ensure that we can plan to that level of load that we expect.

So, just a few policy pieces that I wanted to touch on.

MS. JAVANBAKHT: Thanks. Thank you all.

JohnBinh, I was wondering from the industry perspective, what policies you see in California that are encouraging or perhaps hindering data center growth?

MR. VU: Yeah, I don't have anything else to add on the encouraging side of things, but I'll kind of maybe piggyback on kind of what Elliot just touched on regarding transmission planning.

I think Dave kind of mentioned this here earlier, right? Transmission planning or transmission infrastructure is kind of the key bottleneck here. I think planning transmission development takes a long time.

Permitting? We're talking about seven, five to seven, maybe eight years for new infrastructure build outs. And a data center can be built within, you know, three to four years, right? Taking into account model lead times and kind of permitting requirements for the building itself.

And so, there's a big kind of disconnect between kind of how quickly data centers kind of want power and the ability to connect to the grid versus when utilities can actually plan for it. And so, having more visibility -- or I guess we recognize that I guess there's a lot of speculators out there in some cases. And so I think there's process improvements that can be made to help the utilities plan infrastructure sooner so that we're not having this drag between, hey, it's going to be eight years for new infrastructure build outs, and now the data center developers got to wait for, you know, another three or four years or five years to get their power from where it was before. So, I think advanced planning, long-range planning is going to be helpful here.

And improving the processes to kind of weed out

qualified developers, real developers versus the guys, you know, two guys in a truck who are trying to make a quick buck here because they've got some real estate property that's really ideal for a project, so.

MR. PORTER: Yeah, if I can touch on that as well, John Bennett, I think it's a good point about like transmission bottleneck. So, I think just for perspective, most of the large load interconnection we've had in the past has been at distribution voltage, and so this is new. I think one thing that we're trying to do is create a tariff specifically for transmission level large customers coming on, and our thinking there is that that will not only ensure fairness and transparency and make sure that everyone's getting the same deal, and that it's benefiting all customers, that cost allocation is clear and fair, but streamline approval from the CPUC.

I mean, basically, if we can avoid having to go to the CPUC every time by exception, because we're using distribution planning tariffs and adapting them -- if we have this transmission specific tariff, what we're calling Rule 30, we filed for it last fall and just asked for interim implementation this month or last month -- that we believe will speed up and bring down the cost associated with bringing these customers on the transmission voltage and interconnecting them faster.

MR. PATEL: I'll just add to that, too.

I think cost allocation is key. We're seeing a lot of this happen around the country, just to make sure that as these large loads are connecting to the grid and the infrastructure improvements they're necessitating, that the large loads are paying their fair share of the cost, and we're supportive of that. I think the industry as a whole has been very vocal about, hey, we don't want to push or increase rates for mom and pop because of new infrastructure buildouts that's happening to support large load growth. So, we're very much supportive of that.

I think we do want to make sure that we see that, hey, if we are making investments in a particular region, not just in the data center buildings themselves, but whether it's generation buildouts, renewable generation buildouts, electrical infrastructure buildouts, that we're not putting a situation where the utility has the ability to kind of take that power back and reallocate that, because if we're making large infrastructure or financial investments within a region, having that visibility that we have a pathway to power for a long period of time is an important part of our decision-making in terms of what is a -- what's a good structure for us to kind of develop and build out gigawatts of power in a particular region.

And so cost allocation is key, but I think having

access to that power that we're paying for, that the industry would pay for, without the threat of it being reallocated is also very important to us as well.

MS. JAVANBAKHT: So, we've touched on this a little bit already, but next question for you all is what trends do you see in data center growth over the next one to five years and over the next five to 10 years and even longer term? So, a lot of what's driving the current growth is AI, both model training and development of new AI tools. Are there also other drivers of data center growth, and, you know, what's your outlook for the next five to 10 years and even further out?

MR. PORTER: Maybe I'll jump in here first since I talked about some of the growth in data center energy consumption around the country and the projections we've made on that. And AI certainly is going to drive the steepness of the curve in the coming few years because that's where the fast growth is coming, because the hyperscalers and product developers want to be in the market first and have that first mover's advantage as they build out models and put them into practice.

With that said, I think it's also really important to remember that the regular business of the hyperscalers and the other types of data centers, whether they're financial, communications, cloud providers,

whatever they might be -- their businesses continue to grow something on the order of about five to seven percent a year on average, so we're going to continue to see low growth associated with data centers from both those paradigms, both the heavy growth related to AI as well as the more consistent growth for their regular products.

And I think one of the things that also gets largely left out of the conversation today when we start talking about the large demand growths is the historical gains that continue to be made in terms of efficiency of computational capabilities, and particularly in terms of individual chips. And while they do grow in terms of energy intensity for each chip, they also gain so much in their efficiency in terms of execution as the new generations come out.

That's part of the reason if you look historically at the curves for data center growth, they've been close to flat because of the efficiency gains. And if you talk to the people that are in the chip business and the people that design the data centers and operate them, particularly the hyperscalers, they do believe we'll see efficiency gains that will help flatten that out over time, and that we're not going to see this steep growth curve for demand for the long term.

MR. PATEL: I'll add on to what David just said.

I think we do a lot of load forecasting as well across the U.S. and especially with data centers.

And I think maybe the real answer is that nobody really knows what this looks like in three or five years.

Like David said, agreed, we're going to need more computing power, generally speaking, for various reasons. That underlying growth is not going away. Then the real question is the steepness of the curve. As a forecaster, any linear curve that goes out and never has any shape to it is probably not right. But that's the way everyone starts from. And I think does it kind of keep going up and even accelerates depending on the different AI use cases. Ultimately, it's around using AI more for various things across businesses, across productivity gains, you know, supporting GDP growth. So really that is how we think about it here, that it's really important to think about that uncertainty as kind of inherent, just given the wide range that we might have, kind of a hard floor, I would say.

But that ceiling could be really high, or there could be a pause and you kind of settle for a little bit before a renewed set of growth, or it could just be growth that sits on top of more growth that kind of ever-accelerates. And I think those are all reasonable and viable future scenarios to look at.

And I think what we spend a lot of time thinking about is what will support that, what are the signposts? And then from a kind of regulatory policy perspective, are you thinking about that when you're making certain policies, especially being reactive to kind of near-term issues and constraints, knowing that this is going to be kind of a long-term issue where, you know, it probably will be a step forward, a step back, maybe a bit bumpy here or there just as new information is discovered and things like that.

So I think how we think about it, I'm not sure if that's super helpful. You know, everyone knows there's a range, but I do think it's really important to think about underlying drivers, the types of data centers that are being built and made. I know when we work with utilities and regulators, I think they tend to see data centers as fairly homogenous, and we know that's not true. There are different business models, different types. So I think that's all really important, and lots of folks are getting kind of up to speed on those different segments, and all that's going to kind of depend on just getting better forecasts, but also knowing that there's always going to be uncertainty, and how do you make decisions around that uncertainty is going to be really important, so.

MS. KOU: I guess as another forecaster in the

room, I will give my best shot at our house view.

So my view is primarily federal, and at BNEF over the next one to five years, what we think is that kind of hyperscale operators will continue expanding quite quickly, matching or even surpassing co-location capacity. Meanwhile, what we think is that retail co-location data centers, they're likely going to lose market share as technology and AI companies consolidate within the AI space.

We're also seeing a move away from single building data centers towards larger campuses, as well as data center clusters, where multiple facilities operate together under one site to handle big interconnected workloads. Within a 5-to-10-year range, those campuses and clusters will become the new normal as self-built AI inference, as well as AI training and cloud services grow. And we expect these larger and more complex data center facilities to really dominate the market. This shift is driven by a growing need for more computing power, as David had mentioned before, which requires data centers to both expand in footprint size as well as energy consumption.

Long term, data centers overall are trending towards much bigger capacities and more centralized operations. And we see this in our own pipeline of projects as well. So from the end of 2024, the average

size of operational data centers across the U.S. was roughly 31 megawatts. But the pipeline of projects under construction, the average size, was 77 megawatts, and the committed projects, the average size was 120 megawatts. And the average size of projects just announced, the average size was 193 megawatts. So in general, projects are getting larger and larger.

Specifically to answer the question around the influence of AI, AI data centers can be viewed by workload type. There is inference data centers as well as training data centers.

Training data centers are the one to actually really understand. Training data centers handle the massive computing demand needs to train today's large scale models, particularly large language models, or LLMs in short. According to Epoch AI, training compute now doubles roughly five every five months. And before DeepSeek, the data set fueling these models were expanding at three times per size each year, causing power required to train top tier AI models to double annually. Only a handful of companies can train a large language model due to the hefty cost and complexity. And of the 81 major AI companies BNEF tracks, 43 are headquartered in the United States.

Although training-focused data centers are limited to just a few big players, their influence on

overall data center development is really significant in the U.S. Like David had mentioned earlier, there is a winner takes all race among tech giants, which fuels that rapid expansion of data center investment in the U.S., where most of these AI organizations are based.

However it is important to note that AI also drives non-AI data center demand by just expanding the digital capabilities of businesses' as well as individuals' increasing data usage, and this growth in turn increases cloud services and related workloads, further broadening the data center market. And at BNEF, it is that general data center market that we forecast and we think is important to track.

MR. DEAN: Yeah. If I could just add one point, maybe wrap us up. So, yeah, touching on a couple of people, a couple of things that other people said, but importantly, I think -- yeah, it's pretty hard to find these forecasts, like to find forecasts beyond a few years, you know, 2030 or so, I think like Kushal was saying, but I do -- and I appreciate Elliot, you sharing your forecast of those all -- but yeah, I do just want to commend the CEC for taking the lead on that. I think it's a difficult task. We can speak personally that a lot of those candidates forecasters and like mentioned, there's tons of reasons for uncertainty, especially in the long term with

AI.

But yeah, I think my take is that the CEC forecast ended up in a good spot and seems reasonable, and so I would just really appreciate the work that the forecasters put into that with CEC.

MS. JAVANBAKHT: Thanks, Daniel. Thanks, everyone for those insights.

DeepSeek was mentioned. And so just also wanted to touch on energy intensity and how the energy intensity at data centers may change over time as AI technology evolves.

MS. KOU: I don't mind explaining DeepSeek if that's helpful to people.

So I guess like in general, like at BNEF, like our long term data center forecast hinges on like two primary factors: the energy intensity of data usage, which largely depends on technological advancements, and second is the overall data usage and generation growth, which is influenced by macro-economic trends such as population and GDP. DeepSeek v3, which was the one that was very popularized and on the news, is widely believed to use fewer parameters per query than ChatGPT-4 in its training process. Yet it still delivered a comparable performance level to chat GPT-4. This is just widely believed.

This challenges earlier assumptions that bigger

models mean better results, and that we must, like, keep adding parameters in training, thus, like, using more energy to improve LLMs.

What DeepSeek's technical paper thus explains and also shows is that it is possible to achieve really strong performance without enormous jumps in model size as well as power use. Because of this, BNEF does not project that energy intensity of data usage will exceed or even remain at 2025 levels. We actually see energy intensity decrease in our overall forecast as model training innovations continue.

This influences our long term data center forecast quite significantly, limiting our overall data center energy demand, even as AI workloads as well as data usage continue to increase.

MR. DEAN: Thanks for providing that background on Deep Seek.

Yeah, definitely, you know, the short summary is it's a more efficient model, right? And so the question is, like, what does that mean for energy intensity and total energy output as well? Something that we were thinking about from the utility perspective, especially for our long-term growth rate, you know, looking into the future, like, how is efficiency going to affect the total energy that we need to deliver to these data centers?

I think it can be a bit of a double-edged sword. I mean, definitely, you know, see the perspective that Helen was saying where the energy intensity may actually be able to be decreased or stay similar to what the level is today. I think there's also concern that more efficiency might just mean more output for the same amount of energy, which could lead to a higher return on investment for adding additional capacity. So pretty much a higher overall energy usage within the same amount of space.

So an example of that is, like, you have a data center, and it's filled with CPUs, you know, which is a traditional central processing unit, and you upgrade that to GPUs, you know, you decide to upgrade it into a much more energy intensive processing unit. All of a sudden, the same rack that used to be maybe five kilowatts can be over 100 kilowatts, and it's the same space within the data center, but now it's using much more energy. And it's doing tasks -- it's creating much more output, you know, with that task, and maybe it's more efficient, but it's using a total net energy increase, you know, more and more total net energy.

So there, I think that there's, it's kind of a double-edged sword when you talk about efficiency, where it's like, is it going to, you know, lead to a net drop in energy, or just make it so we can produce more? The AI

models can do more for the same amount of energy, in which case, we might actually see the energy spike.

So I'd love to hear some more, you know, thoughts on this. It's definitely one of these big uncertainties that we're looking at for the long term.

MR. PATEL: Yeah, no, I agree with that, Elliot.

I think what we've seen as well, maybe for some historical context, like the original, call it data center boom period, you know, was a pretty fast ramp, actually, with the growth of cloud computing, and remote computing kind of, you know, moving away from premises to connect the cloud. You know, it kind of grew very quickly, but then also plateaued, because you saw a lot of efficiency gains that offset some of that demand growth, and had been relatively flat until, you know, kind of the advent of chat GPT, and then kind of the race for AI dominance, let's call it.

So I think, you know, again, like, that's one historical precedent that we can look at, like, there could be a big ramp, but then efficiency kind of keeps up with demand, you know. Or like Elliot saying, like, you can just have demand on top of demand that -- you know, there will be efficiency, like, there's lots of reasons for that, like economics, you know, the power constraints to get on faster -- you know, lots of motivation for folks to do

that.

But then ultimately, it comes down to kind of usage. And we're already seeing, you know, the new reasoning models, you know, take more power than just, you know, kind of the original, you know, large language model kind of queries. So they're becoming more kind of powerful, but also more energy intensive. And, you know, again, that's going to also produce incentives to be more energy efficient.

So I think it's going to be that race, right? Like, is increasing demand, you know, going to outstrip efficiency, or vice versa, or kind of stay, you know, in lockstep somewhat. Again, just putting out kind of the different scenarios and sensitivities. I don't think anybody knows exactly how that looks, but, you know, just given some of the big increases, like what I've seen and read and talked to folks in the industry, and I'd love to hear that the panelists if they disagree is that, you know -- I think one of the kind of common, you know, rules of thumb is that, you know, kind of a ChatGPT LLM search is, you know, like 10 times more than a Google search; but if you use, like, the video, you know, kind of functions, it's like 10,000 times more; your reasoning is maybe, like, a couple hundred times more.

So again, you kind of quickly scale, especially

if people are actually using it in various industries, and you can kind of see it actually increase quite rapidly.

MS. JAVANBAKHT: Would any of the other panelists like to chime in on energy intensity?

MR. NELLI: Yeah, not much that I think the Jevons Paradox point that I was bringing up is an interesting one. I think that was a quick rebuttal to the DeepSeek news. And, you know, like Kushal was just talking about, like, who knows, but ultimately, we forecast annually, we'll keep tracking this, we'll get better data as more data centers come on and this data becomes more public. And so, but yeah, we're planning to keep an eye on it and adjust accordingly.

MR. DEAN: Real quick addition, and this is just a kind of a different perspective on it. We're talking mostly about like the IT equipment, you know, the -- in terms of the efficiency of that equipment.

But, you know, there's also the cooling systems within these data centers, which is a fairly large energy suck, you know, around 30 percent. I think it's a number that they say the energy is for cooling, right? So there could be efficiency gains overall on the cooling side, or maybe technology advancements on the cooling side that allow for, you know, effective cooling for much less energy, and this could reduce total energy draw from these

data centers as well, so just another area to another level to pull on the efficiency side.

MR. PORTER: That's a great point that I think it's missed a lot of times too. There's a lot of advancements in cooling technologies, particularly immersion cooling for the chips, that are much more efficient.

The other aspect that we really haven't taken advantage of yet, except in very small cases, is recovering the heat that's generated inside the data centers and rather than just rejecting it to the atmosphere, doing something else with it, providing that for some district heating or district water heating. Certainly a lot of that depends on climatological conditions, but there's a lot of opportunities for us to do some things in heat recovery as well that would also help lower the overall energy consumption of the data centers.

MS. KOU: I think I agree with all of the panelists' points here today. I think, just to add on and point out, Jevin's paradox is, like, very much true, but I do want to emphasize why DeepSeek was quite interesting within the AI world.

I'm not a large language model expert, by no means. I'm a power analyst. And the only reason why I know so much about LLMs is because I had to forecast power

demand for power price forecasting purposes.

But, like, the reason why AI training was so unique of a data center type is because to train a large language model, historically, what, like, the industry believed is that you had to have increasing amount of parameters in a model to train to be able to have really, really sophisticated and complicated types of AI models. The increased amount of models or parameters correlated to higher compute power, and as a result, increased amount of energy. That in itself results in high energy intensity.

And that was, like, from a forecasting and mathematical perspective, what made AI data centers and AI training data centers in particular, a really unique case study for power demand forecasting purposes.

DeepSeek is unique and broke that paradigm in particular, because although it has quite a lot of parameters in terms of the total model, the way it trains reduces the amount of parameters per query. So it's, like, a unique way of training the AI model.

Because of its unique way, I think the industry then realized very quickly that, like, the original thought process that more parameters is necessary, therefore, energy intensity will always increase is no longer true. And so, like, instead of data usage going up and energy intensity also going up, it's actually, like, AI training

data centers follows the same format as other types of data centers, which is energy intensity has efficiency gains that go down, as well as data usage goes up, which follows other types of data centers.

And so AI training data centers aren't necessarily unique.

MS. JAVANBAKHT: Thanks, everyone.

Shifting gears just a little bit, I wanted to talk about load flexibility.

What are some potential load shifting capabilities or strategies of data centers to reduce load during hours when the grid is constrained, and do these strategies depend on the type of data center? Are there data center design considerations that would enable flexibility during grid constrained hours?

MR. VU: I guess it does vary. I think I can't remember if someone had mentioned or touched on this before about the main response or flexibility of the load, but it does vary by the type of data center, right? And I think maybe Helen kind of touched on it, whether it's training AI or if it's kind of a different type of data center, I think the needs are different.

I think the variables besides kind of the type of data center itself comes back to the level of redundancy that's generally required of data centers. So usually

you'll see that the data centers have backup generators, right, to ensure that if there's an event that happens, that they can still keep running their facilities at full capability. And so demand response could work in certain cases. And I think there's also maybe kind of, I guess, behind the meter solutions that could pair well with that.

That doesn't necessarily work in every county or every utility or location, because the rules in each state or county or utility are different in terms of kind of what's allowed to happen, and so I think it's going to have to be a case by case basis based on locality, based on the need for the data center, how big the data center is, whether it's a campus gigawatt type size campus or if it's just a single building, right?

And so those are different factors that I think we'd have to kind of factor in, in terms of kind of what makes the most sense for a particular project or a particular site.

MR. PATEL: I'll chime in a little bit. I know we've been working with several data center companies and utilities looking about, you know, what is like that level of flexibility that is both, you know, kind of needed for the grid, you know, to be able to kind of manage kind of costs as well as interconnection.

And I think the jury's still out, but I think

there's lots of folks, you know, like with the EPRI initiative that David talked about, you know, kind of exploring that.

You know, is it moving some of the computing workloads around, you know, across the fleet of data centers? You know, is it, maybe, having more discrimination around some of those workloads that are coming in from various businesses? You know, not everything needs to be done kind of instantaneously with low latency. You know, I know like for us at E3, we run lots of power models in the cloud. You know, if we need results in a week, you know, maybe we get a lower kind of credit price, right, than a higher one and you can move that around.

You know, so I do think, you know, we'll see kind of different innovations both kind of from a physical, you know, kind of perspective as well as maybe from a business model perspective to kind of get at that, you know, differentiation of latency need to, you know, have some flexibility there. And of course, you know, all these data centers have some level of backup or emergency generation onsite. And that's another big source of, you know, kind of flexibility. Again, you know, similar to many large industrial customers that have, you know, like CHPs or other things kind of onsite, you know, they haven't really

been incentivized to be used. They're there for reliability and maximizing uptime for the data centers.

But again, you know, there's a really good example in the Bay Area in San Jose with a Microsoft data center that has, you know, a lot of kind of, you know, generation that's running on kind of RNG that can kind of do this and is already in the PG&E, you know, BIP program. So, again, you know, the kind of capability and the kind of resource may be there and it's really, you know, are there the right regulatory incentives, policies in place to be able to maximize that. There's also, you know, obviously very important kind of local air quality restrictions and rules, so they have to be kind of considered as well.

You know, I don't think anybody thinks that you'd run your diesel generator for like a day for that flexibility. But, you know, there's lots of different types of potential solutions there that people are exploring.

So, you know, I think you'll see a lot of innovation around that in the next year or two, just given, you know, that kind of, again, incentives are aligned and also the need is there, I think, on both sides of the meter to make that happen.

MR. NELLI: Yeah. Well, we're particularly interested in this because, like, trying to make sure that

we can bring this float on at the least cost and ensure it's beneficial to all the customers. I think managing the peak is a big part of that.

I agree with everything that Kushal and JohnBinh been just said, but one other point that I'm thinking about is -- and this is not based on specific analysis is just my general understanding of like different business models -- is it could be to your question about different dependency on the different type of data center, Heidi, could be that, you know, hyper scalers are a little bit more able to manage compared to like a co-location.

The Helen's Exhibition facility, just because this co-location where they're, they're kind of renting out space and renting out equipment to different companies, it'd be harder for them to manage -- or it could be, let's say, harder for them to manage multiple different clients and throttling that load, compared to if you as the owner and operator of the load, just one decision making entity.

MR. DEAN: Yeah, definitely. I think that utilities would love to find ways for data centers to leverage some sort of load shifting capability. And a big way to do that is with some sort of onsite renewable.

You know, there's even the potential for -- we've seen this -- I think was a case study with Silicon Valley power, where they worked with a data center to kind of co-

own or kind of split some of the cost of the build of behind-the-meter generation onsite for that customer, trying to facilitate that process to get them hooked up, you know, to like essentially like a little micro grid right there. I mean, still connected to the grid that you need to be connected to the grid, you know, at least for backup power and for they probably fully rely on the grid, but having, you know, a micro grid there, maybe a solar storage combo, something like that, where they can leverage that and split the cost partially with the utility could be a solution to help increase that flexibility.

MR. PORTER: There's a lot of great points that have been made by the other panelists, and I would just add a couple more things.

One, the subject of backup generation is a huge one, and let's just say sort of across the Board, regardless of where you are in the United States, the ability to run a tier two diesel gen set for any length of time is very, very limited because of air quality constraints.

It's a workhorse. The data centers love them because they know it's dependable. It'll start when they need it to, and it'll run when they need it to.

A big part of the work that we're looking at, and this gets back to the point, I think, Kushal made the point

about the RNG Microsoft project in Silicon Valley.

We're also going to be working with opportunities with other renewable fuels in existing gensets at data centers, because there's an opportunity to really improve the air quality aspects of the output from those generators to the point that there may be an opportunity to change some of the regulatory standards and allow for longer run times on an annual basis. Again, a lot of this is regionally specific, but certainly it would provide more flexibility for the data center if they can run those generators for longer periods of time and make them available to the grid for a longer period of time.

I think there's two other things I would mention.

One, particularly the hyperscalers, they're more motivated now than they ever have been to work with utilities and energy providers because of that speed to market that they want to accomplish. And they understand now that their ability to be flexible has a large impact on how quickly they can be served and how that service works over time.

To Elliot's point on a microgrid or something like that, those kind of things can be put in as a bridge solution but be a long-term solution as well and provide great value back to the grid. But you've got a willing audience with the major data center developers and

operators today. It's a great time to partner up.

We've even seen some ideas that we're kicking around with some of the hyperscalers in our utility program development where maybe the data center doesn't want to come offline in certain locations, but they're willing to pay other people to come offline and put some capacity back on the grid.

So there's a lot of different ways to go after this, and the point -- I can't remember who made it, I'm sorry, but we'll see a lot more innovation. There's a lot of interesting thinking going on right now that we have an opportunity to capitalize on in the coming few years.

MS. JAVANBAKHT: You touched on this briefly, but I was hoping we could talk a little bit more about how could load flex strategies be leveraged to help new data centers connect earlier?

Any thoughts on that?

MR. DEAN: I was going to say you mentioned bridge, the idea of bridge power.

Do you want to expand on that a little bit?

MR. PORTER: Sure. Maybe I'll cover a couple different points here.

I think one of the biggest challenges, and JohnBinh touched on this earlier: the ramp rate for the data centers once they start operation is really critical

to the speed with which the utility can meet the service requirements.

And I think it was JohnBinh that also mentioned the timing around building out new transmission capacity in the US. I thought you were pretty kind with that seven to eight years because in a lot of places it's more like 10 from design to having it operational. It's a big challenge today.

But that load ramping has a big play in this. Then the bridge solutions, I think one thing that's really attractive about that, to Elliot's point, whether it's something that you bring in on a skid on a temporary basis to help meet the load until that transmission capacity can be better built out. There's a lot of opportunity with transmission capacity constraints today to do some more things with grid enhancing technologies, whether that's with advanced conductors, power flow controllers, or other techniques. There's opportunities to get more out of existing transmission corridors today than what they're able to do. All of those come with some costs, but they also come with greater speed than trying to put new steel in the ground.

But those bridge solutions are particularly attractive because if you do something in the short run, whether it's skid-mounted or you bring in front-of-the-

meter versus behind-the-meter resources, and it could be a combination of solar and storage that maybe helps get the data center up and running while that capacity is coming on, there's no need to remove that at the point where the grid is able to fully service that. But it's there then as a full-time grid resource that can augment what the data center can do with backup generation or just provide grid services when it's needed, particularly in markets where there are ancillary services markets. There's a great opportunity for those types of facilities.

There are plenty of folks that utilities partner with today that like to provide those type of islanding solutions, and would be happy to be part of broader solutions as part of utility programs to make those things come to fruition more quickly.

MR. VU: I'll just add to that too.

Dave, you touched on air permitting, right? Because I think a lot of load flexibility or demand response programs that are being shopped around right now are very limiting and basically really only allow for kind of backup diesels to be able to permit, I guess, participate in that sort of program.

It doesn't really allow for storage or renewables paired with storage to kind of fit the bill because of the guidelines, limitations, requirements in terms of what

constitutes demand response from the utilities. And so, if that can be expanded or the air permitting kind of restrictions or constraints, right, that does kind of allow for more opportunity to allow for more demand response or load flexibility type programs to be implemented to allow more data centers to come online earlier.

MR. PORTER: Yeah. JohnBinh, that's a great point. And I think EPRI is a 501c3, so technically we stay out of policy discussions.

But I will mention that exactly to your point, there are some unintended constraints from some existing utility programs and policies and regulations. And having 50 different regulatory bodies across the U.S., you get a wide variety of mixes of things. And some of those kind of things for large point loads and opportunities with things like data centers need to be revisited because they can be constraining without intending to be from their initial point.

Another good example I've seen in the Southwest, some utilities have developed microgrid programs with the express purpose being to provide more microgrid capacity, islanding capabilities, and particularly around large point loads. But when they got approval for those programs through their commission, they made the program so small that now they're cut off, and there are developers like you

and others that want to come in and be part of those programs now.

So we need to help them work through raising those caps because they do provide value to the grid. And if they're beyond the pilot stage, and we can expand those, we need to take those opportunities and move them forward.

MS. JAVANBAKHT: We've also been hearing about data center partnerships with Chevron or other energy companies that can provide co-located generation, where that onsite generation is the primary electricity source and then the grid is the backup, which is a different setup than most of the data centers, at least in our state at the moment, where the grid is the primary source of electricity.

What do you all think would be the role of onsite generation, whether that be diesel generation or battery storage or something like that for data centers for California?

MR. PORTER: How much time do we have left at this point, Heidi? Because we can chew on this one for a while.

MS. JAVANBAKHT: Yeah. We've got about 10 more minutes and then we'll hand it to the panelists for their questions.

MR. PORTER: There's certainly some options there

that we're looking at. And you do see particularly the hyperscalers investing in advancing small modular reactor technology, for example.

But at the end of the day, the hyperscalers do not want to be in the business of running a powerhouse on their data center property. That's not their core business. And if somebody can come in and do that for them, that's another option. But what they really want long term is a reliable and resilient power supply. And that doesn't come from any better place than the grid that's out there today. Backup generation is great. There's a need for it. Some of those front-of-the-meter bridge solutions can also help and provide resources to the grid.

But at the end of the day, even if you stack a bunch of small modular reactors together or you put a combined cycle turbine onsite, for example, all those things need maintenance. They need refueling. They're going to go down. And it's not a great equation for anybody that is connected to the grid to have the grid operator provide only backup service in times of extreme need and have to hold capacity back in their planning processes for some of those rare type conditions. So it's really better overall if these folks stay connected to the grid, both from an operational and affordability standpoint

for everybody that's involved.

MR. PATEL: Yeah, I agree with David. We've done a fair amount of economic analysis around that.

And I think, no surprise, it's always better to be part of the network in the grid versus trying to go an island mode or totally go off. You do that if you have to, I think, from a speed to market and things like that.

And I think we're looking at -- we're seeing and have this important kind of innovations around that bridge power solution that we were talking about earlier. How do you get on fast, but then how do you kind of slowly transition or transition fastly away from, you know, that model to be interconnected and then have that resource lever be part of the grid and support other customers over time?

So I think we're seeing that kind of in real time across the country, exploring that idea and how that would actually work in practice. So, you know, especially for some of the larger, you know, kind of campuses and things like that, you know, we're just talking, you know -- they end up being almost like little utilities, right, or even big utilities, you know, given the scale. And I think that's the way to think about it, not just, you know, small kind of commercial, you know, buildings and locations, but really large power users, similar to other industrials that

have their own power on-site.

So, you know, I think they'll take different forms in different parts of the country, you know, in California, obviously, you know, a little bit more land constrained on the coast and things like that. So it'll have to be kind of denser and work with the kind of air quality restrictions, but there should be some, you know, benefits there. And I think what would be interesting is if we can, you know, leverage those kind of behind-the-meter resources for kind of the front of the meter aspects.

And at the end of the day, like you need to kind of serve the load, you know, however you can serve it, either behind or in front of the meter. And I think that's going to be kind of the biggest question, especially around like how fast do some of these loads really come on, which obviously is very fast. But, you know, some of the customers are also -- or some of the data centers are also thinking, you know, they're going to be doing this for a long time as well. So, you know, what does this look like kind of over time, you know, after the big initial rush kind of, you know, beats a bit, so.

MR. NELLI: Yeah, we're studying it. I agree, Heidi, it would represent a new paradigm. I think we're studying in particular.

Yeah, there's opportunities, but we want to make

sure, as was mentioned that it just aligns with like affordability goals that we have for our customers and meeting California's climate goals. So, we just want to be careful, and we think it will require careful planning to ensure those and make sure that you're avoiding kind of unintended consequences for the other customers on the grid.

MS. JAVANBAKHT: Any other thoughts from the other panelists on this one?

MS. KOU: I guess, in terms of BNEF's opinion, I mean, we know that data centers have always had on-site generation, particularly for reliability purposes. Typically, they've been diesel generators or UPS systems, but as, you know, there's been widespread grid interconnection constraints, data centers have now considered co-locating generation on-site.

BNEF's opinion is that as data center loads continue to scale, the exact mix of onsite generation, be it natural gas, batteries, renewables, or small modular nuclear, really just ends up depending on the project timeline, local regulatory frameworks, and the corporate sustainability goals of the data center facility owner. We, as a third-party research firm, have no strong opinions on this.

From an analysis perspective, particularly within

California, I think, like, the CPUC's proposal around bridging solutions, which David had already mentioned, that's been quite an interesting, like, framework, just allowing data centers to interconnect quickly and receive, like, temporary interconnections while utilities complete, like, major grid upgrades. Companies like Enchanted Rock are able to, like, capitalize on these frameworks. That's quite helpful, and that's probably an area where, like, regulation and policy can really be applied quickly for the data center industry.

MS. JAVANBAKHT: Thanks, everyone.

I now am going to move to the questions from the dais.

Vice Chair Gunda or Commissioner McAllister, do you have any questions for the group?

COMMISSIONER MCALLISTER: I just want to note, Vice Chair had to be in and out, so (indiscernible) a chance. (Indiscernible) speaking first, so I'll just proceed and we'll accommodate when he shows up.

Well, this is great. I mean, really amazing, very complimentary group, so I really appreciate all of you, and thanks for putting your time in to prepare and just all the work you're doing to become experts on this issue. I guess I'm -- so I love the conversation about load flex. I just want to comment, I think all of our

loads, all these new big electric loads, need to hopefully be as much as they can be good citizens of the grid and really help improve load factors overall, and really help us manage our reliability, enhance our reliability, and also manage costs, manage infrastructure costs. A lot of this conversation has been around infrastructure costs.

I guess I just want to kind of make a comment where I participated in a couple of groups that have utilities in other parts of the country and, you know, other agency leaders, and in other parts of the country, it seems like this conversation is even more kind of on steroids. You know, there are co-ops on the East Coast that have applications in the queue for data centers that are multiples of their peak load, actually their maximum load, sometimes like 5x or more.

And so I appreciate the conversation at the outset of this session about California being a high-cost state and seeming like -- I mean, I think the kind of understanding is that that tamps down data center load to some extent, that it's going to come to California.

And then, Helen, you made the distinction between training and other types of data center usage. So I guess I'm wondering -- and also we have this, as you all, I think, pointed out, we have this concentration of the hyperscalers. A lot of the data centers are being built by

a very small number of entities.

So how much arbitrage is going on across the country?

Here we are in California, does an Amazon or a Google or Meta, do they have -- are they playing different sites off one another and they're really going to land in one of them, but the other two are kind of vapor? I'm wondering how much of the application queue is real and do we have any handle on that, on how to assess that?

MR. PATEL: I'll go first. I think that's a question we get asked quite a bit across the country as well, how real is it? I think it depends on how you want to define it. Every developer thinks their project is going to be real, similar to what we see on the generation interconnection queue side sometimes.

I do think there is some double counting that goes on within a jurisdiction. There might be multiple developers looking to develop a site for a particular hyperscaler. It could be hyperscalers or other developers looking across jurisdictions to see which are the ones that are going to move forward the first.

But I think back to your earlier point, California is kind of so central and key, but also so difficult that as a natural filtering process doesn't happen in a rural co-op in Georgia or in Virginia, for

example, I've personally worked with, right, where everyone's going to have cheap land, relatively easy to put in an application. You're kind of, I don't want to say shotgunning it, but you're definitely a lower cost entry, a lower cost to keep those development efforts going versus here in California, right, where it's just going to be more difficult and expensive to do it.

COMMISSIONER MCALLISTER: Yeah.

MR. PATEL: So you're probably more committed.

COMMISSIONER MCALLISTER: How should we think about that? What's the main driver? Is it latency needs or is it some, you've really got to be close by?

MR. PATEL: I think from my perspective, working with some folks, I think it's all of those, right? Latency.

Also, at the end of the day, you want to be close to people for retail products. Think of your TikTok videos or things like that, but also for businesses, enterprises.

And then I think what we haven't talked about too much is just the fiber lines across the ocean to Asia are also pretty important. So just, you know, California is a big state economy place. It needs a lot of computing load, so there's kind of a natural pull through there no matter what. And then you don't have 15 gigawatts of applications, right? You have a much smaller number.

Some of that might not go through, but again, there is kind of multiple levels of filtering that we see and also kind of strong underlying demand that make it a pretty attractive --

COMMISSIONER MCALLISTER: Okay. Okay.

MR. PATEL: -- market for the ones that are willing to develop here, knowing all the challenges that are many. But again, just from my perspective, that could change.

COMMISSIONER MCALLISTER: Right.

Anybody else?

MR. DEAN: I think that's a very good question. And it's something to really pay attention to. The project inquiries and the engineering studies that we're getting, really trying to parse out how likely are these to materialize? And a big portion of that is, are these inquiries, are these projects applying elsewhere, inquiring elsewhere, right?

And so that's one of the factors that we build into our forecast when we're looking at each of them, because we do assign a confidence level to each project, so we're not just assuming that the full impact of the project will be realized. We do it on a confidence level approach, so how confident are we that this project will materialize in our service territory? And a big part of that is trying

to figure out if this project is seeking energization elsewhere as well.

But that's not very straightforward. That particular part of the equation is not particularly straightforward, and clear communication from the project is greatly appreciated on that piece, for sure, in terms of working with our customer service team to understand that.

MR. VU: There's definitely an element of replication or inquiries happening, right?

I think Kushal touched on it here in terms of barrier to entry. I think a lot of places don't have any sort of barrier to entry in terms of inquiring kind of what the load is, and so you're seeing kind of really large numbers, like 20 gigawatts, 80 gigawatts in certain utilities.

That's probably not realistic, but there is probably real growth that's going to happen there. I think you can debate whether it's going to be 10 gigawatts or 80 gigawatts or somewhere in between.

But I think as the utilities update their processes to make the barrier to entry more difficult so that they can kind of weed out real developers with real qualified experience and real intent to actually develop something, versus those who are just trying to get a sense for kind of what's going on in a region, I think that's

going to naturally pare down over time. And I think you're starting to see a lot of utilities update their processes because all of a sudden they had a flash flood of 5,000 megawatts in the queue and they didn't know, kind of -- it's hard to kind of plan for that when you don't know what's real or what's not real.

COMMISSIONER MCALLISTER: And so -- go ahead. Finish your thought.

MR. VU: I was just going to say the natural evolution of updating the processes to kind of weed it out, you're seeing that happen around across the country to kind of figure out who's a real project, who's willing to kind of put the work in, who's willing to kind of put the money where their mouth is to make the investment to make this a real project.

COMMISSIONER MCALLISTER: So hearing from all of you, all three of you so far, that basically kind of California's -- ironically, I guess, California's sort of barriers to entry and process-heavy kind of approach that you need, you got to be serious about if you're going to really embark on that siting process or that interconnection process.

So, more likely, at least here, they're serious when they get to the point of getting in the game.

Helen, I'm interested in your point of view on

this.

Daniel, go ahead.

I think you were about to talk.

MR. NELLI: Just a short thing. I was going to add to Mr. McAllister that, you know, well, from a forecasting perspective, this application conversion rate is very important just to get to the root of the question.

COMMISSIONER MCALLISTER: Yeah.

MR. NELLI: We will -- all the forecasting entities in California I think will get better as we go along. Like we're getting data back now, for example, Mark Lester's study about, you know, like signing rates, and so being able to incorporate that data in future years will be super helpful.

COMMISSIONER MCALLISTER: Okay. Great.

Helen, any observations to add?

MS. KOU: Yeah. Thank you, Commissioner.

I guess, like, I may have a very different view from the other panelists. And I'm beginning to realize that BNEF has a very similar forecasting methodology to some of the utilities, which is both interesting in many different ways.

But, like, at least from a national perspective, because at BNEF we are forecasting data center demand on a national level, and we do split that out on different ISO

regions. Like, California is not currently, like, an attractive data center market.

Our research indicates that California's project pipeline really lags behind other major U.S. data center markets. Like, when we're examining data center demand across 11 leading U.S. markets, California ranks ninth in projected power demand by 2035.

We also see that in California's data center market is softening currently just through vacancy rates. Like, by the end of 2024, California's vacancy rates for data center is roughly 10 percent, while the national average is 5 percent, with Virginia's vacancy rate being 1.7 percent, and Oregon being 4 percent.

A lot of this deals with kind of, like, locational challenges for California. So, BNEF's done interviews for its research report with various hyperscalers as well as data center developers on background, and they all have indicated interconnection availability is one of their top concerns when choosing a data center facility site, which had been known or discussed within this panel. But there's also other location-specific factors, which includes sales and use tax exemptions at the state level, as well as land cost and water availability.

BNEF has not done a rigorous economic analysis

comparing California to other states on those specific metrics, but the industry perceives California as potentially less attractive on those above location metrics.

Obviously, California does have a lot of favorability because of Silicon Valley, but I would like to stress that the types of data centers that are currently in pipeline and queue, that at least BNEF has visibility on, are co-location data centers.

They're not the hyperscaler data centers like that you're seeing kind of announced on the news, and, like, what that really indicates is that you're really just seeing a really small pocket of really specific, like, type of industry that is really catering towards the startup and innovative firms within the Silicon Valley area. It's not like the large hyperscaler AI data center that we're seeing across the news.

COMMISSIONER MCALLISTER: That makes a ton of sense. Yeah. That makes a lot of sense. And if you're going to train a large language model, why would you do it? You want to go somewhere where you have cheap power, basically, to crank that out. That makes a lot of sense to me.

And that's kind of a little bit of news that the market would be softening, so I'm trying to relate this

back to our forecasting work, Heidi? If we can narrow the uncertainty bounds around the data center load going forward and really kind of understand the market dynamics and which slice or slices, which pieces of the data center build out are most likely to take place in California, that would be a way to kind of limit the uncertainty relative to forecasting like other parts of the country.

I see the Vice Chair is with us. I do have at least one more question, but I'll cede the mic for now and ask the Vice Chair. Yeah, Commissioner McAllister. First of all, I want to just say a big thanks to this group. I mean, I think it's really helpful information. I think you really started on a really good thread of conversation, so I will hold and I just would like you to complete your thinking there.

COMMISSIONER MCALLISTER: Oh, thanks. Okay. Okay. Well, I guess, sort of like the nationwide arbitrage, if I'm not from Amazon, maybe I have, you know, a proposal in California, but I have another in North Dakota and wherever else. And they have multiple, right? They have lots of facilities all over the place. And so maybe this relates to the flexibility conversation. I'm not sure.

But if I'm a hyperscaler and I've got multiple facilities all over the world, really, can I -- do I, like,

is it an established practice to move compute around to different facilities to take advantage of temporal conditions? Like, say, you know, time of use, electric rates? Or, like, would I push work to, you know, Ontario, you know, away from the West Coast at a certain time of day or something?

Like, kind of just getting, wanting to know, are there management techniques that some of these, you know, big companies are or could be using to -- that would have an influence on electric load in California?

Maybe I'm completely off base here.

MR. PORTER: No, that's a great question, Commissioner McAllister.

And there are opportunities there to do those types of things. If you talk to the hyperscalers, you can get a very different answer from each one of them about how they feel about that and what kind of distances they think they can actually move compute around without potential negative impacts to their operations, but it's certainly something that they are exploring and has some potential.

And as you look to these even bigger data centers, the things that are being tagged as frontier data centers, which are projected to be five gigawatts in load, several of them already are experimenting with putting different pieces of the puzzle in different locations.

It's kind of to a point that Helen made earlier, where one particular campus could be just for model development, another one could be just for training, and then another one is where the model is actually applied or the inference takes place.

And there's differing opinions about how much distance can be between those types of facilities, and, of course, how that impacts the grid is really important because if these facilities in some places are all very locational, but they could be 10 to 20, 30 miles apart, and that wouldn't necessarily help the grid, depending on what the given situation is.

So they are exploring that. I don't think right now that that is a preferred approach for them because, quite honestly, the cost of electricity overall for the returns on the products that they're putting out the door and back onto the communication system, they're vastly different, and the lower price of electricity is just not that attractive to them currently.

COMMISSIONER MCALLISTER: Go ahead.

MR. VU: Sorry, just to piggyback on that. Dave's right.

The preference today is to basically -- if there is any shifting, it's kind of more regionally based, right, within 30 to 50, 60 miles, I guess it depends on kind of

who, what their operation is. But generally, that's kind of more of a local level.

Like, is there opportunity to kind of do that at a more national kind of level between utilities or across state lines? I think possibly. But that just hasn't been the case today. Right?

But I think the reason why you're seeing these big pockets within certain regions, right, like the nine or 10 markets that Helen was referencing, is because of latency issues, so that when these new data centers, as they're installing them campus wide, they want to be able to talk to each other. And staying within that 50 mile radius is key to that. And so whether that's for transferring of services or communications or whatnot, I think that's a big reason why you see these pockets here, and you're not seeing an even spread or distribution across all utilities.

They are trying to stay within certain pockets for multiple reasons.

COMMISSIONER MCALLISTER: That's my strand. Daniel, where are you?

VICE CHAIR GUNDA: Sorry, Commissioner McAllister, I just wanted to kind of jump in on this kind of comment there. Maybe Daniel, sorry if I inadvertently cut you.

I just wanted to kind of say, I'm just trying to connect the dots between the latency and Helen, kind of your comments earlier on. The level of data center growth that we're seeing elsewhere in the country, could you kind of connect those dots, if possible?

Like, early on, the thesis was, given that a lot of latency issues are present, much of the data center growth will happen around where the corporate, you know, is currently set up, right? And then so you either kind of move as a company along with the data center somewhere else or, you know, it would so, you know, or they'll try to figure out, you know, a way to be close, and that goes to what JohnBinh was just kind of saying. That's what we heard early the last couple of years in the iPod workshops and such, and we were trying to use that.

Could you kind of explain, is there a clear way of saying, you know, that a training, large training model could be elsewhere, so the compute could be built somewhere, but the services could still be in a certain area, relying on that? Could you help that -- reach that thesis that you mentioned earlier?

MS. KOU: In terms of just, like, clarifying the question, is it, like, is your question just asking whether or not AI training data centers necessarily need to be locationally bound, like, in these, like, cluster

locations? And if they could be, like, placed in, like, non-clustered locations?

VICE CHAIR GUNDA: Yeah, definitely. Thanks for phrasing that more clearly. I think that's part of it.

And I think the second part of it is, if that is true, right, like, depending on how you observe that to be true, what is the -- what do you think the economic demographic impact in California will be, right, within the tech sector? So given the frame of this going to become an input into the broader conversation.

MS. KOU: Got it. Thank you. And thank you for the question.

So, originally, I guess, when the conversation around AI training data centers became a topic within the energy sector, there was a lot of interest in kind of putting AI training data centers outside of these large data center clusters and data center hubs because the working theory is that because training data centers don't necessarily have that latency concern, they could be located in, like, non-hub areas, similar to crypto mining data centers. Crypto mining data centers are often located where power prices are really cheap. And so there was this thesis that similarly to crypto mining data centers, so can AI training data centers be located and placed.

What we've noticed and seen is that particularly

with hyperscaler companies, these AI training data centers maintain within data center cluster regions and locations, and the reason is more because of the business operations of these companies. Data center, like, business and these companies, like a specific data center in general, has a long lifetime. And like a data center can be reconfigured and reworked to go from an AI training data center within, like, several X amount of years to maybe a cloud services data center in the long tail. So from a business risk and business operations perspective, companies may prefer to hedge in terms of having their data center site near other data center sites that they currently already own.

Plus, it is much easier to build in locations where you already own data centers since you already have the infrastructure, you already have the -- like, you already know the location very well, and so like building off of your existing infrastructure is quite easy, which is why you still see AI data centers being built near and around clusters.

There are, like, niche situations where you see maybe, like, smaller companies, third party companies that are trying to build small AI data centers, maybe in, like, niche locations, similar to crypto mining data centers, but in terms of volumes, they're much smaller.

VICE CHAIR GUNDA: Thank you, Helen.

Just kind of then completing that rule line. So when you mentioned kind of the cooling off in the California market as you're watching the 2024 and the number of kind of applications of the cluster planning is happening elsewhere.

Can you kind of help -- what does that mean from kind of -- does that mean some of the work that would have been planned in California is being planned elsewhere? Is it just kind of a natural progression of companies kind of investing in several areas in the country on different kind of services, products?

Can you just explain how to understand that?

MS. KOU: It comes from the -- just based on pipeline, like relative pipeline. So in terms of our mid-term forecasts at BNEF, what we do is we look at the entire pipeline of data centers across the United States. We have, like, quite a lot of visibility on announced under construction and committed data centers nationally across the United States, and we do quite a lot of statistical analysis on like the probability that a specific data center moves from one stage to the next.

We also very much, like, struggle with understanding, like, what's the probability of a specific data center going from just announced to live and committed. There's a lot of, like, rigorous analysis that

we end up doing to kind of figure out that specific capacity amount.

But, like, in essence, what we know is that from like a pure pipeline perspective, the volume of pipeline in California is significantly smaller than just all the other markets that we've analyzed. And so, like, as a result, it's just a smaller market in the long term.

VICE CHAIR GUNDA: Yeah. Thank you, Helen.

I don't know if anybody else wanted to comment on that. Kushal, David, Elliot, or did anything else that you want to add on that?

MR. NELLI: Yeah. My only comment was, I would be skeptical comparing based off of, like, announced applications for the point raised earlier that they're just -- it's crazy in some markets, you're getting multiple X of their entire capacity in the application queue. So, you know, it's not -- like, we have to consider like the actual conversion of those applications into projects as well.

MR. PATEL: Yeah. I think maybe I would add, you know, one thing that we did in work that we did in Virginia recently is just look at kind of the concept of the strain demand. You know, what can the power sector actually accommodate in a realistic term, you know, every year and start from that perspective, rather than, you know, the other end of how many data center applications there are.

I think you need to do both. You know, kind of a top down and the bottom up, and then hopefully they meet in the middle to kind of get a sense of, okay, we can only interconnect X, Y, and Z realistically over the next, you know, one, two, three, five, 10 years. And then go from there in terms of, alright, then what's on the other side of it?

And then, you know, that will always be, like Daniel said and Helen said, kind of a continual process, like as you get more data, as the market shifts. You know, this is going to be a pretty dynamic kind of industry and, you know, forecasting exercise. Like we're working with a lot of folks who are kind of redefining this in real time as they get more information, so I think it's very much a live topic. I mean, I know one right approach.

So multiple approaches are usually better at this point, probably.

VICE CHAIR GUNDA: Thank you so much.

I'll pass it back to you, Commissioner.

COMMISSIONER MCALLISTER: Thanks, Vice Chair. We're a little bit over time and we need to get wrapped up, I do have a hard stop at 4:30.

I did want to just mention before passing it back to Heidi for the Q&A, that there is a legislative discussion happening about benchmarking and reporting

requirements for data centers. And so, you know, just to encourage everybody to pay attention to that.

You know, I'm not going to handicap where it's going or anything, but it's interesting that it's being discussed at the legislature. And obviously a lot of detail would have to be put in place to allow that to be done well. But as you mentioned, as we get more data, well, that would be a good source of data, if we do have something like that in the state.

And it would be great for our forecasting team.

Okay, great.

Back to you, Heidi.

MS. JAVANBAKHT: And I am actually going to hand it to Taylor Harms to moderate the Q&A.

COMMISSIONER MCALLISTER: I'm going to drop off at 4:30, but I really appreciate. It's a great, great set of presentations and just the expertise in the virtual room here is pretty outstanding.

So just thanks everyone for taking the time and being with us and helping us out. Great conversation.

MR. HARMS: Okay, so we have a number of questions in the chat. How many of these forecasting models factor in data centers being powered by natural gas, fire, and electric generation?

MS. JAVANBAKHT: I can answer this from a CEC

perspective, and I think what this question is asking is about on-site generation.

So right now, for the data center forecast that we did last year, we assumed that all of those would be grid connected. So we're not assuming that those are natural gas powered, but we are tracking this this year. We are aware of some applications, some sites out there looking to build with on-site generation, and we'll be tracking those and be incorporating those into our gas forecast this year if need be.

I don't know if PG&E, if Daniel or Elliot have any thoughts on --

MR. NELLI: Yeah, I agree with your answer, Heidi. I think we're still -- my expertise is on the demand side. We're still moving this through into generation planning and, you know, assuming what degree of this load comes on, what that will entail for generation planning. How much capacity do we currently have? What will we need to enable in the future via building of various infrastructure?

So I can't speak to that specifically, but the planning is coming along.

MR. DEAN: And then, Daniel, you know, we both are utilizing a bottoms-up forecast for the most part, and so we're getting information about these projects that are

looking to be developed in our territory.

And, you know, I think probably for both of us, you know, we're not hearing directly that these projects are going to have, like, on-site gas generators, right? And if we did hear that, we would factor that into the forecast, of course, as reducing the grid impact.

So, you know, whatever we're hearing from our customers, you know, that are doing the developments, that's what we're going to integrate into the forecast. And beyond that, you know, we don't have specific assumptions that we're building into the forecast.

At least speaking for SCE, in terms of X percent is going to be onsite or behind the meter versus X percent is grid-tied. Right now, the assumption is that they're going to be grid-tied, unless we hear otherwise, with their own kind of backup power.

MR. NELLI: Yeah. Yeah, I agree. I should clarify that my prior answer was just about grid electricity generation generally, but I do agree with that.

MS. KOU: I guess I can provide BNEF's forecasting methodology.

So at BNEF, we forecast pure IT megawatt power. So the data center, like megawatt capacity, and like pure data center demand power, and we do that from a bottoms-up perspective. So we forecast data center capacity by

analyzing bottoms-up the historical transition rates between the different, like, development stages. A data center moves from stage to stage, from announcement to financially committed to under construction to live and connected onto the grid, and we account for things like ramp rates. Like, that's our mid-term forecasting process.

And then on the long term we, like, benchmark a TAM to a specific market, a total addressable market, based on the energy intensity of data usage relative to the data usage and data generation of a specific market. And we bridge the two mid-term bottoms-up forecast to the long-term forecast to give an overall data center demand forecast.

I guess the second iteration of this analysis would be to then figure out how that overall demand matches with grid capacity and grid availability to figure out what then would be necessary for onsite generation, but that is not an analysis that BNEF has done yet.

MR. HARMS: Thank you.

So I just have time for a couple more questions.

What mechanisms should California regulators explore to ensure that ratepayers are not saddled with the stranded costs should data center growth not fully materialize?

MR. VU: I think there's several examples going

around in the country that other utilities are exploring, one in particular in Ohio in terms of kind of what AEP is doing. And so I think that model of having a minimum transmission and distribution kind of charge associated for a certain period of years is something that would, I think, help address those sort of cost allocation or cost subsidization issues that maybe folks are concerned about, and I think definitely the industry is supportive of making sure we're paying our fair share.

MR. NELLI: Yeah. One more point on that.

There's different, you know, mechanisms that we could follow to ensure cost allocation equitably. I mentioned our Rule 30 application prior, that transmission-specific tariff. And one thing -- one part of that is, you know, the ability to protect against stranded assets by requiring to some degree that the funding of some of the interconnection projects by the new customer, and then refunding that only once the customer has reached a load level that justifies it. So that kind of shields the rest of the customers on the system for a number of years until that load is deemed justifiable. And basically until it reaches the point that it is beneficial for everyone else on the system.

Just one other idea.

MR. VU: And I will say, I think every utility

and the regulatory constructs they deal with are different. And so it's not necessarily a one size fits all in terms of, hey, this utility did this, therefore we should do this here.

And so I think if there's discussions or exploration in terms of kind of what California or the different utilities here in California would consider doing, I think I would encourage a conversation and discussions with the industry, with the large load industry, just to kind of explore what makes the most sense so that we're not unintentionally stymieing growth here because, you know, certain policy X, Y, Z just kind of created unnecessary unintentional constraints that would just kind of block growth or interest in the region.

MR. HARMS: Thank you.

So that is all the time we have today for answering questions. Thank you for posing questions in the chat.

Please consider using the public comment period of this workshop session to raise your question and comment. Please also note that we do not have time for real time responses to public comment.

SANDRA NAKAGAWA: Thank you, Taylor.

Thank you, Heidi and all the panelists for a great conversation there.

We're now going to turn over to our public comment period. As a reminder, one person per organization may comment and comments are limited to three minutes per speaker.

While we welcome your comments, unfortunately, we will not be able to respond to questions during the public comment period. Also, the workshop notice provides information on how to contact us with any follow-up questions you may have, and that email is: IEPR@energy.ca.gov.

Alright. For public comment, we're going to use the raise hand feature. So please raise your hand using Zoom if you'd like to comment. We will call on you and open your line to make comments. I'm going to give folks a minute.

If you're looking to make public comment, please raise your hand now.

I'll give it another few seconds here.

If anyone wants to make public comment, please use the raise hand function on Zoom.

We will turn to the phone lines. So if you are dialed in and you're looking to make a public comment, please hit star nine to raise your hand and star six to mute or unmute your line. We can unmute your line from our end.

Give it a few more seconds here.

Not seeing any raised hands or interest in public comment from our phone lines.

Alrighty. Well, with that, public comments are due by 5 p.m. on March 12th. You are able to submit written comments as well.

I will turn it back to the dais.

Vice Chair Gunda, if you're available to make any closing remarks, we are ready to close out the workshop.

VICE CHAIR GUNDA: Yes, Sandra. Thank you.

I just wanted to say thanks to all the panelists and the attendees for giving us the time today to discuss some important topics.

I thought all three panels, the high-level econ demo, friends in California, and the afternoon sessions on both the L.A. investments but also the data centers was extremely productive. I look forward to input from the stakeholders into the process and how do we take all this information and further that into the forecasting process.

So with that, thanks, everybody, and I'll just conclude the meeting for today.

Adjourned.

(The workshop adjourned at 4:35 p.m.)

CERTIFICATE OF REPORTER

I do hereby certify that the testimony in the foregoing hearing was taken at the time and place therein stated; that the testimony of said witnesses were reported by me, a certified electronic court reporter and a disinterested person, and was under my supervision thereafter transcribed into typewriting.

And I further certify that I am not of counsel or attorney for either or any of the parties to said hearing nor in any way interested in the outcome of the cause named in said caption.

IN WITNESS WHEREOF, I have hereunto set my hand this 8th day of October, 2025.

MARTHA L. NELSON, CERT**367

CERTIFICATE OF TRANSCRIBER

I do hereby certify that the testimony in the foregoing hearing was taken at the time and place therein stated; that the testimony of said witnesses were transcribed by me, a certified transcriber and a disinterested person, and was under my supervision thereafter transcribed into typewriting.

And I further certify that I am not of counsel or attorney for either or any of the parties to said hearing nor in any way interested in the outcome of the cause named in said caption.

I certify that the foregoing is a correct transcript, to the best of my ability, from the electronic sound recording of the proceedings in the above-entitled matter.

October 8, 2025

MARTHA L. NELSON, CERT**367