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STATE OF CALIFORNIA

CALIFORNIA ENERGY COMMISSION

In the matter of,	)	
	)	Docket No. 22-IEPR-05
2022 Integrated Energy Policy	)	
Report Update	)	RE: Western
(2022 IEPR Update)	)	Electricity System
_____	)	Integration

IEPR COMMISSIONER WORKSHOP ON

WESTERN ELECTRICITY SYSTEM INTEGRATION

In-person at:

CalEPA Headquarters Building
Byron Sher Auditorium
1001 I Street
Sacramento, California 95812

Remote Option Via Zoom

Thursday, December 2, 2022

9:01 A.M.

Reported By:
Elise Hicks

APPEARANCES

Commissioners

David Hochschild, Chair

Siva Gunda, Vice Chair & Lead Commissioner for 2022 IEPR Update

Andrew McAllister, CEC

Genevieve Shiroma, California Public Utilities Commission (PUC)

Liane Randolph, Chair, California PUC

CEC IEPR Team

Heather Raitt, Director of the IEPR

Presenters

Clifford Rechtschaffen, Commissioner, California PUC (remote)

Neil Millar, California Independent System Operator (ISO)

David Smith, TransWest Express (remote)

Fernando Martinez, New Mexico RETA (remote)

Steve Johnson, SPP (remote)

Letha Tawney, Commissioner Oregon PUC (remote)

Arne Olsen, E3

Branden Sudduth, Western Electricity Coordinating Council (WECC) (remote)

Sarah Edmonds, Western Power Pool (WPP)

Maury Galbraith, Western Interstate Energy Board (WIEB)

Darcie Houck, Commissioner California PUC

Phil Pettingill, California ISO

APPEARANCES (CONT.)

Presenters

Eric Blank, Chair, Colorado PUC
Elliot Mainzer, President and CEO, California ISO
Mark Thompson, Oregon PUC
Eric Blank, Chair, Colorado PUC
David Bobzien, Director Nevada Governor's Office of Energy
Cliff Rechtschaffen, California PUC
Darcie Houck, California PUC
John Reynolds, California PUC
Liane Randolph, Chair, California Air Resources Board
Alice Reynolds, President, California PUC
Eric Blank, Colorado PUC
Keegan Moyer, Energy Strategies
Anna McKenna, Vice President Market Policy and Performance, California ISO
Carrie Simpson, Director Western Services Development, Southwest Power Pool
Spencer Gray, Executive Director, NIPPC

Public Comment

Fred Heutte, Northwest Energy Coalition

Christian Lambert, Public Advocate Office, California PUC

Bill Julian, Retired Public Interest Lawyer, Member of the Public

P R O C E E D I N G S

DECEMBER 2, 2022 9:00 a.m.

MS. RAITT: Good morning, everybody. Welcome to today's Commissioner Workshop on Western Electricity System Integration. This workshop is being held as part of the California Energy Commission's proceeding on the 2022 Integrated Energy Policy Report Update, or the IEPR for short. I'm Heather Raitt, the director for the report.

Today we're holding a hybrid workshop using Zoom, while we're also meeting in person in Sacramento. For those in the room today, videos of the western representatives on the dais, the presenters and panelists are the being broadcast over Zoom, and everything displayed on Zoom is also being shown here on the screen in the room. And then we're using the in-room microphone for sound.

The workshop is being recorded, and we'll have a recording link to the Energy Commission's website shortly after the meeting today, and then we'll have a written transcript posted in about a month or so.

And to follow along, the schedule and slide decks have all been docketed and they're posted on the Energy Commission's website, and we do have hard copies of the meeting schedule, and all the materials being

presented today are available at the entrance to this hearing room, and if you need to have your own copy, just please let us know and we can get you something.

Attendees may provide comments today on the materials being discussed. There's two different ways. First, you may make comment during the public comment period at the end of the day, so we'll take comments from those in the room and also from those on Zoom and folks who may be calling in. If you wanted to make comments and it's on Zoom press the raised hand icon, and that will let us know you want to comment, and if you're on the phone press star nine and that will let us know.

The second opportunity is to provide written comments. We always welcome written comments as well, and those are due at 5:00 p.m. on December 23.

So, we're covering a lot of topics today and this morning we have three sessions, opening with the plenary introductory remarks from western representatives. Then the second session is on the essential role of markets, and then, third, we'll talk about transmission, the enabler of integration and markets. And then we'll break for an hour for a lunch break at 12:30.

So, with that, I'm very happy to introduce the

CEC Vice Chair Siva Gunda. He's the Lead Commissioner for the 2022 update and California's representative on WIRAB, the Western Interconnection Regional Advisory Body.

Thank you, Vice Chair.

VICE CHAIR GUNDA: Thank you, Heather. Good morning, everybody. Thank you for being here. We have a number of folks joined online today. I think it's going to be an important conversation to have, so I want to begin by thanking our IEPR team for the diligent work that they do in putting these workshops.

I also want to thank Grace Anderson who is our principal staff on the western issues broadly, so, Grace, thank you for your work on this, as well as the lead division here, Alicia and David, who are from the Energy Assessments Division that works on some of these issues.

I want to just contextualize this workshop a little bit and then pass it on to the further comments today.

At a high level, just kind of making sure for the record as well as the audience today, CEC has primarily four functions as an agency. It's the data repository totally for the State, collects all sorts of information on energy to be able to have it accessible

for people who are working on policy issues and planning issues. Also have some regulatory functions that I will have my colleague, Commissioner McAllister, here who, you know, works on the Codes and Standards, Building Codes and Standards, and other regulatory functions that CEC has, including power plant siting.

We also have a function on developing common planning assumptions and broad policy elections for the State and acting as a neutral venue for gathering that information for the State.

So, as we think through that role and IEPR, the Integrated Energy Policy Report is the foundational document that CEC produces every year, and what we try to do in that is apart from developing the common planning assumptions and adopting them as a Commission, we also try to elevate important topics to make sure the broad policy, as well as interested parties in the State Legislature is aware of what is happening in the energy space that is important to track.

So, with that spirit we have included the western integration topic as an important element of this year's IEPR. A lot has been happening over the last couple of years, and we thought it extremely important to provide a transparent high-level update on what's happening in the West as it pertains to the

western integration and the markets.

So, that's the spirit in which we work this workshop today, and I'm really glad and thrilled to have the entire Commission's line of both at CEC, CPUC. We also have the Governor's office today on the dais as well as our, you know, generous host and leader here Liane Randolph, Chair of CARB.

So, with that, I would like to move forward with introducing Chair Hochschild to provide his opening comments. Chair.

CHAIR HOCHSCHILD: Good morning, everyone. Thank you so much, Vice Chair, for organizing this and look forward to the discussion and no further comments. Thank you.

VICE-CHAIR GUNDA: Thank you. With that, I would like to invite Elliot Mainzer. Elliot is somebody who everyone knows here. Elliot has been an incredible addition to the broad energy space in California. His leadership has been unparalleled in keeping the lights on but also supporting the broad clean energy transition goals in California. With that, it's an incredible pleasure to have Elliot on the dais with us today, and, Elliot, I'll pass it on to you.

MR. MAINZER: Thank you, Vice Chair Gunda. I really appreciate the opportunity. I wanted to just

start out not only thanking the many, the organizers, all the work that went into putting this workshop together, but I really deeply appreciate the personal engagement of the leadership of the California Energy Commission and the PUC, and also the very collaborative way that you set up this meeting today, I think bringing in many of your peers from across the West, and very grateful to see many of the partners from across the western United States who are participating in this conversation today, really sort of painting a picture of many of the very -- all these very dynamic and very interesting moments for the West in terms of Western Electricity System Integration.

I think some of you know I had the pleasure to grow up in California, but spent over 20 years living in the pacific northwest where all my time at Bonneville Power Administration and during my time as the cochair of the Western Electricity Industry Leaders Group I had the opportunity to really watch the evolution of regional coordination across the West.

And I think many of us look back to 2014 with the creation of the Western Energy Imbalance Market is a really pivotal moment for the West in terms of really bringing the interest from across the region together to better optimize the system and to leverage transmission

connectivity and resource diversity across a really wide footprint.

I think we now know that after ten years the EIM has now produced over three billion dollars of cumulative benefits. It has helped significantly displace fossil fuel emissions, and it has also really built, I think, a tremendous new set of relationships across the West.

For us at the ISO I think all of us who experienced the heatwave together back in September, you could also physically feel during that event the interrelationships and the physical connectivity across the West, the ability to leverage transmission connectivity, the ability to take advantage of geographical weather diversity, and the actual operation of the energy imbalance market as it cycled energy between utilities across the West. California, of course, was in a significantly stressed condition, but we were not the only one, and we were able to work together and I think really demonstrate that ethic of partnership and collaboration in supporting each other to maintain the overall reliability of the system and to help reduce costs for electricity consumers on the path to the decarbonized electricity system.

I think also, for me, probably one of the most

important outcomes of the Energy Imbalance Market experience has been the personal relationship that it's built, and I think we'll see some examples of that here today.

We were extremely pleased to be able to host our stakeholder symposium back in early November. It was just a wonderful gathering of many of the folks from the western electricity community the chance to celebrate the relationships, to build on the relationships developed in the body of state regulators, the regional issues forum, and the partnership that's now developed between our governing board and the western EIM governing body to the joint authority decision making model, and the level of interest, level of excitement that was present in that room was something that really buffered us as we're now prepared to release the final proposal for the extended day-ahead market next week, and to try to build on that platform of collaboration and physical economic interdependency that we've had through the energy imbalance markets.

I think today this is going to be a fabulous session to be able to hear about those core components that go into Western Electricity System Integration, of course, resource adequacy, transmission optimization, market design, and, of course, the very, very important

work in governance which is important to all of us.

So, again, I really appreciate the way that you've set up this meeting today and very excited to continue evolving together and making progress towards increasing reliability and reducing costs for electricity consumers as we take on the important challenges of the energy transition.

So, thanks again, and I wish you all a very successful workshop. Back to you.

VICE-CHAIR GUNDA: Thank you so much, Elliot. You know, I'm personally a little partial towards you as a person, but I just want to say it's extraordinary to have you at this moment. I think you have the unique set of skills, and experience, and personality to really help develop the necessary collaborations as we discuss this important element across the West. So, thank you for being here and a part of the discussion today.

We are actually really lucky to deviate a little bit from our schedule today to accommodate Karen Douglas, a friend of the Energy Commission, currently serves as the energy advisor to the Governor, to be here and provide some introductory remarks as we take our workshop today. So, with that I will invite our friend, colleague, and guidance advisor here, Karen Douglas.

MS. DOUGLAS: Good morning, everybody. Thank

you, Commissioner Gunda. Thank you, Chair Randolph for hosting this great event, and it's so nice for me to see our California climate and energy leadership gathered together in person and virtually to talk about this important topic.

And I'd also very much like to extend a welcome to the representatives from other western states who have joined us for this dialogue today. I really appreciate your engagement in this forum and your partnership.

Looking at the agenda, I'm looking forward to hearing more about all of the panel topics, markets, transmission and resource adequacy. These are foundational topics for all of us and they speak very directly to the outcomes that we're solving for here in California and throughout the West, reliability, affordability and the clean energy transition.

We have really aggressive climate goals here in California. We're not alone in that. The more that we can solve together for the challenges in front of us, the better off we can be, and particularly as we deal with a very new climate reality on the ground as we deal with this unprecedented drought and the impacts on hydropower in California, and in the southwest, and the Colorado River basin as we deal with these increasingly

extreme and widespread heat events and increasing minimum temperatures as well as very high temperatures. These are all challenges that we collectively have to find our way around and manage together to deal with as we move forward and build out the clean energy infrastructure that we're going to need.

So, I very much look forward to this discussion. If we've learned anything over the last three summers in a row here in California dealing with various kinds of climate-related events, we've learned that the kind of coordination, and communication, and partnerships that we've developed both in-state and more regionally are essential tools for us both in terms of near term reliability and managing the kind of challenging events that can come up very suddenly, but also in the long term as we work together to build this clean, reliable, affordable energy future. So, I'm very much looking forward to today's discussion. Thank you.

VICE-CHAIR GUNDA: Thank you, Karen. Thank you so much for taking the time to join us today. It's really good to hear your framing, and I want to just elevate a couple of elements that Karen just mentioned. Obviously, the Governor's office has been incredibly important in mobilizing all the states together in ensuring the clean, safe, reliable and affordable

transition of California's climate goals.

So, as we think through that, I think, you know, as Karen mentioned, one of the core topics here is to make sure that we both understand the importance of and continue collaboration and coordination not just within the state agencies here in California and within the energy landscape in California, but more broadly in the West.

As all of us continue to work on those important elements, it's extremely important that we have coordination, transparency on what we're thinking through and help each other leverage our various programs to help move forward together.

So, with that I would like to introduce my friend, colleague, and mentor, Andrew here who has -- Commissioner McAllister who has been sharing the topics of western markets and integration with me over the last year and a half, so we work on these topics together. We have been dividing some of this work together to help coordinate and use our skills and time the best we can.

So, for those of you who do not know, Commissioner McAllister has been a Commissioner for CEC -- at CEC since 2012 with a central focus on energy efficiency and decarbonization. He leads the State's Title 24 Building Standards Proceeding and Building

Decarbonization, but Commissioner McAllister is also a member of the Western Interstate Energy Board and our official designee on that from California.

So, with that, it's my pleasure to pass it on to Commissioner McAllister to complete the rest of the session.

COMMISSIONER McALLISTER: Thank you, Vice Chair Gunda. Really happy to be here and just kudos to Elliot, just reiterating a lot of the thanks, particularly Grace and the Energy Assessments Team and the IEPR Team for having put this together.

It really is -- I'll be very brief, but it is really just wonderful that we're having this conversation in California and really kind of collecting a lot of the dots probably, and really inviting people into that conversation here, and I really just want to, again, highlight all of the collaboration that's happening, and I think that will be reflected just wholly today across the whole day and all the panels.

And we have an incredible group of colleagues from within California and across the West that are going to be sharing their wisdom and their thoughts today, and, you know, the -- I guess I would invite everyone to -- we have like a navigation problem in terms of all the acronyms. This is a public

environment, so we want to make sure the record can be developed and understandable by laypeople if they want to delve into this. So, we have the EIM and EDAM and the COSR, and the BOSR, and the WIEB and the WIRAB, and you know, all of these acronyms that we all know but many will not. So, just be mindful of that.

So, we have -- I will just go through the list as it is on the agenda and invite each presenter -- each representative to just introduce themselves very briefly with just a couple of sentences, so we'll try to be efficient in getting through this section. But we will start with Commissioner Letha Tawney who is at the Oregon Public Utilities Commission and has really been a key thought leader and mover on this conversation and just a really I think facile collaborator and facilitator of these conversations. So, Letha, thanks for being with us today.

COMMISSIONER THOMPSON: Commissioner McAllister, I hate to say it. I think Letha Tawney is not able to be here this morning.

COMMISSIONER McALLISTER: Oh, okay, sorry about that.

COMMISSIONER THOMPSON: I'm Mark Thompson from the Oregon Commission.

COMMISSIONER McALLISTER: I'm sorry. Hey,

Mark, how are you. Sorry, about that. Go ahead.

COMMISSIONER THOMPSON: Would you like me to introduce myself on behalf of Oregon, or --

COMMISSIONER McALLISTER: That would be perfect, yes, please. Thank you very much.

COMMISSIONER THOMPSON: Sure. Thanks so much. Hi, I'm Mark Thompson. I'm one of the three commissioners at the Oregon PUC. I've been a commissioner for about three years, and just really appreciate being invited to this. I would echo all the comments that you've heard. I appreciate Elliot's recap of the progress that's been made, and I think Oregon -- the Oregon Commission sees that the same way. We've seen tremendous benefits from the EIM and, you know, from the recently created Western Resource Adequacy Program. We expect, you know, it's very likely to yield some substantial benefits in terms of giving us transparency and to resource adequacy needs, and really represents, I think, the incremental step towards something more like a, you know, a full-on market in the Northwest and represents the kind of collaboration that we think is probably going to be needed to sort of get there on an incremental basis.

So, just to kind of set out our views for the discussion today, we are following really closely to

leading the extended day-ahead market opportunities offered after the CAISO and California markets, and also looking at the SPP Markets+ opportunities, and just really finding ourselves at this really important moment where we have a real hunger to optimize the system in the region as we try to meet our renewable resource goals.

And, so, I think the question is to first identify one major thing that's on our minds, and I guess I would say that as we look at all options that are on the table before us, you know, we're very interested in this and the continuing conversation with California as we recognize major load neighbors for Oregon similar renewable energy goals, and so we see just a ton of value in collaboration and hope that that's reciprocal.

And I think that as we consider all these different options going forward, the question on our minds is what does that look like to really eventually form this partnership going forward where we can have a strong voice and kind of break through these governance questions and figure out how can we really collaborate and more from, you know, what is kind of a California base and California view right now to potentially something that incorporates more western entities, and

it's determined, obviously, if we can do that and how other options kind of shake out on that front. So, really, again, just appreciate being invited today. Thanks so much.

COMMISSIONER McALLISTER: Thank you, Commissioner Thompson. Really appreciate that. And, you know, I think building on the symposium, we felt all the trust in the room there and I think, you know, today we hope to sort of do more of that sort of ground work to build trust and evolve this conversation.

And, you know, to your comments, there is just a lot of oxygen in the room right now, which is great, the desire to move forward together. So, I think Oregon has been a great positive influence in that kind of bridge building and a really positive influence. Thank you to you and your colleagues there.

Next we have Eric Blank, who is the Chair of the Colorado Public Utilities Commission and is here with us remotely as well, and I would say the same comments about you in Colorado in terms of, you know, building the conversation and really being a positive influence to help, you know, bridge some of these informational issues and sort of build the conversation in a way that creates trust and I think makes it easier for us all to hold hands going forward. So, Eric, over

to you.

COMMISSIONER BLANK: Thank you. Thank you for the invitation. I greatly appreciate the opportunity to be here, and since I'm facilitating the next panel, and since I'll start that off with a discussion and framing from Colorado. I'll keep my powder dry and just say thanks so much for having me here and I'm really looking forward to the day and the conversation and appreciate your leadership. So, with that, thank you and I'll give it back to you, Commissioner McAllister.

COMMISSIONER McALLISTER: Okay. Well, great. Thank you, Commissioner Blank. I really appreciate your being here and spending most of the day with us, so thank you.

I don't see David Bobzien. Is he with us? Oh, there he is. Hey, David. I've got Hollywood Squares here so it's hard to tell who's on and who's off. But you definitely fit the Hollywood Squares prototype, so most of us, I think, know David Bobzien. He's from the Nevada Governor's Office of Energy, has been the director for a number of years. I had the pleasure of working with David in a few forms, but in particular, in the National Association of State Energy Officials, and we run across each other a lot, and just always insightful and positive force in any conversation

that he's in, and has a lot -- a broad portfolio on his plate. So, thanks for being with us, David. I really appreciate you being here and over to you.

MR. BOBZIEN: Well, thank you, Andrew, and thank you to everyone in California for the invitation and for bringing together this important conversation, and I definitely want to build upon the theme that's been expressed numerous times about just how exciting it is, the relationships that we have and the personal conversation levels that we have to kind of moved us forward.

And I think from the Nevada perspective I want to express appreciation to a number of you on the panel who have patiently indulged my various efforts to represent Nevada's interests when it comes to transmission, and that will I think feed into the question that I want to pose.

It's important to recognize where we're coming from in Nevada in that all the way back to the Energy Act of 2020, the 25 gigawatt target for the development of renewable energy on federally managed public land, Nevada BLM estimates that north of 13 gigawatts of that will occur in the Nevada geography, so we are building generation. We also have, certainly, our own load needs as well, but with that comes the need for transmission.

And I guess the question I would pose is what are the opportunities? How do we maximize the opportunities for coordinated planning with the states when it comes to transmission needs to connect generation to load.

We're looking at profound changes in the West. We're going to see those in Nevada, and that's something that I want to make sure that we keep front of mind as we move forward in this conversation on integration.

COMMISSIONER McALLISTER: Thanks very much, David. Really appreciate you being here and your leadership on these issues.

And, so, next -- actually, it's a great segue mentioning transition -- transmission rather. We have actually all five commissioners at the California Public Utility Commission with us today, and we'll let each of them introduce themselves in turn, starting with Commissioner Cliff Rechtschaffen who is I think a long-term leader in many fields in the energy space in California having worn a lot of critical hats over the years but involved very integrally in many of the issues we'll talk about today, but in particular transmission planning and the dialogue across the West. So, Cliff, thanks for being with us.

COMMISSIONER RECHTSCHAFFEN: Thank you very much, Andrew. I'm really delighted, like everyone else

is, to have decisionmakers and stakeholders from so many states participating in this discussion and talking about integration. It does show how much work we've done and the unprecedented level of attention to these issues.

I can't remember who said it since we've got a parade of great people already, but the elements that we're going to be talking about today, markets, transmission, resource adequacy are all critical.

I'm going to be leading the transmission panel, so like Commissioner Blank I'll keep my powder dry, but I'm confident we can find solutions to ensure better coordination while preserving each state's policy, priorities and decision making. There's a lot of opportunity with a lot of challenges, but the fact that we're so focus and we have so many people working on this issue in a way that we've never had before is very, very encouraging. So, I look forward to the discussion today.

I thank Grace. I think Grace Anderson has set a record for how meticulous and detailed she is in preparing everyone for this discussion, so I really want to give a shout out to Grace and everyone else at the CEC.

COMMISSIONER McALLISTER: Thanks a lot, Cliff.

I think we all second that, also, a record maybe for the number of planning documents circulated before this workshop as well, which is just going to serve us all in great stead as we really try to focus on the substance, and it really helps to have a highly organized day.

Next, we have Commissioner Darcie Houck who is with me here in person on the dais. We have a longstanding collaboration with Commissioner Houck because she was chief counsel at the Energy Commission for a number of years before moving over to the PUC and is just a thought leader in many areas and just a really thoughtful leader I would say on these and other issues. So, thank you for being with us Commissioner Houck. Over to you.

COMMISSIONER HOUCK: Thank you, Commissioner McAllister. I just want to thank the Energy Commission for sponsoring this workshop. I think it's an important and timely discussion, and it's really great to see so many leaders across the West sitting here both in person and virtually. I think we all have a lot of challenges ahead of us as we're talking about western integration, but there's tremendous opportunities and now is the time to have these discussions. I think as Commissioner Rechtschaffen said, we've made a lot of progress. We've got a lot of folks looking at these issues, and we have

a lot of potential.

And I just want to also highlight, you know, we've all stated in various forms, including some of the speakers earlier today, the priority of reliability and cost effectiveness, and I think we all have that as a foundation and a priority to make sure that we ensure reliability and affordability as we move forward with our clean energy goals, and I'm really looking forward to the discussions today and hearing from everyone across the West.

COMMISSIONER McALLISTER: Great. Thank you, Commissioner Houck, and thank you for your leadership on tribal issues as well which I think is, you know, obviously relevant here also.

Next, we have Commissioner Genevieve Shiroma. Genevieve has also a long history in energy and previous to joining the PUC was on the board of the Sacramento Municipal Utility District, so has a wide-ranging perspective on utilities and regulation. And we partner quite a bit on energy efficiency and some of the equity issues as well around energy efficiency in our programs in the state, which are, you know, from my perspective foundational to build into this conversation. You know, it's all kind of increasingly connected. But as we talk about load flexibility, and digitization, and active

grid management, those kinds of resources in an aggregated way are going to really play a part in this conversation, and I'm really sort of gratified to be working on those issues with Commissioner Houck and Commissioner Shiroma and their colleagues on this, and just the leadership we're developing in the state. I think it's going to be really critical going forward.

Anyway, with that would cede the mic to Commissioner Shiroma. Thank you so much for being with us.

COMMISSIONER SHIROMA: Thank you, Commissioner McAllister for that very nice introduction. Good morning, everyone. I'm very pleased to join you. Many thanks to you, Commissioner McAllister, Vice Chair Gunda, Chair Hochschild and your team at the Energy Commission for this very important convening. Very impressive, thank you.

As Commissioner McAllister outlined, you know, the various proceedings such as energy efficiency in my case, also the clean miles standard for transportation network companies, the wheelchair accessible vehicle proceeding, the market grids and resiliency, water utility consolidations and acquisitions, and the low income offerings for energy customers and communication customers energy savings, in all of these proceedings I

look for opportunities through the utilities, through the customers who are affected, through our regulatory authority, what are the opportunities for contributing to our decarbonization future to the reliability of the grid, the resiliency of the grid and whether it's small or large.

And I think the experience of going through the stay at home during the COVID pandemic really helped to inform the kinds of quickly designed efforts to keep everything running, but also really keep an eye out for the consumers.

So, I'm looking forward to the conversations today. As those have said, it is really about how to advance integration in a decarbonized future, how do we prioritize and evolve markets for access to renewable energy to lower our greenhouse gas footprint, and improve reliability with our sister states, and keeping an eye to the affordability, especially for our lowest income customers.

So, thank you very much, really appreciate being here today. Back to you Commissioner McAllister.

COMMISSIONER McALLISTER: Thank you very much, Commissioner Shiroma, and thanks for your leadership in those areas, really critical.

Next we have Commissioner John Reynolds from

the California Public Utilities Commission, and really happy to have the entire contingent of PUC commissioners with us, and, you know, the PUC deals just with so many critical issues and doing that in a facile way that allows for some, you know, cross walking between all those issues is particularly challenging I think in that environment, and just the collaboration that we see both among commissioners there and just the outreach to the other agencies, certainly including Energy Commission, to coordinate on specific issues is just so vital, and it's happening, really, in an unprecedented way I think just across the board, and I think the fine commissioners, including Commissioner Reynolds, Commissioner John Reynolds, is -- just that culture is just a pleasure to engage with every day, and so thanks to you for being here and over to you.

COMMISSIONER REYNOLDS: Thank you so much Commissioner McAllister. It's a pleasure to be here with colleagues throughout the West, and I won't repeat everything that's already been said, but I agree with so much that was said by my colleagues, and I would particularly like to amplify the remarks of Commissioner Houck. I think it's really important that we yes, continue to build relationships across the West, build trust, and it's also important I think that we focus on

our shared interests. I think that we all have shared interests in affordability, in reliability and in meeting our respective states policy goals and I really look forward to today's dialogue. Thank you so much for putting this all together.

COMMISSIONER McALLISTER: Okay. Thank you very much. We are moving down the list here, and we're getting towards the end of the plenary. And we are lucky to have our colleague, Commissioner Vaccaro, here. I don't see her on camera. Oh, she's not here, okay. She's on the list but not here today, okay. So perhaps she'll be joining us later. We'll see.

Let's see. With that I want -- we're lucky to have a couple of particular VIPs here with us today, and I just want to introduce them in a little more depth. Thanks, everyone for self-introducing efficiently. I really appreciate that.

So, I'm really honored to introduce Liane Randolph as she is our host today because we're in the CalEPA building for the Air Resources Board, which she chairs, and hard to believe that Liane has been leading the ARB for more than two years. Time flies when you're having fun.

And, you know, during her tenure the board has really made some groundbreaking decisions and just

really impressive strides forward on our decarbonization future, and recently, in particular, requiring all new vehicle sales to be electric in the not too distant future, 2035, light duty, and as well as the scope of land development which has -- you know, is ongoing and, you know, the latest, the final version is out publicly right now and it is just a massive step forward even hitting the popular press which is kind of unique to our sector, and just that level of leadership really helped move the needle. It helps open the envelope to lots of possibilities. So, really thankful for Liane's leadership at ARB.

And Chair Randolph is no stranger to electricity. She previously served as a California Public Utility commissioner, leading in many areas, including one of our panel topics today on resource adequacy. She was also the deputy secretary and general counsel at the California Natural Resources Agency. So, a real pro in our area, and, so, we're really looking forward to your comments today and over to you, Chair Randolph.

CHAIR RANDOLPH: Thank you so much and welcome here to the EPA building. I'm feeling very relaxed. I don't have to run the meeting. I don't have to wrangle any votes. Just hanging out here on my dais, and so

appreciate being here with all of you.

And in a couple weeks we will -- the board will convene to consider the scoping plan, the update of the AB-32 Scoping Plan, which will set forth the continued work that California is doing in decarbonizing the economy. And that plan calls for an unprecedented increase in load growth. We are moving away from fossil fuels in buildings, and in transportation, and in all segments of the economy that we can. And, so, the importance of integrating the western electricity sector, the importance of ensuring that we have the resources that we need throughout the West to support this transition, the importance of ensuring that it is as economically efficient. As Commissioner Houck mentioned, affordability is a critical issue along with reliability. And we really have an opportunity throughout the West to make progress in tackling climate change and having an effective electricity system that will support the transition that we need to see.

One of the things I very much enjoy about my job is working with other states on all of these goals and implementing all of these goals, so I'm super happy to be here with colleagues from throughout the West. And I'm looking forward to the discussion today and just want to express my deep appreciation for the CEC -- to

the CEC for convening us, all of us to have this really, really important conversation, so thank you.

COMMISSIONER McALLISTER: Thank you, Chair Randolph and for hosting us.

Our final speaker on the plenary is also a real pro in this space and has worn a number of hats through the years and just has a breadth of experience and insight that is remarkable. And wanted to conclude the plenary with welcoming Alice Reynolds, the president of the California Public Utilities Commission.

Alice was appointed president of the CPUC in 2022, so still, I guess, roughly a year in, but before that served for three years as Governor Newsom's senior advisor for energy and as a senior advisor for the climate, environment and energy, was also a key member of Governor Brown's energy senior leadership team as well, and she previously served as chief counsel for the CalEPA. And really thanks for all your leadership President Reynolds, and I'll pass the mic over to you.

PRESIDENT REYNOLDS: Thank you, Commissioner McAllister, and I also wanted to give a special thanks to Vice Chair Gunda for your leadership in bringing us together, and then, of course, to all the staff members. You heard Grace called out today, but also to other staff members who picked up orders to organize this

event.

I'm really happy to be joining you today, and as you've heard from the other CPUC commissioners, I think we are all pleased to join you as a full commission for this event.

And I'm also incredibly grateful to everyone who's attending both in person and virtually. This is a critical workshop, and as you've just heard, we do have an impressive group of panelists, our California Energy Commission, our energy family, and then also our sister state colleagues. So, welcome everyone.

I did just want to get us warmed up for the day and take a moment to reiterate something that you've already heard from numerous people and that is -- and that's also illustrated by all of us gathering today and the theme for the day, and that is that we are all interconnected, and we certainly feel that at the California PUC and we appreciate being here with our partners.

We also understand that each state, each utility, each balancing authority can better achieve reliability and cost effective outcomes through cooperation and reliance and reliance on others. These are some of the things you've already heard about today, reliability and affordability.

And like other states, and I think Mark mentioned this for Oregon, California has big dreams. We have lots of work ahead of us, and today we'll be talking about our continued joint course which we all know can lead to achievement of a more integrated and coordinated future.

So, I'm hoping that today we are all really thinking outside of our boundaries as we approach the topics today, but that we're also sharing our views and expertise that we've gained from within those boundaries.

So, I'm here virtually but I can tell there's a collaborative spirit in the room, and I think in all of their remote sites as well, so I look forward to the discussion and I have my eye on the operational and economic benefits awaiting with our joint cooperative actions.

So, with that, I'll turn it back to you, Commissioner McAllister, and I'm looking forward to getting started. Thank you.

COMMISSIONER McALLISTER: Thank you, President Reynolds.

So, that concludes our self-introductions, and I really appreciate everyone's comments. I mean what a star- studded group we have going forward. And with

that, I wanted to pass the mic back to Vice Chair Gunda for some concluding comments for the plenary, and then we'll get started on our panels.

VICE-CHAIR GUNDA: Thank you, Commissioner McAllister. Thank you for helping that -- facilitating the introductions.

Again, I want to just, you know, say a big thank you to Grace, Chris McLean and the Energy Assessments Division, and everybody who took the time today to be here and move the conversation forward.

I want to underscore a couple of things that, as most of us mentioned here, and just, you know, the attendance here today is indicative of the importance of this conversation. You know, we have such thought leaders across the West, leadership from across the West be a part of this conversation, just reiterating the importance of this conversation that is happening today. So, I'm really glad that we're doing this.

The other thing I wanted to just raise is a significant part of our Integrated Energy Report this year is equity and how do we ensure equity as we move towards our energy transmission, and a part of that discussion has been around, you know, shared goals, finding common ground, making sure we understand the tradeoffs, and for that, you know, the importance of

transparency and putting everything on the table and coming together to raise the importance of our own values and convictions, but also working towards common goals.

So, I think we have an incredible opportunity here with the leadership and top leadership as well as decision making power to help us move forward in the West together into really reaching our goals of reliability, affordability, resource planning, all of that, at the same time holding on to our own values and convictions that we have to bring to the table.

So, again, incredibly grateful for all of you being here and looking forward to the rest of the conversation, and again, a big thanks to Grace for really thinking through how best organize this and move the conversation forward.

With that, Commissioner McAlister, I'll pass it back to you.

COMMISSIONER McALLISTER: Thank you, Vice Chair Gunda. We're a little bit ahead of time which is I think a great omen. It's going to open up all sorts of possibilities for a dialogue which is excellent.

So, with that we will move into our panels, and I want to just preemptively thank Commissioners Blank, Rechtschaffen, Tawney and Houck for helping

facilitate -- for facilitating those panels.

And our first panel is about the essential role of markets. Maybe I'll look at the IEPR team and just see if there's any housekeeping that needs to be done before we launch. No, okay, great.

So, let's just move right into the first panel, the essential role of markets, and facilitated by Commissioner Eric Blank from the Colorado PUC. So, over to you and your team, Eric. Thank you.

COMMISSIONER BLANK: Again, my name is Eric Blank, and I'm a lawyer, an economist, and the current chair of the Colorado PUC.

Before that, I spent just under 20 years running a pioneering national renewable energy company that I formed and cofounded.

Among other things, at one point we developed the largest operating solar projects in MISO, PJM Georgia and Colorado.

And I just say, again, I'm honored to be here again today. As President Reynolds implied, we're all in this together, and I'm very much looking forward to the conversation today.

And I just want to start off the panel by framing the regional markets issue from a Colorado perspective. By state statute Colorado is obligated to

join an organizes wholesale market and reduce greenhouse gas emissions from the utility sector BY at least 80 percent by 2030.

Separately the Colorado PUC was asked by our legislature to quantify methods and costs of enhanced regional coordination.

A "zoning study" found that regional markets could reduce statewide utility costs in Colorado by roughly 300 million per year, or about five percent off of six billion dollar annual statewide revenue requirement.

These benefits were roughly the same whether we went west to CAISO, east to SPP or did something in the middle.

Of the total benefits identified in the study, roughly 20 percent, or 60 million dollars a year, resulted from energy and imbalance markets and optimizing dispatch. The remaining 80 percent accrued from optimizing unit commitment and other capacity and reserve margin sharing.

We did not try and attribute these latter benefits between day-ahead markets and a full RTO because the answer seemed to largely depend on how much new transmission be built and on capacity sharing which seemed at least somewhat independent of market

structure.

At the same time we also found that there were real concerns associated with moving to a full RTO mainly involving shifting control of interconnection queue management and transmission expansion, state processes to regional.

In Colorado under our current approach interconnection is timely awarded winning that is in a state managed resource planning process, and individual projects can be quickly quote online.

As I understand it, each of the five national RTOs are struggling with new filings that are several multiples of coincident peak demand. There was concern that shifting our interconnected or regional process could delay our clean energy transition.

Similar issues may surround transmission expansion. In Colorado we can build new interstate transmission in three to five years from application, wherein in the RTOs it can also take eight to ten years. So, again, this may be a significant issue for our clean energy transmission, although we're hoping Commissioner Rechstschaffen can help us solve this concern in his panel later today.

Other concerns involving governance, emissions tracking and team's issues may arise in the formation of

a "day-ahead" market which seems a far more amenable solution.

In summary, like many others have said, we see real quantifiable benefits to enhance regional coordination and believe that some significant portion of these benefits could be realized through day-ahead markets. We think for a bunch of additional benefits to going to a full RTO, but are struggling to quantify and compare those benefits as against, in our view, some of the real unresolved issues surrounding interconnection and transmission expansion, and maybe governance.

I'm very much looking forward to hearing and learning from our incredible panel of experts, and I'd like to start with our lead presenter, Keegan Moyer. And Keegan is a principal of Energy Strategies directing the firm's technical transmission and market analyses. His project teams provide advanced grid simulation tools, complex industry data sets and financial analyses to help clients identify and evaluate generation and transmission investments, market strategies and energy policies.

Keegan is responsible for support of generator interconnection and transmission service. He has worked with clients in the western, eastern and Texas interconnection.

Keegan, would you like to take it away, please.

MR. MOYER: Thanks, Commissioner Blank, and also thanks to the Energy Commission for having me here today. I appreciate the chance to speak. It's sort of my own nod to Grace that she's been present in regional forums, you know, outside of the borders of California for years, and I think in some sense today is a realization of the benefits and the strategy of California for having done that and had her out there. I know I certainly wouldn't have had a chance to interact with her over the last ten years absent that, and I probably wouldn't be here today absent that, so I want to just recognize that before I start, and also recognize that for me this is a little bit of a homecoming. I grew up in California on the fringes of society in eastern Lassen County, and so it's fun to fly in last night and see the Sutter Buttes and, you know, think of the I-5 road trips as a kid, so it's good to be home in some sense.

So, that's not where I reside now. My firm, Energy Strategies, is based in Salt Lake City, Utah. Our company has been in business for about 35 years, so a long history in the electric and natural gas sectors. We have regulatory practice, a policy practice and the

practice that I lead is our Transmission and Market Analytics Group.

And, so, I'm excited to talk to you today -- you can go to the next slide -- and really try to set the table for my panelists. I'm often called upon to give presentations like this where I go fairly deep into a specific topic, or a study that we've done, or some type of analysis.

Today's presentation that I'm going to give in the next 20 minutes or so -- I should start my timer here -- is a little bit different. I'm hoping to build up, kind of provide some building blocks for the panelists to kind of run from, and in the spirit of building a public record I hope to keep this as simple as possible. But this is a relatively complex topic when we're talking about the role, and the benefits, and the services of wholesale energy markets, so, we'll see if I can step through this, and I will say I'm having one of those moments when I'm looking at my contents here and wondering if that's really what I'm going to talk about, but -- so I'll see how that goes.

So, if you can go to the next slide, I'm going to start with literally the worse opening slide that you could possibly have. And, so, this is an overview, an attempt to break down the different types of services

and attributes that you would associate with different types of wholesale energy markets. And I put the words in generic because every market in its design is slightly different and they have different features that really make it difficult to fit this all in one slide. And, so, there's certainly some tweaks around the edges here that could be done talking about any specific proposal. But the intent in showing this slide is it says "reference sheet," and that's intended what it's supposed to be. I want to do two things here before I walk through it, you know, is really give the CEC, the laymen reviewing these contents kind of a guidebook to be able to look and say, you know, what is the difference between some of these market constructs. And to some extent I hope to make that layman or professional somewhat dangerous and kind of understand what types of questions to ask about these different market constructs and features that we'll talk about more today.

In addition to that, one of my goals here is to maybe set a little bit of a framework on the next slides I'm going to show, sort of what we have now -- if you could go back actually -- I'll talk about where we're at now and what we hope to gain by some of these new market services.

But before I do that, I'm going to talk through kind of what each of these are and draw some, hopefully, reasonable analogies in going through each of them.

So, to start, you know, the different types of markets. We have a bilateral market, a real-time market, a day-ahead market and an RTO. Those are sort of incrementally add-in services and features. You know, there's some costs and other governance issues that come along with those that I'm really not going to get into today. I'm mostly talking about what knobs do you have to turn. So, on the left you have, you know, how does the dispatch work. How does the transmission wheeling structure, so what's the cost to move power from A to B? How much transmission is in the market? What type of transmission planning functions do or do not exist? What's the tariff structure? You know, where's the balancing area at? Those are all the different knobs, and those things change as you move across the screen.

So, I'll kind of briefly describe maybe at a higher level. I don't think it's really that useful for me to get into all those details, at least in this session. I'll leave that to my panelists to do.

But just a high level, you could think of a

bilateral market really as the Craig's List of energy markets, all right. So, you go on Craig's List and you are trying to find something, and it's a rather manual process, right. You kind of search in I want a dishwasher, and you find one that meets your needs. You see the price. You call up the person. You send them an email, and you buy it from him, meet at some central point, a hub, right, in that case of energy, and there's basically a bilateral transaction that takes place.

Some of the [sic] tenets of that is that there's not a lot of flexibility in what you can choose, all right. They're kind of pretty strict products, and those products aren't often as granular as you want.

The other thing to note is that that transaction is not automated in any way. It's relatively manual. There's a lot of friction, and, so, because of that there's a limited economic efficiency in bilateral markets. Prior to the EIM that's effectively how the West operated for a long time outside of the CAISO.

The next market, a real-time market, I'm going to equate this to equivalent of like Door Dash or Uber Eats, right. So, it's really meeting your real-time needs. So, you know, you forgot to pick up groceries. Dinner has got to get on the table. You can open up the

app and have your short-term needs met. You're not going to get rid of your entire kitchen just because you have this ability to have your short term needs met from a meal standpoint. It's not going to avoid any investment. You know, it's not going to change how you might have planned things the day before, but it will address those real-time uncertainties and difficulties for those of us trying to manage a family and get everybody fed, right.

So, that's kind of more what we would compare real-time market. The substantial benefits, though, as Elliot mentioned earlier, a couple little benefits of about three billion dollars since 2014. And, so, these real-time markets can have a substantial impact in the efficiencies of the system and also help to support reliability.

The next market tranche, day-ahead market, the equivalent of that would be like Amazon, right. So, you're able to order something and it's there the next day. You can kind of plan your life around the ability to get what you need. These are large purchases. There's a lot more volume of transaction going on in a day-ahead market and Amazon relative to just ordering a burrito on Uber Eats. So, it's a completely different marketplace. There's tons of market participants. You

can get almost anything you need from a market and product standpoint, and it's reliable in terms of there the next day.

The final comparison I'll draw with RTO, it's sort of like Google in the sense, right. It's really the internet, right, so it can house these other market features that I've talked about.

In addition to that, it provides substantial levels of transparency, and insight, and ability for really a connection between all these different market products.

So, when we think about, you know, moving from one market to the other and where we're at today -- so now if you can go to the next slide -- we're certainly not there. So what I've highlighted here in green is sort of just a really kind of crayon sketch, if you will, of sort of from a western perspective which of these tabs have we knocked off to some extent so far. And, you know, I'm open to debate around the edges here, I think. A lot of this depends on how some of these market products evolve.

So, there's one point I'd like to make before I move on, you know, and it relates down here. There's going to be a whole panel on resource adequacy, so I'm not going to talk much about that right now. But when

we compile this chart, you know, we're associating resource adequacy with a particular market service, right, and it's certainly true, as we've seen through the development of RAPC and the Western Power Pool Western Research Adequacy Program, there's ways to overlay that function, right, and semi-connected or fully connected to some of these markets. So, it's not necessarily required or mutually exclusive.

Okay. So, the rest of my presentation -- if you can go to the next slide -- is really, okay, if that's where we are now, what are some of the benefits that we expect to gain by really capturing more of these market services as we move from, say, left to right across the screen and add various products? Where do we get and realize the most benefits? Where's the most bang for our buck in terms of adding these market features?

Let's go to the next slide, please.

So, the panelists here are going to discuss the details of some of these market proposals, the market design. And what I'm going to focus on is kind of the underlying driver or purpose of these markets, which is to improve the efficiency and reliability of the system. These improvements, you know, to really justify moving this forward, some of these markets, we

try to estimate what types of benefits they might create.

So, we do that by, to the extent possible, translating those benefits into dollars savings whenever possible, and that allows regulators, and policy makers, and utilities to make the decision, you know, around if the juice is worth the squeeze in terms of pursuing these different markets.

This breakdown here is how my firm has been thinking about kind of stacking the benefits for regional energy markets over the last couple of years.

The first category of savings I want to talk about is operational savings. So, this is really not anything to do with investment. This is literally how efficient are the operations of your system. This is the dispatch of the units. This is avoided start-up costs. This is, you know, more efficiently managing your transmission capacity through a market. This is, you know, lowering your operating reserves requirements and allowing you to decommit resources that you otherwise would have had to commit to meet that obligation, right. All those result in operational savings, really avoided fuel costs, avoided start-up costs, all the mechanics, you know, and costs that roll up into the kind of hour-to-hour costs we see on the

system. Now, through a modeling exercise I'll describe momentarily we can estimate what those costs are.

The next tranche of benefit we broadly refer to as capacity savings. These are basically savings due to efficiencies tied, you know, to planning for resource adequacy on a more consolidated basis. That's a better way to characterize it. Capacity savings is sort of short for that.

So, when we look at planning for an individual system, right, it's sort of the simple notion that as you add load and broaden the geographic footprint, you capture load diversity, resource diversity benefits, and those add up to really avoiding investments that you otherwise would have had to make.

This is not always obvious, but, you know, the most popular benefit category is the first one I mentioned where we're looking at, you know, how much do we save when we change the way the system operates. Well, those investments have already been made. Those assets are sitting there. We're just making tweaks on, you know, did this unit run at a 43 percent capacity factor or a 42, you know, and you can save a lot of money doing that.

But where the real savings add up in terms of market efficiencies is when you don't build the unit to

begin with, right. The capital investment far outweighs generally the operational savings. So, that's an important note and that really supports some of our findings from some of the work we've done the last couple of years that I'll get to momentarily.

The third tranche of benefits is really -- I'm calling this other energy related savings, so these are savings related to the energy sector but that are often difficult to quantify.

So, at times it's fairly difficult to quantify. Say you've had an RTO and that RTO gave you price signals that would allow you to plan a transmission system more efficiently. Well, how much did that save you rather than the status quo? That's a difficult number to quantify. We're pretty sure that it's big, but we just don't know how big all the time.

There's also this idea that a more integrated marketplace, you know, removes the pancaking of transmission fees, right, so then if you're a state like California or Oregon and you want to access say Wyoming wind, right, you could contract for those resources because the market gives you a framework to do that. And, so, that's also a difficult benefit to quantify, but it's definitely substantial.

There's also the environmental benefits of

reduced emissions. We typically don't always tack those on, but depending on how much you value reduction in carbon emissions, markets typically lead to those, and so those could be valued to some extent.

And then there's also other factors like today in the bilateral markets we typically trade power in blocks, you know, blocks of power or strips of power. Being able simply to move from a strip trading structure to an hourly trading structure inherently has savings just from changing the types of products that you're trading. The higher fidelity or the granular the product, you can buy and sell only what you need which leads to economic efficiencies.

So, those are all sort of energy-related savings that, you know, aren't always quantified and certainly weren't quantified in some of the work that we've done recently, but are not lost on those that think about these types of things.

The final tranche of benefits are nonenergy savings. So, it's not pretty clear to most of us in this room that to some extent our cost of the power is a, you know, lynchpin to the economic productivity of society. So, if you save on your power costs, those savings trickle through to all of the organizations and companies and allows them to hire more people who get

paid more, who help increase the productivity of society. So, there's certainly follow on benefits by achieving these savings in the electric sector.

Our firm just recently completed a study which I'm not going to talk about much more today for the advanced energy economy looking at some of these follow-on benefits, and I'll just say that in terms of jobs and economic benefits to the Western region, you know, with hundreds of thousands of jobs it's tens of billions of dollars of gross regional product impact, and it's hundreds of millions of dollars of tax implications when you look on the follow-on effects of some of these kind of savings that we see in the energy sector that then flow through to the rest of industry.

Go to the next slide.

So, I mentioned I would come back to how we quantify some of these benefits. This is my one slide attempt at that. This is a -- you know, a task that takes months to do, and I'm kind of breaking it down here to one slide. I would have omitted it except for that the CEC and the CPUC are such respected modeling enterprises that I thought it would at least be worth having the modeling slide here.

So, when we look at the operational benefits of wholesale markets, like pretty much any study you

would do, it really starts with the business as usual case. So, when we do these types of analyses we endeavor to build into that business as usual case all of the status quo sort of representations that we can think of, including transmission plans, generation, load forecast, policy requirements, existing markets like the energy imbalance market.

And then on top of that we develop a series of I'm calling them modules, but basically these are knobs that we can turn in our simulation tools to represent what would this market do, right. Would it create transmission paths that wouldn't have a wheeling rate? Would it, you know, combine ancillary service products, and we're able to plug those assumptions into the model, run both studies and compare the two, right. And so that comparison is where a lot of the benefits in the analyses that you see coming out. There's a suite here of software tools. We use several. Companies like mine also use them. And, so, this is kind of the framework where a lot of this type of these conclusions are built from.

Go to the next slide.

So, this is just a quick reference to the materials that I'm kind of pulling from today. Over the last several years my firm has completed three studies

relevant to today's topic. Many of the participants on the call were involved in the state-led market study which was a DOE funded effort led by the state of Utah and some sister states that applied for the grant, all 11 western states involved, and really was a modeling and kind of a policy exercise, leading states, energy offices, public utility commissions through a process to evaluate market benefits by the states for the states. You know, typically these studies are done by RTOs and utilities. So, that was, I would say, a first of its kind effort to look at this from the state's perspective. That work was completed in 2021.

My firm just also just recently completed some work for CAISO looking at the benefits of EDAM market proposal. That work was published just a month or so ago. And then a couple years before that we completed some work for the Western Interstate Energy Board called the Western Flexibility Assessment which looks at flexibility challenges the grid faced in 2035 as we approach the high penetration of renewals.

A major finding of that study is related to what we're talking about today, which I'll quote my own words here. "It will be very difficult or at least extremely costly to achieve western policy targets without broad coordination of wholesale markets." So,

highly relevant to today's discussion.

That's not the only work on this. I think there's going to be a discussion later about ACR-188 and the suite of studies that have been identified, so there's about 38 other studies that are really similar to these three that I just mentioned that provide a wealth of information on this topic to California and the rest of the Western region.

Go to the next slide.

So, quickly here, this is a one-slide attempt to summarize a couple years of work, breaking down some of the benefits that we've estimated for some of these markets that I've been talking about so far.

So, what you'll see, first of all, these are all in millions of dollars per year savings. So, a quick observation. You know I mentioned that three billion dollars a year, three billion dollars since 2014 that we've observed for the EIM. You know, we're looking up here and some of these scenarios, you know, 1.4 billion per year, right. So, there is still a lot of market efficiencies left to be had for the West. That should be the first take away here. The EIM was an excellent first step, and the three billion number is impressive, but every data point that we've seen from our work and others is that there's still a lot of

opportunity out there, which is why you see so much effort, I think, put into this by the industry.

The other thing I wanted to note is the dash line kind of separating this chart. The chart on the right is the recent work we performed for the CAISO. The stuff on the left there is the state-led market study. They're comparable enough, you know, that I put them on the same chart, and so I wanted to mention that before I went any further.

So, there's two categories of benefits rolled in here. The green bars represent the capacity savings I described earlier that sort of represents the load diversity of the system. The blue bar represents the operational savings. For reasons I mentioned earlier, we often see the capacity savings exceed what we see in the blue bar.

A couple important caveats here with regards to the capacity savings and why certain market products and footprints have that shaded in light green and certain have been shaded in a dark green.

So, we've been operating just for the purposes of presenting materials, operating under the assumption that a future RTO would have embedded in it some type of RA program that would achieve those savings, right, and we haven't gotten that much debate or pushback on that

from stakeholders. So, I think that's why we put in here, you know, you stack those two together, that's a reasonable forecast of the benefits that you would get from an RTO.

These other market scenarios which look at basically day-ahead markets show those operational savings stacked on top of the capacity savings. And the reason that those are shaded in a lighter color is that those benefits are more uncertain. It is not a given that a day-ahead market would definitively have a resource adequacy construct attached to it. It could be, like I mentioned earlier, a parallel program that might realize those benefits.

I'll note here that, you know, as it relates to capacity savings you can only get those benefits once, so, to the extent you have a different market framework to get those benefits, you're not going to get them again just because you pursue an RTO or something like that. You're going to wring those benefits out at some point.

The fourth note I want to make here, you know, I've got two notes here on the bottom. What we're varying here as we go across the screen are different types of markets and different type of market footprints. So, you can see here the little --

VICE-CHAIR GUNDA: Keegan, just a quick question on that previous slide.

MR. MOYER: Yes, absolutely.

VICE-CHAIR GUNDA: The percentages in the blue, they are not the same as the ratios. Can you please explain what the percentage is?

MR. MOYER: Yeah. I was about to get to that. That's perfect.

So, it's oftentimes when we characterize operational savings, which I'm referring to in the blue there, it's interesting to see the 500 million dollar per year number, but that doesn't really help to put things in the context that much, so here we're providing them as a percent reduction in operational costs.

So, in the case of, for example, the one market EDAM study which we basically assume what happens if EDAM spreads their cost to the West, we're saying there that operational costs for the West will go down by five percent.

And these ranges here, you'll see prior work. Typically, when you do these studies, the number generally end up between kind of one to six, seven percent changes in operational costs. So, we're generally not seeing a 50 percent reduction in operational costs just because we had a market that's

just sort of technically infeasible. These are marginal reductions but they add up to fairly large numbers when you aggregate them across the entire region.

Okay, next slide here.

So, focusing on operational benefits, I'm glad you asked that question and kind of got us focused in on that because that's what I want to talk about next. We've done enough of these studies at this point that we're able to kind of break the data down and look at, you know, where do the benefits actually come from an operational savings standpoint.

So, what's the best we can do? The best we can do from an operational efficiency would be an RTO where we kind of combine balancing areas, no wheeling costs in the system. Transmission is used up to its maximum capability. That's sort of a best case kind of theoretical operational efficiency, and that's the chart on the left, right. Let's just call that 100 percent.

So, what we've broken down here is how much of that we can achieve through these different market products, and what else we get by adding on different modules, if you will.

So, the bar in the green, that's basically a day-ahead market that has limited transmission availability dedicated to the market, and a, you know,

nominal three dollar per megawatt hour wheeling rate. So, there's some type of charge between those transactions. That achieves about 14 percent of the operational savings of an RTO.

So, if we remove that three dollar kind of hurdle, right, that only gets us an additional two percent. So, what does that tell us? That, you know, it does kind of matter what we're charging in these day-ahead markets in terms of the efficiencies we eek out, but it's not really that big of an impact, and that's more of a transmission revenue issue, right. That's not really related as much, in my opinion, to the operational efficiencies we expect to see from the market.

What does matter a little bit more is how much transmission capacity you have available in that market. If we basically say, market, you have all of the capability of the system now with which to optimize your day-ahead dispatch, we get an additional 14 percent savings, right. So now we're actually making some headway in terms of these day-ahead markets and how much efficiencies they can ring out by adding that in.

The final lever that we pulled is this concept of an imbalance product, so this is sort of a, you know, between a ten and 20 minute forecast error variability

product really consistent with in the EDAM proposal. And what we see is that has an outsized impact on the operational efficiencies of the system. And what that really tells us that when we look at the benefit of markets there is, you know, this wheeling model and how much transmission capacity can be available. That all makes a lot of sense, but you get tons of benefits when we say, hey, let's operate our system together in terms of how we're going to move our power, you know, in these ten to 15 increments and, you know, adjust our day-ahead schedules with that in mind.

So, we saw significant amount of benefits and that's -- you add all these up, you get to about 78 percent, so that's what we estimated for the CAISO's WECC-wide EDAM achieved about 78 percent of the operational savings of an RTO.

So, where is the other 22 percent? That's kind of balancing areas we still assume have their regulation reserves. We have contingency reserves. These are other reserve products kind of sitting out there that if you consolidated those like you would in an RTO to some extent you'd get the rest of the way there.

A couple caveats here. This is going to vary state by state, all right. These are kind of general

regional numbers. And, also, I'm only talking about operational savings here, so this is kind of just one tranche of benefits that I'm breaking down in this manner.

My final point here before I wrap up is that, you know, I've got this orange arrow which is about transmission expansion. So, transmission expansion can be thought of a couple ways. So, it's sort of a rising tide that lifts all boats, right. So, markets will give us price signals that make it more clear what transmission should be built, sort of going to be great once we have those day-ahead price signals.

It's also true that from some of the work that we've done when we add that transmission in we see the performance of these markets increase, right. So, they perform better. They result in more savings, and in this case our RTO study for the West resulted in 13 percent additional savings, right, when we had more transmission built out onto the system.

So, there's this idea that, you know, should I build transmission before or after. It's sort of this no regrets investment in a sense. Don't wait for a market to form to build your transmission, right. You don't need those price signals. You can build it now and be confident that whatever market you end up with

will operate more efficiently with that transmission service, and that's simply because we don't have enough of it in the West right now.

Go to the next slide.

So, I'll wrap up here with a view on kind of, you know, less about the benefits, but maybe policy implications and planning decision impacts these markets could have. So, it's definitely going to impact resource procurement and some of the policy choices made by states.

So, first of all as I mentioned earlier, policy objectives that require high penetrations of renewables in the long run are likely to struggle absent a regional market, struggle in terms of cost, struggle in terms of reliability, struggle in terms of just general technical feasibility.

Similarly, to the extent you have a regional market, that would enable policymakers to the extent this is a priority to be more aggressive with those carbon reduction targets. So, it would give states the power to look at that problem differently.

I'll also add here that markets would change the way energy procurement is done, right. You have now the ability to procure, depending on the market setup, more geographically diverse resources which helps to

improve reliability, likely to lower costs, so on and so forth.

I've mentioned this a couple times, markets will also help facilitate the buildout of transmission, you know, when and where and what should be constructed. Neil and his team have clear price signals within the CAISO that says we've got congestion between A and B. Let's build project Z. It just makes sense economically. The rest of the West does not have that, so there's likely lots of benefits to be found in that simple framework.

Reliability will increase, you know, that rarely quantified benefit, but as California knows well, the value of lost load, right, and so to the extent we can tie that to these markets there's a lot of value there.

And then it would be remiss if I didn't again make mention of governance structures and the impact of those oversight and jurisdictional issues on these policies, so I'm not going to sit here and act like I'm an expert on those things, but it felt a little disingenuous to list all these benefits and talk about all these great things but not address some of the challenges in getting there.

So, thanks for the chance to make those

comments. I'm happy to take any additional questions you have, otherwise, I look forward to the other panelists.

COMMISSIONER BLANK: Thanks, Keegan. Do you guys have any additional questions for Keegan?

VICE-CHAIR GUNDA: Yeah, thank you, Commissioner Blank. Just a couple of questions at a 30,000 foot level. First of all, Keegan thank you. That's an excellent setup, you know, recognizing the details that you've said might change a bit, but just kind of the setup of the importance of markets and how do we think through the different values stack readily. I like that.

Just a couple of things from a modeling perspective, but also kind of the imbalance product that you specifically mentioned.

So, the modeling question first. So, when you kind of dabble up these regional modeling, you know, which we are all doing to understand the benefits regionally, based on the input that you take into your modeling, how are you prioritizing the knobs that you used, you know, for understanding regional efficiencies and statewide priorities? How are you managing that in your model?

MR. MOYER: So, what we've tried to do when

we've been doing this work the last couple of years, in the case of, for example, the CAISO EDAM proposal and we went off to model that, we were able to interact with the CAISO staff, it's a specific market design proposal, and basically it's an exercise of sitting down with those that do that and developing ways to reflect that in these simulations tools, right.

So, that's a relatively straightforward process, whereas the work that we did previously with the state-led study, there's a lot of judgment, I would say, you know, that we developed with the states and those that participated in that effort to say, you know, what's a reasonable representation of this type of market framework based off our experience, what we've seen in the East, right. And, so, it's really not done with state policy objectives in mind, you know, kind of working towards that end. It was done with a goal of, you know, what's a reasonable representation of the types of market services that are provided under this particular framework.

VICE-CHAIR GUNDA: All right. Thank you. And specifically on the imbalance product that you mentioned, you know, it has an outsized opportunity, could you dig into that a little bit more on where it is coming from. Specifically, you mentioned about planning

reserves, for example, across the West. So, if you could kind of dig into that a little bit, you know, given -- let me also contextualize where I'm asking that from. We have been seeing these needle peak, middle peak kind of reliability issues in California, and we have been structuring different statewide strategies to deal with that. I see the opportunity across the West as we think through that, you know, the probability of these needle peaks that happening across all the West at the same time might reduce, but also, you know, as the climate change, you know, kind of evolves, how do you think about broad that coordination of reserves, and that's where my mind is. So, if you could dig into that a little bit more.

MR. MOYER: So, focusing specifically on the imbalance reserve, there's a little bit with the peak that has to do with resource adequacy, and I think I'll just defer that to the panel later on, so, I'll focus on the operational component.

So, what we see, right, kind of the basis for that study is, scenario one, let's assume that all balancing areas have to carry their own reserves that are equivalent to this imbalance product, and let's add those up and see how big that number is for the whole interconnection, right.

Scenario two, let's assume that there is a market, in this case EDAM, but it could be a different market, that would provide a mechanism for those reserves to be consolidated, right. So, there's several efficiencies that come from that, the consolidation.

First, under the status quo you have more variability within a smaller geographic footprint, so the reserves on a per megawatt basis are generally higher, and then those reserves must be met generally by generators in that area. So, they might not have the most efficient generators.

If you contrast that with our EDAM kind of west- wide imbalance product, what we've done is we calculated the collective error and the collective uncertainty of the entire system, and so, that forecast error, that uncertainty, tends to cancel out as you get a bigger system, and that causes you to have really two factors that drive the benefits, your gross imbalance reserve is significantly lower. We have a slide in the deck in the appendices that I reference. I think it was somewhere between 20 to 30 percent lower. So, we just simply have to carry fewer reserves.

And then second, we can use the most efficient generators across the whole system to meet those. So, instead of having to run an expensive combined cycle CT

during certain conditions in northeast Montana in the status quo, we've now just shut that unit off and we've used the marginal unit in Arizona now to meet additional reserves.

So, that's an example of, you know, it's in the form of those decommitted units and that avoided fuel expense which just really adds up the value of resource diversity and the load diversity really can't be outstated, and that's just another example of that.

VICE-CHAIR GUNDA: Excellent. Thank you.

COMMISSIONER McALLISTER: I just have a couple of questions. So, thanks for that. That was just really great. I love the sort of internet business model kind of set of metaphors that you used. I think that's really a -- I'm not sure where all the advertising revenue goes on that one, but --

COMMISSIONER BLANK: Made my day.

COMMISSIONER McALLISTER: So, you focused on operational benefits, and I really appreciated you sort of unpacking that stack, and what's sort of implicit to all that is that there's some capital costs that, you know, in transmission primarily you discussed, you know, I think we all agree those investments have to be made in order to realize those operational benefits, and I wonder if there's sort of, you know, a rollup. Maybe

you can characterize kind of sort of a net, so the present value of sort of all of those different time horizon streams of cost and benefit sort of us to help us contextualize the operational and the capital pieces of it.

MR. MOYER: I appreciate that. So, I'll just reference maybe some of the work that we did as a part of that state-led study. So, we did make an effort as a part of that engagement with the State to develop some representative costs of these markets. I think one of the unknowns when we started that initiative is, for example, what does the day-ahead market cost, you know to implement. And I think at this time I don't know that we have a specific cost proposal from the CAISO and I think SPP, plus you could maybe talk about that later, Carrie. So, we are getting some more numbers out there. I'll say when we did the original analysis we used some per unit estimates and sourced from some FERC filings to get to a number, and that number in terms of costs was less than the benefits on an annualized basis.

I think I probably couldn't go much more beyond that, and I'll just reference you to that report to see what on a millions of dollars per year those were, and, you know, when they're spread across the West they were less than the benefits that we were

estimating.

COMMISSIONER McALLISTER: So, we'll dig into that. I'm sure Commissioner Rechtschaffen will dig into that transmission cost in that panel, but I guess, you know, I'm definitely interested in understanding sort of whether the allocation structure for those capital investments sort of impacts, you know, your analysis in any way that's meaningful, so maybe that will emerge over the course of the day, but thanks again.

I have a second question about the state-led market study. I think, you know, that has -- I think it's been kind of a lodestar a little bit, kind of a nice resource that has helped organize the conversation, and I'm wondering, I know that CAISO asked you to do an update of that. I'm wondering sort of whether that is -- so, how you see the future of that and sort of follow ups of that as, you know, we have a lot of changing conditions across the West, and sort of the context of the original state-led market study isn't what is in the context today. I'm wondering sort of how much -- how useful a tool or, you know, the life going forward you could see that approach kind of having to revisit it periodically and kind of adjust our thinking.

MR. MOYER: Yeah. I mean I think a periodic revisit makes sense, you know, in the name of how

important some of these decisions are, and also the fact that the system is quickly evolving. You know, I'll say we -- I told somebody the other day I think I started that grant proposal with DOE the winter of 2017, 18 is when I actually wrote that, and then we did a lot of the work in, you know, late 2019, 2020. So, all that does need to be updated at some point to the extent the nature of the market proposals would require it.

I'll also be practical and say, you know, there's benefits out there. I don't know that we need to study this to death, and so I don't want to be, you know, kind of self-serving in that sense.

COMMISSIONER McALLISTER: Spoken like an ethical consultant. That's great.

MR. MOYER: I think there's been enough study. It's a clear answer. I think there's maybe more work to do for individual entities as they pull the trigger a yes or no. I think that's where the next work would probably be. So, I wouldn't advise the region to spend a ton of effort on trying to quantify these benefits again. I think it's -- I'm excited to see the effort that SPP and the CAISO are putting into what is the proposal, what does it cost. And then maybe there's a little bit of a feedback loop there, but that should be maybe on a smaller effort level.

COMMISSIONER McALLISTER: Okay, great, and I would just point out I've neglected to see Maury Galbraith over there in the audience. Thanks for being here today. I would just sort of maybe raise the flag that WIEB could be a place where we, you know, sort of moderate, mediate, sort of develop some of those conversations going forward. So, that's kind of what WIEB is for.

So, yeah, so that's all the questions I have. Anyone else from the dais? I don't think they have any questions.

COMMISSIONER BLANK: Commissioner Shiroma, I think.

COMMISSIONER McALLISTER: Oh, I'm sorry. Who's got their hand up on line, yeah.

COMMISSIONER BLANK: Commissioner Shiroma.

COMMISSIONER McALLISTER: Oh, great.

COMMISSIONER SHIROMA: Thank you.

COMMISSIONER McALLISTER: Eric, thanks.

COMMISSIONER SHIROMA: Thank you, Keegan, very, very insightful presentation. My question is this just briefly especially for our lay audience. A few examples as to how you have validated your modeling.

MR. MOYER: So, yeah, yeah. Thanks for that. So, our model work that we did as a part of the state-

led study, which is sort of the initial framework of this, actually all began with kind of a current year assessment. So, we looked at sort of what if you had an overnight RTO, what if you had an overnight day-ahead market, and we built that from a base case that to the extent possible we tried to represent I think the 2020 system as accurately as possible.

So, the validation exercise was really one in anchoring the modeling framework into the current system and then making only incremental additions and documenting those assumptions clearly in our work.

So, that's kind of a classic approach to doing these types of studies when we felt that it needed to have a solid framework, because we start with what we know, which is today, and then we're pretty clear about what we're assuming in the future.

COMMISSIONER SHIROMA: Thank you.

COMMISSIONER BLANK: So, unless there's other questions maybe we should jump into the full panel. Thank you so much, Keegan. Really nice job. Greatly appreciate the full and comprehensive presentation.

I'm going to introduce all three of our panel members and then turn it over to them.

Anna McKenna is the vice president of market policy and performance for the CAISO. She oversees the

development of marketing infrastructure policy, market performance analysis and validation, short-term forecasting in California regulatory affairs. Prior to her current role she served as regulatory assistant general counsel, successfully advising the ISO for numerous market and infrastructure policy changes and compliance market for formative matters. Prior to joining the ISO, Ms. McKenna was an attorney with a practice focus on energy market development and transmission congestion management policies.

I'm also going to introduce Carrie Simpson and Spencer Gray and turn it over to you.

Carrie Simpson is director of western services development in the southwest power pool and is responsible for directing the ongoing development and implication of wholesale electric markets and other services in partnership with SPP stakeholders.

Her background in the electric industry is diverse, working in operations, marketing, regulatory and market design, and it includes over 18 years of experience.

Prior to SPP, Carrie was the western markets director for Xcel Energy Colorado leading across the departmental team responsible for analyzing and evaluation participation in the organized wholesale

markets.

During her time at Xcel she established and developed strong relationships with utility representatives, state regulators like me, and other stakeholders around the West.

Carrie has her undergraduate degree from Harvard and is licensed to practice law in Colorado.

And, finally, Spencer Gray joined NIPPC as executive director in February, 2020. He is responsible for leading NIPPC's efforts toward a more competitive and nimble electric power system that can satisfy the region's evolving policy.

Spencer worked in Washington, D.C. for a decade as a member of several congressional staffs. He served in senior capacities on Capitol Hill for U.S. Senators from the northwest, including as a legislative director and member of the professional staff to the Senate Energy and National Resources Committee.

Areas of legislative and oversight responsibility have included electric power markets, the Bonneville Power Administration, hydroelectric licensing and pollution regulation.

And I guess before we jump into it, Grace, any thoughts on timing. When would you like us to end?

MS. ANDERSON: I think we're doing well on

schedule. We are slightly ahead, so you have some flexibility, and remember, we're going to gather together after all three panelists have spoken to have questions, so, full speed ahead. Thank you.

COMMISSIONER BLANK: Anna, do you want to jump into it?

MS. McKENNA: Thank you, Eric. Good morning, everybody, Chair Hochschild, Vice Chair Gunda, Commissioner McAllister and all of the distinguished commissioners on the dais today, and my fellow panelists as well as everybody participating today on this very important discussion. I am honored to be here, and thank you very much for holding this meeting and this convening of so many involved and interested and experts in this area at such a critical time.

And following Keegan's presentation I must say, Keegan, thank you for laying out such a great first slide. I know it was busy, but that slide was very meaningful and I think will be very educational for all of us.

And thank you, Grace, for organizing this. I want to extend my thanks to you all as well and making sure we're also prepared.

With that, I'd like to spend a little bit of time with you all today on sharing with you what we have

done to extend regional markets through the California Independent System Operator. We have been operating --

Next slide, please.

As indicated on this first slide we've been operating a real-time regional market since 2014. We started off with one participant and it has since grown with 19 participating balancing authority areas, and it's growing, and we have at this point about 35 percent of a load in the West.

And I know you've all heard the three billion dollar number today a few times. This market has proven to be quite beneficial for both California ratepayers as well as others across the West. I listened to some of the earlier comments earlier this morning and I heard in everybody's comments the need for concern not only the reliability benefits, but also the ratepayer benefits of expanding markets across other footprints, and enhancing markets within our footprints.

And WEIM has been a perfect example of those cost reductions that we get to the real-time market, and we can see that in the three million benefits that we're clocking to date.

Next slide, please.

What is this real-time market? We talk about it all the time. I want to spend a little bit of time

in this area because I want to focus on the fact that the real-time market is, in fact, only -- and the western imbalance market is really focused on the real-time timeframe. And what it does for us is it allows us to extend within the real-time timeframe which is an hourly to 15 to five minute timeframe an ability to exchange energy across larger footprints as all our partners who are participating in the WEIM in a more efficient manner. And leveraging some of the costs and the operational benefits that Keegan mentioned earlier and dispatching those lower cost resources and making sure that we can meet loads, also physically reliable based on the transmission optimization that we can accomplish to that timeframe based on what's provided.

It's been proven to be quite helpful for that, you know, 15 to five minute space, and it's been helpful for folks to join quite readily because it doesn't require an integration of our tariffs we leverage, the respective tariffs, the market rules are integrated into the CAISO tariffs, but each entity that participates is able to retain full control of their transmission operations, as well as resource adequacy planning, and is able to -- and we benefit and coordinate on some of the tariff rules with each other so that you can synchronize our operations through this real-time

market.

So, it has that benefit of not having to move to a full, you know, integration of the markets and allows the entities to ensure that they can still meet their operational needs and have full control from an operational perspective.

It does also support what we reference as an autonomous and independent governance of the market rules. We have developed very robust, joint governance structure around that without having to, again, go into a full RTO status, and this was one of the first steps that, you know, Keegan was mentioning in terms of being able to maintain that autonomous governance over the market without fully requiring changes in our governance structure for independent governance body Board of Governors. That has been beneficial because we have been able over the past few years now to demonstrate our ability to actually integrate market rules and enhancement that are beneficial to this overall community -- the whole community participating with WEIM.

So, what the WEIM does in the Western energy imbalanced market, it allows us to after we have run our hourly schedules here at the ISO, we then optimize on a 15 and five minute basis the dispatch of energy, and we

take into account all the operating characteristics and constraints of participating resources as well as the underlying transmission that supports that.

We include -- we have also within our market structure a short-term unit commitment that allows us to ahead of time, four, five, six hours ahead of time be able to identify the need to commit resources which then also allows to capture some of the efficiencies that Keegan was referring to with regards to the ability to identify those lower cost resources across the footprint that need to be dispatched at an earlier timeframe. So, it does allow us to through short-term unit commitment processes ahead of the 15 and five minute process, you know, we can then get a little bit more efficiency on some of the renewable energy forecasts that we have, as well as hydro limits and complexity of the resources such as, you know, we have a lot of resources across the western footprint that are under combined cycle requirements as well as other limitations on running these resources, and we're able to model all that stuff through the timeframe of the real-time market so then we could really get a better efficient outcome and economic dispatch once you get to the 15 and five minute dispatch.

So, what we don't have, though, as part of

this real-time market is the ability to optimize all these benefits in the day-ahead timeframe. Today when we enter the real-time market what all participants do in the Western Energy Imbalance Market is they leverage whatever day ahead processes they have within their own OATTS and own tariff structure.

In the case of the ISO, we run our day-ahead markets and we establish our day-ahead schedules and then enter the real-time market to optimize any imbalance energy after that which, of course, then limits the amount of energy that you get to optimize the rest of the West in the energy imbalance market. But we're able to set up our schedules coming out of the day-ahead market, enter into the real-time market, and then optimize the remaining imbalance energy.

The other participating entities in the Western energy imbalance markets, they don't have a day-ahead market structure under their OATTS, so what they do is they come to the Western Imbalanced Market with what we refer to as base schedules through which diversity of tools that they use they're able to establish what that starting point is for them to optimize the remaining amounts, the residual amounts, if you wish, from both the base schedules and the day-ahead schedules from the ISO.

So, when you think of it in that structure, you know, you immediately realize there's really a small portion of the total amount of coordination that happens throughout the system, and it demonstrates that there is a potential for a lot more. Right now, we -- you know, within that imbalance market we have like five to ten percent of the total that gets co-optimized throughout this later system, and so you can see that if you open that up to the remaining, you know, 90 to 95 percent of it, you can unleash some of those benefits that Keegan was referring to quite a bit.

Next slide, please.

So, what have been the benefits? This slide, I wanted to share this with you. We have that three billion dollar number that's been shared out there now, but, you know, I wanted to note that when you look at the breakdown of benefits for the way we looked at it through this slide, back in -- since 2014 we've accrued quite a bit of benefits for both the total of the WEIM, but also California. Now what you see California's benefits really improving over the past, you know, eight years, the bulk of them really has been in the past few years with 201 million coming in California benefits, and only since the beginning of this year. In the prior years from 2014 to 2018 we saw about 601 million of

benefits for California ratepayers, but in this year alone you can see there's about 201 million. That is a substantial amount.

Some of the drivers behind that, it has been the cost of energy over this past year, so when cost of energy goes up, then the economies that you get out of the co-optimization of that energy across a greater footprint, of course that is reflected at a higher savings as well.

But, in addition, what we've seen is that the number of participants participating with WEIM has been contributing to this overall increase in benefits that we've seen the later years of the history of the WEIM. So, I wanted to share this with you all as well.

Next slide.

So, as I noted earlier, what we lack today is a day-ahead market that extends across the WEIM footprint, and so we all come to the WEIM with our expectations of schedules that are going to get, you know, considered in the real-time market. What we'd like to do now in our next phase is extend the day-ahead market as well so that we can actually optimize the generation across that larger footprint.

If you think of it as in layers, you know, the evolution of WEIM was one of those efforts when we

started off that, you know, we were thinking one or two, three, maybe four entities will start joining. But when you think of it as in layering the benefits that we start seeing in those early days of WEIM, both internal and external parties had the incentive to increase the footprint. The footprint, itself, is not necessarily, you know, pivotal in making these markets sustainable, but it does allow for a greater diversity.

When you extend that day-ahead market to the greater footprint, that diversity and the bulk of that diversity now becomes optimizable in that day-ahead timeframe. So, this is really critical in terms of thinking about how these markets layer up.

With the extended day-ahead market we're leveraging the similar models to the real-time market in that we don't expect or are not designing the market to integrate other elements of the balancing authority areas' businesses into our market.

So, for example, you know, all balancing authority areas would still retain the resource planning that they do, the transmission planning, and ultimately their NERC reliability requirements and operational requirements. We would not have coordinated efforts in that area. But as Keegan noted earlier, and I'm leveraging a lot in his discussion, he had nice little

bullets there about those benefits, you still see quite a bit of incremental benefits by simply extending the operational day-ahead market mechanism across the larger footprint.

So, let's go to the next slide, please.

So, what does the day-ahead market do in the West? As I noted, you know, looking to expand it to that 90, 95 percent of the total optimization that happens on the larger footprint, you start to see some of the economic benefits that are -- that really accrue from the optimization of both the unit commitment, the day-ahead timeframe, as well as some of the -- considering what the operational capacity constraints might be on the system. And just as an example, we have many -- across the footprint we have many longer start resources that require to be considered in the day-ahead timeframe, and without a good functioning day-ahead market optimization those benefits may not accrue. So, having that optimization accrue in the day-ahead you'll start to see the dispatch of lower cost resources ahead of time, as well as the reliability benefits will start to accrue because you start to also be able to identify some of the uncertainties that were previously not identified collectively and the diversity we get from the load uncertainty across the greater West. And

identifying those benefits in the day-ahead really does provide a better reliability picture as well.

And part of the effort of the EDAM is to also ensure that those who are participating in the market and those who are expecting, anticipating transfers from in and through and out of the system can all ensure that those sufficient transmission behind those transfers to provide the confidence that is needed in the market solutions that are approved in that day-ahead timeframe, so that when you get into the real time you're not having to scramble again and redispatch everything all over again.

And then lastly, of course, we still continue to see that and we'll have components of the day-ahead market designed to address the environmental benefits, both from being able to provide better tracking and accounting of the greenhouse emissions and a reduction of greenhouse gas emissions -- excuse me -- as well as respecting the various state policies. And if we can go to the next slide, I'll talk a little bit about that as well.

So, our day-ahead market design in the form of how we intend to, you know, develop this and extend it to the rest of the Western parties consists of a number of components that are critical. Critical to our design

is the resource sufficiency evaluation, and that's critical because as I noted earlier we're not going to be expecting a singular resource adequacy program to apply across the market. But it's important to ensure that as we start looking to or wanting to benefit from some of that diversity in the day-ahead market that entities that enter the day-ahead market have this capacity and the resources available to meet their own load reliably.

And that's necessary so that once we, you know, get into the market timeframe that we don't have the erosion of the confidence that everybody expected to have of the market because that, you know, over time could erode. Folks will start to see that if there is not sufficient resources that they may not see their own -- the transfers being, you know, sufficiently robust and supported.

So, that leads me to confidence in market transfers. We designed the extended day-ahead market models so that their obligation for those who do pass and get through the market and, you know, ensure that any transfers that are set to those schedules in the day-ahead market can actually be deliverable into real time.

And that is important to ensure that when --

especially when you're in stress conditions that you're not, like I noted earlier, having to scramble into the real-time timeframe.

We also have ensured that there's rules and expectation of the provision of transmission into the day-ahead market for participants. And this element is important to ensure that the schedules that come out of the day-ahead market are fully deliverable into the real time. We always expect things to change on the transmission grid that the contribution and the assurance and that accounting ahead of time to ensure that market flow will come back with a transmission that is provided by all participants is critical to this design.

We also have included and retained an element of the WEIM design with regards to the ability to manage greenhouse gas accounting will extend a similar model that we have today in the WEIM to ensure both that we can provide the information needed for reporting requirements, but also for optimizing the costs of meeting such requirements so that resources that are affected by such costs can then incorporate that into their bids and we can dispatch those costs with that given expectation.

And finally, the settlements part of this.

All the day-ahead market transactions will be financially settled through the ISO system and imbalances from those day-ahead transactions for the WEIM entities will, you know, will accrue naturally between those day-ahead schedules and the real-time schedules through the financial system -- settlement system.

So, that gives you an idea of the main components of the market structure as we're intending to extend this.

Next slide, please.

I wanted to spend some time to talk to you all about a change we're making to the actual day-ahead market design overall.

To basically capture and harness some of the benefits that Keegan noted earlier we refer to this product that we're introducing as an imbalance reserve product. And the imbalance reserve product is kind of a unique product. No other ISO has incorporated this, the need for this product in the same way that we're intending to do, I should say, there are different flexibility products that are across the footprint. But here at the ISO we've noticed that the need for this product has really, you know, become more important over the past few years as we look at the weather-dependent

events that we have on the system that affect not only supply, but also demand on the system which provides or, you know, effectively causes us to have to deal with greater uncertainty between the day-ahead and the real-time. And when I refer to uncertainty in the context of the imbalance reserve product, it's really important to think about it as not just the uncertainty between loads to the day-ahead and the real time, but also, you know, certainty between the availability of resources and especially resources that are dependent on weather, such as the sun and the wind, to be available at critical parts of the day.

So, you've heard us note many times of our need to manage our net load expectations, and that can cause some increased flexibility requirements. I'm noticing as you're taking time of the time -- taking note of the time. I will move on quickly on this. But the main essence of the imbalance reserve product is it allows us to capture those imbalance uncertainties to the day and the real time, but the imbalance certainly within the hour that we can then line up our resources better share on the cost of the greater footprint for purposes of, you know, being able to line up both the uncertainty requirements you get from the load perspectives and share and leverage the diversity of the

load across the greater footprint and the diversity of the lower cost resources.

So, what we've done over the past year is developed a new element to the market design that we plan on incorporating and including as part of our EDAM extension, and we'll be working towards including that later.

I wanted to also note that the extended -- next slide please -- the extended day-ahead market --

COMMISSIONER BLANK: This is our -- we're pretty much at time, so I think you're going to have to wrap up fairly quickly.

MS. McKENNA: Last slide, please. Just the last slide. Sorry. Last slide.

I wanted to just note that we're going to be presenting these changes to our board in February for a decision and wanted to note that we'll also be providing a briefing in December. And we've had a very robust stakeholder process around all of these elements, quite a bit of design going on over the past year, and hoping to wrap this up with the continued participation of stakeholders.

And I will stop right there. Just wanted to make sure you all saw the last slide.

COMMISSIONER BLANK: Thanks so much for the

presentation and for your leadership in the West. Greatly appreciate it.

With that, Carrie, would you like to jump in?

MS. SIMPSON: Sure. Can you hear me?

COMMISSIONER BLANK: We can.

MS. SIMPSON: Great. So, thank you for the opportunity to be here and for the introduction, Chairman Blank.

So, for those of you who don't know, I was -- I've been in the West now for about eight years -- seven years, and was mostly at Xcel Energy Colorado. I'm still in Denver, but I had worked for SPP prior to the launch of their day-ahead market and then left, wanted to live in the West. And then have since returned and I'm still living in the West, still living in Denver but excited to be a part of SPP's efforts in the West and around the country.

So, with that, my plan is to -- let's go to the next slide. My plan is to talk to you about what we have already both in the East and the West at a high level and then what we're looking to propose to other entities around the West who may be interested in our services, and then how we see that working together, our existing services and new services combined.

Next slide, a little more.

So, SPP is an RTO and has been since the early 2000s, serves 14 states, and that's that bright red on the map. It's been around since World War II, originally was put together by utilities trying to pool power together, and effectively has evolved incrementally since then.

And one thing that I see in common between what SPP's services have evolved to and how the West is evolving is SPP was very much incrementalist and in that there was an energy imbalance market in SPP starting in 2007. They didn't want to jump in to the full day-ahead market until they had a better idea of the design they wanted, and they were watching their eastern partners. They were watching PJM. They were watching MISO.

And, so, after 2007, they did a study much like all of us have been doing studies and said, hey, there's benefits to adding a day-ahead market. Let's do this. Let's get the design right and unique to our region.

And, so, they took several years to develop a design that was specific to their needs in the central U.S., and that market launched in 2014. They went from 16 balancing authorities to one, and that day-ahead market and all of its services has saved I think as of this April 5.6 billion dollars since 2014.

So, on the same kind of scale that the West is seeing in its studies and in reality, and what markets can do, there's been a lot of success there.

So, that's the East. And, of course, it's full RTO, so there's many other services, but I'm going to focus on markets here.

So, to the West on this map since a few years now SPP has been the reliability coordinator for many entities in the West, and I've got a slide next that shows who that is, but that's the yellow portion of the slide. And then most recently, the orange area, we are also a program operator for Western Power Pool for the WRAP program, and I won't get into the WRAP because I know that's later on today, and Sarah is here to talk about that, but we are providing services to the Western Power Pool.

And then the blue lines there represent the Western energy imbalance energy service market, so very much like the EIM it's an energy imbalance service market and it serves most of Wyoming and Colorado, and will serve all of Colorado here in the next few months when Public Service Company of Colorado's Balancing Authority joins.

So, let's go to the next slide.

Just to give you an idea of who we're

providing reliability coordination services to. That's the list there, and I'm sensitive to acronyms, so RC, that's the highest level reliability function under the NERC model, and so we've got quite a few customers there taking contract service.

And that's something that -- something to keep in mind. So, the red states, we are also the reliability coordinator there for -- but they're under the RTO structure, and the RTO has -- it's a multi-state organization so it has the independent board, has a governing structure that's been evolving for decades, and in the orange there the reliability coordination services, that's a contract service, so they're not under the RTO formal governance, but they are taking services from the RTO and, ultimately, their services report directly to the board, so that's how that works.

Next slide, please.

So, this is just a timeline of the Energy Imbalance Service Market and how it's grown. Definitely not in the scale of the western EIM. Right now, it's two of the WAPA, the Western Area Power Administration balancing authorities, and then in August of this year Colorado Springs Utilities joined the WEIS market, and then in April we're expecting Public Service Company of Colorado, Platt River and Black Hills, to join the WEIS

market.

So, it continues to evolve. And then notably, the next slide -- four more. I need to get rid of my transition slides because it's just, you know -- just keep going, right.

So, notably just as that evolutionary, you know, principle, we're offering options to expand. So, right now we're in the left under the WEIS market where we provide real-time market services. We also provide reliability coordinator services. It just so happens that everyone that will be in the WEIS market is also under our reliability coordination footprint. But there are parties within that group and then other parties around the West who are interested in other services.

So, Markets+ is our name for an EDAM, and, you know, they're similar services, do similar things, and just as Anna went through the different components that CAISO and its stakeholders have been adding to the day-ahead market design, SPP has been doing that with western stakeholders in the Markets+ forums.

So, many of the same issues. You know, how do we manage GHG, how do we manage transmission across multiple balancing authorities, across multiple transmission service providers, you know what's the most effective way to add services to provide value to those

who are interested.

For our Markets+ I added a bubble there, resource adequacy, because from the get-go Markets+ has been pretty consistent about saying, hey, we're going to have some kind of resource adequacy construct. I'm not sure what it would be, and its evolved, and basically based on stakeholder feedback. As of Wednesday of this week, we put out our final offering of the proposal, basically describes the high level details of the proposal. We have proposed that Markets+ will adopt the WRAP construct, so if you're in the Markets+ you'll effectively be expected to satisfy the WRAP requirements.

I want to make sure that it's also clear, though, that if you're in the WRAP and you're not in the Markets+ we're absolutely expecting to support those services and figure out how to make those programs as compatible as possible to support entities because we understand, you know, not everyone may be interested in joining Markets+, not everyone is interested in, you know, joining a different program, so hey, let's make this as seamless as possible.

So that's Markets+, and similar with RC, we'll continue to offer that service. We have not come out and said, you know, if you're going to be in Markets+

you have to be in our reliability coordination footprint. But these are all things and details that we'll work through with stakeholders based on, you know, the needs that they have.

The column on the right is the full RTO, so that's all of the services, everything consolidated under one hat. We're also looking at how do we make sure that if we have RTO expansion into the West, how that could be compatible with a Markets+ footprint, since it potentially could be housed under the same software, and I've got a slide about that here in a couple of minutes.

So, let's go to the next slide.

So, RTO expansion into the West. So, there's been a lot of focus about EDAM and Markets+ and much less conversation recently about the RTO expansion, and mainly it's because they've been going through their process and this was a lot more visible a couple years ago but is coming back into the spotlight.

So, in late 2020 SPP received letters from different entities largely in the Western Area Power Administration Balancing Authority, those that are already participating in the WEIS market, about interest in expanding the SPP RTO into the western interconnection.

The goal was to evaluate joining the RTO without touching much of the eastern governance or eastern rules that basically just adopt their tariff. And, so, there are, of course, things that have to change simply because it's a different interconnection, and there are DC ties that connect the West to the East and how to treat those just operationally and under a tariff.

And, so, the parties worked through that up through this summer and have also done studies with -- I don't know if they're in the list of the 41, but they've also been a part of evaluating the benefits to their customers and states, and so, a decision is expected by March of 2023 if those parties will join the RTO. So, if that happens then the western RTO -- there will be an RTO in the West under the SPP footprint.

So, next slide.

That's just a picture of a footprint of what I'm talking about. The Colorado section actually would be a little bit more red because Platt River Power Authority came out and said they would be a part of this group, and they're right now in the PSCO Balancing Authority, so they would have to move BAs, and so that part of Colorado that is not red is PESCO with Xcel Energy Colorado.

Next slide.

So, that's the RTO. So, I wanted to give you an idea of where we are with Markets+, and I can go into the design details. It's interesting. I've got in the appendix slides to show that. But this is the high level timeline. The final service offering was posted Wednesday, so all of the details. We're reaching out to parties who've expressed interest in committing with the goal of getting them signed on to support phase one which is where will go into the tariff and protocol language development and ultimately a filing at FERC, and then there will be an implementation phase to actually implement and launch this market.

So, I think I've got one more slide, and I see it I'm on that time. So, effectively WEIS would continue for a while. To the extent Markets+ gets launched those WEIS participants would evolve into Markets+, and then to the extent we have a day-ahead market as well we would have effectively a seam between Markets+ and the RTO west and we'd be optimizing that.

And I'll finish on one slide because I want to respect everyone's time. This is kind of the visual aid for us visual learners of how all these things fit together. And in the dotted lines on the right is basically -- think of that as the eastern and western

interconnection divide, and so we would have RTO activity in the West, Markets+ activity.

And then importantly I want to make sure since this is a California audience, you know, you can have many markets next to each other optimizing efficiently though seams. We have it in the East. It's very common, MISO, PJM and SPP coordinate regularly together. And, so, to the extent that we have seams, we absolutely will want to work with all of our neighbors to make sure we're optimizing systems as efficiently as possible to bring the greatest benefits to customers.

With that, I will hand it off.

COMMISSIONER BLANK: Thank you, Carrie. Spencer, would you like to jump in?

MR. GRAY: You bet. Can you hear me on the mic here?

COMMISSIONER BLANK: We can.

MR. GRAY: My name is Spencer Gray. I'm with the Northwest and Intermountain Power Producers Coalition. As my slides get pulled up here.

Thank you for the invitation to join today, and I really appreciate the Commission hosting this workshop to hear from stakeholders, commissioners, those of us operating outside of California but very interested in the future of an integrated western

system.

The Northwest and Intermountain Power Producers Coalition, we go by NIPPC, is the trade association of independent power producers and both wholesale and retail marketers who are active in the four northwestern states, Washington, Oregon, Idaho and Montana.

The members of this coalition, several dozen companies, are active in all of the markets in the U.S. -- actually across North America. They're experienced in both RTOs and ISOs, as well as the bilateral market that we have in the West outside of California and outside of the EIM.

NIPPC is an advocate for competitive markets, and at our core we believe deeply that geographically diverse interstate wholesale markets are the most economically efficient and the fastest way to decarbonize the power sector as a whole.

I would offer for the Commission's consideration here, my fellow panelists that we, the West, can be better than we've done to date in terms of organizing the grid and building a better grid, and that, second, I'm really optimistic that we can get there.

The developments you've heard about by my

fellow panelists through the CAISO and through SPP, and I know you'll hear later about resource adequacy developments which is at a very exciting moment with a draft tariff in front of FERC. These are major developments compared to where we've been for the past 20 years in the West in terms of integration and coordination.

So, I want to highlight that optimism among the competitive sector in the West and move on to my next slide here.

This shows a rough comparison, and I have an addendum to the slides here that I won't go into detail about for some caveats and notes about the data shared here. But I thought it would be important to characterize the part of the market and the power sector that I'm representing and the size of that sector both compared to California and across other asset owners in the West.

This slide shows the 11 states that are wholly or mostly in the western interconnection. It does not include small segments of states on the edges of the interconnection. Carrie's comments just now about the potential treatment of the DC ties on the border between the Western and the Eastern interconnections highlights the possibility for innovation in integration in the

West as we look at opportunities as a sector to increase transfer capabilities between regions.

But for the moment here this is really just to give snapshot for the commissioners here and my fellow panelists to think through what is the asset class and the volume of transactions in the power markets that's the subject of our panel today.

Some important things I want to note here, first of all, just to characterize the three sets of data shown here. The first is a nameplate capacity comparison of independently owned generation across each of those 11 states compared to total capacity in those states. The share that owned by companies I represent IPPs is about one-quarter of the nameplate capacity in the ten states outside of California. You can see the comparison to California. California has a quite competitive wholesale power market in terms of asset ownership.

The second set of columns shows the same plants, but how they're actually running, so this is a generation comparison. It comes out to about the same. About a quarter of generation in the West is independently owned and operated, and you can see the comparison of California there as well.

And then, finally, the last set of columns

shows retail choice programs, direct access it's also known as in some states, and the relative share of that in the four states outside of California that have significant retail choice programs. That total there in the second lowest row is a total of those four states since the others do not have active retail choice programs.

The key point here to make, and I've highlighted this in the rows on the bottom left, is the size of the opportunity here for integration in the West. California is the largest market in terms of single state having both generation and load, but the size of the generation resource outside of the state, the actual generation outside of the state is multiples of what exists in California, two times the capacity and three times the actual generation.

Now, much of this is indicating power plants that are under long-term power purchase agreements with utilities in California. This is a static analysis. It doesn't account for potential electrification across the sector. And these are in front of meter resources, not counting distributed resources.

But I think the point I'm trying to make here is that as the last two panelists indicated, the opportunity for centralized regionally organized markets

in the West is huge, and I hope that the conversation in the coming months and years in California contemplates the potential to have sort of a franchise opportunity that ISO has certainly taken advantage of with the EIM. I believe exists for EDAM and perhaps may exist for more market functions beyond that.

We can go to the next slide.

Thankfully, Keegan gave a much better and more sophisticated analysis of the many options from RTOs, so I don't need to spend much time walking through the details here. But this slide does show the suite of services that RTOs and ISOs across the country offer to regulatory authorities, utilities, independent generators in each of those markets.

I've circled up at the top here what those of us outside of California currently have in terms of this menu. We have reliability coordination, much of us through the ISO, some entities through SPP, as Carrie indicated. We have an energy imbalance market which has provided benefits over three billion dollars since it launched, as Anna indicated. That, of course, is a relatively thin market compared to the potential for a full day-ahead market.

And I've put a dashed circle around the centralized capacity market. As you'll hear later

today, the RA program that's been launched in the West is not a market per se, but it does serve the same function in terms of ensuring resource adequacy in the West.

The other RTO functions here are really the parts that the competitive sector is eager to see developed in the West; Changes to transmission service, to consolidation of balancing authorities, to transmission planning, to ancillary services markets, and even to better aggregation of demand response.

In addition to the day-ahead market conversation that the West is having both in SPP and ISO proceedings, that is the suite of opportunities that part of the sector I represent is very focused on.

In my view there are opportunities both for generators outside of the West to integrate better with either SPP or ISO as the platform, and also opportunities for the state of California in terms of meeting California's objectives as well as resource development opportunities in California, whether that's offshore wind or solar that can meet some of the load profile of balancing authorities and utilities outside of the state.

A principal takeaway I wanted to offer from NIPPC's perspective in today's conversation, and I say

this very mindful of the branch of the state government that we're appearing in front of, but I want to say it clearly, integration beyond EDAM, and I hope EDAMs can successfully launch with the well designed market offering, but integration of the power markets beyond EDAM and even the success of EDAM, itself, from my perspective hinges more than anything on a key legislative step that has been discussed before, and I don't intend to go into the details of it, but it's really a threshold question for those of us outside of California. Will the governance of the ISO evolve to encompass views, and perspectives, and decisions by more than just the state of California?

California and ISO have built an incredible platform for running market operations and transmission services, but what I want to note is that those of outside of the state are waiting eagerly, but not indefinitely, to see if the ISO and the state will take a different direction in terms of regional governance.

What's different now than was the case when EIM launched and than was the case 20 years ago when the West last had this conversation is there is a viable organically generated and both independently and regionally governed opportunity through SPP. I'm not here to advocate for either of those options, but I am

here to advocate that IPPs and marketers outside of California would really like to have competitive options for where to go with plants they own and may develop.

I've sometimes had conversations with policymakers and those close to the California process who are a little bit incredulous that an SPP market offering is to be taken as seriously as what the CAISO has to offer, and my message is yes, it is. Those of us who are operating in other states who are subject to state commissions, who are thinking about governance issues are looking at it as a serious option.

We can go to the final slide.

The second point I want to make here, and I'm really pleased to see the couple of sessions devoted to transmission today, is that transmission reforms are at least as important as the rest of my comments I've just made about organized markets and the direction of a potential RTO in the West. Because transmission is becoming increasingly scarce, at least in the places where we now need it for new decarbonized resources, and to carry that new set of resources to where the load is, changes to how we plan for transmission, anticipate demands, and make sure it's available to meet our decarbonization goals is at least as important as market reforms.

This slide simply highlights the most important transmission provider in the region where my members operate, the northwest. The Bonneville Power Administration owns three-quarters of the high voltage transmission lines in the northwest. Those are all of the bold lines in the map on the left. And like many transmission providers, Bonneville is not unique in this case, BPA has seen unprecedent levels of interconnection requests, transmission service requests and potential for new projects being energized and moving across Bonneville's lines.

And, so, that's just a plea for all of us in the West to get creative and figu.re out how to build transmission so it's available in time to meet all of our regional needs.

That concludes my prepared remarks. Thank you.

COMMISSIONER BLANK: Thank you, Spencer, and we're certainly struggling with many of the same issues.

With that, the panelists can turn on the cameras and I'll turn it over to you all for questions.

COMMISSIONER McALLISTER: Let's see. I don't yet see any -- oh, was there one? Okay. So, at least a couple of us will have questions, but other dais members, please raise your hand we'll make sure to get

you in as well.

So, first, I just want to -- this was a fascinating panel and it's really great to have the various perspectives, the setup with Keegan, and then Anna, and then Carrie, and Spencer. Thanks a lot for that.

So, it's interesting, you know, I think we're focused on the right issues, and sharing perspectives is really how we kind of dig into work through the path forward.

I had a couple of questions for Carrie. Let me just frame my thought here. Let's see. I guess -- so, could you maybe walk us through the proposed kind of membership sort of cojoined -- the parts that are kind of cojoined and the parts that are mutually exclusive in terms of, you know, sort of EIM members, what happens to them if they want to move around, just sort of help us map out sort of the various programs in terms of conditionality on joining, say, Markets+ relative to RA programs, and I think you said there was really no conditionality on coordination, but if you could just be a little more explicit about that.

MS. SIMPSON: Sure, right. So, at this point Markets+ is an offering, a service offering that we've made. We posted on Wednesday. And really the offer at

this point is, look, this is the design that we've come up with based on all the input from stakeholders, based on what we've learned from the East, based on what our capabilities are. And I didn't talk much about governance, but there is a whole governance structure that defines who would be a participant, who would vote.

So, one thing that I think is different -- I know is different between the SPP process and, for example, the CAISO process is there's explicit voting in the RTO. And, so, for Markets+ that is ported over to some extent, but it's evolved because it was a governance designed by the West effectively to ultimately report under the SPP board, but has a really strong design of what we call the MIP, which is an independent panel that would govern much of what happens in Markets+.

Now, if I'm an EIM entity today and I'm looking at Markets+ there's -- basically there's what we're calling funding entities which would be the entities who would put up a commitment to participate in the protocols and tariffs development of Markets+, so, getting into the details. And that's a -- in total it's a 9.7 million dollar commitment. And so, an EIM entity could decide to do that. We're allocating the costs based on their, you know, load ratio share and

generation, but that would give them the right to vote, and there's different sectors, so there's an IOU sector, there's a public power sector, and an independent sector.

And, so, signing up to do the explorations into the next phase doesn't mean you're committing to join Markets+. It means you're committing to go to the next phase and figure out the details, and ultimately there would be a decision point later to pull the trigger and say, okay, I'm going to join this market.

And then, you know, a lot of what an entity has to do to participate in the market is the same, regardless of what market it is, getting the metering equipment ready, getting software in place, training your team on how to respond to market signals. And, so, there would be differences for sure. There might be different software packages, different rules to follow, but it's not -- you know, it's possible that someone could do that.

So, that's kind of one way of participating, and then we also have I mentioned the independent participation sector, so if you're like an NGO or a PIO, whichever acronym you want to use, you know, you're not a utility but maybe you're an interested party, you can sign up to have a vote. In the independent sector it's

a $5,000 fee, but that can be waived if you're a nonprofit. And then also we have a state committee role, so basically every state can decide how it participates in the process.

So, does that provide a little more detail?

COMMISSIONER McALLISTER: Yeah, yeah, that was helpful.

MS. SIMPSON: Okay.

COMMISSIONER McALLISTER: I wanted to -- so, really talk about, sort of this has come up already previously, just about the respecting of the state level policy goals and just how kind of that gets managed, and I guess, you know, I think some of us at, least, kind of an ongoing concern about sort of transparency and just doing that accounting in a rigorous way that satisfies the state need, and certainly in California we want -- you know, we have to be able to pin down, you know, the molecules and the electrons so that we know we're complying with our relatively aggressive goals, and I know other states have similar but not identical goals. And, so, the accounting and particularly across any seams that emerge, you know, with the appropriate level of granularity that may not be uniformly expected across all the states in the West, how are you thinking about that, and, you know, maybe, Eric, you might have a kind

of an opinion about this as well or a viewpoint as well.

MS. SIMPSON: Right. So, in our proposal we did look at what was happening in Washington and, also, what California has done in their design for GHG tracking and emissions, and we made two proposals in the Markets+ design right now. It's, one, a commitment to reporting and tracking and facilitating that between utilities and states so that utilities participating in Markets+ that have state mandates -- that we will help provide the detail that they need in order to comply with state requirements.

And then the other thing that we've proposed is a zonal GHG design that effectively would support the ability for the market engine to redispatch in recognition of carbon, to the extent that a state or even a particular zone within a state, you know, because there's also nuances on non-jurisdictional issues, where one entity within a state may have a mandate, or may come out with a mandate that, you know, enforces on itself that is -- hasn't come down from a legislature. And, so, we are supporting that design and have that embedded in the Markets+ proposal.

COMMISSIONER McALLISTER: Okay. That's very helpful. Thanks a lot. I know Commissioner Houck had a question to kind of build on this, this line.

COMMISSIONER HOUCK: Yeah, just as a follow up, and this is for you, Carrie. A number of state regulators have signed on to a multi-state electricity organization principles document. Is SPP's organizational structure, do you think it's consistent with those principles?

MS. SIMPSON: I think so. You know, it's a -- much of what we put together in the governance design was based on the input from not just, you know, the utility industry but the -- I think you're talking about the MOU group, right -- and incorporating that feedback into what our structure is.

So, a big part of our governance structure for the market is having -- it's not a Regional State Committee like we have on the RTO, but it's a state committee where states can participate and advise and be -- we've been open about, you know, whether it's -- basically each state will decide for itself how it's going to participate on that committee. We're not saying it's got to be one type of commission versus another, but we really leave that up to the states in recognition that the state's role in whatever market is developed is going to be important, because it's not going to be single states. And that's how we operate in the East, our RSC has some very explicit requirements

and rules that it uses to participate in guiding policy and the decisions that are made in SPP.

COMMISSIONER HOUCK: Thank you. And it will also include a robust stakeholder process for inputting.

MS. SIMPSON: Yeah. All of our -- yeah, so -- yeah, and one of the slides in my appendix has the structure of the governance, and I'm happy to go into as much detail as you'd like, you know, offline or separately. But, yeah, all the meetings are open. Anyone is allowed to participate, and we have some rules around voting as things move up through the process, but absolutely they're open meetings and we encourage as much participation by all parties as soon as possible.

COMMISSIONER McALLISTER: Okay, thanks. I don't know how useful it is to sort of get into the governance questions fundamentally, it's just kind of a different discussion that we're having now, and I just want to, point taken, Spencer, in your presentation, you know, talking about sort of I guess a market for options, about where different states might go with that question.

I guess I did want to just point out that, you know, the West is unique, and there's a sort of broad bracket that's -- can't tell which slide number it is, but your final one that you showed with the sort of

visual. The bracket does sort of encompass both interconnects. The governance bracket sort of is underneath both interconnects, and I wonder -- you know, I think the sort of independent board that has roles in both interconnects, you know, obviously the western states want to make sure that they feel full representation there, and, so, any comment along those lines about how -- you sort of alluded to this, but a little more detail maybe.

MS. SIMPSON: Yes. So, I think one thing that was surprising to perhaps the eastern side of the RTO was, hey, we have this independent governance. Why do you feel like you need another, you know, more feel of independence in the West. And I think it's true to that. It's like it's for the West and it's by the West.

And, so, one thing we added to the governance design is a MIP. More acronyms for you. It's a panel, caps Markets+Independent Panel It will be five members that are not -- there's going to be a nominating committee, so they're all independent. There will be sectors. So, all of the policy and the decisions of what happens with the Markets+ design will report in those voting structures I was talking about, go to that independent MIP. And it's only if something implicates the Eastern RTO like financing, funding, issues of

dollars, and there's a list in our proposal, of the things that would also really need to be approved by SPP board that's looking at it East and West. That's really when those things would happen. But the goal is that it's approved by the MIP, it can go to FERC.

COMMISSIONER McALLISTER: Okay, great. Perfect. Okay. Vice Chair Gunda.

VICE-CHAIR GUNDA: Thank you, Commissioner McAllister. I just want to, first of all, thank the panel. That was extremely excellent information and overview, starting with Keegan, Anna, Carrie and Spencer.

I just wanted to have one question to Spencer, to you, and I think the core role of CEC is to really have, you know, information on the table to help in advance state policy and then legislative options. So, you kind, your know, of framed very specific question from your standpoint of, you know, the NIPPC. So just wanted to ask you to elaborate a little bit on, you know, the needs from your perspective, you know, that you kind of alluded to, need for legislative action in California. I just wanted to have you expand a little bit more on what you're looking for.

COMMISSIONER BLANK: And we're getting close with time, so hit a high point.

MR. GRAY: Thanks for that question, Commissioner.

I'm cognizant of the status of the ISO responding to ACR-188 studies to be presented to the Legislature. I think generally what stakeholders outside of California are looking for is a pathway to transition the governance of the ISO itself at a high level from a governor-appointed single state legislature confirmed board to something that is more representative of more states and not subject to a decision by a single state executive.

What form that exactly takes, I don't know that there's a consensus view on that, but until that indication from the Legislature is apparent, we've been able to have a blue sky exercise, is the way I put it, with SPP to come up with a governance model that stakeholders can more or less support. We simply can't have that exercise thinking about the incredible market platform of the ISO until that other branch of state government acts. But I'd be hesitant to pin down, you know, an exact structure that I'd come here and suggest.

VICE-CHAIR GUNDA: That's really helpful, sir, I mean just at a principle level, and I think you just said it, you know, the broad stakeholders would love to have the option to have a blue sky exercise and then

from there have, you know, principles and structures evolve. And what I'm hearing from you is given the CAISO's structure today doesn't allow for that blue sky discussion or its constraints. Is that accurate?

MR. GRAY: Yes, that's right.

VICE-CHAIR GUNDA: Thank you.

COMMISSIONER BLANK: We're at time. I just want to thank the panelists so much for a great series of presentations, and thank you all for having us and listening. And I think with that we need to probably move on to the next panel.

COMMISSIONER McALLISTER: Thank you very much, Eric. Really appreciate your facilitation, able facilitation of the panel.

So, let's see, we're pretty much right on time, I think, and thanks to the moderators for keeping us there.

So, let's move on to session three. Now, this will be partly done in the morning, or partly done before lunch, partly done after lunch, but both pieces will be facilitated by Commissioner Cliff Rechtschaffen from the California Public Utilities Commission.

Commissioner Rechtschaffen serves at the PUC with areas of interest including decarbonization, safety, environmental justice, integrated resource

planning, transportation and building electrification and renewables portfolio standards, just a small portfolio there. He's a pleasure to work with and always very insightful, so Cliff is California's original member of FERC's Joint Federal State Taskforce on Electric Transmission and has been really in the trenches of the western interconnect for a decade plus. So, Cliff, thanks for facilitating and over to you.

COMMISSIONER RECHTSCHAFFEN: Thank you very much for that very generous introduction, Commissioner McAllister. And -- excuse me -- thank you to some of the people who spoke, talking up this panel so people don't leave for lunch, but highlighting how important transmission is. And it is, indeed, really critical to realizing the benefits of regionalization, whatever form we take.

You heard Keegan Moyer talk about how more transmission just increases savings. Spencer Gray just talked about how transmission is at least as important as market design. And you'll hear from Neil Millar talking about how transmission is the enabler.

Transmission is definitely having its moment. I will say there's an emerging consensus in the West, and more generally, but especially in the West, that transmission is just critical to meeting our clean

energy and electrification standards. We have, and you'll see from Neil's presentation, many states in the West with a hundred percent electricity goals, and it's also increasingly vital to meeting our reliability and resiliency goals. We can see how California helped the Northwest in 2021, how the Southwest helped California this last summer. We see how isolated grids like Texas are so vulnerable during hurricane years.

There's a lot of consensus about the need for improvement at the Federal level. FERC is engaged is engaged like it hasn't been in a decade or more about the need for change. As Commissioner McAllister mentioned, there's a FERC state taskforce on transition that I know Commissioner Houck is now serving as one of the two western representatives. Chair Thad LeVar from Utah is also on the taskforce.

But FERC basically has said we need to rethink how we're looking at transmission. We're not -- the current planning process is not well suited for what's to come, for the changing mix of generations, for accessing renewables that are from -- are far from loads. And they've issued three NOPRs, rulemakings on transition planning, interconnection queue reform. There's one likely coming on interregional planning. And at the same time, as reflected in this meeting and

others, there's really an unprecedented interest on the part of stakeholders, and policymakers, and utilities about these transmission issues. We've had discussions at CREPC/WIRAB meetings. There's an initiative led by Governor Ritter in Colorado on transmission issues and so forth. There's a lot of focus on the need for better coordination with the states. You heard David Bobzien of Nevada talk about that.

So, on this panel you'll hear some of the opportunities in the West that we can realize from improved transmission coordination, and they are very, very considerable, and also some of the challenges which are very considerable given how fragmented we currently are that we have 38 balancing authorities, as well as some of the innovative approaches that are out there to unlock the benefits of region-wide transmission coordination, how we can expedite development, how we can hold down costs, and so forth.

And costs are something we need to keep front and central throughout the West. In California I can say transmission costs have been one of the primary drivers of increased rates, and we are facing a real problem almost, I would say, almost crisis in the affordability of our rates. So, whatever we can do to hold down transmission costs is critical.

All right. Without further ado we're going to start with Neil Millar from the California ISO, the transmission king. Well, if Canada had royalty, he would be a king. He's at least a prince, but he's certainly a guru. And he's known to almost everybody. He's vice president of transmission planning and infrastructure development at CAISO where he leads transmission planning, infrastructure contracts, generation interconnection and operation engineering services. We're very lucky to have him in California. He serves many roles in the Alberta Energy System, including he was the Alberta utilities consumer advocate, the electric system operator, and also worked at TransAlta Utilities.

So, with that, Neil, you're on. So, what we're going to do, Neil is going to talk first. He has a deadline. He has to be leave right at 12:30, so Neil is going to go first, and then we'll take questions, and then after lunch we'll hear from David Smith, Fernando Martinez and Steve Johnson. Okay, Neil, on to you.

MR. MILLAR: Well, thank you very much for those kind words. Certainly raised the bar for the presentation here. And I should confess, I'm also able to rearrange, so I'm going to be able to stick around a little after lunch.

If I could have the next slide, please.

First, I wanted to thank you all for the opportunity to speak today, and also, just to provide some context for the comments I was going to make here, I was asked to provide more of a western interconnection context, as well as getting into some of the perspectives from the CAISO and some of our activities and touch on some of the opportunities and challenges in the planning processes that we're dealing with today, but starting very much with the perspective of the top down, what's happening in the western interconnection.

Next slide, please.

So, the western interconnection is unique with a single reliability organization or a regional entity delegated responsibilities from NERC, the North American Electric Reliability Organization that was set up under the Energy Policy Act of 2005.

WECC has some very specific responsibilities delegated to it, and what makes WECC unique is that it is a multi-state regional entity that also encompasses an entire interconnect with the connections to neighbors to the East being through DC ties. So, it's that single AC interconnection encompassing a very large footprint.

The responsibilities include, of course, certification, registration and compliance for regional

standards. It also includes a reliability assessment and performance analysis role, as well as these other requirements.

I wanted to spend a minute just on the reliability assessment. Most of that work traditionally has focused on the reliability assessment in the near term, but WECC can take on, and I believe it's interested in taking on a larger role in assessments on the longer term plans.

The one area that's always delicate is that it would be very difficult and probably very awkward for WECC to ever get into a role of either being seen to promote or advocate for particular solutions given their responsibilities. But the assessment of the overall effectiveness of the current system and the future plans could be very helpful.

Next slide, please.

When we look at the West there's a fairly large diversity with thermal resources on one hand and hydro on the other. The graph here represents information borrowed from WECC on their current resource adequacy assessments. Just going from the Northwest down to the Southeast you see the shift from the hydro resources to thermal and then very much growing solar and wind resources, with solar particularly climbing

quickly in the California, Mexico system.

Next slide, please.

Now, most of the western interconnection is outside of an ISO RTO framework today, and there are other coordination frameworks in place that I did just want to spend a minute recapping and touching on.

First, you know, besides the fact that the California ISO represents about 80 percent of the load in California, and that in itself is about 30 percent of the load in the western interconnection. There are 39 -- - in terms of organizations there are 38 or 39 -- we have a general new balancing authority area in the process -- depending on how you count. Balancing authority areas in the western interconnection, the ISO is one. So, we have a very large number of balancing authority areas ranging from very large to very small which increases the complexity when we're looking at scheduling issues and so on.

There are ten states in the Western Energy Imbalance Market. Anna McKenna talked a bit more about that earlier, and she said over 75, and I have nearly 80 percent of the WECC load is inside the Western Energy Imbalance Market.

As well there's the reliability coordinator framework that provides another overlay, and there are

42 balancing authority areas and transmissions operators taking services from the CAISO's RC West, which accounts for most of the United States western interconnection.

Next slide, please.

Just shifting on to some of the interconnection issues, on the left I borrowed a map from David Smith from TransWest. They did a very nice job of just mapping out the relative proportions of transfer capacity, total transfer capacity, within the western footprint, really helping highlight where the strengths and weaknesses are in the current system.

On the right I've also provided a graph here, a picture here of the transfer capability that's made available through its participants into the Western Energy Imbalance Market. This is available on the quarterly Western Energy Imbalance Market report, so sorry for the eye test here.

The other interesting part, though, is the total transfer capacity made available into the Western Energy Imbalance Market adds up to about 75,000 megawatts. So there's a lot of transmission capacity being made available for the sake of achieving those energy imbalance market opportunities.

Next slide, please.

Now just shifting to some of the context for

the transmission planning. A lot of our current transmission planning framework evolved primarily through three FERC orders over time.

First, of course, beginning with FERC order 888 back a number of years ago that opened up -- provided open access service on a nondiscriminatory basis to wholesale transmission customers.

Concerns at the time then led to FERC order 890 in 2007, that really set out frameworks for requirements for parties to engage in in planning that was coordinated and established a number of principles that transmission planning service providers were expected to follow.

FERC order 1000 came along later. The notice of proposed rulemaking was issued in 2010. The order took affect in 2011. It made really -- it created four more particular changes. One, it required participation in a regional 890 compliant-type process. It required the framework to consider public policy transmission projects, which was something that the ISO had already incorporated into it but had been known as its revised transmission planning process that went into effect in late 2010, early 2011. It also required interregional coordination processes that included a cost allocation framework, and it removed the first right of refusal for

certain incumbent transmission owners for certain facilities, really enabling transmission competition for new facilities.

I will circle back a little bit on the interregional coordination on the next slide -- two slides down.

Next slide, please.

So, what we have here is a map that I also need to update, but this is a map of the ISO's current relationship with the other regional planning entities as they're defined under FERC order 1000 in the West. The one update, of course, is that Nevada has -- sorry, NV Energy has now moved from WestConnect and joined the Northern Grid. Northern Grid was the merger of two previous planning regions that took place. It went into effect at the beginning of 2020.

Now, the important part about FERC order 1000 was that it established interregional coordination. It did not dictate interregional planning. So, the key point there was that the data would be shared that the different planning regions are using for their own transmission plans. It would be publicly available. There would be public coordination meetings, and that everyone would be doing their planning themselves, but based on shared common data. That was the important

aspect on the planning side.

WestConnect and Northern Grid run a biennial process. The ISO, of course, runs an annual transmission plan. So, we meshed two cycles of our process to line up with the biennial process conducted by the other two planning regions.

Cost allocation was particularly important. Interregional projects are only considered if there is a -- they can be compared favorably to a regional solution to a regional need. So, if the other two planning regions don't identify a regional need in the first place that calls for a regional solution within their own region, there is no discussion about an interregional transmission project under the tariff provisions. That's basically a show stopper.

And the other two planning regions have gone through three complete biennial iterations of their process and have not identified a regional need yet. There's been a lot of transmission moving forward in those areas. It's all been considered local under their framework, not regional.

So, the cost allocation that's enshrined in FERC order 1000 principles is also, I admit, a concern to us and something that we've been hoping to see changed in the future. The cost allocation methodology

right now calls for a sharing of costs based on sharing of benefits, not necessarily sharing of actual capacity which tends not to be a very useful framework for the West for the types of transmission that's being pursued and for the purposes its being pursued. So, that has been a bit of a problem at times to getting more meaningful discussion going with our planning neighbors.

Next slide, please.

As Commissioner Rechtschaffen indicated, there are a number of active of FERC efforts under way, notices of proposed ruling makings and other processes looking at refinements to the transmission planning processes and generation interconnection processes.

We're also expecting to see something coming out on the interregional planning side that really hasn't been addressed yet by the other NOPRs. As well, of course, there's the Joint Federal-State Taskforce on electric transmission that you heard about. There's also a staff workshop next week actually through another proceeding on establishing interregional transfer capabilities as a requirement for transmission planning and cost allocation purposes. So, a lot is happening on the FERC side about the evolution of the transmission planning framework.

Next slide, please.

In terms of the transmission development in the West, clearly the transition to clean energy goals, load growth and retirements are increasing the interest in the transmission and major transmission projects across the West.

On the left I've provided our most recent understanding of the different long-term clean energy goals from the various states.

On the right I've also provided a picture here of a number of major transmission projects that have been proposed or are in various stages of development or analysis.

I also wanted to highlight down in the California border two projects, the Harry Allen-Eldorado Project which was approved by the ISO in 2014. That's already in service. That was one of our first major projects in recent times increasing our transfer capability. As well the Delaney Colorado River Transmission Project that was approved by the ISO has now moved through the permitting stage and is expected to start construction shortly.

A few other projects I would just call out. You'll be hearing from TransWest Express as well later, but with regard to both TransWest Express and the Sun Zia Transmission Project, the ISO has been developing a

subscriber participating transmission owner model looking for ways to include projects that have been moving forward on a merchant basis to find ways to achieve the operating efficiencies and streamlining operations by being able to incorporate them into our balancing authority area while still respecting the rights of the people that subscribe to the transmission projects and are paying for the transmission projects. So, that's the objective in that area.

All right, next slide, please.

So, California is admittedly probably accelerating the pace of resource development most quickly right now in the West. A few key points I'd just like to make on this somewhat busy graph is if you look at the four bars to the left in the lower graph, those are showing the steady escalation in resource requirements that were established in four consecutive years of transmission planning based on our coordination with the Public Utilities Commission and the Energy Commission and the resource planning efforts and the results communicated to us through the Public Utilities Commission.

So, what you see there is very quickly a growth of a ten year projection of needing roughly 1000 megawatts a year, to 2700 megawatts a year, to 4000

megawatts a year, and next year we're expecting our base case portfolios to be planning around adding 7000 megawatts a year over a ten-year horizon.

So, our rapid escalation in new capacity requirements, as well as increasing load growth as shown on the graph on the right, that's largely associated with natural load growth and also electrification of other industries, including transportation. So, we have a lot of our work cut out for us.

Next slide, please.

This is kind of a key picture that came out of our 20-year outlook document. We believe that -- this was an effort that was achieved through collaboration with the state agencies that we really much appreciated. It allowed us to map out a long-term transmission vision to provide context for our 10-year planning efforts, as well as being a jumping off point for our discussions with our interregional -- with our neighbors about interregional opportunities.

Many of the projects we've identified here in the -- within our footprint are directionally pretty well nailed down and solid. The work needs to be done over the next number of years identifying exact needs and timing, but the general direction, the corridors that need reinforcement, those are becoming clearer

already.

When it comes to the out of state, we identified a significant amount of new transmission capacity needed to meet the state policy goals expressed through the renewal generation portfolios, and this really is what allowed us to get started with our conversations with our neighbors about what it would take for California going its own way and what are the collaboration and cooperation opportunities to do better by working together.

If we could move to the next slide, please.

So, the key point I wanted to make is just coming off of that 20-year outlook document to achieve the out of state wind goals that were identified in our 20-year outlook framework really requires basically all of these projects to move forward, as well as additional high voltage transmission capacity reaching both into Northern California as well into Southern California. So, for us for many of these projects it's a case of when, not if.

Next slide, please.

So, just shifting gears a bit, this is a bit of an assessment we put together of our current planning processes, what's working, what's not.

When it comes to our what we call regional

planning, which under the FERC nomenclature means within our own footprint, there we see our regional planning processes have a lot of work to do, but the processes themselves are robust and working quite well. This relies very heavily on the state agency coordination on the inputs for our resource planning efforts.

We do see that we also have what's been proving to be a relatively successful competitive solicitation process for new greenfield transmission projects, and we have an established coordination framework on the interregional side.

When it comes to the generation interconnection processes, our processes have been working very well with the cadence of development that was going on for the last number of years, projects supplying and moving through a cluster study approach as opposed to dealing serially with interconnection requests, and that generally lining up with procurement interest. We do see, though, that these processes will not be able to sustain the escalation of the amount of new development we need to pick up, not only in the near term, but sustaining that level of new development reaching out over the next ten and 15 years.

So, we do see needing to tighten and improve the level of coordination between our generation

interconnection processes and the transmission planning and resource planning efforts.

So, those, as well as the procurement activities themselves conducted by the load serving entities, that scenario that we do need to make improvements.

On the interregional planning side, the FERC order 1000 process established good coordination and communication, but it proved not to be effective in advancing interregional solutions, and that's an issue that we see FERC taking on right now with some of these notice of proposed rulemakings, looking at different issues there.

From our perspective we felt just from -- just anecdotally, we felt that the cost allocation framework that was enshrined in FERC order 1000 really became a huge barrier in getting more meaningful conversations going with our neighbors who felt that they were being asked to participate in something with very little control on the outcome around how costs would be allocated, which makes people very nervous about putting their hands up and identifying a need in the first place, and we can appreciate that concern.

So, we can move to my last slide.

The last thing I wanted to touch on was some

of the opportunities and challenges. So, we do see that in the coordination and collaborations through effective dialogue is critical. The interregional planning process has been -- helped with some aspects but not -- but it has its limitations. We have been in discussions through other frameworks, and I heard mentions of CREPC WIRAB, as well as the efforts being undertaken through the Western Interstate Energy Board.

We also need to be clear that to meet our future challenges we really need to line up the transmission planning with the resource planning. We cannot wait for the resources to develop and then look for opportunities to capture synergies. These need to move forward in lock step.

On the funding side we do see opportunities through federal funding opportunities to help lower the cost for rate payers. That has not been a barrier for getting interest in people building transmission. Our competitive procurement processes have always had a lot of active participation from well-healed, well-funded participants.

But we also see we need to be creative and flexible in using the tools we have to develop the right solution for the right type of transmission project. We think examples like the subscriber model that we've been

developing to support TransWest Express and Sun Zia are good indications, and we're putting a lot of effort into helping those get across the finish line, which we think could be really helpful to the industry overall.

So, that wraps up some of the overall context, and I'll look forward to any questions you may have.

COMMISSIONER RECHTSCHAFFEN: Thank you, Neil, and I think you finished to the second of your allotted time. I would just take my moderator's prerogative and point out that the CAISO has been in the forefront of some of the transmission reforms that are being considered nationally and that are seen as really necessary to move us into this next stage of transmission planning, including the very tight link with resource planning, some of the reforms for competition, interconnection generators helping to facilitate subscriber models, and so forth. So, I think there's some very good lessons to be learned from what the CAISO has done.

Let me turn it to the dais and see if there are questions from you.

COMMISSIONER McALLISTER: It looks like we have Chair Randolph, and then Commissioner Houck, and Vice Chair Gunda.

CHAIR RANDOLPH: Okay, thanks. My question

actually just tees off something Commissioner Rechtschaffen just said, which is sort of what specific recommendations do you have to better link resource planning and transmission planning?

MR. MILLAR: Well, thank you for the question. When it comes to the linkages, right now what we see is perhaps the biggest gap is actually between the procurement activities being conducted by a very large number of load serving entities and the actual planning direction that's being set through the resource planning efforts, Public Utilities Commission and our transmission planning that keys off of that.

We see a large number of projects applying for interconnection services and getting interest in different load serving entities' procurement processes that are in areas that are not aligned with where the resource planning was trying to steer resources and where we were reinforcing the transmission system. So then those parties are raising concerns that transmission is not being developed for their projects, and to be blunt, that was the plan was to not develop transmission into those areas, the transmission was focused elsewhere. So, we do see needing to tighten those linkages.

When it comes to the regional -- sorry, to the

coordination more broadly of resource planning with transmission planning, this is an issue more on the interregional coordination side. We see many of our neighbors very hesitant to be very all in on their resource planning activities and engaging in meaningful transmission planning discussions around their longer term resource planning needs. And we do see some of that being driven out of some trepidation around the cost allocation framework at FERC.

Many of the participants when they're submitting models into the WECC processes aren't showing the full impact of their own integrated resource planning efforts. They're only showing the projects that are already largely committed and aren't showing their full long-term needs and requirements. So, we need people more comfortable demonstrating their longer term resource needs and then using that as a jumping off point for engaging in effective dialogue on advancing some transmission solutions, and in an environment that all the parties feel that they have some comfortable amount of control over how the cost allocation would shake out.

COMMISSIONER HOUCK: Thank you for the presentation. I really appreciated this. All of the presentations today have been excellent.

My question kind of digs a little deeper into Chair Randolph's question, specifically looking at some of the interconnection issues associated with the large amounts of storage that we're looking to bring on line and the current planning processes and how the ISO is going to be addressing the need to get those projects on line while we're also balancing delays with some of the supply chain issues.

MR. MILLAR: Yes. I think there are two things I need to emphasize there. One is the total industry capacity to build and get connected, the volumes we're talking about. It's a significant ramp up from our past experience.

You know, when we look at the volumes of 5,000 megawatts quoted as being connected last year from summer to summer, we thought that was a very big number, and it's just a good start. So, now we have to sustain those levels and even higher going forward.

So, total industry capacity from ourselves, from the transmission owners and from the industry itself to build those projects is going to be tested when you look at a 20-year projection of 120 gigawatts of new installed capacity by over a 20-year period.

On the more immediate pressure side we do see needing to find ways to better shape and focus our

resources on the projects that are moving forward. We've definitely been hit. In the last two years we've been dealing with the aftermath of a very overheated competition. In our Cluster 14 process in April of two years ago we were faced with over twice the number of projects we've ever had apply for interconnection in a single cycle. And our current queue volume right now of projects in our interconnection queue is still around 235,000 megawatts.

We need to be able to focus our resources, our staffing resources and the utilities resources on the projects sooner that are moving forward instead of keeping so many projects alive, fighting it out for competition for contracts within service states even two years out.

So, that's a key area where we see needing to focus, and we do think that there's room there for procurement to be directed for projects with in-service dates that are not two years out, but three, four, five years out so that we can winnow down and focus our efforts on the projects that are moving forward more quickly, because the volume we're dealing with that's trying to stay alive for near-term competition is simply not helpful.

VICE-CHAIR GUNDA: Thank you, Neil. As usual,

excellent presentation.

I just wanted to build off a couple of things that have already been asked and just thinking through, you know, I was previously chastised in one of the workshops that there is no low hanging or at least a good transmission. It's always good.

So, let me just kind of ask a question on even under a best case scenario, you know, to kind of get some of these reforms moving forward and building large scale transmission we're looking at five, eight, ten years away, right, and there's an incredible need in the short terms for coordination and increased interconnection of resources.

I wanted to -- you know, you kind of laid out some creative and flexible opportunities in our toolbox right now, the subscription model that you talked about. Could you just expand on some near term things that we can do to -- I mean you kind of responded to Commissioner Houck's question there. What are some of the things we can do on really maximizing what we have in terms of transmission today, and what can we do as we think through the longer term reforms?

MR. MILLAR: Thank you. In the very near term a few things we're looking at is last year we made a number of changes already in our generation

interconnection process that were focused on trying to help the projects that are moving forward get a bit more attention, and recognizing that the projects that aren't would be getting less attention, and also helping set the stage for perhaps more reasonable volumes and more focused interconnection requests going forward. We're not seeing that that alone will get us where we need to be, so we are expecting next year we are going to have to look at some other process changes on our generation interconnection side to lean even more heavily on coordination with the procurement processes and with the transmission planning.

So, we really need to shape where people are applying for their interconnections to be in areas where we can bring on the maximum amount of capacity most quickly. And that might mean having to make some tough decisions about those areas that aren't in those prime areas.

Now, some of that then feeds into some longer term structural changes. You know, we do see things evolving on the FERC order 1000 side. We also see that procurement interest, especially on the long lead time resources, that needs to be firmed up as soon as possible, whether we're talking about accessing offshore wind potential or these out-of-state resources, the

sooner we can get those, the procurement locked down for the long lead time resources, the sooner we can commit and jump all in on getting the transmission in place.

So, the policy framework we established back in 2010 has been working quite well, but it does need firm commitments. One of the reasons I kind of -- I admittedly flinch when I hear these days of least, least regrets planning, is that the least regrets planning is focused on studying a wide range of future scenarios and only moving on the common denominators, the items that show up in all those plans. And that's great when you're in a relatively slow measured pace of development and you have time for feedback loops. But the amount of the development we're talking about here, we do need to make some bold decisions, get moving on the projects, and if some of them need course corrections along the way, so be it, but we have to be moving forward. These are long lead time transmission projects we're talking about.

We also fully explore opportunities using grid enhancing technologies. We have approved recently a number of HVDC projects for local purposes for control technology.

We also see more years of phase shifting transformers, HVDC transmission being used in the

horizon, as voltage control devices to get the most use out of the wires we do have in the air.

COMMISSIONER McALLISTER: Thank you, that was great and a great presentation.

So, asking a bit more pragmatic question about this procurement topic. I mean what -- are there institutional and structural barriers that kind of prevent -- that would prevent that conversation from happening? I mean, you know, there are jurisdictional issues. I mean, you know, we're not in the business of sort of getting into -- getting across agency, you know, sort of crosswise conversations. We want to respect authorities and jurisdictions. And I guess the -- so, in terms of sort of really trying to focus on the path forward that has the -- that starts at point A where we are and kind of, you know, pragmatically moves forward at the kind of scale you're talking about, are there any process barriers or sort of issues like that that you're concerned about in terms of say the CAISO's ability to participate in a meeting or those sort of things?

MR. MILLAR: I think the biggest issue that stands in the way of locking down resources that need to be brought on line, you know, four, five, six years out is the concern -- and I appreciate where they're coming from -- the concern among load serving entities about

how volatile the costs are for a number of these resources. There's little thanks for locking down the contracts further out if it turns out that the resource prices are dropping.

So, all of those uncertainties tend to put pressure on load serving entities to make no longer term commitment than they absolutely have to.

I think that we're at the point, though, when we look at how quickly solar and storage projects can -- themselves can be built, one of the reasons now for requiring people to look further out is so that we can get some clarity on the transmission system. Otherwise, we're faced with trying to massively overbuild the system, which I don't think we actually have the resources to do anyway right now. I think we'll be challenged to get all the resources built we do need. But, otherwise, that's the pressure is maximized transmission to create optionality for people entering into contracts that aren't reaching as far out. That's a paradigm we have to shift. We have to get more clarity on what's being built and where so that -- I should have clarified this. Our policy driven transmission framework has proven -- with the input we're getting from the state agencies, it's proven very effective in helping us move on some big projects inside

our footprint where we get the challenges are the local projects that depend on which specific resources actually get contracts. Those are the ones that are harder to handle on a more programmatic basis in your long-term transmission planning process, and those are where we're having people getting held up on getting connected with the smaller local upgrades because the utilities can't pivot that quickly to start building some of those projects, and they also need a bit of lead time.

COMMISSIONER McALLISTER: That's helpful. Thanks a lot. I'm conscious of the time, and I want to sort of make sure that Commissioner -- Vice Chair Gunda has a chance to follow up, and get back to Mr. Rechtschaffen. It would be lovely to hear your thoughts on this topic as well.

VICE-CHAIR GUNDA: Thank you, Commissioner McAllister. So, just one other question on this one. You mentioned the interregional coordination and, you know, the difficulty in making sure everybody recognizes the need for a certain transmission before that moves forward. So, in terms of just the resource, and barriers, and then constraints, you know, are we -- what are some common themes that are emerging across kind of the coordination areas in terms of, you know, ability to

plan, right, and then also ability to interconnect, and some of the soft resource problems we've been seeing in terms of just the human power to be able to kind of get through these levels of analysis, and planning and coordination.

MR. MILLAR: When it comes to the information itself, last year the Western Interstate Energy Board took a huge step forward with collating the integrated resource planning information from different parties across the West. And we do see that those frameworks, Western Energy Interstate Energy Board, CREPC, WIRAB, perhaps providing the right framework for more conversation about longer term, sooner or later someone is going to have to sit down and cut a deal for how some of these transmission projects move forward, and the transmission planning organizations, including my group, will need the active support through the appropriate state powers in that arrangement.

So, we're seeing a lot of opportunity there for improving the kind of coordination and dialogue, not just among the technical planners, but also among the policymakers, that that's going to be critical.

When it comes to the staffing concerns there, that is a concern across the board. I think the utilities will probably be feeling that even more

acutely than we will, but there there's opportunity for ramping up, training, university programs, and so forth. And then on the other hand we also need to make sure, just like with the wires, we need to make the best use of the planning and engineering talent we do have, which means focusing those resources on the most -- with those areas that produce the highest amount of resource connection in the short amounts of time. But we really need to channel those resources effectively.

COMMISSIONER McALLISTER: Okay. Well, we're pretty much at time. I don't see any hands up on the virtual dais, so we'll pass back to our facilitator, Commissioner Rechtschaffen, to wrap things up. Thank you, Neil.

COMMISSIONER RECHTSCHAFFEN: Thank you, Neil. So, will you be around a little bit after lunch?

MR. MILLAR: Yes, I can stay until 2:00. Thank you.

COMMISSIONER RECHTSCHAFFEN: Okay, great. So, don't change the station dial. We have a great second group of panelists after lunch. Thank you, Neil, for your insight, and we'll be providing some broader lessons in -- between 4:00 and 5:00 when we have our report back to the larger group, but I think at this time we're ready for our lunch break.

MR. MILLAR: Thank you.

COMMISSIONER McALLISTER: Okay. So, looking at Heather, the IEPR lead, we're back at 1:30, right, 1:30 sharp, okay, everybody, thanks very much.

(Lunch recess at 12:34 p.m.)

(Back on the record at 1:30 p.m.)

VICE CHAIR GUNDA: Good afternoon, everyone. Welcome back to the best panel of the day, being moderated by Commissioner Rechtschaffen: We have a lot of audience just for the panel.

Commissioner Rechtschaffen, if you're here, you want to turn on your camera.

CPUC COMMISSIONER RECHTSCHAFFEN: Yes, I am here. Thank you, Commissioner Gunda. Can you hear me?

VICE CHAIR GUNDA: Yeah, I hear you. Passing it back to you. Thank you.

CPUC COMMISSIONER RECHTSCHAFFEN: Okay. Welcome back everybody. We are now going to hear from three additional panelists.

And our first one is David Smith with TransWest Express. David is Director of Engineering and Operations for TransWest Express, which is an affiliate of the Anschutz Corporation. Through its affiliates, Anschutz has been actively involved in the west for more than 75 years in agriculture, ranching, energy

development, transmission and more. And that's part of -- these activities are part of its commitment to managing natural resources in a responsible way.

David, the floor is yours.

MR. SMITH: Well, thank you very much. And also, thank you, Commissioners, for inviting TransWest and the Anschutz Corporation to the presentation.

Just to give a little background on myself, as Cliff mentioned, Director of Engineering and Operations for TransWest, and also have a background in working in mainly utilities, working on different market expansion issues from there, as well.

You know, as a transmission development company we're primarily a market focused company. Appreciate, you know, us being invited to this policy discussion and I'll try to, you know, speak to the policy issues that are up on the floor, in front of the panel today.

And so, you know, if you can go to the next slide. You know, as a market-focused group, the simple -- the simple case for the TransWest Express Project is, you know, shown here on this map that has -- it's a couple maps. One is the wind resource in the United States and the other is the capacity map, transmission capacity map that Neil showed earlier, that TransWest has developed.

The circled area is in Wyoming. And as mentioned, I work with Anschutz Corporation and we're developing both a wind resource in the middle of that circle on the map, as well as a transmission, the basic transmission to get to California.

And so, we've been working on this project for a number of years. And I've been through different transmission planning process. We're very excited to be working with the California ISO and others to work on a new model, called the Subscriber Model for transmission and wind development to meet market needs.

So, we can go to the next slide. This is just an overview of the TransWest Express Project. It's a multi-state project and an interregional project as well, as it connects to each of the three regions within the west.

And this is a map that shows all the jurisdictions crossed by the project, on the 732 mile journey from one end to the other.

The project is a 3,000 megawatt transmission line. We saw that, you know, to get long distances transmission economies of scale we saw as the line to be the largest that the western interconnect can handle, which is 3,000 megawatts. And we've also selected to use HVDC technology because that can be placed on a

single set of towers, to a bi-pole system.

And that's, the length of that line is shown here in the green, from Wyoming down to Utah. We plan to have an interconnection with the Intermountain Power Project, and Utah will then have a 500 kV AC line down into Nevada that's shown in the blue line.

If we go to the next slide, we'll talk about that kind of in terms of capacity and how transmission planning, you know, has helped the TransWest Express Project refine its configuration.

And as Neil said earlier, there's a number of projects that are needed on the side of all the different projects. We haven't -- you know, what's shown here on this slide is adding the TransWest Express Project, the green from the Wyoming to Utah nodes on this map, and then from Utah to Nevada.

As Neil mentioned, there's a number of other projects that are also being developed. And if you look at those maps and start putting it to this map, it's basically trying to make the thin lines thicker from resources areas to the -- to transmission lines that have been built, you know, to feed into California.

So, in the -- as we've been working on developing the project, TransWest has been reviewed in a number of different transmission planning processes,

both by the Cal ISO and Northern Grid that's helped inform us into the configuration of the project.

In addition to that regional transmission planning process that takes place, there's a number of other electrical reliability-based planning efforts that take place, and there's a lot of coordination amongst the entire interconnect, and all transmission providers. And TransWest appreciates everyone's work, you know, and working on, you know, the very important reliability and other elements building a major transmission infrastructure.

And I'll just mention a couple of that. One is the WECC path rating process, where the NERC reliability standards are tested by different folks.

And then, also, system impact studies where TransWest will be interconnecting into the 500 kV system in Wyoming, the system in Utah, and the system in Nevada.

You know, as a major interconnect, you know, we're connecting to the existing system, you know, everywhere we can because that provides all that added interconnection and regional capacity benefits that others have talked about before on the panel.

On this map, what I'd like to point out is, you know, you get the Wyoming to Utah 3,000 megawatts leg.

At one time, originally in the development of the project, we were going to build -- we were looking at a 3,000 megawatt project all the way from Wyoming down into Nevada.

We've changed that due to different planning activities. So, now, that DC line, the 3,000 megawatts is going to Utah and that's in large part to utilize the -- what's going to become available capacity on the HVDC line that goes from the IPP plant into the LADWP system.

And so, that's an example of being able to use existing transmission assets effectively that were used for coal to integrate into California, but now they can be repurposed as the folks as IPP, along with LADWP, are looking at a renewables energy center there that's going to involve hydrogen and other very exciting opportunities as well.

And then, you see the AC line that goes down into Nevada. And I'll just point out, Neil mentioned earlier, the Harry Allen to Eldorado line that was of the major lines that was built by the ISO, outside the -- recently. That represents that bump out, if you will, between the Southern Nevada and market nodes on here. That's about a 50 mile line that goes basically from north of Las Vegas to south of Las Vegas.

And so, we're looking at connecting into north

of Las Vegas and utilizing the capacity of that line. Because again, we see that as the effective way to use the existing system and kind of minimize the amount of transmission capacity and other, you know, impacts on building additional transmission.

So, the overall transmission planning process has been very helpful in helping informing in particular this project. And I won't say that just for the TransWest Project, but you know, all the projects that have been in development for a number of years, that are advanced and have permits have all, you know, gone through refinements that are all kind of supported by the transmission planning process, and the ability to work with other planners and developers throughout the west.

Okay, we can go to the next slide. This is a listing of the different -- different types of milestones that have to be passed before a transmission project can go to construction. And in this here, I've just listed out where TransWest is.

But I'll just quickly go through, you know, the things that are needed for any transmission project to start construction is, you know, obviously all the permitting and land rights. And you see here, TransWest has secured those.

You also need to have all the interconnections and reliability checks, planning, system planning done around, you know, be able to operate within the grid reliability, and safely, and add benefits.

There's a number of preconstruction activities to get ready. The most important one, I'm happy to announce today, is TransWest has selected a HVDC technology supplier and we're under contract with one. That's a significant step for a project, HVDC project like this because the demand for HVDC technology is very high. And, you know, this actually represents the critical path for our project now in getting it placed in service.

It will take five years from today to get that HVDC project engineered, built and installed. And so, we're looking at a 2025 in-service date, with construction starting early next year.

So, the other items we're continuing to work on are the interconnection agreements. We're preparing -- we're bringing on, you know, additional contractors to work on the line and station portion of the project. And also, we have to finish up financing.

The next few slides have a few commercial elements that we can talk about. Go to the next slide.

Back in 2021 TransWest Express, conducted --

conducted an open solicitation for capacity on the line. And this is a, you know, a FERC policy that's used a lot in the gas pipeline industry, where there are subscribers that subscribe to a transmission or a gas pipeline, and that money's used to fund and build the project. And that's the model that TransWest has moved forward with for the TransWest Express Project.

And this is just a list of the different steps we went through. But the outcome for this is TransWest has subscribed 100 percent of the capacity from Wyoming to the California points I spoke about. All of that has been allocated to the power company in Wyoming, which is the affiliate of TransWest that is working on the wind farm in Wyoming we spoke about.

So, with all the capacity allocating to Wyoming wind resources, these Wyoming wind resources are now in the -- can represent to the market in California that they can deliver these resources to different off take points in the -- on the Cal ISO system and the LADWP system that then can supply California customers.

So, the next step in the process is TransWest needed to -- move to the next slide, please -- TransWest needed to operate within a balancing authority, which we heard earlier about the different integration of the, you know, the interesting having better BA to BA

transactions, and coordination, and all that.

You know, from our perspective, we didn't want to be the 39th or 40th area in the West, and so we wanted to join one of the existing balancing areas and approached the Cal ISO and requested joining the -- joining their balancing authority. But also, respecting the customer agreements that we've entered into.

And so, we've worked with the ISO and have submitted an application to become a participating transmission owner.

And the key difference in the -- in this arrangement is that TransWest will recover revenues for services on the line directly from customers, and it will not -- they will not -- customers will not -- the transmission access charge will not be increased to provide this service.

And so, we see that as a very novel and interesting way to move forward and for us to work directly with load-serving entities going forward to get the projects contracted and then built.

One more slide that just has different advantages, but I think I've run out of time. So, I'll just leave that up there and conclude my remarks now. Thank you.

CPUC COMMISSIONER RECHTSCHAFFEN: Thank you,

David. Maybe we'll have time for -- to get into some of those advantages during questions because I'm sure people will want to hear them.

Our next speaker, our next panelist is Fernando Martinez. He is the Executive Director of the New Mexico Renewable Energy Transmission Authority, which is a different model, as you'll hear. It's a state run transmission authority. Colorado has something, a few other states. We don't in California.

Fernando previously held senior positions in New Mexico State Government, including the Chief of the Drinking Water Bureau, the Director of the Energy Conservation and Management District, and the Director of the Mining and Minerals Division. He has broad experience in the natural resources, and energy, and mining area.

And so with that, I'll turn it over to Fernando.

MR. MARTINEZ: Thank you. Can everyone hear me okay? Okay, great.

Okay. Well, good afternoon everyone and thank you for the opportunity to participate and present at today's event. It's a pleasure and honor. I appreciate everyone's efforts here to overcome the many hurdles we face in the west as we transition to increasing amounts of clean energy.

As each one of you knows and it has already been stated many times today, this is an enormous challenge. It's going to require that all of us work together to solve.

Today what I want to discuss is how New Mexico is building an increasing high voltage transmission capacity and what we are doing to move toward utility scale long duration storage to meet the demands in New Mexico and export markets.

In New Mexico, we're fortunate, we have a congressional delegation, a governor, a legislature that has developed supportive clean energy policies that are making possible this new clean energy future. And one of the many ways in which New Mexico is implementing this clean energy future is by increasing our electric transmission and utility scale storage capacity. And that's enabling us to just develop massive amounts of renewable energy.

And the New Mexico Renewable Energy Transmission Authority, or RETA for short, and I'll just call it RETA for short from here on forward, we're doing this through engaging in and entering into public/private partnerships. Such as the ones we have with Pattern Energy, Ameren, Southwest Power Group, and Invenergy, and other developers.

Our world class renewable energy is being made accessible to New Mexicans under the broader western export markets. So, as a result of this New Mexico is on track to meet our clean energy goals of the New Mexico Energy Transition Act to move to 100 percent zero carbon electricity by 2045, as well as helping other states meet their clean energy goals as well.

These efforts are also helping New Mexico's economic recovery with this pandemic and into the future. The rewards have been substantial here, with thousands of jobs, and multi-billions of dollars in capital investments. And at the end of it, an upgraded and flexible grid that's going to help deliver low cost reliable energy. So, all great benefits from the work that we've been doing.

We've been rising to this challenge by working with and having early engagement with developers, utilities, state and local officials, tribes, military installations, federal agencies and the public to help achieve this brighter future with renewable energy.

But to be successful we must maintain communication at all levels between local, state, interstate, regional, national leaders to implement energy policies that benefit the West.

One of the things that we're finding in New

Mexico, as I'm sure everyone else that's involved in building transmission capacities has figured out by now is that we need to ensure the timely permitting of projects and that regulations are predictable. A predictable regulatory landscape is essential.

We need to consider modifying appeal processes so that they are limited to cases of malfeasance and not for frivolous reasons.

In short, we need to streamline permitting processes, but without cutting any corners. We absolutely don't engage in cutting any sort of corners, we just understand that there's many permitting processes that run sequentially rather than concurrently. And there's areas that I think that we can make improvements so that we can make sure renewable energy, energy storage, and transmission projects get the necessary permissions to be put into commercial operations.

Everyone in this meeting is pretty well aware that developers have the capital and the engineering capability to plan, develop and construct projects, but it's getting timely permission to do all this that is the most challenging hurdle. And this is how RETA can help.

So, if we could go to the next slide and I'll

describe a little bit of the model here in New Mexico that we used. RETA was established by the New Mexico Legislature in 2007 to plan, finance, develop, and acquire high voltage transmission lines and storage projects in order to promote economic development in New Mexico.

So, any project we sponsor has to have at least 30 percent -- be 30 percent renewable energy. But so far all our RETA projects are 100 percent renewable.

Over the past couple of years, RETA has completed a number of renewable energy developments studies, in addition to all this work that we're doing, that coincides with the work that we've done. We've completed multiple projects and we have partnership agreements with three projects in development, and MOUs with more. And I'll highlight some of those projects.

So, if we can have the next slide. And I don't want to get into this too much because I think it would cause a little -- a lot of duplication from, you know, what we've heard earlier in the day.

But really, the bottom line here is that 78 percent of energy use in the West is now aligned on decarbonization. All the states in the -- well, maybe not all the states in the West, but most of the states in the West do have policies that are going to drive the

need for 100 gigawatts or more of renewables by 2035. And that's part of the reason that this landscape has changed rapidly in the next years.

If you could go to the next slide. But it's not all about the policies that have been put into place in New Mexico and other surrounding states, it's also the great economics that are driving massive amounts of wind and solar. When you find that wind and solar are now cheaper than new gas and new coal, even without federal tax incentives, and that by early 2030s we'll find that new wind and solar's going to be cheaper than existing natural gas. So, that's a big deal.

And in order to make all this happen I think everybody understands we have to have an organized Western grid that's going to require transmission upgrades and a flexible grid. We're going to have to have geographical diversity, meteorological diversity, lots of interconnections to make all of this work.

Next slide, please. Just to give you an idea of what we have here in New Mexico, in terms of wind and solar resources. And as you can see from this map, we have world class resources. You know, we have 137,000 megawatts of the highest quality wind potential and most of this is on State Trust and private lands.

We also have 824,000 megawatts of the highest

quality solar potential, also on -- with most of it being on State Trust and private land. So, lots of benefits there.

Could I have the next slide, please? I know I have a few minutes left, so I'm going to -- this one, I think we've talked a lot. The point is here there's been a lot of discussion here, but in Intermountain West we don't really have a really good organization for how we get all this done.

So, one of the things that RETA's doing is promoting the idea of a regional transmission organization.

We can go to the next slide. So, I want to highlight our current projects that we have under development right now. And I just apologize, I just saw -- now that I looked at it, I do have one small mistake here on the SunZia Project. It's actually a 550 mile line. It's composed of Line 1 and Line 2. Line 1 is being developed in partnership with Pattern Energy. And Line 2 is being developed in partnership with Southwestern Power Group. And I'll get into a little bit more of this, but it's also going to be rated at a capacity of 4,500 megawatts.

We're also working with Ameren on the Mora Line, which is in the northeast New Mexico. It's got some of

the highest wind for 114 miles. And that's going to support 182 megawatt renewable energy project.

And then we have North Path, which is Invenergy, which is a 400-mile long line at 345 kV HVDC that will enable a 4,000 megawatts wind farm as well, in Northeast New Mexico.

I'll go on to the next slide, please. And I just want to highlight here is the Western Spirit Project that we put into commercial operation in December of 2021. This was a 150-mile, 345 kV single circuit line. It enabled a gigawatt of wind power to be produced in New Mexico. It was a $2 billion project, lots of economic development there.

And I know I'm kind of running low on time, so I want to go to the next slide. This is just a map of -- you can see it went through this horseshoe shape. It went through several counties in New Mexico. It required 43 -- 433 parcels of land, another 300 access agreements we had to negotiate. We didn't have to use eminent domain in a contested fashion at all during this project, which is a really big deal. We did have 18 uncontested cases of eminent domain to clear up title, where we couldn't find landowners.

Next slide, please. This is just a little bit more information on the SunZia and the El Rio Sol

Projects, which make up the entire SunZia project. Just the Pattern line alone, along with the SunZia wind, is going to comprise one of the largest renewable energy infrastructure projects in U.S. history. It's going to be an investment of total of over $8 billion. These are privately funded. It's going to deliver widespread economic benefits across New Mexico and Arizona.

The next slide, please. Here's just a simple map of how the line will run from Central New Mexico to South Central Arizona.

Next slide. And as I mentioned, we did a number of studies to look at our resource potential, how we could competitively develop these resources, the transmission needs that we have to undertake, and the economic benefits. And these can all be found on our website.

We did the initial study in 2020, an update in 2022, and an energy storage study also in 2022.

The next slide, please. Just want to let you know, I have one minute left here, but here are the advantages of working with RETA. You get property, gross receipts, and compensating tax benefits. We have the powers of eminent domain. We can work government-to-government with state agencies, federal agencies, tribes, and other permitting agencies. And we also have

the ability to issue and sell bonds. So, those are some of the reasons that developers like getting involved with RETA.

And with that, I'd just like to close out, if you could go to the last slide, so we can just get to the key takeaways here. And that's, you know, as we mentioned the energy market is demanding enormous amounts of renewable energy. We know we need this Western grid, it's necessary, and it's going to require transmission upgrades and a flexible grid.

But I also want to just point out that renewables cannot rely on transmission alone. We need long-duration, utility-scale storage. Renewables with storage will create firm capacity and dispatchable power available 24/7 which is what's required.

So, with that I'll close and wait for questions at the end of the presentations. Thank you.

CPUC COMMISSIONER RECHTSCHAFFEN: Okay, thank you very much, Fernando.

Our final speaker for this panel is Steven Johnson, with the Southwest Power Pool. Steven is the Director of Markets Administration, and he manages some of the activities you heard from about -- hear Carrie Simpson talk about. The SPP's RTO Integrated Marketplace, the WEIS, which is the imbalance market,

the day-ahead market, and congestion hedging markets.

Before coming to SPP in 2020, Steve had a 20-year career with WAPA. He was Manager of the Colorado River Storage Project. And he has extensive experience in transmission, energy marketing, hydroelectric power plant operations, and reliability coordination in the West.

Steve, the floor is yours.

MR. JOHNSON: Good. Thank you, appreciate it.

What I'd like to chat about this afternoon is just maybe a little broader vision that kind of ties everything together that you've heard David and Fernando talk about.

So, next slide. Some of the renewable penetration that we're seeing in the SPP RTO footprint. So, current penetration records, a little over 90 percent penetration instantaneously this year. Mostly wind. It looks similar to what California is seeing except it's wind instead of solar, for the most part.

The next slide. So, our maximum wind so far, as of earlier this year, is 22,000 megawatts. I fully expect we will be able to exceed that. It's going to get interesting, though, because we -- as we add more and more capacity, we're starting to see more and more congestion issues. And the fact is we're getting to the

point, with a 55 gigawatt peak system, that it's getting tough to manage and move around.

I know some of the swings and the ramps, compared to what you're seeing with the solar, aren't necessarily super impressive. But still, very difficult to manage seeing very similar issued to what the California ISO is seeing in their management with an entirely different type of renewable generation.

Next slide. So, just to show that a little bit more, you can see this was just across less than 24 hours. We went from 51 percent wind down to 6 percent. And it really keeps our operators busy trying to bring everything else on to be able to back that up, as we manage this system.

Next slide. Over time, just wanted to show, you know, we've seen a steady climb of wind, a steady reduction in coal. You'll notice gas stayed pretty flat and then coal and gas kind of diverged around 2020. And that's driven mainly by just the difference in prices between gas and coal, honestly. But wind continues its steady climb and I believe will continue.

Next slide. So, year to date generation, this is not the first time we've seen wind be our number one resource. Again, we expect to see that trend continue. We have seen coal and gas shift as natural gas prices

have shifted. But wind remains constant and I believe it will remain our number one resource going forward.

Next slide. This just shows that the bulk of the generation that's been built in our RTO footprint over the last several years, last ten years, is mostly renewable. And I took a quick look at our GI queue dashboard and we've got about 90 gigawatts in the queue currently today. Only 4 percent is thermal. We have about 70 percent between wind and solar of that 90 gigawatts that -- and then, the rest would be either hybrid or some type of storage.

So, lots of renewable, lots more coming. But again, we only have a 55 gigawatt peak footprint.

Next slide. So, as mentioned, we have about 30 gigawatts of wind installed today. We have another 11 gigawatts unbuilt, with signed interconnection agreements. And another almost 40 gigawatts in all -- if you add it all up in all stages of study and development.

So, hopefully, one more slide and I'll make the point here. We sit on the largest, you know, wind opportunity in the country. I've heard it explained as we are the Saudi Arabia of wind in our footprint. The highest wind speeds and the most sustained wind. When you're looking at the capacity factors that wind

generation can get in our system, it's incredible.

So, the whole point of this is we have a lot of wind and it's got to go somewhere. We're getting to the point where literally transmission's going to have to be built either east, or west, or both to be able to use all this resource with what we currently have and with what is coming.

Next slide. So, when you compare our footprint to the east or the west, something becomes very obvious. There's probably, and we know this, and we've seen studies from NREL before, there's probably a lot of synergy between the Midwest wind and the Southwest solar.

And next slide. And here it is. I pulled a year's worth of data, just out of curiosity when I first got to -- well, maybe six months after I got to SPP, so about a year and a half ago. And this is one day out of that year. It's most pronounced in August. But every month the complementary nature of SPP's wind and the Southwest's solar, when you consider the time zone diversity with it, is uncanny.

And the fact is both footprints are running into ramp constraints. Both footprints run into times of the year when they're curtailing. We're curtailing mostly at night, as you can see by the graph. But you lay the

two together and it is a really interesting strategic opportunity.

And I know most of the studies don't look beyond the interconnection. There are some folks looking at potential DC ties across the interconnections, but for the most part it hasn't been out in the forefront of people's minds. And that's really what I wanted to point out today is there's something here.

Next slide. So, to finish it up, I just want to propose, folks, you know, the energy transition in our nation is currently undertaking -- I mean, it's incredible. We are rebuilding a plane, repowering a plane as we fly it, and it's difficult at best. But what we're doing is going to require out-of-the-box thinking, collaboration and coordination that no one has previously envisioned, at a scale no one has previously envisioned.

We have great technologies today. We can do things with DC that we couldn't do before. We can do things with AC we couldn't before, if we can -- if we can get over that hump.

But I think we really need to engage, and have a passionate and collaborative conversation because I think we can do a lot more together than we'll ever be able to do on our own. We have a huge potential here to

be able to leverage this resource and likely help each other manage our ramp issues, and our highs and lows as we go through the day. And the reality is transmission is absolutely the enabler.

As you consider events like the heat storm that the Southwest experienced in 2020, and then not too many months later, in February of 2021, we had Winter Storm Uri. Both footprints had to shed load. Both footprints saw incredibly high prices. And in both cases, if we'd a had, and I'll be honest I haven't run the study, this is a back-of-the-envelope guess, but if we'd a had about 3,000 megawatts of generation -- or, excuse me, transmission between the two footprints, we probably could have avoided load shed in both cases. Definitely would have mitigated some of the high prices.

And you may see these transmission lines pay for themselves literally in a couple of weeks, if you pick the right weeks. Not over 20 years. You take that on top of the ability to enable, as I showed. You see, you know, in our footprint over 21 hours we had to ramp in a lot of fuel. If we could leverage some capacity and bring solar across, we wouldn't have to necessarily be ramping in that carbon emitting resource to be able to keep the system stable.

While I think storage is definitely going to

play a huge part in what we do going forward, it's going to stay awhile. Scalability is an issue with storage and it's just going to take a while.

Now, technologies will continue to be developed. There will likely be some game changers along the way. But I think it's an all-of-the-above approach is my point. We need transmission, we need storage, and we need the ability to leverage the diversity of the system in ways we never have before.

So, that's basically what I wanted to bring you today is just something to consider. Look beyond the border because there's a huge opportunity if we start working together. And that's all I have.

CPUC COMMISSIONER RECHTSCHAFFEN: Well, you ended where Neil started, transmission being the enabler.

Heather, how many -- how much time do we have? Do we have 10 minutes, or 5 minutes, or how much time do we have for questions?

MR. RAITT: We have until 2:30, so you have about 20 minutes.

CPUC COMMISSIONER RECHTSCHAFFEN: Okay. I'm going to start off with a question this time. Steve, can you talk about the SPP cuts across multiple jurisdictions, multiple -- with multiple policy

objectives, multiple states? Can you describe -- I want to get back to Neil's question about cost allocation and how that's been a barrier to greater interregional collaboration. SPP has, I don't know how many of states it crosses, but quite a number. How have you dealt with the cost allocation issues given all these, you know, many states that you have to deal with, with different policy objectives, different perspectives?

MR. JOHNSON: Sure. You know, through SPP's collaborative stakeholder process, I mean they hammered out basically what we call highway/byway cost allocation. So, below a certain kV, so basically 115 is wholly allocated to a local zone. 230 kV is two-thirds allocated to a local zone. One-third, basically what we call highway or regional cost allocation. And above 300 kV is 100 percent regionally cost allocated. So, it's spread across the entire footprint. And we have 19 zones and that's basically how it's broken up.

But that is one of the things that an RTO can absolutely help is those multistate barriers, it's difficult. And it forces people to come together and hammer through that.

Now, when you talk about the other thing distinct is a fact like resource adequacy, that's been delegated to our Regional State Committee to manage

things like that. So, there's some of that going on as well.

But overall that is the one that we are able to get done. And every RTO has a version of that, that just happens to be the one that we have. But that's how it's been overcome.

CPUC COMMISSIONER RECHTSCHAFFEN: Okay. I'm going to turn to my fellow panelists, both in person and virtually, to see what questions they have.

VICE CHAIR GUNDA: Thank you. Just wanted to thank the panel, that's really helpful information. David, Fernando, and Steve thank you so much.

I think Neil has left for the day. I'm not seeing him here.

Okay, so Fernando, just wanted to discuss kind of the model that you discussed in terms of the states and their transmission entity. And then, you kind of talked about the takeaways specifically around permitting opportunities and then also financing opportunities to really bring together large projects.

Just wanted to ask you about, you know, given the experience for over a decade now doing that, you know, what are some of the lessons learned in terms of, you know, early thinking around, you know, what you thought would work and how you evolved would be really

helpful.

MR. MARTINEZ: Okay, yeah, thank you for that question. I appreciate it. It's a good question.

First of all, RETA is like built around a governing board that's appointed by the governor, the speaker, the house president and the senate, and the secretary of energy, minerals and natural resource is on it, and the state treasurer.

So, we have a project selection committee that works on our recommendation and determines whether projects can qualify to be a RETA project. And if so, they have to meet environmental policies and standards, and ensure they're going to meet all state and federal requirements, that sort of thing.

So, really, we're only working on real deal projects where we've seen that our co-development partners will have the engineering and financing capability to do these projects.

And some of the biggest lessons that we've learned I think is really early stakeholder engagement is really the key for us. In particular the siting side of things. Like when we're trying to do these big projects, we've found that the most expeditious way to get through all the hurdles is by these early

stakeholder engagements. And we do tons of them.

We meet with people, we meet with county commissioners, we meet with landowners that are going to be hosting the project. We meet with other folks that are going to be impacted by the project. We have lots of military installations in the state that have real important national security missions. They have tens of billions of dollars they bring into the state and thousands of jobs. We don't want to adversely affect what they do. We have tribal lands. We have federal lands with EIS processes.

So, it really takes a lot of coordination given the real checkerboard of lands in New Mexico. And the biggest takeaway I can say is if you have your ducks lined up from the beginning by these early stakeholder engagements you just avoid a lot of problems in the future, you know.

For instance in like SunZia, like there were some early issues with military installations that, you know, had to be readdressed many years down the road, and that ate up valuable time.

So, I think the sooner you bring in the stakeholders, the better.

VICE CHAIR GUNDA: Okay, thank you. Just to expand on that just a little bit, in terms of, you know,

the intervention of the state in kind of developing these large infrastructure projects, you know, we want to make sure there is optimal support for the markets. I just wanted to ask you about what's some of the criteria for the projects that the agency considers and how did you take into account more broadly, you know, the market versus the state kind of intervention into it?

MR. MARTINEZ: Okay. You know, like first of all, like I mentioned, we do have a project selection committee and we have a whole rule of criteria that they need to meet when they submit an application to us. There's public participation requirements, public notice requirements. There's all sorts of things like that. You know, we have to look at their plans for permitting, for getting all the hurdles.

I know in California it's probably similar to the case. But in New Mexico, when I list like maybe all the environmental and cultural laws you've got to comply with, there's like 38, 39 of them just at the state level. Not to mention, you know, federal EIS processes or other processes you might have to go through at the federal level.

So, it's all those criteria. You've got to have a good plan, you've got to be able to show you can

finance the project, that you have the engineering capability. All those sorts of things are real important before we're going to decide that we're going to engage with a project and become partners.

So, we do go through a pretty rigorous vetting process and I think that's real important because when we get into, say, government-to-government negotiations with, say, a federal agency, or a tribe, or a military installation they do know we have a lot of credibility because it's been well vetted, and it's a real project. And it's a project that's going to be expected to do things the right way, without cutting any corners.

VICE CHAIR GUNDA: Thank you so much.

MR. MARTINEZ: Sure.

CPUC COMMISSIONER RECHTSCHAFFEN: I have a question for David.

COMMISSIONER MCALLISTER: Please --

CPUC COMMISSIONER RECHTSCHAFFEN: Sorry, Commissioner Gunda.

COMMISSIONER MCALLISTER: No, no, I was going to solicit a question, so go right ahead.

CPUC COMMISSIONER RECHTSCHAFFEN: Okay. TransWest is a very interesting project, so I have two questions, really could be three questions, but limit it

to two.

But one question is just how much time you think you saved going this route as opposed to getting your project approved through the traditional transmission planning process.

Well, then secondly, I just want to talk about the financing and who is capable of doing a subscription model like this? Anschutz is obviously a very deep-pocketed corporation, and you said the off taker is one of the -- a subsidiary of Anschutz, it's Wyoming Power.

But if you're just -- you know, if you're just a merchant transmission owner and you want to pursue this model, can you get financing without having an off taker lined up? And who can afford to do that financing on speculation, basically, without knowing that -- you know, in another situation where there might be 10 or 12 off takers who might want to subscribe to the transmission line how would that financing work? So, two questions. Just how much time do you think you saved and how replicable is this model if you don't have a kind of deep-pocketed developer at the helm?

MR. SMITH: Sure, sure. Thank you for that question, it's a very good -- or couple questions.

So, first of all we have been going through the traditional transmission planning process for the past

ten years or so. And I think Neil outlined a lot of the challenges in that process.

And so, you know, we've come to the -- you know, so we have been participating in that process but, you know, the other -- the other model that's available to companies, developers moving forward is the shipper model. And so, as we're, you know, we're pursuing that model.

With respect to financing, you know, basically it would be a project finance much like many other renewable resource developers. The challenge here is we have the capital cost of the transmission, you know, to include into that financing.

There's two companies involved in it, with respect, but it's, you know, our customers, TransWest Express customers, which is the Power Company of Wyoming has to go out and secure off take agreements. And so, we're approaching the market to get off take agreements for our project.

With respect to how do we need to get and, you know, what our different financing opportunities are, we are working with the Department of Energy and one of their federal programs, the Loan Guarantee Program. And so, we're excited about that. And so that's -- all of those terms that you've just asked about are not, you

know, defined at this point.

The intent of the company is not to use our own resources to fund the, you know, several billion dollars worth of economic investment, you know, with the two projects. So, we're going through project financing for that.

Now, I'll stop there. I don't know if there was another question on top of those.

CPUC COMMISSIONER RECHTSCHAFFEN: No. Thank you. I'm not going to add three questions to what I said, too. Thank you for that response.

Commissioner Shiroma, I see your hand is up.

MR. SMITH: Yeah, great.

CPUC COMMISSIONER SHIROMA: Yes, thank you. Another excellent panel discussion. My question is for Steve. And first of all, I'll point out that your slide 11, on the SPP Wind juxtaposed with CAISO Solar is really interesting. A very compelling slide in terms of just the Western U.S. grid potential.

My question is back on your slide 3. This is where you had a 29 -- let's see, it was -- actually, it's slide 4. Slide 4. December 11, 2019 51 percent wind and 21 hours later you're down to 6 percent wind and having to rely upon coal.

Is there a -- is there a grand plan for SPP to

get off of coal at some point?

MR. JOHNSON: So, as I mentioned there's certain things that are delegated directly to the states. The Regional State Committee has authority, resource adequacy being one of them.

So, to the extent that states are entertaining various requirements they have to meet, what we come out with is the attributes that we need to keep the system stable and reliable. We are actually, as an organization, fuel agnostic. We are attribute -- we determine attributes, not types.

So, it's really a will of the states that operate within our system where they want to take their various requirements and portfolios.

CPUC COMMISSIONER SHIROMA: Uh-hum.

MR. JOHNSON: So, SPP, for example we're working in the West on developing various GHG proposals as we work on our Markets+ Initiative, et cetera. And we believe that will be ultimately very useful in our current footprint as that continues to expand. And I expect it will.

So, SPP in and of itself, again we're about attributes. We want to make sure we can keep the system reliable. And that's -- that's really where I was going with this idea of some transmission between the East and

West. Because of instead of having to do that kind of ramp with the thermal, if there happened to be excess solar in the Southwest or other resources, it's expensive to do that. And because some of these have long lead times and various things we have to do to maintain reliability. And to the extent we have other options, you know, it can really help solve some of these other issues, like you're pointing out.

CPUC COMMISSIONER SHIROMA: Okay, I see. And just a follow-on question. And that is, as you have been looking for additional membership, what have you, have you encountered any ESG or environmental social governance questions about -- as you say, SPP is agnostic on this, but in terms of the power mix, you know, the ESG attributes of having a sizeable coal portfolio.

MR. JOHNSON: So, generally, mostly in the West currently those conversations are going on. The State of Colorado, for example, we've been engaging in a pretty robust conversation there, the State of Washington. Currently, I'm not aware of those conversations really coming out in the forefront in our current footprint. You know, it doesn't mean it won't.

But as I pointed out earlier, when you look at our queue there's virtually no thermal. And there are

many planned retirements. And resource adequacy is starting to become an issue in our footprint. We had to recently raise our planning reserve margin for example, simply because as you bring more of a single type of resource, like wind, on you tend to have to accredit it less per megawatt.

And so, our system is engaging in that transition based solely on prices and incentives that the industry has out there. And we are going to get to the point where, like I said, it's going to have to go somewhere. We're going to have to be potentially double our current peak load in capacity of just renewable.

And to the extent that we can flex with other footprints and not have to use reliability, you know, in a commitment to bring on thermals to back that up I think that's an interesting opportunity.

CPUC COMMISSIONER SHIROMA: Yeah. In my days at SMUD, we were looking at hydro from the North at various opportune times, like in -- well, even though SMUD had its own hydro system.

And last I just want to say to Fernando that you indicated the need for long duration utility scale storage, a very important takeaway.

Back to you, Commissioner Rechtschaffen. Thank you so much, Steve, for your thoughtful answers.

CPUC COMMISSIONER RECHTSCHAFFEN: Are there other questions? I have to -- I just have to point out, Steve, that while SPP was at 90.2 percent, the CAISO, they were at 97.6 percent renewables in April of this year. So, we get -- if you want to start fighting about it, we're a little bit ahead. Are there other --

MR. JOHNSON: What about if we had about 6 gigawatts to 9 gigawatts of transmission between us and we could get 100 between us.

CPUC COMMISSIONER RECHTSCHAFFEN: Yeah, exactly. Yeah, better than going East.

Okay, are there any other -- are there other questions?

I had one question for Fernando, but it looks like Commissioner McAllister has a question.

COMMISSIONER MCALLISTER: No, no, I just want to just be mindful of time. We have three minutes left before we wrap up, but go ahead.

CPUC COMMISSIONER RECHTSCHAFFEN: Okay, if there's no other questions from the dais, I'm channeling my fellow commissioner from Idaho, John Chatburn, who's at our Western get togethers is always talking about the challenge of permitting on federal lands and how difficult it is.

And I'm wondering if RETA's had any success in

streamlining the federal permitting process or otherwise making it easy to navigate?

MR. MARTINEZ: Yes. Actually, that's one of the things I was hoping to discuss today. We do work with what's called the Federal Permitting Improvement Steering Council. The director's appointed by the president. It includes, I think, 13 cabinet level agencies, everything from USDEA Forest Service, to BLM, to FERC, NERC, DOD. All sorts of agencies at the assistant cabinet secretary level or above, or higher. The Office of Management and Budget director sits on there. The director of CEQ sits on there.

And so, what they can do for you, and we use this on the SunZia project, and the most recent update to the environmental impact statement, you know, for the reroutes that I mentioned earlier. They managed to just coordinate the whole process with all the federal agencies, put everybody on a time schedule with everything that had to be done, and it's really streamlined the process for getting the approvals.

The director is Christine Harada. She's really good at what she does, along with her team. And it's really kept that project on track. I mean we started, I think, that in March of 2021. I'm trying to remember exact date. But in any event, I think we're looking at

BLM making a record of decision in April of 2023. So, a pretty fast-tracked process through that. And they did a great job.

So, I'd recommend Federal Permitting Improvement Steering Council to any project that has any federal lands on it. And even state processes can be opted into that process as well.

CPUC COMMISSIONER RECHTSCHAFFEN: Thank you, great. All right, well thanks everybody, for Steve, David, Fernando, and Neil for a great panel.

And back to you, Commissioner McAllister.

COMMISSIONER MCALLISTER: Thank you very much, Commissioner Rechtschaffen. A fascinating discussion about sort of the corralling of different resources into different jurisdictions that maybe SPP is agnostic on, but the states, you know, in practice aren't. So, how that interplay goes forward I think is going to be really interesting. And appreciate everybody's sort of attention to it.

So, thanks Commissioner Rechtschaffen, great panel.

And we are right on time, so we're going to move into our fourth session. And I wanted to introduce our facilitator, Commissioner Letha Tawney, from the Oregon Public Utilities Commission, who is on the phone with

us, I believe. I'm not sure if she is on camera, but I think phone.

Oh, there she is, great. All right, hey, Commissioner Tawney, how are you? Thanks for finding a quiet spot to help us out.

Commissioner Tawney has served as a Commissioner on the Oregon PUC since 2018, representing Oregon on the Electricity and Critical Infrastructure Committees for NARUC. She serves on the Energy Trust of Oregon Board and Chair of the Energy Imbalance Markets Body of State Regulators, the EIM BOSR. And engaging closely with or on the Western Electricity Market Development in several forums.

Commissioner Tawney has offered her expertise on electric utility business models, state regulation, clean energy development, and large customer buying strategies to the World Resources Institute as well. So, a great background for this conversation.

And Commissioner Tawney, I'll pass the mic off to you. Thank you.

OPUC COMMISSIONER TAWNEY: Thanks so much. Let me first of all make sure you can hear me.

COMMISSIONER MCALLISTER: Yes, loud and clear.

OPUC COMMISSIONER TAWNEY: Wonderful. Well, first of all, apologies that I've not been able to join

today. I am at a different regionalization conference and traveling this afternoon. So, apologies if there's background noise, I'm at the airport.

And I have heard from different folks who've been popping in and out of your meeting how really excellent the conversation's been today. So, really appreciate you putting forward the effort to draw all these issues together and raise the conversation level on all of them.

So, just to frame up our panel here today, we're moving on now to the resource adequacy questions, which as the description lays out are absolutely foundational.

And I have to say as I work with regulators across the West, one theme a hundred percent across the board, in every single state is how deeply every commission and energy office cares about resource adequacy and the challenge that we're facing as the fleet goes through such an enormous transition.

Everyone is focused on how to face that challenge. And in particular, the implications for costs, for reliability, a real sense that extreme weather is putting new pressures on the system, and that consumers are demanding something probably more than 1-in-10 LOLE

And everywhere I go, in every regional

conversation I'm in this comes up front and center as an urgent issue. As fast as it comes up, sometimes the conversation can turn quickly to complaining about how someone else isn't taking reliability as seriously as perhaps you feel like you are.

And I think we have to be pretty cautious about that. There is a parable on the Sermon on the Mount about looking after the speck in your own eye before looking after the log in your neighbor's eye. And I think we all need to approach the reliability question with some humility and recognize that our neighbors, whoever they are, are likely approaching the issue just as urgently and in good faith.

And so, while it's easy for any one of us, and as happens in hallways around the West, to doubt whether our neighbors are really taking steps. As I move between forums, I really see how absolutely seriously everyone is approaching the problem.

And I think that's really evidenced in the quality of our speakers today. I think probably in your discussion today, certainly in the two days of discussion I've been in, it's clear that the reliability of the system is going to be deeply intertwined with transmission, and how we're going to use markets to drive down cost. But without a good reliability frame,

we aren't going to be able to accomplish what we need to.

So, with that I want to turn to introducing our first panelist, as Senior Partner Arne Olsen leads E3's Bulk Energy Infrastructure Practice. And he helps clients navigate changes to the bulk electric system operations and investment needs that are brought about by both the policy and the market interests. As we heard just now from SPP, part of the drive and after the recent legislation more of the drive is just straight economics.

Prior to joining E3 in 2002, he served with the Energy Policy Division at the Washington State Energy Office and has deep experience in these questions.

He's led landmark studies on the feasibility and cost of achieving deep decarbonization, high renewables penetration goals for all sorts of areas in the U.S. And has certainly been helping Oregon grapple with these questions as often a speaker for us at CREPC as well.

So, I want to hand the mic to Arne to take us through a really foundational piece of the conversation.

MR. OLSEN: Thank you, Commissioner Tawney, for that introduction. And to Chair Randolph and Vice Chair Gunda, and to all the assembled Commissioners really appreciate the opportunity. I'm honored to have the

opportunity to come here and talk to you about this really, again, foundational issues which I think is central to our challenges both today, and as we look to transition our system into the future.

So, if we can bring up the slides. I'm going to start with just a little bit of an introduction to what resource adequacy is and the way that we think about it as an industry.

I'm going to then talk about where we're going. The central challenge of resource adequacy as part of the energy transition. And I really do think it's the biggest challenge to achieving a fully zero carbon grid.

And then, I'm going to bring it back to what we've seen on the ground today, looking at the transition from this end.

COMMISSIONER MCALLISTER: Sorry, we're working on -- working on bringing up the rights slides.

MR. OLSEN: I can probably just keep talking.

COMMISSIONER MCALLISTER: Yeah, if that's something you're up for, that's good with us.

MR. OLSEN: I mean, why don't I -- why don't I do that. I mean, I, you know --

COMMISSIONER MCALLISTER: Yeah, go ahead.

MR. OLSEN: -- the slides are helpful, but they're not necessary to understand the story, I think.

VICE CHAIR GUNDA: And then we -- I have the slides. Do you want me to put it up, you know?

COMMISSIONER MCALLISTER: There we go. Great, thanks.

MR. OLSEN: Oh, perfect. Great.

COMMISSIONER MCALLISTER: All right, go ahead.

MR. OLSEN: The next slide, please. All right, yeah, so this is where I was. This is my introduction. And I think we can go ahead and move on to the next slide.

All right, so planning for reliability is -- it's increasingly important and it's increasingly complex. You know, back in the mythical past we only had to plan for the peak load and we didn't have to worry about net peak, and all of our -- or many of our resources being weather dependent, in addition to our load being weather dependent. I think we all understand that that's changing and we're having to plan for many more contingencies than we have in the past.

And at the same time, reliable electricity has never been more important for the functioning of our modern economy and increasingly for keeping us warm. Not just keeping us lit, but keeping us warm and keeping us mobile. So, as we look into the future it's only going to get more and more important.

If you go to the next slide, please. So, just to take a minute to talk about what resource adequacy is and the way that we think about it. It's really, you know, quite simply the ability of a power system to meet the demands placed upon it, the electric load across a broad range of conditions. And those are weather conditions and they're also generator outage states, and those sorts of things.

We generally would like loss of load events, supply insufficiency events to be very rare. Commissioner Tawney talked about 0.1 LOLE. That's kind of the standard that the industry uses. What that means is one event every ten years is kind of traditionally what we've planned to achieve. Don't know whether that's the right standard going forward or not. I do know that whenever there is a big outage there's a lot of attention being paid to it by a lot of nontechnical people who really want to understand why.

I think it's also worth noting that one event in ten years is kind of what we've had in California. We did have two events in 2020, but those were the first events that we've since 2000. So, that's really two events in 20 years or one event in 10 years. So, it's worth just noting that we actually are meeting the standard that the industry has planned for

traditionally. Just as a point of information.

Why don't you go ahead and move to the next slide. So, then, I'm going to start and talk about the transition and the importance of resource adequacy as we move towards a zero carbon grid.

So, go ahead to the next slide. We like to talk about the four pillars of decarbonization, energy efficiency and conservation more than we've ever done before. Electrifying as many end uses as we can. Decarbonizing our electricity supply as much as we can. And for end uses that are difficult to electrify, we will still need some form of low carbon fuels.

I just want to note that all of these point to the central role of the electricity sector in leveraging the changes that we need to meet all of our economy-wide goals.

We're going to be asking our electricity sector to play an increasingly large role, and really to displace fossil fuel as the main source of primary energy for our entire economy.

And so, what you see on the left-hand chart there at the bottom is we might see peak electric loads in California growing by as much as 60 percent between now and 2050 as a result of a lot of this new electrified load.

If you go to the next slide, please. How might we meet that need? The SB 100 study I think is a really good for a first step, in looking and understanding what our long term needs are.

The primary scalable resource that we have in California for meeting those clean energy goals is solar power. Along with solar power, you tend to see a lot of battery development. There's a lot of nice synergy between the diurnal cycle of solar energy and the short duration of lithium ion batteries that are now commercial and becoming a large part of our power supply. So, that's going to be our primary resource in California. That's a resource that's very low cost, it's very abundant, but it's very limited in its capability of serving load around the clock.

We have other resources that can help us provide diversity. Wind, both instate, onshore, offshore, out-of-state wind also complements California load very well, geothermal, and some other resources. They're very important for diversity, but they're also limited in quantity.

If you go to the next slide, please. What we see as we transition the system over the next 10 to 15, to 20 years is that more and more of our energy supply is becoming dependent on the weather. And we tend to

see loss of load events less built around peak load conditions and more around extended conditions of low renewable energy production. And those tend to occur in the wintertime in California.

And especially as we electrify our heat loads, where we tend to see the loss of load events being in effect, multi-day renewable droughts. And if those occurs, as they often do if the sun's not shining, it can be cold in California and so that's when our heating load will spike.

So, those become the sort of dominating planning events, the most challenging loss of load events to meet.

And to meet those, we need some form of firm resource. When we add up the numbers for how much of that firm resource we need, it's quite a large number. It's 30 gigawatts, roughly, that -- I'm sorry, this slide has an error, it should say gigawatts and not megawatts. It's kind of roughly the size of the need for firm resources.

And you can see on that bottom right-hand chart, if you do a little bit of math there, the loads are roughly in the 50 gigawatt range. This is a wintertime load in 2050. And the sort of the -- the amount of energy that you have at the bottom of that curve at

night is maybe in the 15 to 20 gigawatt range. So, the delta is 30 gigawatts. That's the size of the need for firm resources in California.

And that's fairly consistent with what we find when we look at other systems as well, somewhere between 30 and 60 percent of your peak load really needs to come from firm resources. In fact, it's lower in California just because of our mild climate.

If you can go to the next slide, please. This is a study that we did a few years ago, that was funded by the Environmental Defense Fund and the Clean Air Task Force, where there was some modeling done by E3, but then also in parallel by some researchers at Stanford and at Princeton. Where we looked at different scenarios for meeting zero carbon -- a zero carbon standard in California by 2050.

And the four sets of scenarios on the left are scenarios in which there was some form of clean firm power available to help us achieve that goal. And the one on the right is the scenario in which there wasn't clean firm power available, and so we really were relying on massively overbuilding the wind and solar fleet with relatively short duration batteries.

And the height of the bars are the total cost of

the electricity system in meeting those goals and meeting our reliability needs.

So, that you can see that the scenarios that had some form of clean firm resources were much less costly than the ones that didn't. Just sort of highlighting the need, and the importance, and the role of those firm resources.

And there's the different numbers or the different letters at the bottom there just indicate the different resources mixes that were available. So, there's nuclear, there's CCS, and a variety of other different options.

And if you go to the next slide. Here I list what some of those options are. So, we know that these firm, carbon-free resources will be crucial if we really want to get to a zero carbon grid.

There are a number of candidates that are potentially available and that are being in development and in research now. So, enhanced geothermal is a very exciting technology.

Nuclear energy we know is firm, can provide a lot of energy around the clock. There's a lot of research being done on small, modular reactors, which maybe are safer and more flexible.

Gas generation with carbon capture and

sequestration is another potential option.

There's lots of work being done on very long-duration energy storage, whether through chemistries or physical means.

And then there's clean fuels, and those could be hydrogen, they could be some form of synthetic gas, they could be renewable natural gas.

These are the set of candidates, clean firm resources. What we find is that we need one of these types of technologies to break through and become scalable. And if you only have one, then that's enough to achieve a zero carbon grid.

If you have more than one, then it gets easier and easier because they can play different roles. Hydrogen's never going to be a baseload resource, you're probably only going to want to use it a few hours. But if you can -- and if you have it, then that's a way to power that 30 gigawatts of power plants that you need. Nuclear would play a very different role, more of a baseload role. And we see CCS playing more of an intermediate role or dispatchable resource. So, we need one or more of these technologies.

And the other point is that these technologies are not yet commercially available. So, what we need is a lot of public investment in helping some of these

technologies get across the finish line. We don't know which ones are going to succeed in the end, so we want to spread a lot of seeds and nurture a lot of technologies along.

So, if we go to the next slide, please. So, just to summarize the points from the long run transition, we need some form of firm resources. Eliminating all carbon emissions from the power system will be very difficult without that.

And we do need to ensure that we keep our electric rates reasonable and the clean firm sources can help with that. Because we need electrification to be an attractive proposition from a consumer perspective. We'll need to induce a lot of consumers to adopt electrified technologies.

And a lot of these sources of zero carbon, clean firm resources and flexibility are capital intensive. So, solutions that don't require a lot of capital, like making our loads more flexible through better rate design, charging our EVs flexibly is going to be really, really important. And I would very much put enhanced regional coordination in that bucket as well, as things we can do to leverage our existing system more efficiently.

We'll go to the next slide, then. Now, I'm

going to talk about the other end of the transition, sort of jumping back from 2050 to today and addressing the challenges that we're facing today.

So, resource adequacy, go to the next slide, please, is not only a long term issue, it's very much a real issue as well. And we're seeing immediate challenges across the west for a variety of reasons, increased frequency, severity, and geographic extent of the heat events that we've seen recently. A lot of our time on our firm resources across the region and very little development of new firm resources. So, we're losing capability, we're replacing it with resources that are less firm. They have lots of capabilities themselves, as well, but also some limitations. So, our mix is changing.

And we're seeing a resumption of load growth due to data centers, and weather, and a variety of other reasons.

Go to the next slide. So, when we add up the numbers for the northwest, and I'm going to talk a little bit about what their situation is on the ground. And I know that Sarah and Branden will have something to say about this as well.

And this is from an E3 study from a couple of years for the Pacific Northwest. When we look at the

northwest, it looks like it's a bit short even today, and with load growth, and more and more firm resources being retired we see that need growing over time. So, that sort of wedge in the middle that's below the X-axis is the shortfall in the Northwest. Maybe 2 gigawatts today, growing to maybe 2 gigawatts -- or, to 10 gigawatts by 2030.

When we add up the resources, the effective capacity from resources that are in IRP plans for all the utilities in the region and we get maybe 6 gigawatts of additions. So, it looks to us like the hole is growing in the Northwest over time. So, it's very concerning as to whether -- the amount of capacity that's available in the Northwest today is going to continue to be available going forward.

If you go to the next slide. This is from a study that we did in the desert Southwest, and it was published earlier this year. When you look at the Southwest, we don't see the same hole now. It looks like it's in rough load resource balance now.

And when we project that region out, given what's in the IRP plans for the Southwestern utilities, it looks like it continues to be in very rough load resource balance all the way out through 2033. So, it looks like there's not really a gap in terms of

planning. They're planning just about the right amount of resources.

What I will note is that for them to remain in load resource balance that's a lot of new resources that they're planning on. So, it's 14,000 new megawatts between now and 2025, and 38,000 new megawatts between now and 2033. Of course, the effective megawatts are less than that, but that's just the steel on the ground that's required.

And I'll just note on the very bottom graph there I've sort of compared the pace of development to what we've seen recently in the Southwestern region, and you can see it just greatly exceeds anything that we've -- that that region has experienced, except for going back in the post-crisis years of sort of 2002 and 2023. And I think Neil Millar talked about this as well.

So, there's a lot that's required for them to stay in load resource balance. And given supply chain issues, and inevitable project delays, I think we can expect that they might start to fall a little bit behind. We hope that they won't.

If we go to the next slide. But California has been aware of these issues, and has been looking on them, and acting on them, really, for quite a number of years now.

I know it's easy to criticize whenever events happen and the California agencies are always just big targets for everyone, you know, all across the country.

But I will point out that in November of 2019, before we had those August of 2020 events, the CPUC issued an order to help address projected resource adequacy shortfalls. They were looking at the load resource balance around the region, they were looking at potential increased load growth here in California, and they ordered in effect 7,000 megawatts of resources in 2019.

So, they asked for a potential delay in the retirement of 3,700 megawatts of once-through cooled gas plants, and then 3,300 megawatts of new resource procurement to be completed by August of 2023. So, 7,000 megawatts that we had -- I'm not sure if we have exactly 7,000 now, but we have a lot, you know, close to that, that we wouldn't have had if the CPUC hadn't acted back in 2019.

And if you go to the next slide. And you can see that those resources were really critical in helping us get through the events that we saw in September with the heat wave, and especially with the September 6th events. This was really an event where you needed every last megawatt that was available just to -- and just to

barely get through without having a loss of load. And we did it. And CAISO did it, Phil and his team pulled this off. And I still -- I still almost can't believe it as I sat there and watched that event, you know, unfold from my living room in real time, as the CAISO now allows you to do.

But we just had to have pulled out here the contributions from all of the various resources there on the right, and it really was a team effort. You needed every megawatt that was available and every type, every resource type contributed.

A couple of things I'll note here, there's been a lot of talk about the role of storage. All of that storage came from earlier PUC orders. The Carla Peterman order for the 1,300 [megawatts], but then also the 2019 procurement order. So, that was important in helping us to get through that event.

I'll also point out that -- and during the most critical hour, which is right after sunset on September 6th, about 40 gigawatts of the 50 or so that we needed were being provided by firm resources. Firm being nuclear, being natural gas, or imports, or hydro. So, just to give you a sense of how reliant we are on those resources today.

And then, if you go to the next slide. And I

think this is my second to the last slide. So, this is now going back from September of 2022 to June of 2021, the PUC didn't stop when they ordered those 7,000 megawatts back in 2019. They continued to assess the potential need for new resources through the IRP program and ordered 11 and a half gigawatts of effective capacity to be procured through the Mid-Term Reliability Order. Now, some of that is intended to be available to help displace retirements of those OTC units and of the Diablo Canyon Power Plant. So, there's maybe 5 and a half to 6 gigawatts of new effective megawatts in the MTR Order.

But again, these are resources that aren't online today. These weren't the resources that helped us get through the September 6th event. Those were the resources from the 2019 order. So, there is this many new resources coming online over the next several years.

And then, if you go to the next slide. So, this is my last slide. So, just to kind of summarize the challenges that we're facing with resource adequacy now and into the future, I would put first on the list is adapting to more extreme weather. And we saw the 116 degree temperatures in Sacramento, you know, last -- in September.

Don't know if that's going to happen next year.

Don't know how frequently that's going to happen. But, you know, we had 114 degrees in Portland the summer before. And it's just these aren't temperatures that we are used to dealing with and planning for as an industry, so we're going to have to change that very, very quickly, and we are.

The other thing about those events is that they tend -- it just seems that they tend to encompass broader and broader areas. We had these whole west wide heat events. We didn't quite have that in September, but we've seen a number of these events that are encompassing a much broader area, which definitely impacts our ability in California to rely on our neighbors to not have the extreme events, and have some surplus capacity available for us, and vice-versa.

We have some programmatic changes that we're addressing as well. So, you know, how the Slice of Day concept might work. This deterministic concept, how we might integrate that with our stochastic methods that the industry tends to use to deal with resource adequacy planning.

There's the proposed Reliable and Clean Procurement Program coming out of the IRP Program at the CPUC, which I think is a really important potential development that would tie together existing and new

resources into a comprehensive wholesale energy procurement program.

And then, lastly, integrated resource adequacy constructs across the West. So, as other resource adequacy constructs stand up next to us, we need to understand how ours, in California, will interact with the WRAP and the others. We need coordination, it's a good thing. We want to ensure that there's no double selling of resources from one program to another. But we also want to ensure that we can really leverage the load and resource diversity that exists across that broader footprint.

And WRAP interacting with the CPUC CAISO Program is a good way to help do that in an organized way, and get a better sense on how much import we might be able to rely on, and vice-versa.

So, these are some of the challenges. And, hopefully, that's given my fellow panelists a lot of good material to talk to. So, thank you very much.

OPUC COMMISSIONER TAWNEY: Thanks so much, Arne. I always appreciate the clarity you bring to the challenge. The graphs -- you can spend hours digging into the graphs, but they crystalize the challenge beautifully.

I wonder if there are questions from the dais,

from the Commissioners? We have just a couple of minutes before we transition to the next speaker.

VICE CHAIR GUNDA: Yeah, thank you, Arne. As usual, you know, excellent presentation. Thank you, Commissioner Tawney for facilitating the conversation.

So, just one question on the -- kind of the premise of, you know, the diversity of geographic -- you know, geographic diversity both from the load and supply could benefit the RA, right, overall RA planning.

You know, one of the things obviously we've experienced in the West over the last few summers is the coincidental load that we've seen in the heat dome. Could you just elaborate on any findings that you have today that support the notion that broader planning would help both demand and supply conditions better, and RA overall better?

MR. OLSEN: Yeah, I mean I would go back to, you know, the reason why we built the north/south interconnections in the first place, you know, we have a winter peaking region in the North and a summer peaking region in the South.

We have a region in the North that has a lot of hydro resources, more hydro than they can use during many times of the year. And you have a region in the South which has a different set of resources, which

traditionally has had thermal resources, and now has an awful lot of solar, which comes at a different time of the year as well.

So, just that alone is a great example of how there's both load diversity and resource diversity across a broader geographic region. Even between California and the Southwest, you know, you might think that they would always peak at exactly the same time, and they don't. There's enough geographic space that as the systems move through it might be, you know, 116 in Sacramento, and it might only be 110 in Phoenix. And then, the next day it might be opposite.

And if it's 116 in Sacramento and 121 in Phoenix, then you probably know that you're in trouble. And I do worry that that is happening more and more just because of the more continental scale of our weather systems. I'm not a meteorologist but that's my, you know, layman's observation.

But even still that diversity does exist and it's important. And, but we don't really have a good organized way of understanding exactly how much diversity is available to us at any one point in time.

That's a bit of the reason why the WRAP is standing up and why it has such a good value proposition for the Northwest. It's an organized way of looking at

those -- that load and resource diversity across a broader footprint.

VICE CHAIR GUNDA: Also, just one follow up, Arne. So, given the broader kind of electrification pathway of California, kind of the decarbonization strategies in the West, are they broadly electrification and do we see the similar kind of gains in electric demand in the winter? And how does that play out into the future, as you see it?

MR. OLSEN: Yeah, that's a great question. And we work in a lot of the northern climates as well. I always have to be a little bit careful to say that, you know, California's leading the way in a lot of areas. Not everything translates perfectly to other regions and to other climates.

Certainly, even in a cold climate electrification of heating end uses throughout most of the year, much of the year is a primary strategy.

It gets a little bit harder, in fact a lot harder to meet the peak heat demand in very cold climates like Minnesota, the Northeast, Manitoba, places we've worked. So, there we're not sure that electric heat pumps alone are necessary the best way to meet all of the heating load. You know, you'd definitely need to get into more cold climate heat pumps. Also, hybrid

heat pumps where maybe there's some thermal resource that provides the backup heat. In a similar to how peaking units provide backup on the grid.

But even then you see much higher, actually, increases in peak demand in those colder climates. You saw the 60 percent for California, it's 100 percent for the Northwest, potentially, and for New England.

VICE CHAIR GUNDA: Yeah, thank you. I have tons of questions, but I'll keep it there. Thank you so much.

COMMISSIONER MCALLISTER: Yeah, I'll keep mine compact. I just wanted to say great presentation. Love the visuals, obviously, you know, a lot of great analysis behind each of these slides

And I really appreciate your emphasizing sort of in equal measure the demand side, efficiency, and particularly load flexibility as key resources. I'm really trying -- you know, we're trying to push that conversation in California building tools and really, you know, taking a regulatory approach to really trying to institutionalize the demand side and the load flexibility.

And I think that's going to -- sort of you highlighted the fact that decisions years before are the ones that really allowed the chickens to roost when they

needed to. And I think we're going to see that with load flex as well, you know, five, ten years down the road. So, appreciate that.

I then have a specific question. On your slide 9, you sort of emphasized that the costs are much higher without clean firm capacity. And that makes a lot of sense. I guess I'm sort of reckoning there must be some -- you said, if they break through and they go to scale, you know, we need at least one. I mean that's presumably you can save money if your clean firm capacity is not outrageously expensive.

But I guess maybe I would wonder -- my question is just how much does that conclusion depend on the actual cost of the clean firm capacity that you do have?

MR. OLSEN: Yeah, and that's a great question as well. So, the good news is that you can meet most of your energy needs with a combination of wind, solar, you know, geothermal, onshore, offshore, you know, the set of resources that are available today. And the more of that energy load that you can meet with those types of resources, the less energy you need from your clean firm resource.

So, if you're meeting 95 percent of your need with something that has zero marginal cost, and let's say it's hydrogen, just to think of probably the

resource that's the cheapest capital cost, but the most expensive fuel. You know, if you're shrinking that down 5 percent, that might not have that big of an impact on the overall cost. If you can shrink it down to 2 percent or 1 percent, maybe you care even less about how much the fuel costs.

But you do need a lot of gigawatts. So what you want is a resource that's very cheap to build and you almost don't care about how much the fuel costs. Again, because you're not using it for very much.

I mean that's another reason why nuclear is not a good sort of peaking resource. It's very expensive to build and does give you a lot of energy, which is great. But you're not going to go 30 gigawatts of that.

What we did find, I think I mentioned this, is that when you make all resources available to the system, the model picks all of them. It finds a role for nuclear as a baseload resource. It finds a role for CCS as an intermediate resource. And for hydrogen as a peaking resource. Alongside of just a ton of wind, and solar, and lithium ion batteries.

COMMISSIONER MCALLISTER: Interesting. Thanks a lot. I'll -- unless there are other questions? I don't see any hands up.

Okay, back to you, Commissioner Tawney.

OPUC COMMISSIONER TAWNEY: Thanks so much. So, we're going to move to our next panelist, and we're going to hold questions for the next three panelists to the end.

Our next panelist is Branden Sudduth, Vice President of Reliability, Planning, Performance Analysis at WECC. Of course, WECC plays a really important role looking across the entire interconnection.

In this role he's responsible for WECC's technical and analysis functions, including reliability planning and assessments, standards development, performance, and event analysis, and situational awareness.

And I was just talking with Branden last night about all of the modeling challenges we face, really grappling with the issues that Arne laid out in his forward looking, his last slide. So, I'm excited to have Branden pick up the conversation and take us forward.

MR. SUDDUTH: Great. Thank you, Commissioner Tawney, and good afternoon everyone else. It's an honor to be with you today, to be part of these conversations.

You know WECC is the regional entity responsible for reliability in the Western Interconnection. It's very encouraging to continue to hear the focus on

reliability and resiliency as we continue to face these different types of challenges that we are facing today.

So, I will be covering two topics, two recent assessments that have been released, that will hopefully give you a perspective on resource adequacy from both the Western Interconnection level, as well as the national level. I'm only going to be covering really high level pieces of these assessments. The invitation is always open if you'd like to dig into some more of the subregional information, subregional results. Please don't hesitate to reach out to me or anyone at WECC, and we'd be happy to discuss this with you further.

But if we could go to the next slide, please. So, the first assessment that I want to cover is WECC's western assessment of resource adequacy. Our 2022 version of the report was released about a month ago. And this is a report that we've been developing and refining for the last three years to supplement NERC's long-term reliability assessment, which is NERC's 10 year outlook primarily on resource adequacy.

However, the western assessment is intended to address western-specific needs, and also to address feedback that we've received from western stakeholders to dig into specific items that might have significant

importance to the Western Interconnection.

At a high level, the report evaluates resource adequacy for the Western Interconnection as a whole, as well as goes into the five subregions that you can see on this map. Unlike our traditional resource adequacy assessments that were primarily deterministic in nature, that really looked at that peak demand hour, like Arne was talking about, this particular assessment evaluates every hour of the year. It's a probabilistic assessment that looks at different levels of load and generation, different expectations to identify, you know, those scenarios where we might have a risk of resource shortfalls where there would be unserved energy.

If we can go to the next slide. So, as I think about the evolution of the power grid over the last decade and regional needs from a resource adequacy perspective, there is one challenge that we're going to continue to face, and that's the challenge of variability.

And, you know, we've talked about it in many ways today, throughout different presentations. But, you know, changes related to things such as the changing resource mix, extreme events, extreme weather events such as those that we've experienced over the last three years, changes related to new technologies, and

understanding how those technologies behave at different times on the grid. Changes related to things such as electrification. And the list goes on and on, and we think about different changes that are impacting the grid.

This increases the variability that we consider as we look at the availability of generation and the variability around load, which directly impacts the types of planning assessments, the complexity of the planning assessments that we're performing.

And as we look forward to system planning, which includes both resource planning and transmission planning, variability is something that we'll need to continue to adapt to, to address.

And really, like that last arrow demonstrates, the direct translation from variability into the things that we need to be aware of is how that translates into risk. And specifically, you know, the risk of loss of load.

So, if we can go to the next slide, please. So, within the western assessment of resource adequacy, and through the NERC long-term reliability assessment, we identify several ways to identify and measure resource adequacy, both from a deterministic perspective, as well as a probabilistic approach.

So, given the state of the system today, and the various unprecedented challenges that we're currently facing, we've primarily used these three different ways to define risk associated with resource adequacy in the western assessment.

The first way that we identify risk is simply to count the number of hours in each month or year where there is a risk that demand may not be served or, in other words, where there might be resource shortfalls.

We call these demand-at-risk hours. And I'll show you a graph in a minute that shows the results for each of those -- those subregions I talked about, using this particular metric.

This metric is a good way to see how close to the edge that we're getting, given year over year trending.

The second way that we measure risk is through attempting to quantify resource and demand variability. And this is a very tricky task. Much of this is done through extrapolating historic system information, such as load forecasts, and generation availability.

And those of you who are familiar with probablistics, you can imagine different distribution curves related to load for any given hour, or related to resource availability. And the variability really

defines how -- how big the tips and tails of those distribution curves might be.

The third way that we measure risk is really built out of the first item, but instead of just simply counting the number of hours in a year where demand is at risk of not being served, it actually quantifies the amount of load that is at risk from a magnitude perspective.

So, this is important, you know, when considering what types of mitigation strategies you would need to consider to mitigate some of these resource deficiencies.

So, if we can move on to the next slide. So, this slide describes a few of the key takeaways from our most recent assessment.

I should mention that something new that we did this year, within our assessment, was to compare the results of this year's assessment with previous years' simulations, so that we can understand, you know, year over year just how the outlook is changing.

Giving a few delayed resource retirements, new resource developments, and reductions, or I should say corrections in load forecast, we are seeing that in the near term the number of those demand-at-risk hours is decreasing compared to our 2021 assessment.

So in other words, you know, we're seeing from an interconnection-wide perspective that some of the actions that states are taking to address resource deficiencies are paying off in the near term. And so, we are seeing the risk dropping in the near term.

However, you know, after some of those retirements come to fruition, we're seeing those demand-at-risk hours increasing once again. And not only increasing, but surpassing what we've seen in previous years' assessments. And this is primarily due to, you know, some of the changes in load forecasting due to some of the extreme weather events that we're now experiencing, as well as, you know, some of the expectations around electrification increasing.

Another one of our key takeaways and, you know, after I talked about this on the last slide, this probably isn't too surprising. But resource and demand variability are increasing over the next ten years. Which, as I mentioned, also means that risk is increasing, which means that we need to start thinking differently about how we quantify resource adequacy.

And then once again, the magnitude and likelihood of resource adequacy risk has increased compared to what we identified in last year's assessment.

So, if we can go to the next slide. I'm not going to go into any detail, but these are the subregional results of our latest assessment. And as you can see, the further we go out into the future the number of hours at risk increases for some of the subregions.

You can see that for the 2022 assessment, which is the dark blue bar, we're actually seeing worse results than we saw last year, as I noted on the previous slide.

You can see though, however, around the year 2030 we are seeing a rapid increase in the number of resources that are being proposed. They'll have a high likelihood of being developed. And so, there is some relief. But there's no doubt that over the next several years we're going to be paying very close attention to resource adequacy within the interconnection.

And I know, obviously, from the conversations here today and from other conversations that I've been part of recently this is going to be a continued area of focus for us from the reliability and the resiliency perspective.

So, if we can go to the next slide, please. Now, I want to switch gears just a little bit to focus on the recently released NERC Winter Reliability

Assessment.

So, as the regional entity in the West, WECC works closely with NERC and the other regional entities across the country to collect information relevant to the upcoming operating season to develop this reliability outlook for the Western, Eastern and Texas interconnections.

A major focus for the NERC seasonal assessments, as well as their long-term assessment, is resource adequacy. So, this really does tie in nicely to this panel.

As I mentioned in the Western Assessment, there is a lot more regional detail that's in the actual NERC Winter Assessment, but I'm going to really focus on some of the key takeaways.

As you can see, and I don't know if this is comforting or not, but the rest of the country is also experiencing a lot of the challenges that we're seeing related to resource adequacy, directly related to the changing resource mix and extreme weather events.

Almost certainly informed by the experience from Winter Storm Uri and other global events, there is a major focus on the impacts of cold weather on fuel availability and generator winterization.

So, it's also interesting to note that generator

retirements are having a significant impact on the seasonal reliability outlooks for the rest of the country as well.

And I have a map on the next slide, if we can go to that, that really illustrates some of the areas that NERC has keyed on that pose a particular risk for this upcoming winter season. So, the areas that are in the black represent different areas that are at a significant risk of resource deficiencies due to extreme weather. In this case, extreme cold conditions.

And then, the area in the Northeast, highlighted by the yellow area, is an area that also has the added risk of fuel uncertainty because they are heavily reliant on natural gas fuel supplies.

And with that, I think I'm about out of time, so I'll go ahead and stop there, and turn it back to Commissioner Tawney.

OPUC COMMISSIONER TAWNEY: Thanks so much, Branden. There's so much more we could unpack, I'm certain about it.

But we also have Sarah Edmonds with us. And I'm sure throughout the day you've heard the WRAP program, created by the Western Power Pool, referenced.

Sarah was selected in 2022 to be the President and CEO of the Western Power Pool, a nonprofit

corporation that helps coordinate electric grid operators for the Western U.S. and Canada.

It's offices are in Portland, so we get to be quite familiar with it in Oregon. It includes major utilities, generators, and energy managers who are working together to increase grid efficiency and reliability. And together, they have created the Western Regional Adequacy Program, or WRAP. And I think she's going to take us through that today.

Sarah, do you want to kick us off.

MS. EDMONDS: Thank you Commissioner Tawney, and thank you to all here for having me today. Very honored to be a part of this conversation.

We're going to shift to talking about the Western Resource Adequacy Program. And I'm really excited to be here because a lot of the themes already hit on by the speakers today really go to the heart of my main messages. Which is, you know, the recognition of the critical role between California and the rest of the Western Grid, looking outside our borders, thinking outside our boundaries. So, that is a good framing theme.

My next slide, please. I'm going to hit this map very briefly. This is the Western Resource Adequacy current map of participants. As you can see, it's quite

a lot in terms of its breadth, depth and scope. We have about 60 to 70 thousand peak load megawatts in that map. So, that's quite a substantial footprint.

We are a first of its kind in terms of a west wide regional resource adequacy, planning, and compliance program. And also unique that we are a standalone resource adequacy program that's built on a voluntary participation model bring load-serving entities together to leverage the diversity benefits that we get from this regional footprint, with the aim to safely and affordably lower our planning reserve margins, if we do this correctly.

And also, establishing priority access to this valuable and diverse capacity resource pool for operations.

The main other takeaway that I want to communicate today is that although WRAP has some regulatory hurdles that remain in front of the Federal Energy Regulatory Commission, I anticipate in a few months we will have what we need. And WRAP is coming.

It has the potential to change capacity availability throughout the rest of the West, and the decision making for procurement, and selling and trading. And so, it's really critical.

And that's why I'm really excited to be here

today because it's really critical that RA programs in the West begin a relationship of trust, collaboration, and cooperation.

Next slide, please. I'm going to spend just a few brief moments briefly describing the program, without taking a deep dive into the technicals. I would say that a lot of the elements of the WRAP planning process for the Forward Showing Program are pretty solidly basic.

We're looking at a reliability metric that is probabilistic, one event in -- one event day in ten years loss of load expectation.

We use, to get to those really demand-at-risk hours that Branden was talking about, we have our own approach which is to determine a set of capacity critical hours. So, that's one step better than a net peak approach.

We use standardized qualifying capacity contribution rules for the different kinds of resources on our system. So, for that big map that you saw, we're using a set of standardized counting rules. There may be some zonal differentiation, but we have common approaches for counting up the resources that will count on this ledger of resource adequacy.

The showing requirement is basically these

entities coming forward, showing that they have used our rules to count up their resources, we've matched it to their load based on a P50 measure.

We have a deliverability component and this is a really critical aspect of our design, where we ask participants to demonstrate that at least 75 percent of their requirements have firm or conditional firm transmission supporting it. So, we have a deliverability from source to sink.

We're asking for this demonstration seven months ahead, and it's really focused on a demonstration of physically firm resources that are deliverable.

Next slide, please. We are working on an operations program that at its core is really comparing what we committed to in the Forward Showing Program and comparing that to the operational reality. Identifying that delta and identifying which participants in WRAP are surplus to those forward showing commitments they made and which are deficit.

And by doing so, we are creating an RA capacity pool, this pool that I mentioned earlier, that participants have priority access to.

We calculated a sharing obligation and in the day-ahead timeframe we're distributing that information and matching up the participants. This is what has been

described in the past as neighbors helping neighbors, as part of one of the WRAP principles.

Next slide, please. We are rolling out WRAP over a period of time. I mentioned earlier that to get WRAP implemented, to kick it off under its tariff existence we do need approval from Federal Energy Regulatory Commission. We are working through that process as we speak. There is a critical mass of funding that I am actively working on as we speak. And, hopefully, by December 16 have a positive answer that we are fully funded and move forward.

Once we are live under the tariff, we roll WRAP out over a period of seasons and years. We have had to, to keep the train on the tracks, and to keep the participants on this train had to offer some flexibility in terms of which season they may decide to go binding in.

And what I mean by that is they would be fully exposed to all the rules of the program, including all of the compliance charges for failure to meet various obligations, and forward showing, and operations. That period is essentially summer of 2025. And by summer of 2028, everyone should be fully in, fully exposed to all of the requirements of the program.

As I gather information about commitments and

funding, one of the pieces of information yet to come is the aspirational season that the participants are hoping to become binding in. So, there will be some calibration and correlation in the months to come about what that looks like.

Next slide. This slide has a lot of stuff about things we're working on. I really want to emphasize that we have some very important funding thresholds that we need to meet. We have to obtain a successful regulatory approval from FERC. Part of that means that we can transition the governance of the Western Power Pool, also known as the Northwest Power Pool, but really is truly West wide, reference the map, to an independent governance. Fully independent, term limits, all of the standards, robust role for states and stakeholders in a myriad of ways to interact with the program.

We work with a program operator. That is Southwest Power Pool. They do a lot of the technical analysis that supports the Forward Showing and the Operations Program.

And, of course, we're working on a lot of other live issues. This isn't on my slide, but I certainly wanted to take a moment and address one of the hot topics of the region as my last comment. Which is we have emerging market expansion going on in the same

western footprint, SPP Markets+, California ISO extended day ahead market.

Our goal, Western Power Pool goal, our participants goal is to maintain the broadest, widest, WRAP footprint that we can. It is only through that broad footprint that we get the diversity benefits that deliver on the value proposition.

We also need to serve our members. We are a 501(c)(6) nonprofit. We live to serve. If our members want to go to EDAM, we must facilitate the solutions of how WRAP can interact with EDAM and be successful. The same on the SPP Markets+ side.

Therefore, I think it's pretty reasonable to predict, sitting here, a future potential of two markets and one WRAP. That's at least my goal.

We have a lot of questions to answer. There's a lot of details. At a highest, 100,000, or 50,000 foot level our timeline in terms of calculating who's deficit, who's surplus, who has a sharing obligation, all of that can be done prior to the market day ahead network model machinations. We can make this work from a technological perspective.

There's a lot of questions, though, about making sure that when the market takes those inputs and does what it does with those, we've been comparing it to a

washing machine, that the high value garments that we put in the machine at the beginning come out the same.

Value proposition of WRAP is really based on physically firm resources that have firm transmission from source to sink. So, that's really what participants are putting in and that's what they hope to get out.

There's a series of detailed questions that we'll be asking in the coming months, working in close partnership with California ISO, but also with SPP, to get to the heart of those details.

Thank you so much for my time today with you.

OPUC COMMISSIONER TAWNEY: Thank you so much, Sarah. And really appreciate how collaborative the WRAP Development Team has been with the Commissioner and State Energy Office community in getting that governance model set up. I'm excited to see it come to fruition as we work our way through the FERC process. So, really appreciate that.

Our last panelist today is Maury Galbraith, the Executive Director of the Western Interstate Energy Board. And he manages the efforts of WIEB to facilitate cooperation among Western states and the Canadian provinces to improve the efficiency of the Western Electric Power System.

He also manages the work of the Western Interconnection Regional Advisory Board, or WIRAB, which provides advice to FERC and to WECC by extension to improve the reliability of the Western grid.

Maury's an economist with long experience in utility rate making. And I really have to say, a trusted advisor by the regulatory community in the West. His work to bring us together and create space for us to grapple with hard problems has been incredibly valuable to the larger regionalization conversation.

As my flight will be boarding here, as we work our way through the rest of the panel, Maury may take over in partnership with Commissioner McAllister to wrap the panel up. But I'll stay for as absolutely long as I can.

And I'll, with that, hand it over to Maury for his comments.

MR. GALBRAITH: Thank you, Commissioner Tawney. Vice Chair Gunda, Commissioner McAllister, it's great to be here, thank you for the invitation. And for all the other Commissioners, both here in person, and on the Zoom call, it's great to be here.

I'm going to be brief with my remarks. I want to start by saying that I've been the Executive Director at the Western Interstate Energy Board for eight years

now. And I just wanted to start by saying that there has been -- there hasn't been another individual that has been more helpful and more engaged at the Western Interstate Energy Board and with all of the committees, and all of the work that we do than Grace Anderson.

Grace is a terrific resource for the State of California and I just wanted to make sure that you fully recognize that.

All right, so let me start there. Let me also say that I've worked with the other panelists here on this resource adequacy issue for what seems like most of my time at WIEB, not quite all of the time, but maybe six of the eight years.

And, you know, and early on in the effort it was trying to raise awareness to an emerging problem. I remember making these kinds of presentations, you know, four or five years ago and really having to convince people that resource adequacy was a real concern. Right.

I think we're over that now. I think in large part to the great work that Arne Olsen has done, and the great work that Branden Sudduth, and the folks that WECC have done. I think people now recognize that resource adequacy is a concern, it is an issue, and they're starting to work on solutions. Right. And that is

really wonderful.

Chair Randolph, I think the first time I met you I was presenting at a conference at Stanford University, with a bunch of students, and we were talking about resource adequacy. And I shared some results from a summer internship program that some of the students from Stanford participated in at WIEB. And their project was on resource adequacy and their big conclusion was that what the West needed to improve resource adequacy was a central clearinghouse, where the utilities could submit information, and there would be an entity that added it all up, and compiled it, and make sure that the region was checked resource adequate.

Now, we have a program that's being sponsored at the Western Power Pool that is essentially a central clearinghouse to do just that, and much more.

So, the issue has really changed over the course of the last, you know, five or six years, it's really different.

I want to talk about WIEB's contribution here, but before I do I want to say I'm not sure Sarah has fully done justice to the solution, which is the Western Resource Adequacy Program.

I mean one of the issues that I think we still have, but I think it's being addressed, is that you have

a lot of different entities in the West, planning for their resource adequacy on their own. And then, you have a lot of them going out and contracting with their neighbors for capacity, or expecting imports into, you know, their balancing authority to meet their resource adequacy needs.

And one of the issues that we have is, is that we do not have somebody that is tallying up all those -- all those buys and sells, and making sure that overall there's enough capacity to meet all of those obligations. So that if we do get in a situation in the West where, you know, there's a heat wave, as Arne was talking about, that's all the way from Seattle in the North to Phoenix in the South, to Denver in the East, and sort of the music stops playing, and everybody sort of holds onto their resources is there enough to go around. Right.

And so, what we really need is a resource adequacy program that sort of checks and verifies that. The Western Resource Adequacy Program is that program. It checks that box. It makes sure that we have a -- that we're reliable.

But then it also does something that I think, you know, Arne was pointing to, which is with the bigger footprint, with that really big footprint that Sarah has

on her map, you can safely reduce the planning reserve margin and save an awful lot in capital costs, and construction costs associated with new resources.

I think it was Keegan Moyer, earlier today that said, you know, in the terms of the scale of the benefits, right, I mean fuel cost savings are great, but what you really want to avoid are those upfront capital costs, those investments costs.

And so, Sarah's program really is -- it doesn't just sort of check that reliability box, it also checks that cost effectiveness box.

I want to point to one thing that the Western Interstate Energy Board has done in this space, one substantive contribution, other than just convening people. We're a convener. And, you know, sometimes that has value, sometimes you're just convening for convening's sake.

But one thing that we did do is we did team up with some of the researchers at Lawrence Berkeley National Laboratory to look at the implications to utility integrated resource planning of that utility joining a regional RA program. And the unique thing about it was is that it wasn't a study on benefits. So, I think you heard Keegan Moyer say, earlier this morning, we don't need a whole bunch more studies on the

benefits, the benefits are there. Right.

This study took a unique perspective and it focused more on the opportunity costs. What would you be giving up if your utility joined a Western Resource Adequacy Program, and we sort of listed 10 to 15 elements of integrated resource planning. And we said, which of those 10 or 15 elements are sort of highly impacted or lowly impacted by your utility joining an RA program.

And so, the result was is that there was two sort of high impact areas, right. If your utility joins a regional RA program in some sense you're giving up some control over the ability to set that planning reserve margin. The WRAP program is going to determine a planning reserve margin.

If you, as a utility CEO, or as a state regulator want to exceed that planning reserve margin, have at it. The WRAP is not going to have an issue with you being super reliable, right.

It's only in the down direction that you're losing some control or giving up some control.

And so, you know, I think that was an important finding in that report and it was an important message.

You know, another message that came out of that report is another area where, you know, states and

utility executives sort of relinquish control to a regional entity is in the setting of those capacity credits, those capacity contributions for resources like wind, and solar, and hydro, and things like that. Because the regional entity, the regional resource adequacy program needs to have a consistent approach to that. Right. They have to have consistent values for those capacity contributions.

So, that might be an area where, you know, states and utilities might give something up.

So, I think those are important findings. I think they've helped people think better about joining an RA program. And I just wanted to bring that up in this context because I think we need something similar to that in the area of market expansion as well.

Right, it's not that it's -- you know, so I was responding, I'm thinking about Keegan's remarks this morning about, you know, we don't need additional studies on benefits.

What I think we do need additional studies on are what are the opportunity costs of making these decisions, right. Thinking about what Neil Millar said earlier about not focusing on, you know, least regrets, right.

We have to be honest with people there are

tradeoffs. You will be giving something up. What you're getting in terms of joining a market is not the same thing that you're giving up in terms of leaving that market behind, right.

And so, I think we need more focus, more studies, and they might be qualitative in nature on what those tradeoffs are and what those opportunity costs are. Because I think that improves people's thinking and it makes it -- you're going to have to let go. Some people are going to have to let go of some strongly held views, right.

I think we heard earlier from Chairman Blank, from the Colorado Commission, that Colorado does transmission within its boundaries very well and very efficiently. They can build transmission, I think he said earlier today, within two or three years.

And one of their fears is, is if they join a regional RTO that all of the sudden -- all of the sudden they can't build transmission quickly anymore. That's an opportunity cost. Those are the kinds of things that we should be focusing on in trying to help people understand and work through better.

So, that would be my sort of recommendation for next steps. Grace encouraged me to think about next steps and offer some remarks. So, that would be my

thinking on next steps.

So with that I will end, hopefully early, and again I want to thank you for the opportunity to be here. It's been a wonderful event.

OPUC COMMISSIONER TAWNEY: Thanks so much, Maury.

And our speakers have been right on the money and there's lots of time for questions. So, are there questions from the dais?

COMMISSIONER MCALLISTER: So, I think we have Vice Chair Gunda and don't yet see any hands raised online. And we'll just query across the physical dais here as well.

VICE CHAIR GUNDA: Thank you, Commissioner McAllister. And thank you to the panelists, Branden, Sarah and Maury. Always wonderful to hear from you all. And it was just -- it was just really well set up.

So, I think that, you know, I will kind of go back to the spirit of what Commissioner Tawney was saying at the top of the session that, you know, we're all kind of doing work in good faith and kind of want to talk through that, that spirit here.

And to Commissioner Tawney just, you know, we are benefitting from Portland General Electric's program on the emergency side which is, you know, wonderful work

that they've been doing.

So, just in the spirit of broader, you know, again Maury you set it up as well similar to, you know, what I kind of remarked earlier which is this sense of tradeoffs and, you know, sense of kind of how do we get to our end goals really recognizing, you know, what is it that we are looking at trading.

So, couple of questions on the -- on just kind of clarity. Sarah, just on the WRAP process, when you're thinking about the resource adequacy, you know, for the region, can you just explain how that works with, you know, looking at them. And there's two elements you talked about, the PRM and then ELCC, potentially, you know, kind of how we look at them. And the idea that ELCC values of a specific resource could be different when you consider them regionally versus, you know, a specific area.

So, if we are looking at those two things, just from your perspective how do we think about the current crisis of climate change we're seeing? Right. So, and how do we develop the cushion for that. So, I'm just going to contextually as California and invite you to comment.

So, if you're going about it alone in California, you know, for example take one side of --

you know, we consider X amount of imports available in our resource adequacy program and try to build to whatever we need. And recognizing that under extreme stress those imports could reduce, right, given that, you know, there are transmission constraints and such.

California has been investing in developing emergency load reduction programs, right. And so, kind of having them in our back pocket to use, which are these, you know, break glass opportunities, which we don't want to do. And I'm here with Chair Randolph, especially, you know, you don't want to turn on a bunch of diesel generators in especially vulnerable communities to keep the lights on.

So, how are you considering within your framework not just reliability, you know, 1 in 10 loss of load expectation, but this future where we might see this enormous amount of volatility, these needle peaks. And how do you look at it geographically, sharing the responsibility and such, if you may.

MS. EDMONDS: I can think of at least two things, Vice Chair, that are responsive. The first would be that we have always committed to evolve the planning reliability metric approach that we use at Western Resource Adequacy Pool. I said before that we are starting with a basic and strong position. We're

not inventing any new wheels, per se. Maybe our capacity critical hours analysis to get at the hours of highest need, constrained need, that might be one innovation. But we have committed from the start to evolve this program.

You have to keep in mind that we are starting from a place of no regionwide visibility or transparency to the resource adequacy position of the West. So, starting anywhere is better than where we are today. And that is what we are striving for.

And it's hard enough, I'll tell you, to stand up this voluntary program just on that basis.

But we remain very much committed to the commitment to evolve the program. There is so much discussion about how to deal with climate change and resource adequacy. Arne talked about is 1 in 10 correct? Is it not? Maybe it is, I don't know.

But I think the whole world is really struggling with how do you innovate on traditionally resource adequacy approaches. We're committed to that. I don't know the answers, yet.

But one thing I would also emphasize is that a driving force behind the, really the industry-driven design that is behind WRAP, it didn't come from me, it's not my program, it's actually the program of all of

industry that put this together over three and a half years, is a real emphasis on a understanding, and a pathway of information from the source resource, the physical resource to the loads.

I mentioned before, you know, really granular QCC approaches. We make approaches or conservative estimates, very conservative estimates about the kind of imports that we can expect. We use our capacity critical hours lens to make sure that we're not overestimating those imports.

I think import and export assumptions was mentioned on this panel as an excellent area for further collaboration and coordination.

But our program design is really trying to see all the way down to the actual resource that is supporting this resource adequacy, including the deliverability requirements, not 100 percent, but 75 percent as a balance.

And I think that's one of the ways that we get to that visibility and understanding whether or not there's a real critical need to change our methodology and when.

VICE CHAIR GUNDA: Great, thank you. Just one other follow-up question on that one. You mentioned kind of, you know, the WRAP, kind of your work will be

facilitating, you know, the EDAM, the evolution of the, you know, market space. However, you know, whatever plays out.

Could you just kind of talk through how WRAP fits into kind of supporting those processes a little bit more? Thank you.

MS. EDMONDS: I'll do my best. There's a lot of work that needs to be done, but we are committed to it and we've started that work.

I think the biggest thing that we're -- that we need to problem solve our way through, in collaboration with CAISO, SPP, Western Power Pool, and stakeholders is how do you take a WRAP obligation -- let's say we do our calculation and a WRAP participant in Markets+ needs to share its resource adequacy capacity with a WRAP participant in EDAM. That market operator is going to receive that information.

And then, the question will be what market design protocols will the market operator use to ensure that export? What priority will it be given? What transmission curtailment is it subject to? It is a resource adequacy need for someone else in our WRAP footprint.

So, to get to that WRAP value proposition and to preserve it we need assurances from the market operators

on both sides of the equation that the WRAP obligations exchanging back and forth from the different participants who have chosen a different market can be honored.

But there are 12 or more follow-up questions about what does that mean. And that's really the tracing work that we're setting out to do.

VICE CHAIR GUNDA: Thank you so much.

COMMISSIONER MCALLISTER: So, we're going to go to Commissioner Houck and then Chair Randolph.

CPUC COMMISSIONER HOUCK: Just following up a little bit on that. How would WRAP work with the product that's being proposed for EDAM, or the imbalance reserve product that's being proposed through Cal ISO? Would it be complimentary, duplicative, or something else? And I know we're all sort of still working through some of these issues, but just any initial thoughts you have on that.

MS. EDMONDS: I asked that exact question of my technical team today. I have a team of three other people, who are not here today, but I did ask them that question.

And I think our answer is we're not totally sure because there could be some crossover, at least in my mind I think so. But they're getting at different time

deltas. They're all reserves, but they're looking at different deltas in time.

So, imbalance reserve is looking at the difference between day ahead and real time, and making sure it covers that, has enough capacity to cover that.

We, in WRAP, are specifically looking at a seasonal difference, seven months ahead seasonal planning to the operations time period. So, very different delta in terms of time frame.

But we are concerned about the same thing, changes. Changes between what we forecast, changes between what actually happens.

We have the ability, I think, and this goes to Keegan Moyer's presentation to tap into that capacity savings element that he was really honing in on, and differentiating from operational savings.

I would say that there may be crossover where some capacity that was earmarked to be a reserve capacity for WRAP could end up being operational capacity that resolves an imbalance reserve need.

One thing WRAP doesn't have, and this is a question that we will answer in this work with the different market operators, is our operations program is not a market. We do not have the ability and the engine to optimize and stack the capacity reserves that we're

sharing. We're matching people up and we're allocating those obligations.

If we were truly a market, an all-integrated RTO, we'd have the ability to do tall of that. We're going to be talking to market operators about what potential is there for that additional economic benefit that doesn't interfere with the core base WRAP value proposition.

So, I hope that helps. But truly my answer is I'm not entirely sure because I think there is some crossover, but they're doing different things and there's certainly a different time frame involved.

I bet Arne knows exactly what the answer is.

(Laughter)

CPUC COMMISSIONER HOUCK: And I appreciate the response and just the continued dialogue as we're working through the issues.

COMMISSIONER MCALLISTER: Yeah, I'll just pile on. I mean this seams issue and the translation of visibility is like what we've all kind of -- a flag that we've all be raising. And it's really great to see that you're like thoughtfully approaching that and committed to build just the informational analytical platform to help resolve that. So, I think that goes a long way to giving folks comfort.

You know, Chair Randolph.

CPUC CHAIR RANDOLPH: I think Sarah mostly answered the question that I was going to ask about kind of when the music stops. You know, you're in a West wide heat wave, you know, what happens as people are hanging onto their resources.

And this kind of dovetails with Arne's point, which I have repeatedly made, which is, you know, we're meeting the 1 in 10 and it's not -- and it is not giving us the comfort level that we as a state sort of feel like we want. Right.

And so, I guess the question, it's sort of a question/comment is, you know, if you have different participants in WRAP do you have a situation where some may have a different sort of risk tolerance? Right. Like you have decided this is our -- this is our reliability standard, this is our loss of load expectation, and this is what we're going with.

But if you have participants who are more, you know, their economy is more electrified than others, is their risk tolerance going to be different? And how do you have -- as an entity do you have that conversation with your participants, I guess.

At the outset you kind of have to decide this is what we're going to agree to, but then when the music

stops are some people going to be more hanging onto their resources more tightly than others and how do you deal with that?

MS. EDMONDS: Thank you for the question. It is at the heart of the last three and a half years of work with the industry, the utilities that help form this compact. And I would say that I would applaud them for their boldness, and the willingness to decide that they're going to pool all their loads and resources into a big Western RA pool. They're going to receive their individualized allocated planning reserve margin.

So, all their individual data goes in. Potentially there's a lower planning reserve margin opportunity because we did it as a giant pool. But they have their allocated requirement of that and they have to honor -- that's the -- the framework of the program expects you to fulfill your obligations.

That you will show us your forward showing. If you are deficient you will cure, using our rules, within the timeframes. That you will operate in a manner consistent with that forward showing.

And then in the operations period, if you are told that you have a sharing obligation, you are surplus to your forward showing and you have an obligation to another, that you will fulfill that or be subject to

very significant, totally uneconomic penalty charges. That is our construct.

However, we're not the total policeman on the beat. So, could an entity decide to violate WRAP, and violate the tariff and not do the obligation, not deliver the obligation? They could. They would suffer the penalty charge.

We're doing as much as we can. I think we set up the charges in a way that that would be a very difficult decision to make. So, we're trying to incent behavior through the right, I hope, economic signals.

CPUC CHAIR RANDOLPH: Okay, that's -- that's kind of helpful to understand how that's structured. Thank you.

COMMISSIONER MCALLISTER: Vice Chair Gunda.

VICE CHAIR GUNDA: Thank you. Just a follow-up question to Branden on the analysis more broadly.

So, you kind of mentioned, Branden, in your slides, as you look through the current procurements that are happening there is a reduction in the risk over the next several years.

So, just wanted to ask how are you thinking in your modeling about potential delays through -- due to supply chain issues and other inflationary issues? Because that's something that we are worrying in

California in terms of, yeah, we've ordered the procurement, can we build to that rate?

MR. SUDDUTH: Yeah, so I'll start off by saying that the information that we get comes directly from the balancing authorities. And so, we have specific, I guess criteria that we ask for when we're collecting loads and resources data.

What you see in this assessment was data that we collected at the beginning of 2022, so earlier this year. And so, the results that you see are based on just kind of the expected loads and resource values at that time.

I will say since we collected the loads and resource data, you know, we've been challenged with things like the solar tariff. A lot of the supply chain issues that we've seen have come along, you know, since then.

And so what we've done is worked to develop different types of sensitivities, you know, based on this analysis. And although we haven't published them, you know, we've shared some of the results with different entities as they ask.

But there is a component of, you know, these resource adequacy assessments that, you know, the system is changing so fast, the circumstances are changing so

fast how quickly do we need to refresh the results and the data to give people, decision makers primarily, the information they need, the most up-to-date information. And to date that's been kind of on a request-by-request basis.

So, you know, if there are specific circumstances that entities are seeing or being faced with, you know, please contact us and we can, you know, tweak the results in our assessments.

But for this particular assessment, the results that we've been discussing, it's largely based on the conditions in early 2022.

VICE CHAIR GUNDA: Wonderful, thank you. We'll follow up with you on some of that modeling framing. I think we'll benefit from learning how you're approaching that. Thank you.

MR. SUDDUTH: Please do. Thank you.

COMMISSIONER MCALLISTER: I see that Commissioner Shiroma has her hand up. Go ahead.

CPUC COMMISSIONER SHIROMA: Thank you. I guess this is a question maybe for Arne, or for Branden, but really could be answered by Maury or Sarah. It has to do with climate change insofar as studies have been

done, analyses have been done, projections and so forth. Is there anything else that we need to do to look ahead for the impact of climate change on our resource mix?

A little story, okay back 20 years ago or so, when I was newly on the SMUD Board, and several of us had the wherewithal to say what -- please do an analysis of the impact on the hydroelectric system that SMUD operates. And around that we concluded we needed to do a lot more on energy efficiency because the -- I mean it's there now, but back then it was, well, okay, less snowpack, more rain, less in our reservoirs, and so forth.

So, it's really a question that simply is, is there anything more that we need to do as we look ahead to assist the impacts on climate change, on what we're going to need to have for our resource mix?

MR. SUDDUTH: Well, I'll jump in really quick, if that's okay, Arne.

I think, you know, Sarah did a really good job of talking about how we adapt our approaches, you know our metrics, our techniques and work. We're really -- we're doing a good job of trying to break, you know, some of the classic ways of thinking about resource adequacy that we've thought about for decades and thinking of new ways to identify, you know, the risks on

the system.

I will say that, you know, one of the biggest challenges I think that climate change poses to us is that it's breaking the mold in terms of how we develop our assumptions.

And I'll speak for WECC analysis. You know, a lot of the load forecasts that we develop, a lot of the resource availability distribution curves that we develop are based on historical performance, and then we extrapolate that into the future to do our studies.

The climate events that we've seen over the last couple of years are really breaking that mold. And so, I think as an industry we have to think of new techniques, new processes, new ways of determining future scenarios that aren't completely dependent on the past and just extrapolating them out.

So, I think that's one big piece of it.

COMMISSIONER MCALLISTER: Yeah, I think Arne. Arne and/or Maury I think wanted to make a comment, yeah.

MR. OLSEN: I might just added, I think that was a great answer from Branden. And it's a great question.

I guess my comment would be that I'm a little bit worried because these things tend to move very slowly in this industry. You know, it's a conservative

industry and there's a lot of machinery that has to turn in order to make a change that's so fundamental as, gosh, maybe our load growth forecast is wrong because, gosh, it was really hot last summer. The climate seems to be changing so rapidly that I think we're not catching up.

So, I think as regulators I would be asking my utilities very hard questions about, you know, how -- you know, what temperature levels make your distribution transformers start to blow up? And, you know, how much hot weather really is embedded into your forecast?

And, you know, I think this is an industry wide problem. There's a lot of uncertainty, there's a lot of research that needs to be done about just how the climate might change, how that might affect our loads, and our wind, and our solar shapes, and all the other things. We need to get on this as fast as we can and I think we're behind.

COMMISSIONER MCALLISTER: Yeah, and I would just point out the Energy Commission, in the Building Standards context is taking a long-term view and actually developing sort of future weather files, trying to predict what that TMY will look like in the future, and kind of get ahead of that.

And so, I think there's a lot of room for

collaboration for load forecasting generally, and also just all the other impacts on the grid based on kind of some consensus of how bad it's going to get, and have that reflected actually in the inputs.

So, that was a good point, Branden, on inputs.

Maury, did you want to have a comment? We've got to wrap up and I want to make sure that Commissioner Tawney has a chance to wrap us up.

MR. GALBRAITH: Yeah, and I will be -- I will be quick. And once I turn on my microphone I'll be quick. And just point out that I think you want to start with basics, right.

We've got increasing temperatures, what are the impacts of those temperatures on utility load forecasts?

We had, again, a couple of Stanford interns spent last summer with us and that was their project, they focused on that. And what I will tell you is, is that most utilities are not adequately incorporating climate change into their basic load forecasting.

They also looked at the load forecasting that is done here at the CEC. I think they had some compliments for your work, but I think they also had some suggestions on how you can up your game as well.

So, and I included a link. I'm not very good at Zoom, so I'm not sure it went out to all of the

participants, but I think it went to the -- I think it went to the panelists and the hosts.

But I'd start there, I'd start focusing on how to get the temperature forecasts correct in the utility load forecasts.

COMMISSIONER MCALLISTER: Great. Well, that was -- thanks everybody. And I want to just pass it back to our facilitator for some wrap up, and then we'll move to the next panel.

OPUC COMMISSIONER TAWNEY: Thanks so much. And I just want to thank the panelists for a really substantive discussion, a really excellent set of conversational questions from the dais as well.

And the conversation we've had here is a microcosm of conversations I'm hearing in forums across the West. I think there is a sense of urgency and we, with the WRAP program, have the opportunity for a step change.

And I really hope that we can both see it launch, but also ensure that any seams that are created because we have folks going in different directions are absolutely minimized as much as possible. Because the customers benefit, the customers require both the reliability, but also the cost savings that the WRAP program, and it's an opportunity to collaborate with the

California could create.

So, thanks so much for posing the panel questions for the afternoon. And thanks for including me, I really appreciate it.

COMMISSIONER MCALLISTER: Well, thank you very much, Commissioner Tawney. And safe travels. I hope we didn't keep you off your flight.

Great. So, with that we will move on to our final session of the day, which is our takeaway session. So, an opportunity for some dialogue.

And that will be moderated by Commissioner Houck, from the Public Utilities Commission. And I hope you don't mind if I introduce you?

We know each other. But for the record, Darcie Houck has served as Commissioner at the CPUC since early 2021. She formerly served as Chief Counsel for the California Energy Commission, and as an ALJ, Administrative Law Judge at the CPUC.

Her expertise focuses on environmental quality, nuclear energy regulation, safety policy. She has a very extensive background representing Native American Tribes on matters, including energy resources, natural resources, land claims and water rights. And is just a very incisive and deep-thinking legal mind.

And I just really have appreciated working with

you, Darcie, over the last few years. So, take it away.

CPUC COMMISSIONER HOUCK: So, thank you and thank you for inviting me to facilitate this last panel. I really appreciate being able to listen to allof the discussions today. I think allof the panelists from across the West that have participated, both in person and virtually. I think we've been presented with a lot of information from experts from throughout the West.

And what's really come across loud and clear is that the West has come a long way in recent years regarding reliability coordination, sharing resources, and development of markets, such as the energy imbalance market, have really been making a difference across the West.

And with increased collaboration and attention to detail, a voluntary incremental-functioning day ahead market could emerge in the very near future, possibly two. And the West has the potential to gain significantly from the next steps in this process.

Collectively, we've worked through many difficult issues and I think we've got the potential to work through the remaining outstanding issues that are there.

Collaboration and coordination, combined with our shared goals of ensuring reliability and

affordability for customers continue to provide a strong foundation for exploring western integration.

And this closing panel is a perfect way to wrap up the day by hearing from the panel representatives on what the critical takeaways are from the different panels that have presented earlier today.

And so, I am going to introduce our panelists, and then ask each of them to provide some brief, critical insights that they learned from their panel, and also some focused takeaways. And then, we'll look at questions and have a dialogue and moving on to the next panelist.

And so, the panelists that we have today are, for the adequacy panel, thank you, Maury. Maury Galbraith has agreed to step in. And again, he's the Executive Director from the Western Interstate Energy Board, or WIEB. And thank you. I believe Letha had to make the airline, so we're really pleased to have you on this panel.

The second panelist will be the moderator from our transmission panel, Cliff Rechtschaffen, Commissioner at the California Public Utilities Commission.

And our third panelist is Eric Blank, Chairman from the Colorado Public Utilities Commission, who

moderated the markets panel, panel two from earlier today.

So again, just really want to thank all of you for your participation and also another shout out to Grace for all of her amazing work on getting us to this point. I'm very impressed with the effort that went into this. So, thank you.

So, with that I will turn it over to Maury to talk about takeaways from our adequacy panel.

MR. GALBRAITH: Thank you very much. I'm just going to sort of summarize the conversation and hopefully I will hit on a couple of the key, key takeaways, and maybe some of the next steps.

So, firstofall I think you heard from Arne Olsen and Branden Sudduth that there is a resource adequacy issue, a resource adequacy need in the West. I think a really important point that Arne was putting emphasis on was this idea that we are going to need a clean firm resource to help us achieve those aggressive clean energy goals.

You can get quite a way there with, you know, utility scale solar, battery storage, and wind, but you can't get all the way there. And so, we need -- we're looking at those technologies that might provide clean firm capacity, things like green hydrogen, small

modular nuclear, geothermal, and resources like that. We're hoping that they develop and we need to put some R&D effort into those.

I think Arne also did a really great job of highlighting the significant amount of investment that's coming. I've heard the folks at the California ISO say that we're at a point of inflection. I think it may have been Neil Millar earlier today that said, look, in the last few plans it's been, you know, capacity additions have been about 1,000 megawatts a year for 10 years, and allof the sudden now he's seeing 7,000 megawatts a year for 10 years.

And Arne did a great job in that one slide from the Desert Southwest that we haven't seen investment like that, at that speed, and that scale ever in the West. Right, we've seen it for maybe a year or two, but not sustained over a 10-year period.

And so, I think that is a huge challenge and I think that we need to keep raising awareness on that issue.

I think that the other issue that Branden and Arne brought up was the importance of maybe looking at imports, and transfers across regions in the West, and really making sure that our assumptions are aligned, and that we're coordinating with our

neighbors.

The work that is going on at the Western Power Pool helps in that area as well.

One other point that I think Arne was right to emphasize, and we've had some conversation about it is that, look, we're in a period where some of these extreme weather events are what really put stress on the grid. We really need to be looking at the impacts of climate change and really be thinking about how we're going to plan for those kinds of events going forward.

So, I think those were all important takeaways. The discussion of the Western Resource Adequacy Program is really mportant. I think it is a solution to a lot of these problems. Well, certainly a lot of these coordination problems.

Right, I used to say a lot that the resource adequacy issues in the West are not planning issues. I think we know how to plan. They're not really -- although, I'm -- they could be investment issues, but they're not necessarily investment issues.

Some of the biggest challenges that we have on the resource adequacy front are just those institutional issues of trying to coordinate between states, and between utilities, and between regions.

And so, Sarah's program is really addressing

that shortfall. They're bringing participants from across the West, they're leveraging that geographic diversity, and they're putting those protocols and procedures in place to, you know, verify that the capacity is there, and making sure that the entities hold onto it so that they can deliver it to their neighbors, helping neighbors, that concept, when the need arises.

So, an important part there is that large footprints help here. Right, large geographic footprints help. They lower that -- those diversity benefits lower the overall capacity need that produces some costs savings,and allows us to sort of share capacity resources. I think that's important.

So, again I think the two takeaway messages from the Western Resource Adequacy Program are: one it's going to help us ensure adequacy and reliability but, two, there's some significant cost savings that can be achieved from joining that program, and working with that program.

Another concern that Sarah pointed out, and it was probably in response to some good questions from the Commissioners, was that there's going to be interoperability issues between the WRAP and the various markets.

We had that conversation at a recent CREPC/WIRAB meeting. I haven't heard Sarah's views on that change too much. I think those issues are issues that can be worked through, right. I think it's just a matter of getting people together, and smart people can figure out how to work on those interoperability issues. It's really honoring the commitments that are made. Right, there's commitments that are made within the WRAP. There's also commitments that are made within each of the two markets, right. And they all haveto honor each other's commitments. And it's just getting in the same room and articulating what those commitments are, and making sure that we can honor them.

So, I think those are some of the important takeaways. I would, in terms of, you know, further studies in this area I would, again, focus on some of thewhat are the costs, and what are the opportunity costs of your utilities in your states participating in some of these programs.

So with that, again, I thank you for the opportunity to summarize. I hope I did not miss anything.

CPUC COMMISSIONER HOUCK: No, thank you.

And so, I want to see if there's anyone on the dais here in the room that has any questions, or follow-

up comments, or additional takeaways that they wanted to reference.

COMMISSIONER MCALLISTER: I have one comment I want to make. So, it's the kind of comment is a little bit of a disquiet that I have that we haven't really figured this out, yet, so it's turned into a question.

Maury, I think your summary was right on. You know, maybe four or so sort of strategies that we've talked about in that panel, in various ways. But, you know, one is geographic scale. That's a way to mitigate this risk, right.

Messing around with the PRM is another one, potentially.

Making sure we have reallygood communications and visibility across the seams, just so everybody kind of knows, has good situational awareness is the third one.

And then, anticipating the future kind of conditions that climate change is going to produce when, you know, when theyou know what hits the fan.

So, those are sort of four strategies that are incrementally pushing us in the right direction. But I think, you know, fundamentally I think we're all still sort of like, okay, well, when the music stops which chair are we going to sit in?

And so, are there any prospective ideas that anybody has aboutother ways we can mitigate some of this risk and make sure that resources are there when we need them.

It seems if we up the PRM in a nonstrategic way we're going to end up overinvesting. It's not efficient, for example. Maybe this is a little too much to ask after we've already had a whole panel about it. But any other sort of pie in the sky kind of ideas people have about that?

Everybody's quiet. Oh, wow. Arne?

MR. OLSEN: Well, Commissioner, I mean I'd go back to what you emphasized earlier, which is the demand side. I think that's where --

COMMISSIONER MCALLISTER: Yeah.

MR. OLSEN: -- there's a really big untapped resource there.

COMMISSIONER MCALLISTER: Yeah.

MR. OLSEN: You know, we have a lot of interruptible customers on the gas side. We really only have a few on the electric side, it seems like. And they're all kind of horned in through these awkward demand response programs, which some of them they're -- resource adequacy isn't necessarily the only purpose. So, I really think it's a resource that's untapped.

COMMISSIONER MCALLISTER: Uh-hum.

MR. OLSEN: And as we get electric vehicles added to our system in large numbers that's going to come at us like a freight train. And it's going to be either a reallybig load that we haveto serve at an inconvenient time, or a reallybig resource that we could turn to, to help us get through some of these reallydifficult challenges.

COMMISSIONER MCALLISTER: Yeah.

MR. OLSEN: We need to get organized on that really, reallyquickly because that load is coming fast.

COMMISSIONER MCALLISTER: That's a great point. And I guess, you know, how that might actuallyplay, interested, maybe not right now, obviously we can't unpack it completely, but how that could bridge into and actuallybe part of an RA program, I guess would be my next question. You know, because it -- certainly as a resource for system use and procurement. But as part of an RA program, I'm not sure.

MR. OLSEN: I mean there's two ways you could measure it, either as a load reduction or as a resource --

COMMISSIONER MCALLISTER: Yeah.

MR. OLSEN: -- that can help meet what would otherwise have been a higher load.

COMMISSIONER MCALLISTER: Yeah.

MR. OLSEN: I think the more restrictions you have on your ability to access it the more you need to treat it as a resource and measure how important those restrictions are. If load that we just get off at some price, then we can count on it getting off, and then you probably don't need to plan ahead for that load.MR. OLSEN: I think the more restrictions you have on your ability to access it the more you need to treat it as a resource and measure how important those restrictions are. If it's a load that we just get off at some price, then we can count on it getting off, and then you probably don't need to planahead for that load.

COMMISSIONER MCALLISTER: Right. So, permanent load shifting versus sort of dispatch.

MR. OLSEN: Uh-huh.

COMMISSIONER MCALLISTER: Well, great. Thanks, appreciate that dialogue.

And back to you.

MR. GALBRAITH: I'll just add there, there's a lot of geographic diversity in that demand response resources as well, right. I mean you've got in Idaho a lot of irrigation pumping loads. I guess in California probably, too. You have these irrigation pumping loads in the summer that you can call on and get a significant

benefit. And then, in other parts of the West you've got other kinds of demands response.

I mean one of the keys there is I think -- I think Commissioner Tawney started this all off by saying, look, we're all working in good faith on these kinds of efforts. Look, every state thinks that their demand response program is the best program on the planet, but they're all different, and they're all snowflakes. Everybody looks sort of askance at eachothers' programs.

I think the Western Power Pool is -- you know, it's probably on their list of things to tackle. It's just one of those things that's probably not at the top of the list at the moment. But I think, you know, it may end up there eventually and I think that's the perfect place to start having the conversation about, you know, how much contribution can we get from these demand response programs and can we get -- it's got to be -- the reliability of the program's got to be sort of standardized across all the programs. You can't let some people use a demand response program to achieve their capacity target just to avoid a penalty, right. You've got to have some standardization of it.

And so, you know, I think in the -- we ought to start thinking about that and we ought to start moving

in that direction. Because it's -- you know, you've got the extreme weather events, and climate change impact on load growth, but you've all got transportation electrification goals, too, and building electrification goals. And so, we're going to need some resources, right, and allof the above strategies probably could.

CPUC COMMISSIONER HOUCK: No, thank you. Those are really good takeaways and a lot to follow up on,and unpack.

And I think we'll move to our next panelist, Commissioner Rechtschaffen, who moderated our transmission panel, to talk about some of the critical takeaways from that workshop, and any other thoughts that he wants to share with us.

CPUC COMMISSIONER RECHTSCHAFFEN: Thank you, Commissioner Houck.

By the way, Maury, I don't think that California has the best demand response program in the country. So, I'm not in that group. I wish we had a better -- I mean not to throw us under the bus, but we can -- we're trying to do better. I think we can do -- we can improve. Okay, that was slightly around -- that wasn't what I was supposed to be talking about.

We heard that transmission is the enabler and it really does fit as the glue, if you will, the

accelerant, or whatever for the other topics we talked about for reliability, and for market advancement and, you know, integration. Who knew that I would be a highlight speaker for being in the NERC NARUC Transmission Task Force, but that's how sexy transmission is now.

It helps with everything. It allows -- we heard from our panelists that it helps grid operators take advantage of load diversity, resource diversity, temporal diversity, geographical diversity. To the extent that there is savings from market initiatives and regional cooperation, transmission can enhance those savings. It can help with reliability and resilience. And it can help with achieving our clean energy goals most efficiently.

You heard from Fernando in New Mexico that almost 80 percent of the load in the west is now part of a jurisdiction which has clean energy goals. And a lot of the resources are not close to load.

And we're never going to get to our goals, let alone efficiently, without a sensible and cost-effective transmission system.

Neil Millar talked about how California's moving very fast, and almost apologetically, I don't -- but everyone's going to be moving faster than we ever

thought, I think, in the West. Because the climate is changing that rapidly.

We heard from other panelists today aboutthe need to deal granularly with net peak, or the capacity critical hours that Sarah Edmunds talked about. But with the impact of climate change on both our load and supply growing electrification, growing demand, we're all going to be moving much more rapidly than we thought. Maybe California's a couple years ahead, but everyone's going to be following us very quickly.

Which makes it even more important, even more essential that we coordinate better, that we have more sensible, more effective interregional planning.

Now, you heard from Neil Millar that under FERC orders we have interregional coordination, but not interregional planning. And we need that to be improved. Whether or not it's cost allocation that those efforts are foundering on, or differences in cost allocation that's one issue. And that's actuallyan issue that FERC is dealing with in its transmission planning regulations. One of which will give states the ability to negotiate cost allocation agreements, states or regions to negotiate those voluntarily so they don't have to follow a fixed formula.

And that kind of flexibility hopefully can help

unleash some of the cooperation with their joint planning that can be helpful.

We also heard from Neil and others the importance of closer links between transmission planning and resource planning. We can't be reactive. We can't just wait and see what resources are developed and then look to see where the transmission is.

As well as better planning between procurement and interconnection. So, we heard him talk about the localized planning, which is uncoordinated, or not coordinated as well as it needs to be, where there are particular developers in particular areas, but it's not necessarily tied to whether or not those are the optimum places for transmission.

All of that suggests that we need to search very quickly for alternative approaches for bringing transmission online, having it come online more quickly, more efficiently, and at lower costs. We need to be creative and flexible.

So, we heard about one very innovative model, the model that TransWest is using, that SunZia is also using, where you have a developer who goes out to build the transmission line and finances it through subscriptions. That's the model that's used on the gas side. Can we use it more on the electricity

transmission side?

TransWest seems to be a relatively successful model. They've applied to be part of the CAISO as a transmission owner. They're recovering revenues not from the transmission access charge, but from subscribers. They've been able to get a lot of approvals, they have an off-taker.

How generalizable that model is, if you don't have a deep pocket financier behind you, I don't know. I mean that's a question I asked. I think that's a question that we need to consider.

The Renewable Energy Transmission Authority of New Mexico is another model. We heard Fernando Martinez talk about that. And he's very positive. I mean it's a positive lesson of how that state authority has really helped. New Mexico has very ambitious clean energy goals and the authority is working to promote development in a way that's helped, expedited permitting, including with the federal government. Streamlined approvals, although he's mentioned that they've done that without skirting environmental requirements. They've been able to partner with private developers, they have eminent domain authority. They have an early engagement with communities. And so, it's a successful model.

Colorado has a transmission authority as well, and Chair Blank may want to comment on that in his closing remarks. Most states don't. In the West, most states in the rest of the West don't.

In California we -- this last legislative session, the Legislature empowered the I-Bank to provide some assistance for funding for transmission lines, to help some of them get developed more quickly. But that's not the same as a full-fledged state transmission authority. So, that's another model to think about.

And then, we heard from Steve Johnson about SPP's profile and his grand vision, his vision to unite the east and the west, and how complimentary SPP's wind, the best in the U.S., and Southwest Solar, how complimentary they are. And how a DC tie could achieve diverse profile resource benefits without needing a formal RTO. So, that's another model to think about.

I'll close with two thoughts. Neil Millar has defined least regrets in an interesting way, I think, and that's very helpful. He says least regrets means moving more boldly, not more hesitantly.

You tend to think about least regrets as something, well, we want to make sure we're really careful, we think it through, we don't jump too far, too

fast. But he's flipped it and I think he's right. To meet our long lead term resources, to bring them online and to meet the demands of where we need to go, we need to be bolder. And if we don't, if we don't act boldly, if we're too conservative we're harming ourselves. So, least regrets in this case means acting more boldly.

So then, what's next in terms of transmission reforms? Those are open questions. Do we need full scale regionalization for transmission coordination? Maybe, maybe not. Maybe we could -- there may be reforms that could happen, there may be bilateral interregional planning. It could occur any way, the market may move any way. State agencies may move any way. We're getting DOE funding to offset some costs.

Certainly, one of the great benefits of full-scale regionalization is that you have more efficient, more seamless transmission planning with fewer hurdles, more coordinated, and so forth. So, that's one model. But some of the benefits may be able to be achieved through other means.

CPUC COMMISSIONER HOUCK: Thank you, Commissioner Rechtschaffen.

If there's no objection, I think I was going to -- maybe we could go to Eric and have him do his takeaways, and then do statements and comments at the

end after that. Would that be acceptable?

So, Chair Blank, could you talk about the key takeaways and thoughts that you'd like to share from our first -- or, our second panel this morning, the markets panel.

COLORADO PUC CHAIR BLANK: Yes, thank you. Thank you, Darcie.

So, I think we learned from Keegan Moyer that markets produce real, quantifiable benefits. CAISO Energy Imbalance Markets have produced $3 billion in benefits to date. And Keegan quantified that day ahead markets would produce even more. And a full RTO would produce significantly more benefits through optimizing capacity sharing and reserve margin sharing.

So, as you move from optimizing dispatch, you get one, one set of benefits and you go into unit commitment, reserve sharing, capacity sharing you get a second, and significantly larger set of benefits.

And Mr. Moyer argued that the time was -- it's time to stop analyzing and starting to implement it that the quantification of the benefits is fairly clear.

We then heard from Anna McKenna, who described CAISO's efforts to create a day ahead market, and the great progress that is being made, and how it's increasingly getting ready to launch.

We heard a similar presentation from Carrie Simpson about the progress in the Southwest Power Pool markets. And how the Southwest Power Pool is stepping up and helping to implement WRAP, a day ahead market in the form of Markets+, and a full RTO for certain sections of the eastern portion of the West.

And as Spencer Gray said, we now have two competitive options, real options in the West. And that's probably a good thing. And Mr. Gray also argued that we have some work to do. You know, it's probably less important in a day ahead market, issues surrounding governance and how we work together to expand transmission, and interconnection queue management. But as we go to RTOs, all those issues are going to have more bite.

And I listened to the transmission and resource adequacy issues, I just couldn't help but think if SPP and CAISO could work together and give us a unified option how much better off we'd all be, instead of trying to figure out which way to go, East, West, something in the middle. Please just give us that one option, work together. And, you know, it's we can meet our goals.

I'll just conclude with one example from Colorado. You know, we can meet our emission reduction

goals in a way that maintains some affordability and reliability by 2030. We havereally good wind and solar. But it's just going to be cheaper, less risky, and better in multiple different ways if we can figure out how to do this on a regional basis. You know, through our own utilities, and through CETO, which is as lower version of what's happening in New Mexico, maybe a year or two behind, we can move our way forward, but it's just not optimized, even within state, let alone for the long term and for the region.

So, I'll end by saying thanks so much for advancing this dialogue and allowing me to participate. It's just as President Randolph said, we're all in this together and we need to move forward together. So, thank you, Commissioner Houck.

CPUC COMMISSIONER HOUCK: No, thank you to all three of the panelists. And I don't know if anyone on the dais, do you have any comments, or questions for Eric or Cliff? No.

I don't know if anyone in the virtual dais has a hand up, a question?

COMMISSIONER MCALLISTER: No.

CPUC COMMISSIONER HOUCK: It doesn't look like it. Any of the panelists have any comments on any of the takeaways from the other panels? Okay.

CPUC COMMISSIONER RECHTSCHAFFEN: My panel was the best.

(Laughter)

COLORADO PUC CHAIR BLANK: I'd like to offer a rebuttal.

CPUC COMMISSIONER RECHTSCHAFFEN: Just like your DR programs.

(Laughter)

CPUC COMMISSIONER HOUCK: Okay. All right. Back to your corners.

Okay. Well, thank you so much. Those were really great takeaways, great thoughts to leave us with on each of those panels, and really appreciate your participation in providing those takeaways to us.

I now want to close the panel discussion and move on to our next speaker, which is Phil Pettingill of the Cal ISO staff. Phil is currently the Director of Regional Integration at the California Independent System Operator. He has represented the ISO for California before Western State regulatory agencies, and currently supports the ISO's market design process for an extended day ahead market, or EDAM. He's leading the project to comply with California's ACR 188,and engages in multiple regulatory initiatives supporting California's environmental goals, including achieving

the 60 percent renewable portfolio standard in 2030, and 100 percent carbon free energy by 2045.

And so, last but not least, I think we're all looking forward to this presentation, so I'm going to turn it over to Phil.

MR. PETTINGILL: Thank you, Commissioner. It is really an honor be the last speaker here. We've had some great presentations all day long. And I lost track of how many references there were to ACR 188. So, I appreciate the opportunity to bring that home, and wrap things up a little bit with a nice bow. Hope you believe that when I'm done here.

So, let me just move to the next slide. Because I'm going to go through a few slides on ACR 188, just in terms of the project, and then I thought I'd give you a little bit of insight in terms of where we are in pulling the report together. And a few thoughts about what we believe ishe outcome and the objective of what ACR 188 is trying to do.

Firstof all, it does require us, the ISO, to work with the other California Balancing Authority areas. So, I would be remiss if I don't really highlight the fact that we've got seven other entities that are working with us to try to make sure that as we are representing our portion of the grid, we're also

talking about allof the other balancing areas that operate the portions of the grid in California. So, it does become a complete California story, if you will.

So, what we've got here, obviously, is L.A., IID, NV Energy, and PacifiCorp, both of small pieces, but certainly load in California, Western Area Power Administration, TID, and BANC. So, a lot of entities and a lot of interest in what we're trying to do as we partner with them in this report.

Let's go to the next slide, please. Because just as a quick reminder, the ACR 188 was proposed and brought to fruition here with Assemblyman Holden. And the idea is to provide the Legislature with the most recent information.

And so, today we've heard a lot of about variousdifferent studies. Whoever first mentioned that there's 41 of them in our list is right on. We have 41 different studies, reports that we're processing. We have engaged NREL to help us go through that because it is quite a voluminous stack.

But I also wanted to take us back to part of the reason Assemblyman Holden asked us to do this was because of Senate Bill 350 that was passed back in 2015. And it was in 2016, almost a year later, that we completed the study that was required of us under that

bill.

That study gave us an opportunity to look at a myriad of different issues. Not only, you know, the economic value of moving to a regional market, but what would it do for the disadvantaged communities we have here, the emissions of greenhouse gases, reliability, our progress towards renewable resources and so forth. So, it was a prettycomprehensive look in terms of providing the benefits to California.

So, that study is certainly part of this. But as Keegan mentioned, there are many, many other studies, and I'll touch on those a little bit just to help characterize for you what it is we're doing as we go through that stack of 41 different studies.

But as a background, that's why we have ACR 188 in terms of what we're working on with those other balancing areas.

(Loss of audio on Zoom)

MR. PETTINGILL: -- impacts not only on the energy component and the greenhouse gas emissions, but also transmission development. And so, what is it that's addressed in transmission.

There is also the point that the multi-agency report that all of you were part of, SB 100, to look at are there any updates to that, that should be

incorporated in here.

So, I know we're working with Vice Chair Gunda to try to make sure that we've got a clear message in this report to report back out in terms of where you all are with SB 100.

And, of course, we are engaging across the regional transmission efforts in the whole interconnection to better understand and capture what is it that's happening in multiple other states that you've heard about today. So, again, a lot of what we've heard today is included in the scope of what ACR 188 is doing.

Now, we're on a very fast time track and I'm going to talk about that in just a second. But the key deadline here is the end of February. So, we've got literally just a couple more months to pull this report together, get it polished enough and submit it to the California Legislature, and everybody else for that matter. Because as all of you know, we work in a very open and transparent stakeholder process, so we are going to be posing all the comments, we'll be posting the reports, the draft reports and the final reports.

And I've already mentioned that we're working with NREL as the author.

So, let's go to the next slide. I'll give you a little bit of insight in terms of how we got to where we

are today, here on the 2nd of December, and let you know what's going to happen, really, over the course of the next 60 days or so.

So, back in early October we did have a stakeholder call. We wanted to share with all of them basically the information I'm sharing with you today, but also ask their feedback, and make sure that we had the right list of studies. We have added at least a half-a-dozen more studies based on that stakeholder call, and that's how we got up to the magic number of 41 we have today.

NREL started drafting the report back in November. We've got just some basic background elements from them. But now, most of the other pieces are starting to roll into us at the ISO, and those other balancing areas that we're partnered with.

So, we do hope to be able to post the draft report for review here, before we get to the end of the year. Hopefully, we can make it a Christmas present, if that's the case. But that's our goal, to make that come out here over the course of the next couple of weeks.

And then, what we'll do is we'll go through our stakeholder process in the beginning of the year. So, we'll have a call. We'll go through the report in detail. Look for a dialogue with stakeholders and then

ultimately ask for their comments and feedback, so we can finalize that report.

We have set up a webpage on the ISO, and I've listed it here on this slide so folks have access to that as part of our normal stakeholder process. We do look for folks to follow us on this project and to be able to give us some comments as we get that report out.

I wanted to transition with you now, and just spend another two or three minutes, if I may, just talking about what does the report look like as we know it today. It's going to have an outline, of course, that includes and executive summary. But more importantly, we do want to give a little bit of background about RTOs. And so, NREL is working on a background piece, how did RTOs come about, what are the fundamental elements of an RTO. Because then, the rest of the report will talk about allof these others that I've been referring to.

So, things like, then, we'll talk about the studies that we think are most substantive in terms of the goals of ACR 188. And, so, there's a review of those key studies. We'll have a chapter on that.

Then, we'll move to an annotated summary. And in that summary, what we want to do there is talk about the different reports that have addressed things like

the generation value and benefits, and we heard some of that from, again from Keegan this morning.

What about the transmission value and benefits of a wholesale or larger regional market? Ofcourse there's GHG benefits that come out of that.

And we've touched on it a little bit today, but different reports have been generated to talk about state policy, and the ability for state policymakers to retain what level autonomy. And Maury touched on this a little bit. Sometimes there's a little bit of giving up on that in these larger markets, and sometimes there's not. And we need to understand where do those things occur.

So, we've got at least those four or five major categories where we're going to talk about how the different studies addressed those substantive topics.

To talk about the studies themselves, we're going to try to group them. As we've recognized in a little bit of the discussion today, many of the studies talk about markets and the technical aspects of markets. Now, obviously, that starts to incorporate things like what are the economic benefits and the reliability benefits.

But as Keegan touched on, one of the things that we asked him to do in looking at the state-led study was

to adjust that study. And that new run that he did, I just want to be really explicit about, was to take the design that we've developed so far in our EDAM conversation with stakeholders, and we've touched on this product call the imbalance reserve product.

And what we wanted them to do was say if the imbalance reserve is held across the whole footprint, rather than with each of the BAs that are participating in the footprint, what is the potential economic benefit.

And when you look in that study what you see is it's many hundreds of millions of dollars because, again, you start to achieve a capacity savings because of it being shared across the broader footprint.

So, there's a lot of really valuable information that comes out of those market studies. But, obviously, there's also a number of studies that talk about policy, what are the implications of policy in a regional market.

And so, there are reports from multiple states, Oregon, Colorado, Arizona come to mind, and we want to summarize what they found in some of those things, as well.

There's been, over these last few years, a number of different reports on legal assessments. What

happens to the jurisdiction or that regulatory oversight that I mentioned earlier. And so, we're going to group the section of reports on that as well, so you've got extensive what happens from a number of different legal experts.

And then, finally, there's a whole bunch of other studies that just cover many, many different topics, not the least of which is transmission, which is a big topic that we've talked about today. But also, you know, pathways and what is the vision to the 21st clean grid future. So, there's some interesting studies that can actually give us some insights into how do we do this over the course of the next few decades and get to a clean grid.

So, I'm going to basically summarize for you where I think ACR 188 is trying to address. And in short, I think what we've seen today is the electric system has gone through a pretty dramatic and substantial change, even over the last five or six years as we have most states in the Western Interconnection moving to some form of clean energy.

And we also need to respond, though, to those extreme climate events. And good discussion from Arne and others today about how to do that.

But I do want to point out that the

collaboration that we've had, partly because of the Western Energy Imbalance Market, and the discussions around wholesale markets have shown that that collaboration can actually help us get through some of these extreme events. And we've seen that now, literally, not only just this year, but also in the previous couple years as well.

So, I think, in summary, most parties recognize the value of a regional market, that it can provide benefits. And now, the real challenge is how do we do that. But, of course, as Mr. Gray pointed out, there's competition. There's at least two different market operators that are looking at trying to extract that value for the West. And I don't want to leave that point too softly here for all of you in California, that California stands to potentially lose a lot of its value it has, depending on how those market structures get developed. So, it's important to recognize that that's a key element of this.

And so, in the end what I think I'll do is just say I think ACR 188 has the potential to raise the topic and provide the background information for the California Legislature in next year to actually consider what are the next steps, where does California want to go. And consider what would it take to have California

to continue to participate more broadly in the rest of the West and continue to try to add value.

That's certainly our interest at the ISO is to look for opportunities to incrementally add value to our entities not only in California, but the rest of the West.

So, I'll stop there. Certainly willing to entertain any questions that you might have,but thank you for the opportunity to address you on ACR 188.

COMMISSIONER MCALLISTER: So, it doesn't look like we have any questions. I just want to peer at our screens here. It looks like not on Zoom land, either.

Thanks a lot, Phil, really appreciate your being here. And, yeah, a lot of information in the air for you to kind of cut through and talk about,and talk through.

So, with that I think I'll pass it to Vice Chair Gunda and we'll start to wrap up the session and move into some public comment.

VICE CHAIR GUNDA: Thank you, Commissioner McAllister. And thank you, Phil, so much for that wonderful closing of the day. That did meet the standards and better.

So, yeah, I think I just wanted to provide some

closing comments and pass it on to Heather for starting the public comment.

So, I just want to begin by thanking every single person that was here, you know, in person, as well as everybody joining virtually to help this event, you know, be convened. And specifically to Chair Randolph for helping host this event.

So, it was an honor, absolute honor to convene this workshop on such an important issue for the West. CEC, as I mentioned at the start of this meeting, as an important role in California to be a neutral venue for important conversations, so we can help with the dialogue, bring the information together, and provide that in our IEPR process.

As a part of our Integrated Energy Planning Report process, or IEPR, we do something called the scoping. And early on this year, this was one of the core topics that was brought up as important for us to have a discussion on,and provide an update on what the regional integration is looking like.

The timing of this could not have been more excellent, given that moving into 2023 we have anumber of critical steps that we're going to take forward. So, just a perfect timing, a wonderful panel. And I just wanted to thank everybody. You know, every invitation

we sent out, you know, you graciously said yes to and you all took this whole day to provide your thought leadership, expertise, and really a transparent, in a good faith, you know, information, so we can takeinto account here as California takes its journey.

You know, we all reviewed three important pillars of integration, markets, transmission, and resource adequacy. Those are extremely important for California, along with affordability.

So, I'm really thankful for all of you for the time, and all the participants who have been waiting all day, listening, and potentially will provide some public comment here.

Before I close off and pass it on to Heather, I want to celebrate a big thanks to Commissioner Rechtschaffen for all his work, for years on this important issue. So, just want to say, you know, a big star among stars, and just want to say thank you for all the work you do.

And regardless of best DR program or not, you are definitely the best. So, we'll leave that to you.

And with that, I also want to thank Grace for her time, you know, for decades here, you know, cultivating the relationships across the West to make this happen today by just simply reaching out on her

behalf.

So, Grace, before I pass it on to Heather, I would like you to kind of close and pass it to Heather.

MS. ANDERSON: Well, thank you, Siva. And I just want for the record that we should all know that this was Siva's idea. He came back from a Western Conference of Public Service Commissioners and said I want to have a workshop, I want to have it be on western regionalization, and I want to have three panels, and he told me what they were. And he said, I want to have facilitators be these three people from the Western states. So, he really does get credit for leading, being our fearless leader. I just filled in the blanks.

I was successful in doing this because the Energy Commission has supported me for 20 years to work in the Western United States. And thank you, Maury, that's one of the most beautiful compliments I've received. It really makes my recent career, anyway.

That investment allowed me to build trust relationships with all these people. And I worked in resource adequacy, and I worked in transmission planning all these different subjects in the West, possible you guys really didn't know what I was doing out there.

But what I learned was that the people who came here, these 18 people, they are the best in their field.

And I was so heartened by the quality and positive response that you've received, at the Energy Commission, to this invitation to come here today. Because there's hundreds of thousands of dollars that have gone into the people who came here, and the works that they presented. And we're very, very, very fortunate. I thank them all. Not that they are here. In fact, it looks like nobody's here. We're just sitting in this big, empty auditorium. But in fact, there were 183 people on the Zoom, plus 37 who were in the presenter group.

So, I really feel this has been a success. I couldn't possibly have done it without this man here, Chris McLean. He just was -- it didn't matter what the challenge was, he was on it and solved it.

And the IEPR Team, I've never been in an IEPR process before, and they just have this down. Heather, she's sending outthe schedule at 1:35 in the morning because she had other workshops she was leading.

So, I just feel that as a team we can accomplish a lot. And poor Andrew would get my texts, and Cliff would get my emails, and they would respond to me, and that's been a big help.

So, I'll just close by saying that in those 20 years where I watched the Western interconnection, the only way that major changes happen is if you are

patient, because they take a long time, but they do happen. And if we work together, we can accomplish a lot. And if we think outside of the box, our specific organization, if we think outside the border of our state, and what we saw today, we want to think outside the boundary of our interconnection, a lot could be accomplished.

One thing clear to me today, we could build some transmission even if we don't have an RTO, and a lot's going to be achieved. You know, we can have a resource adequacy program that's going to achieve a lot. Of that big pie of benefits, there's a lot of ways to get it. And we don't have to argue over governance of an RTO before we go get those benefits.

And Keegan did a beautiful job of trying to say these are the categories of the benefits, and these are the big categories, and these are the small categories, and let's look at how -- let's get a roadmap to achieving the benefits that isn't bound up in a West wide RTO.

So, I'm sorry, I had too much to say.

VICE CHAIR GUNDA: No.

MS. ANDERSON: But a heartfelt thanks to our participants and to the fact that we had allof the leadership in California was here. You know, five

Public Utilities Commissioners, four Energy Commissioners, Liane, we had Karen in the Governor's Office. I mean this is the importance that California puts on this issue. And thanks.

VICE CHAIR GUNDA: Thank you, Grace. As usual, you offer a graceful message.

I just want to close with the sentiment that President Reynolds mentioned we are in this together. And I think Maury said it slightly differently, he's the Universal Advisor for the West, he said, think of it as not benefits, but the opportunity costs as we think through the tradeoffs, and such.

And I just want to sincerely thank all our neighbors for helping us keep the lights on this summer. I don't think California would have kept its light on without the kind of coordination across the West. So, it's an important element for reliability, resource planning.

So, thank you all, thanks for being here. With that, I'll pass it on to Heather.

MS. RAITT: Great. Thank you, Vice Chair, thank you, Grace. It's a pleasure and a privilege to be part of this workshop.

So, we will move on to public comment. And so, we have one commenter from in the room. And then, as

I'll ask him to come up.

In meantime, I'll ask folks on Zoom to press the raise hand function to let us know if you'd like to comment. And so, we ask that we have one person per organization, and we allow three minutes per person to make comments.

So, first is Fred, and I'm sorry if I mispronounce your name, Heutte, if you can just come up to this microphone and go ahead. Thank you.

MR. HEUTTE: Hello everybody, can you hear me okay? So, Fred Heutte from the Northwest Energy Coalition. Thanks very much, Commissioner Gunda, all the Commissioners, and the staff, and the vast multitude online. It's been a reallygood workshop today.

It's just a fortunate coincidence that I'm here, because I was here for meetings in Sacramento. It's reallygood to be here again in this not quite post COVID era to be able to meet everybody in person again.

The Northwest Energy Coalition represents about a hundred organizations in the four Northwest states, ranging from environmental community groups, labor organizations, utilities, local government. And we've been involved in promoting clean energy development in the Northwest and the West for -- since 1981.

I'd like to make three quick comments, but I

also have to start by thanking, in particular thanking Grace Anderson. I have the great fortune to serve on the WECC Member Advisory Committee. We'll be meeting next week in Salt Lake City. We are both, Grace and I are both on the Member Advisory Committee, which is elected by the different classes of WECC members.

And Grace is a patient leader at WECC. I really appreciate her long-standing service there, and guidance.

Let me make three quick points, at the risk of extending the day a little bit here, at the end of the week. First, and also what I'm about to say reflects much of what we've already heard today. But I thought it might be helpful to get a perspective from the Northwest, as your -- one of your adjoining neighboring regions.

The first is on the value of resource diversity and system diversity going forward. To have a more reliable, clean, and affordable Western Grid, which we've got to have, we must capture and optimize the load and resource diversity on the widest possible footprint across our region. Transmission and markets are the things that tie us together and make that possible.

The Western Grid is becoming more complex, but also more diverse, and that's a major opportunity for

us. With many more options than we've had in the past across geography, scale, and type of resource, on both the supply, storage, and demand side.

And we're already becoming more interdependent. Let me give you one point. I've been looking at, the Bonneville Power Administration publishes flows on their different paths every day. For the last three weeks, virtually every day, there have been flows, net flows from South to North, from California to the Northwest, reflecting a variety of things, but a lot of it is for economics right now with high gas prices, and a lot of surplus solar during the middle of the day here in California. This wasn't happening 20 years ago. It wasn't happening 10 years ago. It wasn't happening 5 years ago. It's happening now.

And it is going to be happening year round. We are becoming increasingly interdependent in the West.

The second point is on markets. We need the largest market dispatch footprint possible to optimize the real time and day ahead markets. And to -- and, aligned with that is the system operation and dispatch.

We haveto avoid creating new hurdles that reduce or divide the footprint of our diverse --

MS. RAITT: Okay.

MR. HEUTTE: -- yeah -- and that would undercut

our diverse state goals. There are many different approaches across the West, but all of us share goals of reliability and economics. And we haveto be very aware of the prospects ahead to make sure that we capture the full value.

MS. RAITT: All right, we need to close, if we can --

MR. HEUTTE: Yes. And final point is on transmission. We need further collaboration on transmission planning and action within the subregions across the West. We appreciate the California ISO's leadership in this with the 20-year outlook that starts to look at the broader issues about coordination across the West. And WECC's new initiative to address west wide planning.

We are proposing to WECC for them to conduct a study, in combination with WIEB, WREB, and DOE, and the National Labs, to conduct a Western Grid strategy study, perhaps in 2024, that would answer the key questions that policymakers, such as yourselves, have about where we need to go with the transmission in the West. And to do this in a collaborative fashion going forward.

I'll send a copy of our proposal in written comments. Thank you very much.

MS. RAITT: Thank you. So, next is Christian

Lambert. So, we'll openup your line. And if you could please spell your name and state your affiliation, if any. You may need to unmute on your end. Excuse me go ahead.

MR. LAMBERT: Okay, thank you. This is Christian Lambert, C-H-R-I-S-T-I-A-N L-A-M-B-E-R-T. I'm with the Public Advocate's Office at the California Public Utilities Commission.

I'd like to provide three pieces of feedback to contextualize the EDAM Benefit Study, which arrived a little too late for us to provide this in written comments on the EDAM Initiative.

First, the alleged capacity savings appear achievable under an RTO structure, but not necessarily so under the latest EDAM proposal.

At the November 18th workshop on the EDAM Benefit Study, the consultant had to find these savings as the result of balancing authority areas carrying less capacity when they share a single coincident peak, as compared to the sum needed for their noncoincident peaks.

We see this as an RTO, rather than EDAM benefit, because the proposed EDAM RSE, Resource Sufficiency Evaluation, at a minimum strongly encourages each balancing authority area to carry higher levels of

capacity. And for the CAISO, the CPUC's Resource Adequacy Program also requires most LSEs to carry higher levels.

We are also concerned that future incidents of west wide heat waves may require for us to need to plan for greater coincidence in BAA's future peaks.

Second, the operational savings appear to be overstated as a result of optimistic assumptions. Theseinclude 100 percent WECC participation in the EDAM footprint, 100 percent transmission made available to the market for optimization, and an implicit assumption that wheeling charges entirely correspond to real transaction costs, frictions that could be reduced, rather than rate design considerations.

There is also a qualitative note that there may be incremental GHG reduction benefits. If that happened to be from reduced coal dispatch, we don't see those benefits as attributable to CPUC/CAISO ratepayers, who have no owned or contracted coal assets.

Finally, EDAM-related costs may be significant. The costs that most concern us include, one, incremental costs for the imbalance reserve and reliability capacity products.

Two, costs for RSE penalties that we believe may serve no function on days when the RSE requires more

capacity than the RA program and CAISO backstops could have provided.

And three, costs for changes in the price formation enhancement initiative at CAISO, which those changes supporters and the CAISO itself has stated are motivated by regionalization. On its own, one EIM entity's proposal for the changes to how the CAISO addresses a very specific set of complexities could be enough to impose hundreds of millions of dollars in new annual costs on California ratepayers, according to that EIM entity's own analysis.

Taken together, these indicators raise the possibility that California ratepayers could be facing higher costs, than benefits. And at least offer key context for stakeholders in reviewing this EDAM Benefit Study.

We look forward to reviewing the final version of the EDAM proposal and do hope to find these concerns resolved.

Thank you all very much for the opportunity to offer comment.

MS. RAITT: Thank you, Christian.

Next is Bill Julian. And just a reminder, if folks want to make comment, if you're on the phone press *9, and if you are on Zoom use the raise hand function.

So, Mr. Julian, please go ahead. And we will please ask that you state your name and affiliation, if any.

MR. JULIAN: I'm Bill Julian. I'm a member of the public. I'm a retired public interest lawyer. I was the Legislative Director for the Public Utilities Commission during the energy crisis,and have practiced law in this area for several decades.

I want to commend the Commission for convening this workshop and for offering state officials from around the West an opportunity to meet and confer on important issues relating to the vision of electric service to their residents and constituents.

In California, we're experiencing two crises of rapidly escalating rates and increasing grid fragility, and we're looking for assistance. And this kind of collaboration and cooperation is going to be an important tool for helping us address our issues in a constructive manner.

Unfortunately, the meeting has failed to address the elephants in the room, and that is FERC and its role in promoting dysfunction in organized markets that have afflicted us with rising rates, and declining reliability. And the role of the Cal ISO.

The Cal ISO is an entity created by and subject

to California law that's assumed a crucial role in operating large portions of California's electric grid,and has increasing responsibility for the significant escalation in California's electric rates.

The CEC has a role to play in focusing attention on the Cal ISO as it carries out its duties pursuant to Public Resources Code 25301 and 302 in developing the IEPR.

I want to focus on two aspects of FERC's policy failures, and I'll keep this short, and I'll submit written remarks that give this a little bit more context.

There are two decisive factors that need to be looked at. The first is market power and strategic behavior by generation owners and sellers throughout the West. And second, transmission revenue requirements and ratemaking at FERC.

As far as market power and strategic behavior is concerned, I simply want to note that in 2016 FERC eliminated the must-offer requirement that was the primary mitigating factor in the first California energy crisis. And at the same time in 2016, FERC essentially punted on market power investigations of Berkshire Hathaway and its multiple subsidiaries in the West.

These two activities have enabled strategic

behavior by energy sellers that may significantly increase prices, as we saw during both the 2020 blackout event, and again in the 2022 September heat storm.

During the blackout event, we saw significant escalation of prices, which Edison and the Department of Market Monitor both commented on at FERC. Edison asked for refunds on the basis that the prices we saw were not in any manner justified by costs.

The DMM said there might have been manipulative behavior and it sought guidance in the future.

In 2021, FERC's response was to approve most of the self-referential devices queried by the Department of Market Monitor, and also approved identity cloaking practices, such as sleeve transactions that may have facilitated high prices.

In the 2022 heat storm --

MS. RAITT: Mr. Julian, we need to close.

MR. JULIAN: Pardon me?

MS. RAITT: Your time is up, please.

MR. JULIAN: Oh, okay. I just -- as far as transmission revenue requirements are concerned, Order 679 at the FERC provides a smorgasbord of goodies that raise transmission costs well above just traditional just and reasonable rates. And so long as those costs are elevated, we're going to see the phenomenon at FERC

that we've seen up to now, and that is lengthy queues incented by the transmission incentives, and an inability to work through those backlogs on any sort of a timely basis.

MS. RAITT: Thank you.

MR. JULIAN: So, I want to recommend that the Energy Commission and the other agencies present at this meeting call on FERC, and if necessary Congress, to do away with Order 679 incentives, and take other arrangements to limit the role of FERC in escalated -- in escalating transmission costs.

MS. RAITT: Thank you. We're going to need to move on to the next.

MR. JULIAN: Good meeting, but those FERC issues need to be addressed.

MS. RAITT: Thank you.

Let's see, is there anyone else who would like to make comment? Please use the raise hand function to let us know. And if you're on the phone, press *9.

We'll wait one more moment. Press *9 if you're on the phone and use the raise hand function if you're on Zoom.

Seeing no more comments, I think we're done with public comment, Vice Chair, thank you.

VICE CHAIR GUNDA: Good, thank you, Darcie, I

think -- sorry, Heather. I think Commissioner Houck has a quick closing comment.

CPUC COMMISSIONER HOUCK: I just wanted again thankthe Energy Commission and Chair Randolph for letting us use this room here today, and all of the folks that came and joined us. And just really, again, recognize all of the work that Grace Anderson has done. And also Bill Chamberlain, who's not here, has done a tremendous amount of work with WECC over his tenure at the Energy Commission, and wanted to recognize that.

And then, again, just thank you so much. I think discussion is reallyimportant. We're obviously going to be jumping in headfirst as we get into next year with ACR 188 discussions, and I think this was a great way to tee off those discussions. And appreciate, again, allof the work that everyone's doing in this arena and look forward to continued discussions and collaboration with our colleagues across the West.

VICE CHAIR GUNDA: Thank you, Commissioner Houck. So, the summary of this day will be a part of the IEPR, so I'll let Heather speak about any public comment timing, and such, any other comments.

MS. RAITT: Yes, thank you. Just to say that if you would like to submit written comments, we welcome them. And the notice gives you all the information on

how to do that. And we request that you send them by December 23rd. Thanks.

VICE CHAIR GUNDA: Okay, with that, the meeting's adjourned. Thank you.

(Thereupon, the Workshop was adjourned at 5:11 p.m.)

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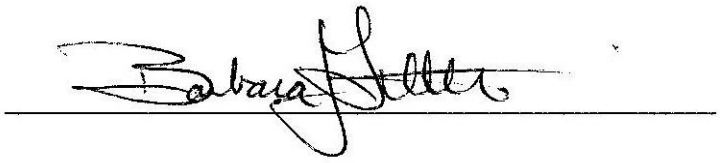

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