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CALIFORNIA ENERGY COMMISSION

IEPR LEAD COMMISSIONER WORKSHOP

In the Matter of:	)	Docket No.
	)	17-IEPR-13
	)	
	)	WORKSHOP RE:
2017 Integrated Energy Policy	)	Strategic Transmission
Report	)	Planning: Interactive
	)	Data Platforms to Support Collaborative Planning and Advanced Technologies

IEPR LEAD COMMISSIONER WORKSHOP ON
STRATEGIC TRANSMISSION PLANNING:
INTERACTIVE DATA PLATFORMS TO SUPPORT COLLABORATIVE
PLANNING AND ADVANCED TECHNOLOGIES

CALIFORNIA ENERGY COMMISSION

THE WARREN-ALQUIST STATE ENERGY BUILDING

FIRST FLOOR, ART ROSENFELD HEARING ROOM

1516 NINTH STREET

SACRAMENTO, CALIFORNIA

WEDNESDAY, MAY 24, 2017

10:04 A.M.

Reported By: Peter Petty

APPEARANCES

Commissioners Present

Robert Weisenmiller, Chair

Karen Douglas

Andrew McAllister

CEC Staff

Heather Raitt

Scott Flint

Misa Milliron

Judy Grau

Also Present

Ken Alex, Director, Governor's Office of Planning and Research and Senior Advisor to the Governor

Panelists

Kevin Hunting, CA Department of Fish & Wildlife

Zachary Townsend, California Government Operations Agency

Lorelei Oviatt, Kern County

Kevin Richardson, Southern California Edison

Kim Delfino, Defenders of Wildlife

Steve Chung, Department of Defense

APPEARANCES (Cont.)

Panelists (Cont.)

Garry George, Audubon

Stephanie Dashiell, The Nature Conservancy

Ed Thompson, American Farmland Trust

Neil Millar, California Independent System Operator

Tom Bialek, San Diego Gas & Electric

Tony Deluca, Sacramento Municipal Utility District

Wendy Zhang, Pacific Gas & Electric

Alex Morris, California Energy Storage Alliance

Public Comments

David Townley, CTC Global

Todd Ryan, Smart Wires

I N D E X

P R O C E E D I N G S

May 24, 2017 10:04 a.m.

MS. RAITT: Good morning and welcome to today's IEPR Workshop on Strategic Transmission Planning: Interactive Data Platforms to Support Collaborative Planning and Advanced Technologies.

I'm Heather Raitt, I'm the IEPR program manager. I'll go over housekeeping items. If there's an emergency, we need to evacuate the building, please follow staff -- please go ahead and follow staff to Roosevelt Park which is across the street from the building.

We are being broadcast through our WebEx conferencing system so please be aware that you're being recorded. We'll have an audio recording for the workshop posted in about a week and a written transcript in about a month.

We will have an opportunity for public comments at the end of the day. If you'd like to make public comments, please fill out a blue card and give it to our public advisor Rosemary is here, she can take your blue cards. And we will be limiting comments to three minutes. For WebEx participants, go ahead and raise your hand to let our WebEx coordinator that you'd like to make comments at the end of the day.

Written comments are welcome and due June 7th.

The materials for the workshop on the public notice explains the process for submitting comments.

And with that, I'll turn it over to Chair Weisenmiller for opening remarks.

MR. WEISENMILLER: Good morning. I'd like to thank everyone for being here and for their participation today. Obviously this is a very important topic going forward as we look at major infrastructure such as transmission to really figure out how to be smart from the start on where to put it.

And also as part of that smartness is to think through adaptation, you know, and again I think we've developed a -- had a fairly long vigorous activity on the DRECP, we've developed some tools coming out of that. Certainly in the R&D side, we had some great tools on climate adaptation and I think it's with this -- today's workshop is really try to figure out how to get those into more general use and what things they need in terms of, you know, make it more user friendly and more usable. But basically it's very important on our infrastructure to do stuff right.

MS. DOUGLAS: Thank you, Bob.

I'll just add as Chair Weisenmiller said, you know, we have been at this a long time. The state has been working very hard and the energy agencies when we talk

about energy infrastructure to meet our climate goals, our GHG reductions, our renewable energy goals, and that has necessarily involved the construction of new infrastructure, planning for new infrastructure, both renewable energy projects, transmission in particular.

And of course as we've moved forward and done that, we've seen that there's been a tremendous amount of interaction between our energy goals and how those play out on the landscape when you meet those goals and other sectors and other values whether that be conservation, you know, biodiversity, water sheds, water impacts, water supply, farmland, local economic interest, military uses of land, you know, other infrastructure plans and planning processes. Climate change, climate adaption considerations on both the mitigation side and possibly on the, you know, climate impacts on infrastructure side.

And so -- so there's been a real need to stitch together these different considerations both because actually permitting infrastructure works better when people are consulted in advance and build the idea, the infrastructure into their planning and it meshes with other ideas that are -- are also moving forward in the landscape and of course the local governments are often the epicenter of where all of this comes together. So working with local governments and ensuring that the energy perspective from

the state perspective, and the utility perspective, and the local government perspective, come together and we can work in a collaborative way.

And so the, you know, the DRECP, the desert work was really, you know, on the energy side, you know, the first time that we moved in to using these advanced data platforms. And a lot of the examples that we'll talk about today use one particular platform.

But in general, the concept is platforms that allow for a really interactive use of data. Platforms that allow multiple parties to provide data that allow you to access data from multiple sources, that allow you to work together in one work space, you know, from different agencies that allow you to involve and engage stakeholders in different ways and much more interactive ways. And that allow you to take the work that's been done in the past or that you're doing today and position it so that the next project that comes along doesn't have to start over. The next project that comes along can see exactly what you did, how you did it, what needs to be updated, what needs to be added, and build on what you've done instead of the first step being, you know, finding somebody to go manually or otherwise gather everything that's been done in the past.

And so there's a lot of potential for efficiency, there's a lot of potential for working collaboratively, and

it helps not only in avoiding impacts, but -- or reducing impacts, which is the way I think we initially came into this and thought about this. But it helps in terms of setting the stage to solve for multiple problems together in a landscape where there are limits and there are -- there are policy drivers that are pushing us in different directions in multiple ways. And whether those policy drivers come from water or ag or renewable energy or national security or where they come from and we need to find ways to harmonize those policy drivers as best we can and meet those goals.

So this is a way of helping us do that. I'm really looking forward to the presentations. We're going to hear from some people who've -- who've really shown a lot of leadership and creativity in this area. And I'm pretty excited about it.

Ken.

MR. ALEX: Thank you, and good morning. I really want to thank the Energy Commission and commend them for the work in this area. I think they've taken very much the lead in the state and in particular Karen Douglas and Scott Flint of her staff have been really instrumental in moving this set of issues forward.

Having said that, I think the state still has not taken full advantage of the massive availability of data

and the various data software and platforms that we could use, I think, to fuller advantage. I think it can lead to and hopefully we'll hear -- I know we'll hear today about some of the prospects for improved decision making, transparency, public participation. It's going to require some investment and some work but I think we've already established that it has really substantial rewards.

We have the ability now to have multiple participants use the same data in different ways pretty much simultaneously doing things like building maps based on their data that as they see it and then comparing them in real time to maps drawn by other individuals and other interest groups. Very quick example that we may hear a little bit more about today. We did a convening around the potential to locate solar projects in the San Joaquin Valley. The way historically it's been done is solar projects pick -- project proponents pick a location and then everybody tells you why that location isn't really great.

So we thought maybe we should think about looking at places that -- that are the least conflict areas and to try to do that up front so that we have a sense of least of what areas might be possible. So over a process that took really just a few months, we had over 200 stakeholders including local governments, businesses, NGOs, state and

federal advisors, and a whole slew of different types of participants with over a hundred WebEx interactions. They drew multiple maps and identified some hundreds of thousands of acres of possible least conflict areas to think about building solar. That has a lot of implications for decision making.

We think that, as Karen just mentioned, that this approach could be more durable. The Desert Renewable Energy Conservation Plan used some of these techniques and now we're following up with some research conservation evaluations that build on the Desert Renewal Energy Conversation Plan.

It's clearly more transparent. Some of these processes live today in a very public way and we encourage people to use them and to interact with them. And one of the most appealing things to me is how easily the information can be integrated. You can look behind the assumptions that go into the mapping processes and to any of the evaluations done by the parties in real time.

It's also conversational in a sense, it really leads to different groups and individuals talking to each other. We saw this in the San Joaquin solar effort. People who really hadn't discussed issues directly actually had some very useful conversations that we think will lead to better decisions in the future.

So I'm a very strong advocate for increased use of these tools. I would like to see us continue to build what I think of as something of the California mosaic where we have many layers of data from groundwater up to atmospheric conditions. With the onset of climate change, we can add models that show change over time that integrate and interact with this data as well. So I -- I think it's something that the state needs to continue to develop and strongly move forward with.

Thank you very much.

COMMISSIONER MCALLISTER: So just briefly. I'm lead on energy efficiency so maybe people are wondering what the heck I'm doing here.

But actually, you know, Commissioner Douglas's and Ken Alex's comments just now really segue very nicely into why I'm here. I feel like, you know, not only is it groundwater to atmosphere, it's also everything in between which includes our build environment. And, you know, I've been a very strong advocate on the data front in the energy efficiency arena, and certainly we're building a bunch of tools that actually have a lot in common with the DRECP analyses for determining how and whether we're meeting -- how we're going to meet and whether we're meeting our doubling of energy efficiency goals.

So that's parcel data. It's got locational, it's

got, you know, locational geographic aspects to it, temporal aspects to it. Certainly we all would benefit from having visual representations of our local jurisdictions, overlaying that on our various resources certainly for, you know, for rooftop solar, say, or that sort of thing but also just under using, you know, the evolution of energy consumption data, building that into these kind of tools so that we can actually do much more, I think creative analyses. I mean, the analytical possibilities are endless and I think if we build these tools, a lot of smart people will engage with them and come up with things we never imagined.

And so I'm interested in being here today to find out a little bit more, you know, more than peripherally which is kind of where I've been on the DRECP, but understand some of the powerful tools have been developed in that context and look for commonalities. These bottom up resources really matter whether you're looking at transmission or large-scale investments all the way down to individual property-level investments, you know, for a homeowner, say. And so the aggregate really matters and I think we all start with a relatively small scale and we -- we roll up into this aggregate.

So if we want to do good policy and truly if we want to integrate, you know, we live in a diverse complex

multiple scale kind of energy system now and it's only going to get more so. If we really want to make integrated decisions, we have to be able to compare apples and oranges and we have to feel like we are understanding all the various implications of those decisions. And so if we're talking, you know, power plants, large-scale renewables, or we're talking demand response, we need to be able to understand how those actually compare in reality and I think these kind of tools will enable that in a very compelling way. And that's kind of the leadership that I think we need to show in California is think about these things creatively.

So anyway, I'll stop there. But that's why I'm interested in leveraging investments that we've made on one side to do things better and more efficiently on the other side. And all the arenas that we cover here at the Energy Commission and across the state, I mean, this is actually a relevant conversation across the energy agencies and the Natural Resources Agency. And I -- I don't think any one person, certainly not myself, knows -- has a good sense of all the potential power of these kinds of tools.

But that's why we live in California and we've got 39 million people and growing and we've got Silicon Valley just down the road and a lot of smart people in universities and we're going to have some beautiful

knowledge come out of these resources.

So thanks.

MS. DOUGLAS: I just wanted to say really briefly in response to Commissioner McAllister's comments. You know, I'm really pleased with his leadership and supportive of his leadership on the data front and energy efficiency and just finding ways to think about how we deliver energy efficiency, how we demonstrate the benefits of the programs. And I do think there's a real potential to look at tools like this and think about, you know, how do we target programs? How do we best account for their benefits? How do we identify areas of real potential where you have multiple benefits? And you can begin to quantify those, whether those are multiple benefits on, you know, certain areas where you get more efficiency savings, more benefit to the transmission or distribution system, where there are water use or other implications that support and that can help justify programs in some areas. Because it's really obviously not uniform, and there are some areas where there's just tremendous potential for multiple benefits. So it's pretty exciting to think about how to do that.

So I think with that, why don't we go to Scott.

MS. RAITT: I'll just say that we have three panels. The first one's on Policy Perspectives on Using

Interactive Data Platforms to Support Collaborative Planning. And the moderator is Scott Flint.

MR. FLINT: So, thank you, Commissioners and good morning. Thank you, Mr. Alex.

Good introduction, I can get through my slides faster. Thanks. I can't get away from slides for some reason. I'm going to lay out a couple of things just to kind of prep the panel and say a little bit about what the Energy Commission has been doing and what we're still doing this year that's relevant.

Next slide, please.

So for the past ten -- it's been ten years now CEC has led or participated heavily in a series of collaborative planning processes and they're on the slide here, I won't go through them all. But they range from the Desert Renewable Energy Conservation Plan which was agency driven and regulatory -- for regulatory purpose. And the complete opposite San Joaquin solar -- San Joaquin Valley solar lease conflict lands which Mr. Alex described earlier that was a stakeholder driven process by using similar approaches and tools and information that we participated in.

And all of these processes have been driven by a common set of overarching mandates and goals. The California climate goals for GHG reduction, renewable

portfolio standard energy goals, conservation goals for species and habitat, and state -- and also to maximize the use of the existing transmission system. So we've been bringing information to bear on supporting delivering renewable energy generation, the associated transmission in an environmentally responsible manner. These processes have all been supported by an unprecedented amount of outreach and input from stakeholders and unprecedented amount of partnering with agencies. Agencies, NGOs, and the local governments, so at least 35 by my last count. And we're not talking about once or twice, it's routine and ongoing.

Next slide, please.

And each of these efforts were supported by and guided by the use of high-quality science and science-based information. For several reasons, most agencies do have a -- follow a mandate to use best available science to support their decisions, use of the best available information is demanded by the stakeholders and the public that participates in these processes. And in the end, we've learned that through utilizing the best available information and making it be easily understood by folks, we have plans and permits, for example, that harbor less uncertainty about environmental impacts and mitigation and better -- and plans and permits that are better understood and accepted by those who have to implement them and those

who are watching over them.

In doing this work this way, we've assembled a massive amount of information to assist with these planning efforts. And I'm not kidding, just some of the climate modeling work that goes into the California Climate Console which is a planning overlay that we can use for -- in various purposes has 900 data sets. And so each of these efforts have -- and each of these different groupings of data sets of data that we're putting together have a tremendous amount of data behind them.

Next slide, please.

Taking direction from recommendations in the Renewable Energy Transmission Initiative 2.0 plenary and technical reports and the 2016 integrated IEPR policy report update, Energy Commission staff are working to complete the assembly of planning data sets and decision support tools to assist with ongoing and future energy planning work.

I'd just like to point out a few of those specific recommendations. First from the RETI 2.0 plenary reports and technical reports, agencies and stakeholders should work together to complete the environmental report writer which is a functionality that we developed during that process and use the data in landscape scale planning processes. So that information could be easily used in

planning and decision making.

Next slide, please.

The integrated energy policy report update directing us to continue to apply proactive tools and approaches like landscape planning to help meet renewable energy and GHG reduction goals and to integrate the information gathered from the processes that we've already completed so that it could be used to inform additional planning work for other areas of the state.

Next slide, please.

So that's what we're doing and in the next -- the Commission staff have already initiated this work in completing, building out data sets to assist with statewide energy planning. And so when I talk -- I use the word statewide but if you look at the map when we say statewide, we're really focused on the areas with the highest renewable energy resources that we've been working on.

So the maps here, they're a little misleading. There is a legend but the pinks are different in the different areas. In the south, we just want to represent that we have completed a consistent set of data for the DRECP planning area which is the farthest southeast on this map. The San Joaquin Valley planning work that we did but we have not built that data and we're currently working to do that for the other two areas of the state. So what

you're seeing in those other empty things but in pink and purplish color are high-energy resource areas identified in various ways by various data sets. So we still have to continue the work to fill out that part of the state. And that's what we're doing.

So we expect to apply the information we have developed and it will be invaluable to facilitate additional energy planning activities both by the Energy Commission and the local agencies, look at siting considerations, even help identify preliminary environmental work and information needed when we get to the site-specific level. But also folks involved with planning in California know that this type of information which consists of information on energy resources information, biological information on species and habitats, and then information on land use, land cover, and agricultural land use are, you know, are key data sets to have a starting point for any planning effort in California.

So we expect the data and tools that we're building to be relatable and certainly usable in climate adaptation planning, conservation planning including the regional conservation assessment work, regional conservation investment strategy development, transportation planning, local land use planning, water

planning, et cetera. The information is universal. We've been using it and focused on energy.

Next slide, please.

Another thing that we're doing as part of our work going forward, we've built data and the tools in somewhat of an ad hoc fashion to support these projects or bring that information all together on a statewide energy gateway. This will be available soon and will serve as a single point of access to access the information, data, and tools from those applications in Data Basin. And we have been using and working with the Cal -- the Conservation Biology Institute in Corvallis, Oregon, to utilize their Data Basin -- existing Data Basin system which is a web-based mapping and data platform.

So here future here this would also be the main point of access for the California Climate Console which we put together. And when it goes online, we'll have placeholders for the work that we're currently doing to build new functionality that will help us use that information we're developing statewide for additional planning work.

Next slide.

So Data Basin has quite a bit of functionality. It was designed not just as a data portal, it was designed to provide enhanced access and integration of data. It was

designed to be easy to use and it was designed to support collaboration. We went to Data Basin for the science. We went there really to get science support building ecological modeling and helping us assemble data in ways that were more meaningful to display and easier for folks to understand in using the process and that includes agency staff and stakeholders and the public included.

So we went there for the science, but we stayed for the collaboration. Because when we were there working with Conservation Biology Institute -- next slide, please -- we also found that the Data Basin site that they have -- that they had already built had pretty robust functionality for what I call data socialization or allowing you to interact, communicate, collaborate with users. So it's really those points in the system where we've been really innovative in our planning. And so just to mention a few things, we've built a lot of what are called data logic models, they assemble complex data sets and multiple data sets into more useful sorts of maps and allow people to understand that. We've included stakeholders in building those so they can see their own values reflected in the various tools and maps that go into the process and the analysis and that's a pretty innovative approach.

Another innovation is we've put all the data up

here from all of our projects and it's freely -- it's freely accessible and downloadable so anyone can get it. And there's a guarantee you'll have the most current and the right data to work on your project.

And thirdly, we went as far as during the DRECP using functionality, existing functionality in Data Basin to create an online commenting tool during the EIR review process, EIR, EIS review process that allowed people to just get on the map and give us their comments specifically by drawing on a map, putting a dot on a map, putting comments that are attached to that dot, much really easy for them to do, really easy for the agencies to interpret and understand the comment in relation to the maps and the information that we used to develop the different alternatives in the plan.

So that's -- next slide. That's all I really wanted to do to set things up here today. So just to give you an idea some of the uses and a continuing use. So coming back -- and moving -- coming back and moving forward as we do the Energy Commission work. As other agencies both state and local are using this information, tools have been developed as a starting point or as again put to their ongoing planning work, come back to the questions that we shared with the policy panel. And they're here on the screen, I'll just briefly paraphrase.

How do geospatial planning and access to quality data sets and information help inform renewable energy development and assist conservation planning in local efforts? How should this information be used to best assist planning efforts and improve collaboration in stakeholder participation and the quality and transparency of decisions? So we're talking about information and systems that we've described here. And how can this interactive data platform be deployed and improved to best support a variety of planning efforts?

So those are the questions we've put out. Panel members are welcome to talk to whatever points they want from the point -- their point of view or to address one or several of these questions that went out.

So we have -- each panel -- we'll go around, each panel member, please take about five minutes to discuss your position and what you want to get out on this. And we'll just go around the room this way and we'll have some time -- about five minutes each will leave us some interaction time with the dais. So that's the plan.

I'll just start on my right, Kevin Hunting, California Department of Fish and Wildlife.

MR. HUNTING: Thanks very much, Scott. Commissioners. Appreciate you raising this topic, it's obviously a very contemporary and important topic and one

that, you know, from the perspective of the programs that my department administers is, you know, at kind of the apex of our thinking about how we move new things forward from a planning standpoint.

So I will address these questions here in a minute, Scott, I want to make a few remarks and I've got four or five suggestions that I hope just again from kind of the natural resource planning perspective I can offer for those that are practitioners of multiscale planning and are using data and collaboration tools as part of those efforts.

So, you know, back in I think it was 2004 I was a newly minted chief of our habitat conservation branch, got invited to a meeting at the Bureau of Land Management, Department of Energy was there, and they pulled out some topographic maps and a big felt pen and said here's our corridors for transmission and here's where they go through California. And, you know, I thought to myself is this how it's done? You know, raised some issues about possible conflicts certainly with our conservation as their state owned lands. We'll get to that later.

You know, I think that kind of illustrates how far in maybe just ten years this has evolved. And, you know, our natural community conservation planning program which is our flagship kind of conservation planning efforts

from my department really started the same way, topo maps, felt pens, pens, you know, what species are out there. It was just professional judgment. We didn't have a lot of good data and information to rely upon. And those first NCCPs, you know, 20, 25 years ago are still moving but sure would have benefitted from a more robust approach to data management and incorporating data.

And, you know, here we are in 2017, I've been through DRECP for several years, was involved with a lot of the individual permitting for these energy projects and kind of watched the evolution of how we use data in these systems. And I think the DRECP was a huge step forward. You know, love it or hate it, it delivered a data, a robust data and collaborative platform that didn't exist before that planning effort. And that's one of the real big take homes from that effort.

You know, I said it then and I'll say it now. I mean, we would not start another NCCP in California without first having something like that in place. It's that central to what, you know, to our -- to meeting the needs from the Natural Resource Trustee Agency perspective and I think from the regulating community perspective as well.

So I'm just going to offer a couple of ideas that I think are important when considering these efforts and how we, you know, look at data. You know, I would

especially in transmission but just also in the regional conservation investment strategy world or NCCP world, I would encourage you to really consider scale as a real important first step and factor in the planning process. And by that I mean, you know, it's equally important to have a relatively high level, a look, you know, kind of a conservation assessment approach across eco regions or other large landscapes to set the stage and the framework for the conversation, but siting is where the rubber hits the road. I think everybody is aware of that. Certainly the regulating community is and we are too from an organization that provides permitting support for these projects. So I scale that support siting I think is critical for these planning efforts. And obviously better quality data is essential for those finer scale planning efforts.

You know, decide on these planning efforts whether this is a regulatory or nonregulatory or a hybrid approach to planning. I mean, for example, DRECP really was a high kind of a large-scale expression of conservation priorities and renewable energy development opportunities in California and the California desert. If you look at our NCCPs, those are really highly reg -- those are permit program, highly regulatory kind of perspective on planning at a much finer scale. So it's important to think about

scale when you're embarking on these efforts.

And then just kind of going back to a comment that Ken offered, you know, these data platforms should not only support the robust planning effort but really implementation of the plan. If you're going to build the platform to support the planning, it should follow through with implementation.

I agree with Scott, Data Basin, the collaborative feature of Data Basin is really beneficial and is one of the reasons why I would say an NCCP is we wouldn't do another one without it. It provides a common language for those conversations. And, you know, Ken mentioned a conversation starter, another benefit of that kind of platform is, it -- it provides the vehicle for interactions between a regulated entity and the trustee departments like mine. You know, oftentimes we find we're speaking slightly different language than the planning proponents or the regulated community at some of these efforts and I think these kind of platforms can provide that level playing field to have the conversation start kind of on an equal footing. So I think that's really important.

Whether it's Data Basin or another platform, integrating existing data sets and existing data platforms into the picture is critical. So a mechanism through which we can pull in not just the data, for example, from my

department, but the approach to analyzing or providing those data to the public is also important. Integrating those approaches so that we have the most robust look at the data possible.

And then finally, I'd offer, you know, we should consider policy incentives both in the legislative and just in the regulatory kind of arena to strongly encourage the use of these approaches in planning whether it's transmission planning or other types of conservation planning. You know, I've seen some recent and through recent legislative efforts, nods towards this but I would suggest we could probably use a little bit stronger signals from a policy standpoint, especially from the state to make sure that we're reinforcing to everyone the importance of having robust data sets and delivery systems for these planning efforts.

So, Scott, back to your question here -- questions here. I mean, Number 1, the obvious answer is they do those planning tools and access to these data sets do promote, I think, responsible renewable energy development and assist conservation by providing the foundation for decision making on whether it's renewable energy development or the conservation element of planning.

And how this information could be used to best assist the planning efforts, we talked about it a little

bit. You mentioned it in your presentation, Scott, I think I've offered a couple of ideas on how we can make that better. The most important one in my mind is at the -- develop these systems, these data delivery and analytical collaboration systems at the beginning of the process rather than at the end or in the middle. That was a lesson learned from DRECP and from other efforts. It's important to get that established right off the bat, I think.

And how can they be deployed and improved to best support a variety of planning efforts? You know, that's a great question, there's a lot of data systems out there. State departments have them, NGOs have them, CBI has one, they exist everywhere. There's several smaller underground data systems that really aren't even visible to many of the planning -- those in to the planning community. So the deployment of those systems is critical, you know, getting back to making sure you're fully inclusive on these data systems when they're deployed. But that, you know, deployment is really important to the entire stakeholder community, to the trustee departments like mine, and to the planning entities.

And I'll stop there, Scott.

MR. FLINT: Thank you, Kevin. Thanks, Kevin, right on time.

Kind of hard to facilitate -- I'm used to

facilitating my peers not my -- facilitating upwards so, I'll do my best.

Next -- next Zachary Townsend, California Government Operations Agency.

MR. TOWNSEND: Hi. And thank you for having me. My name's Zach Townsend, and for those of you don't know the California Government Operations Agency is the sort of the back office of government. We're -- we have functions like the Department of Technology, Cal HR, Franchise Tax Board, CalPERS, CalSTRS, things like that.

So it's critical to mention that since I want to be clear I know nothing about transmission planning and have very little expertise approaching zero on energy of any kind.

So why am I here? Why I'm here is I'm the chief data officer of California which is a very grandiose title for a relatively simple concept which is that I work with departments and agencies across state government to think about how they can use data in new and different ways. So although I won't really be able to speak to the particular application that we're talking about here today, I hope to give some overview on how we're thinking about these questions and how different people think about them across the state government.

I think the most important thing that I'd like to

just sort of say is that the purpose I think the people who get the most benefit from thinking about these types of tools are the people who think about the tools and then reevaluate their policy process. So it is -- it can be done, you just have your policy process and then you insert the tool at some point of it, and I think it makes you feel really good, but then you really haven't done anything different than you would have done historically.

So it's necessary to consider how you can do the process differently. One way that I see this is that the feedback loop by which you sort of think about whatever the policy is can be so shortened that you can do that loop many more times. So if you imagine a planning process where normally -- and again, I don't know anything about transmission planning so I don't know what the process is right now. But if you imagine a process that normally you think about it for two years, you talk to the public once, and then you think about it for another two years. What you can do instead is say okay, we're going to use the tools we have, the new tools we have to get feedback on our plans every two weeks if not every two minutes over a period of time to continually iterate on sort of that feedback from the public.

And one of the most important things that I would say there also is to think about the distinction between

the specific questions you want to answer and also what sort of platform you should build so that people can answer all sorts of questions.

When thinking about a platform, I sort of think through five different steps, whether it's data or the technology. The first is to think through sort of what the standards are around that platform. And the reason that you set standards first is so that everyone can participate in the platform. It's really great if you have one department who works on their 800 data sets. But if they put their data in a format that is meaningless to other departments or collaborators, that doesn't do you very much good. So it's useful to have some sort of governance process at a high level to say this is how all the data should be structured, here's how we're going to describe it, here's the format we hope to see it in. Completely separate from where the data comes from just so that you can as Commissioner Douglas said mash up the data in a meaningful way.

The second step, I think, is to think about data as a product itself. It is not merely a means to answer any questions you have but is itself a product that people want to consume. People inside your -- the Commission would want to consume and people across, your stakeholders, they want to consume that data as a product, not just as a

series of maps, not just inside an application but as a product itself. And you need to think about how you're going to open up that data, how you're going to describe the data in a meaningful way. Also, how you're going to be transparent about the creation and the process by which that data came to be.

That leads to my third point -- or the third step in sort of these platforms which is to have some important measure of transparency. I think it's -- the distinction I would draw here is to make sure that you're as transparent as possible about all the elements that sort of make up that system, not just the data itself. I think sometimes there are terms like open data and they're thrown about, but the reality is if you don't have an open standard and you don't have an open process, then the transparent isn't -- transparency isn't particularly meaningful. And again as Commissioner Douglas said, if one of the goals is to make sure that the process is replicable in the future, then you have to be transparent about the process, not just sort of the outcomes.

Fourth I think is the tools. There's obviously a lot of talk about Data Basin but the tools themselves are sort of obviously part of the platform thinking through this but they're -- it's also important to ask questions about, you know, equity, and like who has access to those

tools? Are they publicly available? Do they work on -- the simple things like do they work on browsers? Can they be accessed from library computers? These are really important points, they're often forgotten because we're sitting on our really fancy computers in our really fancy state offices. But -- well, actually, I don't know anyone who has a fancy office, so. But in people's minds, I'm sure they're fancy.

And then lastly, I would ask -- a lot of people have mentioned collaboration, but I think it's important to think through the question of collaboration with whom and how that drives the questions you're asking in the entire process. If your goal is to sit in a room with policy experts and make very fine decisions, then you want a platform that does certain things, answers certain questions that engages people in certain ways. And if you're trying to engage stakeholders that are very informed, that's one -- that's, you know, another, a different platform and different collaboration tool -- and -- but if you want to engage John Q. Public, then you need even different tool that is asking questions in different ways and is much friendlier.

So I can say much more, I've been asked to wrap up and I would -- I'm happy to answer any sort of generic questions while leaving it to the expert panel on all

questions transmission.

MS. FLINT: Thanks, Zachary, for that great input. I was being really subtle, thanks for announcing the wrap up thing.

Next we have Lorelei Oviatt from Kern County director of planning.

MS. OVIATT: Thank you so much for having me today, Commissioners and Director Alex. I am not an expert on energy but I think I'm an expert on siting when it comes to large-scale renewable energy.

First, we want to thank the Commission for the DRECP portion that brought Data Basin and this idea to us. We have taken this idea, and I'll be talking a little later about some of our projects, and actually embraced it. But we've embraced it from a slightly different perspective. We do think that the large-scale collaboration is a good point. We've actually taken it down to the site plan level because of some issues which Zachary has pointed out with information technology.

Fifteen years ago, property owners would have rebelled if you said you were going to have an online or a hard copy map that showed where a San Joaquin kit fox was. And it was a true issue for property owners. Now because of Google Maps and you can look in your own backyard online, the entire thought process has changed. And while

local governments have GIS systems, I can assure you they are not a high priority in the budget against public safety money.

And so GIS systems have become important at the local level, but they are not funded appropriately, they are not, you know, they are not used at a county and a city. Some have, some haven't. Data Basin and these other gateways provided an opportunity for us to go to the level that we needed to go to, which is to make streamline permitting and engage applicants. Applicants and property owners are the ones who drive the government budget. They are the ones who will clamor for these types of platforms.

We've actually created it as a solution to a couple of issues. One is staff resources. Even at the state agency level, it is highly staff -- there's a lot of staff work that goes into dealing with consultants, looking at the accuracy of information, and dealing with the questions that developers bring or companies bring. And this platform is extraordinary for actually cutting through that, and creating a permit system that can streamline that information and make sure that accurate information is available for everyone.

Consultants may not like this platform direction as much because it actually creates a system where we will know as staff at an agency you either check -- you can

check the box that say it's not in a floodplain but I know it is in a floodplain. And we will no longer have an argument about that because of this kind of permitting.

So from a local agency standpoint, it's not just a collaborative planning at the general plan level, but we are moving forward with our general plan and we will have this kind of platform from the whole 8,000 square miles. And we believe that thanks to the DRECP we think our deserts are done, we may need to take it down to another level, but we think this is the future. These new collaborative processes, the public wants these types of access. We already have a GIS system but this takes it to a new level.

So another part of this for us is that it's very critical aspect in what we're calling land use rebalancing for water. So especially in the San Joaquin Valley and probably in other basins, we are looking at an unprecedented conversation at looking at how can the rebalancing of land uses for our new water constraints under the Sustainable Groundwater Act also benefit renewable energy siting? We are using this platform as a way to get that information, create that information, and provide it to the public.

Last thing in regards to funding these efforts, I certainly support Director Hunting's call for the

legislation to prioritize this, but in the meantime, we are actually having applicants fund this. And the tradeoff is streamlined permitting. If an applicant group, an industry can get streamlined permitting, then we can have them funded. And then for long-term maintenance, we've actually already adopted an electronic maintenance permit fee that goes on every single permit and that fee is enough for us to be able to maintain our platforms. We think in the long run, there will be a time, there already is a time, when looking at a paper map is something that only someone an old person like I do and that, you know, having larger monitors and larger kinds of conversations about them will be more collaboratively done online.

And I look forward to the comments of others and I look forward to presenting some of the projects that we've used this platform for.

Thank you.

MR. FLINT: Thank you, Lorelei.

Next up we have Kevin Richardson from Southern California Edison.

MR. RICHARDSON: Good morning, I'm Kevin Richardson, a transmission planner working in the generation interconnection planning group at Southern California Edison. I'd like to thank the CEC and other stakeholders for the opportunity to participate in today's

panels.

Edison definitely supports the geospatial planning tool such as the Data Basin because it allows quick, collaborative and quality work to be performed in a shorter amount of time and allows stakeholders to work off the same tool which aids in the transparency and the effectiveness. I can initially see about four opportunities at Edison for such tools.

The first one we're currently doing, we have the 50,000 square-mile service territory, we have a lot of operations and maintenance work so we have crews running around all over the place doing this work. And there's something about an interactive geospatial map that is just so much better than just a static paper map that's allowing us to kind of connect the dots and use our crews more efficiently.

But getting back to renewable energy a bit more, Edison's grid is also publicly available on a map so you can kind of zoom in on different transmission or distribution circuits, click on a line and you can kind of see the capacity, how many queue projects or how many existing generation projects are on the line. And it's kind of a tool to try to help developers site their projects better before they actually submit an application to get on into the generation or connection process.

But, I mean, it's kind of one dimensional. I mean, how much better would it be if you had environmental layers or other layers as well that we've seen in the San Joaquin solar Data Basin or the DRECP Data Basin? If generation developers had those kind of tools within our tool, those kind of layers within our tool, how much more effective would they be in siting their projects so that they'd have a higher percentage chance of getting all the way through the process.

I mean, if we see something that looks a little too crazy, we might be able to inform the developer when they get to the scoping meeting but by then the developer's already spent like a lot of time and money on their project to where if this tool is a little more robust in addition to seeing the capacity on the lines, you could see other environmental issues, it might steer them even better to, you know, a more fruitful location.

Another opportunity is actually siting a large transmission facility. I remember being on a licensing team for a large transmission line a couple of years ago. We're actually in the field and we invited some environmental NGOs out with us. We had the Center for Biological Diversity, Kerncrest Audubon, Transition Habitat, CalISO, and The Nature Conservancy, and we were getting really schooled on the impacts of ravens on desert

tortoise, cryptobiotic soils, and desert ecosystems, the significance of ancient creosote rings. But I sit here wondering after partaking in the San Joaquin solar and DRECP how much more fruitful would that site visit would have been if before we went out there, we would have had like a little Data Basin site set up for that transmission project that all those environmental NGOs and whoever participated could have uploaded layers. And they were out in the field with like tablets kind of looking at all the information. You know, it would make the utilities or other transmission builders be able to submit better projects for approval in that process as well.

Another opportunity I see is, you know, when you're licensing a project, you're in a general study area, you're in that general study area because some engineer or transmission planner when they were doing the initial study as part of the CalISO Transmission Plan or a generation interconnection study thought it was a good area. A lot of times the tools they're using don't have any of these kind of layers, it's just white lines on a black background that just show you transmission line or transformer capacities. And they're being guided, you know, maybe if they're on a project before like a licensing project before or if some of their projects have failed in the past. But if they actually had a Data Basin tool to kind of use when they're

actually performing the system impact studies for these generation interconnections or connections to other utilities, they might propose better projects even to begin with so that when you get to the licensing stage and you're looking at that initial area, it's a better area even to begin with. I guess the only hard part would be about still maintaining the timelines that we'd have to do the studies in.

And lastly, I guess I have a question. In a FERC Order 1000 world when a lot of people were allowed to bid on transmission projects, do we think this is something we would have kind of like a Data Basin analysis before actually the project went to bid, so that the routing is kind of somewhat already fleshed out for a new line or do we think a tool like Data Basin might be used after someone wins the bid and then they would kind of use Data Basin to kind of help, you know, submit their project then.

So those are my initial comments. Thank you.

MR. FLINT: Thanks, Kevin.

Next we have Kim Delfino, Defenders of Wildlife.

MS. DELFINO: Thank you. And thank you for the opportunity to come and speak this morning.

Defenders of Wildlife, I feel like I'm sitting here and I'm representing a whole lot of other people, other NGOs like The Nature Conservancy and Audubon Society

and NRDC, Center for Biological Diversity, California Native Plant Society. There's a lot of organizations that have been very invested in the development and the deployment of these geospatial planning tools.

I mean, I can -- I don't want to cover ground that's already been covered through the previous speakers, but I think that you can see through the diversity of the folks sitting here who are basically saying the same thing, which is before it was like we were operating with, you know, black and white television and now we have Technicolor, 3D, 4D, Smell-O-Vision. I mean, it's -- the amount of infor -- these tools have been invaluable in many respects.

My organization talked a lot about for renewable energy development, you know, doing it smart from the start. And that sounded great, but it's these tools that are showing us how to do that or we're using it to do that. And it's been a learning process, I think as you've heard with some of the comments of DRECP, but what we have seen is that the development of these tools and the development of this data has given us an opportunity to level the playing field so that, you know, NGOs, local governments, companies, state agencies, federal agencies, tribes, all the various folks that are part of the collaboration are operating off the same set of information and speaking

in -- with the same language which is really invaluable.

It's also given the opportunity for people to get access to data whereas before you couldn't have access to data. If you couldn't afford to pay CNDDB for data information, you wouldn't have that information. But this is, you know, now you can go online, use -- open up your browser and click on and have information again that can help you participate more effectively. The transparency has been absolute critical for people to have confidence in the policy decisions that are being made that are based upon this data.

And also it provides flexibility in that, you know, and this is something I had conversation with Lorelei yesterday afternoon and she pointed this out and I thought, I thought yeah, she's completely right about this. Back in the day you'd have a paper map. No one would want to update that paper map until you actually got a bunch of information together so it was cost effective to then provide that update. So you may have a huge lag time or like in the case of CNDDB you had boxes of data that hasn't yet been entered so you have no idea where that information is and so that you would think the gap on the map might be a good place to go if you were a developer.

But this has completely changed the playing field on this. Now we can operate these tools in a real time

setting, people can upload information in a real time setting. And again, that's been invaluable.

The other way it's been invaluable is that -- and I think you've seen it with Lorelei's comments about how Kern County is now using these tools. We're able to layer and compare data in a way that we've never been able to do it before and ask questions and answer questions that we haven't been able to do that before. For example, or as Kevin has pointed out, you know, in planning transmission if you are then able to layer in biological values, engineers and transmission planners can ask questions that before they couldn't even -- they wouldn't even know that they could ask that question and answer it.

With Kern County asking the question about if we have to take agricultural land out of production because we have a more restrained groundwater withdrawal number, where should that -- where should we do that and how do we, you know, if we could bring biological information in with renewable information with, you know, housing infor -- it allows you to layer and ask questions that opens up an infinite amount of possibilities in planning decision making. And so in that way it's been incredible useful.

Frankly, I appreciate Kevin's point about, you know, the second question as how should this information best be used? Of course he very politely says we should

create incentives. Of course from the NGO perspective I would say we should make everyone do it. But the point being is that whether you go through a carrot process or a stick process, we should end up with the end result which is these -- we need to be using these tools in our planning and in our procurement, and in our permitting decision making because we will be doing it in a way that maximizes transparency, public confidence in the decision making, how we spend our money in mitigation, and also I think reduce conflict.

And, you know, you might think as an NGO, you know, you thrive on conflict, but actually the opposite is true. I don't want to file a lawsuit challenging a project. That is not my idea of a win when I go home at the end of the day. For me, that's the definition of a loss. And so this allows us to change the paradigm. So I would recommend that, you know, where we can, we should be trying to push the industry -- to push, to incentivize or push folks to use these tools and figure out how that they can -- how they can afford it. I appreciate the Lorelei's asking folks to pay fees, but, you know, there has to be probably a diversity of ways to fund these efforts.

And then how to make them better. Well, one is funding them so they can continue to stay viable and not stale. The other is just making sure that when you're

doing them, you're doing the data in a way that's organized and useful and it's not just a data dump. And I think that Data Basin does a very good job of doing that. And also the only other thing I would just say and, you know, this is just me NGO world nothing's perfect but there should be -- we do need to recognize our limitations with these tools and the data sets. That just because we now have these cool things that we can look at doesn't mean that we know everything that's going on on the ground. And so that therefore there should be caveats operate -- offered up that while this is going to produce better planning in permitting decisions, we still need to invest in on-the-ground information gathering and we shouldn't forget about that.

So I'm sure I'm forgetting points, but I again I appreciate the opportunity. I'm glad that the CEC is having this hearing and -- or workshop, and that has led the way in really pushing this forward which I think it energy planning is not the only thing that's going to benefit. I see this benefit going across all -- all types of use, land uses and for biology and conservation.

So thank you.

MR. FLINT: Thank -- thank you, Kim.

Bringing us home on this panel is Mr. Steve Chung from Department of Defense. You said you needed just three

minutes, Steve. I'm going to hold you to that.

MR. CHUNG: I will not only cover it in three minutes or less, I will also put out a pitch to recruit Scott Flint to work for the military since he loves PowerPoint, can't get away from them. I on the other hand will go without PowerPoints here today.

Commissioner, Director Douglas, Mr. McAllister and agency colleagues, thanks so much for having me here.

Let me go ahead and share a few thoughts with regards to -- and again, I will not repeat many of the positive comments that were stated here today. But having been involved from the get-go on the DRECP from '08 to its completion and signing last year as well as the San Joaquin Valley, the military as a whole has seen these tool sets by the state really help us in one key area. And that is providing the necessary awareness, providing the necessary education, and to promote, and again, I think every one of my colleagues has mentioned the importance of collaboration.

I'll put an additional caveat word with the collaboration. I think these tools actually instill and promote the sustainment of the collaboration and that is critical so our engagements are not one-hit wonders like The Ramones. I know they've had more than one hit, but that's the line I use. That being said, let me share a

couple of contexts and lessons learned from the military's perspective in the southwest region states here.

In the early 2000s, about 2002, when we began seeing, we on the military side, began seeing an influx of proposals that were coming in for renewable energy projects, there were efforts early on to gosh, you know, how do we track? We need to educate. And in certain cases at the local level, many of our installations reached out and did the necessary collaboration. But one of our lessons learned through the years in from 2002 to two thousand, let's say ten, was there's got to be a better way. You know, we are just beating ourselves up. We don't have the resources to multiply or clone ourselves. God knows my wife would not want me to clone myself but technology's just not there. How can we do things better? How can we do things smarter? How can we be more efficient leveraging what resources that we have on the military side?

So when the state began to embark on leveraging tool sets like Data Basin as we've seen in DRECP, as we've seen in San Joaquin Valley, as we will see in the California offshore planning initiative, from our perspective internally within the military with -- within a resource constrained environment, having the ability for us to share our information when and where we can, to and into

a platform that provides a greater level of awareness, and couple that with a multiplier effect in providing the necessary education. So external parties, agencies, NGOs, mom and pops, as well as our internal military team are looking and utilizing the same information.

That's pivotal, that's key. Because quite frankly as I mentioned earlier, we just do not have the resources to send a hundred military personnel out to do these ongoing sustainment collaborations and engagement. So that's one of the key benefits that we have seen, we see today, and we will continue to see as things progress.

That being said, I do want to quickly hit on the three items, Scott, that you raised. And here's some lessons learned that -- that I will share from bouncing some of these questions off my colleagues, also have shared recently with the state of Arizona because they are looking at trying to do something similar. And that is this. Has it helped? Of course on question one in siting. How has it helped? Essentially from an agency industry stakeholder, that awareness quite frankly, and my colleagues and I go through early consultations with industry probably once a week somewhere in the state of California.

We think it has minimized conflict and it has promoted compatible renewable energy projects throughout

the state. Where some of the elements could be improved as we move out, collectively and together, is looking at and understanding and setting those expectations. And I think Kim mentioned it in part is this is not the Swiss Army knife tool to do everything. I think that that expectation is very important, it is pivotal. A 70 percent solution to hit the majority I think will do the trick.

That being said, as data comes in from a variety of different agencies, a variety of different sources, I think one of the key things that would help the users is establishment of a simple and straightforward interface as well as an organizational construct that does not resemble how a military's department may be organized which is kind of complicated at times. So simple, simple.

But I think in the end from our military team perspective, we have seen great benefit in past, we see great potential moving forward, and we're glad to be part of the efforts as they move forward.

Thank you.

MR. FLINT: Thank you, Steve.

And we'll entertain some questions or if -- from the dais. But I just wanted -- before we do that, I want to thanks -- thank all of you for coming so well prepared and making the trip up here to participate. Your input's invaluable and it was all very, very good. Thank you. I

know you didn't have a lot of time so I really appreciate it.

Speaking of time, I left zero time for discussion. So I failed.

MS. DOUGLAS: That's all right. I think we will discuss anyway.

Ken, did you want to start?

MR. ALEX: Well, thank you. I mean, as it's been noted, the variety, a group that does not always agree on things and so it's I think indicative of the power of data and the platform to bring you all together on this and be so supportive.

A couple of comments. One, we -- this is great to have this testimony and then when we go to the Department of Finance to request funding for these efforts, I think it would also be really helpful and Lorelei and some of the others have hit on some points that I think if we can gather some of the information would be great, which is where there are cost savings and where there are benefits that we can quantify monetarily, hugely helpful from our perspective in getting budgets.

Zach, you raised a number of points that I want to underscore. I think governance is hugely important, QA/QC for both data and software. And then the durability of the platform so that we know it's going to be available

into the future. I think those are -- all of you hit on those in some ways but I want to underscore that.

I have probably any number of questions but since we're a little short on time, let me ask one to Zach if I can.

We -- a lot of the power of this is from the government's perspective is that it can be cross agency, crosscutting through lawyers of government, we have the federal government, we have local government, we have state government, and we have sources of data outside of that. And gov ops is in sort of the unique position to run data programs across agencies. Do you -- do you have the capacity and the willingness to do sort of the cross -- to be the location of a cross agency platform?

MR. TOWNSEND: I think my boss would want to know who's going to make that Department of Finance request, Ken? No. More --

MR. ALEX: Fair enough.

MR. TOWNSEND: -- serious --

MR. ALEX: No, fair enough. That's a fair question.

MR. TOWNSEND: Right now we provide a sort of a robust open data platform where data.state.gov where standardized data sets can live and the state has already -- every state agency and department has access to

that for free and that they're already paying for it in sort of a way that's not important. So that exists.

As for Data Basin itself, I don't -- I actually have no idea what its cost is. I think in principle if Data Basin were a, if you thought of as a service that tons of departments were going to consume, having it live at the Department of Technology might make a lot of -- with gov ops's support, might make a lot of sense. But then I would, again, underscore governance as a critical question. And right now I think there are nonmonetary incentives for departments to participate and that they're solving those specific problems and making sure that there's incentives would continue to exist even if the platform was owned by an outside entity where I think being really important.

MS. DOUGLAS: So this question's really for all the panelists or for everyone, anyone who wants to jump in on it.

You know, I've really been struck from what we've heard this morning about the many ways that tools, you know, like Data Basin, that these kinds of interactive platforms can be used and at what stages, you know, from high-level planning and opportunities and constraints and what issues might you encounter, to kind of pre-project filing conversations completely outside of a regulatory process like what Kevin mentioned, you know, site visit

with NGOs; we're thinking about this, what do you think?

And making that a very informed -- a very specifically informed discussion on the fly each step of the way wherever questions come up to, you know, it's possible use in permitting. You know, how do we, you know, take these big picture understandings and translate them into permitting to, you know, plan implementation? You know, how do we take these tools and develop them so that they not only get us a plan but they inform our implementation, they help us sustain relationships going forward? Not one and done, but we've worked together and now we are figuring out, you know, now we are using this to continue to work together which, you know. And so I've been struck by all these different layers.

And I guess the question I have for the panelists or for anyone who wants to jump in is, you know, how do you all from your different positions and perspectives think that we can support more engagement in these kinds of tools? You know, how do we foster more use of these kinds of approaches? And what are some of the barriers to that? You know, how do we work together to overcome barriers to doing more of it?

MR. CHUNG: I'll take a shot at that.

Commissioner, some of the ideas that have helped out not only military but some of the agencies and industry

folks that we've dealt with in the past leveraging the data sets, type of data sets that are captured not only within Data Basin and DRECP as well as San Joaquin is to actually bring some of those stakeholders together on an issue or an item that was actually worked. Leveraging, utilizing the various layers and data that existed.

One of the things that may be helpful if it can be done, if other agencies are able and willing is to incorporate a series of and maybe it's a category that's called case studies for category A, B, C. The military would be compatibility in planning. So that may be something that could be leveraged or used to promote some additional collaboration with actual case studies of real prior activities with multiple agencies and in this case industry that took place.

MS. DELFINO: I think that you can -- I think we're already starting to see it, but I think that you can look at where planning and permitting is done and look at incentivizing the deploy -- the use of these -- of this type of tool.

So, you know, Kevin was saying with NCCPs, they're not going to do -- they don't want to do another one without using something like Data Basin. The Regional Conservation Investment Strategy process, you know, it fits perfectly into utilizing this kind of tool. I think

that -- so I'm not, you know, part of me says just require it but maybe the -- you know, the easier way to do is to say -- is to show the efficiencies of you may get your plan faster, you may get your permit faster, you may be able to spend more efficient deployment of mitigation dollars by using this type of tool so as you're demonstrating and incentivizing through those demonstrations so that local governments and companies and others would want to use this.

You could as thinking through general plan updates, you know, allowing -- having this as being part of that, you know, the next generation of doing updates. You know, working within the IRP process, building that into the processes. Planning and permitting is constantly evolving. It's not like you have to rewrite laws for it, it's just how you implement them. And so you can start building this in as sort of the best practices approach in how you're doing, you know, the things that you're supposed to do regularly. So that's one option.

I think the only -- the issue, you know, the issue is going to come down to I think a cost issue in terms of if it's going to cost -- if there's going to be a fee charge, that's going to be a cost issue. But then there's a cost issue that we've sort of and I think Ken's got -- talking about this a little bit is how do we keep a

tool like this going after this administration leaves? How do we ensure that it continues to be useful? That investments are -- investments of information and the ability to put that information in there is still viable. Because the worst case scenario that I can think of is that, you know, this administration change is over and we stop investing information into this, it becomes stale and then people just stop using it. And that would be, I think, an enormous tragedy and stranded assets, frankly, from the state's side.

MR. RICHARDSON: This is Kevin Richardson from Southern California Edison.

I think we just really need to get over a lot of the antagonism in licensing process to be able to work more collaboratively. I mean, you'll see great collaboration on an effort like San Joaquin solar or, you know, RETI when the caveat is oh, it's just kind of like an FYI, you know, to kind of sort of inform the regular process. But once you get to the regular process and your, you know, $500 million project is on the line, it's scary to try to be collaborative.

COMMISSIONER MCALLISTER: So I see Heather is hovering and wants to move along which is okay. So I'm tempted to ask a question but I'm not going to, I'm just kind of going to get something on the table.

So I wanted to first of all thank you, Zach, and Secretary Batjer and the whole team over there for supporting these efforts because I think it's huge just within the state service context, it's really huge to have that vision and that strong support certainly that would that here at the Commission as we move forward on various data projects, you know, it's important to check in and sort of have that back up.

And I guess just on a very implementation just nitty-gritty nuts and bolts kind of level, you know, hiring people with analytical skills who can take advantage of these tools is a real challenge. Definitely in state service. I mean, it's a huge set of issues. And, you know, the governor's leadership and Secretary Batjer and others, you know, a lot of progress is being made I think on reformulating some of the classification issues and all that. So that's got to move forward, it's huge.

But, you know, I imagine throughout our economy, I mean, granted we're in California, we've got Silicon Valley, we have lots of big data, you know, young graduates coming out that just have these skills that none of us even imagined. That's all great but I think building the -- to Kim's point -- building the teams that can make this a long-lived effort and really build on it and build -- and build a productive direction and give it this institutional

memory over time is really a big challenge.

And so I was tempted to ask a question about how, you know, you're all doing that at your different context, but I'm not going to do that. I just kind of want to get it out there.

MS. DOUGLAS: Thank you for that. And I think with that, we'll move to the next panel. But some of us on the dais as we shift panels might take like a two-minute break. But we're not -- this is not a 15-minute break. So if anyone needs a super quick break, but we'll move to the next panel.

(Off the record at 11:28 a.m.)

(On the record at 11:33 a.m.)

MS. MILLIRON: Welcome back, everybody. My name's Misa Milliron, I'm staff here at the Energy Commission. I work for Scott. And I'm going to attempt to make up a little bit of time and keep us on track here for our second panel.

Just one change to the agenda that you have in your hand is that Scott Flint is going to be making some comments on behalf of Vicki Campbell, BLM, who could not make it today.

So with that, just want to introduce the panel here today which is one that complements the previous one nicely by diving into specific project examples of using

interactive data platforms for collaborative planning.

I'll kick things off with some examples with usage of Data Basin that the Energy Commission's worked on. And then each of our panelists, which we have a lot of great diverse examples here, will share their experiences using these kind of collaborative platforms, a variety of different uses.

Next side, please.

So Scott mentioned our staff work. We have kicked off a separate complementary process that will inform this IEPR proceeding regarding landscape planning work that's follow on from the RETI 2.0 process and past IEPRs that focused on landscape planning.

We've established a new docket with the name Environmental Information for Energy Planning to capture this type of work and a variety of other kind of statewide landscape planning and analysis efforts related to energy. This is going to provide a venue for additional public engagement around this topic, and we encourage people who are interested, there's many of you in the room who've already been engaged in that process but I've put this slide up here so that you can get our website and see where you can sign up to find out about other workshops that complement this topic really nicely and will feed in to the IEPR.

So as Scott briefly mentioned, the staff here are working on defining considering case studies to test some new analytical tools with real data and help us look at transmission and landscape issues.

Next slide, please.

This is similar to one of Scott's slides. The point is just to show the Energy Commission's work in the -- related to statewide energy planning and really show how we've assembled the significant body of environmental data sets and models. The areas that are colored in show those areas in the DRECP and San Joaquin Valley.

We're collaborating with others through gathering data sets in the red areas, particularly the Modoc and the North Sac Valley areas to assemble and share information in those areas on Data Basin. The goal being developing comparable and consistent sets of data elements that can be applied across the state to evaluate transmission and environmental issues.

We are hoping to provide that functionality through Data Basin that will allow people, like I said, we're focusing right now on areas of high renewable energy resource as recommended through the environmental land use technical group report of RETI but, you know, this approach could be taken in other areas for other purposes.

Next slide, please.

So a little bit more to show you some examples of these data elements that the staff are working on assembling for our purpose related to energy planning. But again, it can be applied to any -- any other types of planning on a landscape scale.

Just wanted to show the categories of what we're focusing on. We started assembling these data sets during RETI and even before that and they're being expanded by the staff and with collaborators. Again, the goal is to use data in these categories to evaluate renewable energy in transmission areas across the state in a consistent way.

So quickly, just to go through some of these. We've assembled information and data sets on renewable energy resources, conservation elements such as species occurrences and habitat information, climate change. I'll show you some examples of that. As well as county land use data that folks can go on Data Basin and look at land use as designation and also explore agricultural land uses.

Next slide, please.

So just want to show you -- show off some of the great work that we've worked with Conservation Biology Institute and to get up on Data Basin. As part of the DRECP we put together this climate console and subsequently expanded it to a statewide scale and called the climate California Climate Console. That's available now online

and anyone can go on there to use it for landscape or ecosystem planning and just go on there and use it to evaluate climate effects, look at refugia for species of interest. Even dive in to some of the climate models and look at maps of climate data over time.

Next slide, please.

So again, just wanted -- main purpose here is to show preview of some of the work that we started in RETI 2.0 and are continuing to work on as far as analytical tools on Data Basin. This is one of the tools that we began development that's still in a beta state at this point. We are continuing to fill out the data sets and test it. And essentially what you have here is report writer and it allows a user to either draw an area of interest or upload a GIS file of interest and get a reporting of environmental and other characteristics in those areas. You might be able to see there's a couple of shapes there drawn as examples and so you would be able to analyze things like protection status or terrestrial intactness of an area or not, and look at whether there's any designated Critical Habitat. And there's a button that you would press and you can get a pdf report to look at potential environmental constraints of an area that you're interested in.

Next slide, please.

So just, again, showing, previewing a couple other tools that are essentially the inverse of the one that I just showed. The top one is one that we started in RETI 2.0. The bottom one is another tool developed under our R&D division for the Antelope Valley. The RETI 2.0 stakeholders saw an earlier version of this and we're continuing to improve the functionality and improve the interface. The goal being that you would have a consistent -- consistency of look and feel between these tools so that stakeholders can go on and either focus in on a certain area for a certain purpose like with the lower tool shown is focused on distributed generation in the Antelope Valley or you could, you know, expand it out for the top tool is going to be on a larger scale.

So essentially it would allow a user to specify site characteristics like the renewable energy development type, the level potential Covered Species and conservation value. And then view the results of areas meeting those criteria that they're inputting. Those blue dots are showing areas that meet the criteria specified, essentially, by the dials or sliders to the left of it.

So anyway, let's see. Next slide, please.

I'm trying to make up a little bit of time. Go quickly here so we have enough time for all our panelists.

Just a little bit on our Energy Commission case

study approach that we're doing. We are using this approach to finish and test the two tools that I just previewed with you using real data and questions that follow on from the RETI 2.0 process. We're in the early stages, we're considering a couple of areas at this point, one of those being the desert area constraint that was identified out of that process. And then also looking at among other areas taking a further look at the San Joaquin Valley using these tools that we're working on.

Next slide, please.

So essentially, that's it for my quick overview of the staff work here at the Energy Commission. I want to then just give an overview of the questions that we sent out to this panel which is looking at specific project uses of these types of platforms. Just quickly paraphrase the questions here.

One, what type of landscape planning processes have you been involved with? Or what activities might use Data Basin or similar platform? Two, have you used or built from existing data sets and tools on Data Basin? And how has it been useful to your efforts? Three, are you planning to share your data and work on Data Basin and will you develop any customized tools for project implementation?

We've shared these and we're looking for people

to answer or address any or all of these questions and show specific examples of their projects. And we have some really great presentations that have come in -- remarks that have come in. So I'll just go ahead and remind folks that we're looking for ten minutes per person, roughly. Hopefully we'll have some time for questions.

And I'll just go around the table, turn it over to Scott Flint, again, from the Energy Commission.

Thanks.

MR. FLINT: Thanks, Misa. Too bad Steve left, I don't have a PowerPoint.

So we invited Vicki Campbell from the Bureau of Land Management to come speak today specifically on the -- one of the policies that developed out of the DRECP which helps facilitate mitigation on public lands. And so I wanted to share that information a bit and talk a little bit about the -- where you can find information on Data Basin that's already there.

Some of it's already there, some of it we're updating, some of it we have to add that will help you use that in your -- in local planning processes or in working on developing regional habitat invest -- conservation investment strategies or depending on the level of data that we have available, regional conservation assessments that would support the development of those strategies.

So I think the information that we developed in DRECP and have available on Data Basin allows us to operate at that higher level with the regional conservation assessment and start zeroing in on areas that would be good for mitigating species on public lands.

So a little bit about how -- why this is there and how it works. So the DR -- when the DRECP conserv -- large conservation strategy was put together, it took into account the requirements for species both habitat, habitat connectivity species and important areas and the size and protection of areas to have them persist over time throughout the entire desert or the DRECP conservation planning area. And that was done without regard to land ownership.

So although the DRECP since the draft was subsequently bifurcated into a couple of parts and we're working locally -- we're working with local agencies and still planning for some energy work on private lands using that information, BLM has their land use plan amendment in place that protects areas on public lands and identifies areas on public lands that are suitable for -- best suitable for development.

And by -- and BLM's decision proceeded with the whole -- with the whole of the conservation strategy thinking in place. So that might not really be evident to

folks. And so what the agencies have done is develop a document which we call it the California Desert Biological Conservation Framework that backs up -- that backs up from the DRECP and ties together the public and private lands in the desert and their importance to species. And so a couple things in that plan, in that framework are it's still -- it's showing what conservation was achieved by BLM signing the ROD for the land use plan amendment and putting those areas under conservation.

So there's a little analysis in there and you can look at how much of what important habitats for each of the covered species were protected by that action. And you can also look to the private land areas and see how much is left and for what species more specific actions might need to be required, still need to be required or dealt with in further planning. So it allows you to compare public and private land that way. And so it allows you to do that. And it also -- it also -- it does the analysis but also identifies for the whole area important areas for species that tied to the biological goals and objectives that were laid out for the entire DRECP planning effort.

So using those two elements of the plan, you can work with that information and start to, in a regional conservation assessment context, start identifying areas that might be better suited for the particular species that

still need a high level of protection and where those areas might be. A lot of the -- a lot of the -- we took time to make sure a lot of the biological goals and objectives had very specific -- they may not all be fully mapped, but they have very specific geographic elements identified in them so you can use those to help guide you through that process.

So that report is available there. It was done by the four agencies, the Renewable Energy Action Team agencies, and put up online I think in December. So the work we have to do to bring that to Data Basin is actually get that mapped portion and the analysis up there so folks can see it clearly. It's not there but the document exists and we can start using it right now in planning efforts that are going on. And those considerations are being used in the planning efforts that are going on.

But by having that -- having those things hang together across public and private land, we -- it also allows BLM's policy for considering mitigation of private land projects on public lands where it's biologically appropriate for the species. So again, looking at the amount of conservation that happens for certain species on BLM land, it's obviously most biologically appropriate to consider enhanced management on public lands as the best thing to do to ensure long-term conservation of the

species.

And so whether it's -- it's fencing to protect an important habitat area or restoration to -- to improve a population center for the species or restoration and some additional acquisition in holdings acquisition sort of work to shore up connectivity, those kind of elements are available within the federal portion of the DRECP. And so there are cases and they should be explored where mitigating a project that affects a species on private land would probably be best mitigated on public land. So the DRECP and having that hang together across -- the analysis hang together across both public and private land facilities that.

There's also a second element that I just wanted to share. From the state's perspective for that public land work to be considered full mitigation under the California Endangered Species Act, Fish and Game worked with BLM to develop what's called the durability agreement and signed a durability agreement with the Department -- with BLM as part of completing the DRECP.

So that durability agreement still remains in place, and what the durability agreement does is allow certain additional land use protections to be applied to those areas that are used to satisfy both state and federal mitigations under both acts on public lands. And so by

having that durability assessment, it also gives the -- I'm sorry durability agreement in place, it also gives the state the reliance it needs on the public land mitigation activities to meet the state Endangered Species Act requirements.

So that's -- I just wanted to briefly mention that. That is available to folks. We have a couple things. One is we do have an implementation tool for DRECP that is up there and folks can contact me if they want to know what it is. But it's called a site assessment tool and we stopped developing it when we split the DRECP apart. It still works but it has less functionality. We need to go back and add the functionality in that will let people view -- spatially view the biological goals and objectives. So that's one element we have to add back that will be helpful in using Data Basin to help you with this kind of assessment in your planning effort.

And the second piece as I mentioned earlier is to -- is to get the actual map and analysis up there for the California Desert Biological Conservation Framework. So that's programmed in our work for this year and we intend to do that. Just wanted to let folks know that we'll be presenting on projects that you're already doing, that that's available.

MS. MILLIRON: Thanks, Scott.

So we'll move next to Garry George from Audubon.

MR. AUDUBON: Good morning, Commissioners. Good morning, Director Alex.

I'm Garry George, I'm the renewable energy director for Audubon California, the state program of National Audubon Society.

So I work closely with our conservation and our science teams to develop, find, and provide data on birds and habitat, on climate change, impacts as well as renewable energy siting. So our objective is to more effectively site renewable energy through identifying least conflict areas that will avoid, minimize, or mitigate effectively for the impacts on birds. And some of these impacts can be significant.

So we're collaborating with and we're -- we've worked on -- with other stakeholders through some of these projects and Data Basin. For instance, the Desert Renewable Energy Conservation Plan. We've worked on the Antelope Valley Regional Conservation Investment Strategy under Assembly Bill 2087. We're currently doing that. We worked on the San Joaquin Valley least conflict PV solar siting process which Ken mentioned earlier. We're working on the statewide energy siting process on private lands mostly in the west Mojave and the Sacramento Valley. And more recently we started work on the offshore wind

taskforce portal. And all of these are in Data Basin and also on RETI 2.0.

So here's a quick example. As Ken mentioned, this was convened by the governor's office of OPR and the California Energy Commission and Berkeley Law. Especially Commissioner Douglas, thank you for doing this by the way.

San Joaquin was done with a face-to-face meeting in Sacramento but then as the different stakeholders broke into groups and the value of Data Basin for us was that the conservation community stakeholders had a special secure part of Data Basin, a work space where we could actually work, look at our layers and begin to analyze what we felt were the highest conservation areas and the lower conservation areas and then the least conflict areas with our conservation values.

And so we ended up with a map that looks something like this in Data Basin. I think you saw that before. So the pink is lower conflict. The purple is the lowest conflict. And then the green is the high conservation value. And this was a map that we presented, then, to the final review and publication of the document that produced a map, the next map, which actually identified the least conflict areas in the Central Valley where solar PV would probably have -- be able to be expedited more rapidly. So that's one example.

So I want to show you a little bit about what Audubon's science and conservation team are developing now to provide for the California Energy Commission climate console and for Data Basin. This is our important bird area GIS data layer. We're the North American partners of an international organization that identifies high conservation value areas for birds on -- based on different criteria like restricted range species or high congregation numbers of species. The red important bird areas are of global significance and the green ones are of statewide significance. So this data is spatial and we provide that on projects as well as in Data Basin.

We also have recent data that we developed from our Christmas bird counts which is the longest data on any wildlife ever recorded, over 100 years in some cases. And we also use the USGS breeding pair data on birds. We took those layers, we took layers of climate, suitability of precipitation, and also temperature. We modeled those toward the future depending on three different emission scenarios toward 2020, 2050, and 2080. So this is what we came up with. We released this is 2014.

We've had -- next slide -- we found that 314 species could lose their wintering or breeding range as climate suitability changed. And we presented this online in GIS -- I mean, GIF model and then you'll see burrowing

owl on the next one.

So let's go to the next slide and you can see how these rain shifts could be looked at in a moving animation. As you can see, the wintering range, the blue ranges looks like they're going to be pretty stable but if you look at the breeding range, you'll see that it's shrinking.

So we are now in the process of publication review to have this published and develop the GIS so that we can provide it to the California Energy Commission and Data Basin.

We're also looking at climate refugia. And this is also under review so we'll be providing this data to California Energy Commission, and this is on -- this can help adaptation, this is on climate strongholds for groups of species and different kinds of habitat. This is a draft. It shows a little bit about oak woodlands and where the species prioritizations might be.

So I just want to say on behalf of Audubon, we look forward to working for the CEC. In the conservation and science communities we've always had this language using spatial data. We're so happy to see our young dispersed now into the energy world and we really think this is a crucial, crucial process that's already showing us some terrific results. And we want to thank the governor's office of OPR and the Commission, especially

Commissioner Douglas for using Data Basin. It's a great collaborative tool and it's been very helpful for us.

Thank you.

MS. MILLIRON: Thanks, Garry. This is really exciting to see some of these things that are going to be coming our way. So I appreciate your showing everybody a little quick look.

MR. GEORGE: Coming attractions.

MS. MILLIRON: Great. So welcome back, Lorelei Oviatt from Kern County. Thanks for coming back for a different scale.

MS. OVIATT: Thank you.

So I want to talk about two projects. One project which has already been implemented so we've actually learned a lot from it. And a very exciting second project that we just now signed contracts for and have a grant for.

So the first project is we went ahead and did a Data Basin for the 2.8 million acres of the valley portion of Kern County to support a energy permitting project EIR. At the end of it we realized how useful this could be for the actual implementation. And so we ended up with a -- using Data Basin. We actually had someone come forward and we bought a software that integrates the permitting system into our Accela program beyond what you can already do. So

Accela is the program that everybody uses in counties. And yes, it pulls from GIS. Now we have a system and a small program that literally an applicant can go online and generate a site plan so they don't have to hire somebody to do the site plan. When the site plan is drawn through this software, it pulls from Data Basin. It also flags all of the mitigation measures from the EIR and explains to them how they have to comply.

These are the staff savings. So normally when an applicant submits something by paper, you have to have a staff person who goes through and makes sure did they do it right? Is there some consultant who's making a case that your interpretation is wrong? In this case, it's highly automated and we also it provides that -- that interim where people have questions, they can go online.

Based on that, we are now embarking on -- we have been working for many, many years on a valley floor HCP on the federal side and for water districts energy projects and some large-scale residential. We are now transforming that into an NCCP HCP, we'll be totally through Data Basin, it'll be online and some of the functions that are coming from DRECP that we think are going to be especially exciting is this issue of that for every APN, we can load in the biological studies such that the state agency people can actually have those at their disposal.

One of our problems as agency staff is where are all -- where is all this paperwork? Where does it live? It lives in someone's, you know -- I know that the public likes to think that we have vast well-organized electronic online archiving. And as we all know, we're not there yet. And so -- so we -- we hope that we can be the first in a pilot project to actually do this as NCCP HCP completely online. We've spent millions of dollars on maps, paper maps over the years which instantly become obsolete as we find out new information and we became adaptive management.

The second part of this which we also think will be useful is at the end of it, hopefully when we get it approved, the permitting. So let's say you have to do a preconstruction survey. We want to create a portal where you could upload it and it would immediately send an e-mail to the appropriate state agency, Fish and Wildlife saying you have a new survey to review. We think this is going to stop what we all like to call the unending I sent it to you by e-mail oh, I can't find it, oh, I found it but when I downloaded it. You know, it is a -- it is -- it is not customer service friendly and at the same time we all have agency limitations on our staff.

And then the third piece of this is that we have a changing generational hiring where we are bringing on new staff. And so we have training challenges both at the

local level and the state level as you bring on new people who have to be trained. So we're very excited about this Valley Floor NCCP and the opportunities for Data Basin.

One of the suggestions that I would make for the Commission is on actually if while it's true that doing this geospatial at the beginning would allow you to do more collaborative planning for your project such as transmission lines, I am very enthusiastic about the end of the project.

So even if you don't have one, I would recommend that you incorporate this because when you're doing the monitoring and the mitigation implementation for a large-scale transmission line, what -- how wonderful could it be for a vendor or the public to be able to go in to some section of that transmission line and right click and find out all the restrictions, all the rules, all the kinds of things that have to be done. And you could have a reporting program for the consultant that you hired to do this that they need to upload the reports, they need to upload all of the things that have to be done.

And right now, it's a very paper heavy, field intensive, and as we know because of our experience with the Tehachapi transmission line, every segment of that line has different requirements. And the public counts on all of us that whatever we put in that EIR and whatever came

out of that California Energy Commission, that somebody somewhere is actually making sure that that is implemented. And that is a huge charge and very difficult.

We and local government are excited about that this actual will support the integrity of our CEQA processes in a way, you know, we -- we're proud of implementing all of our hundreds of EIRs. But this system could actually provide the cost savings from staff and provide a backloaded monitoring where we could actually go back and see here's how we implemented it, here's what happened in a way that we struggle now to actually do. So those are two projects.

Our third project is we are doing a two-year general plan update, you know, we are absolutely going to be populating our other areas and creating Data Basin and we're moving our general plan online. So we are moving our general plan to integrate it.

Now as a reminder, I was -- I was -- I was interested in this statement that was made about, you know, this -- California Energy Commission is doing this whole collaborative, what was it called for the whole state and you're pulling in land use. I would just caution you that you may think that the layers you're pulling in for cities and counties for their land use as their land use, it may not be. So I think we discovered that in the DRECP that,

you know, our consistency and how much we updated and how it all works is not standardized. And so I think your leadership is actually going to help that. We need more standardized GIS. We need the ability to share layers in a way that we haven't in the past and just share information.

So I do support the collaborative planning process but I also wanted the opportunity to share with you that at the end of this, there's actually streamlining for applicants, streamlining for permits and more integrity in the CEQA process. And I think those are all things that we also can bring forward when we're looking at, you know, how to -- how to finance, how to fund, and why are we doing this?

Thank you so much.

MS. MILLIRON: Thank you. Really appreciate those comments. Getting lots of good ideas for how we can help with some of these multiyear processes that, you know, like you said, lots of paper, hard to track things. So really appreciate those suggestions and the caution for the data layers. So.

Next up we have Stephanie Dashiell from The Nature Conservancy.

MS. DASHIELL: Hi. Thank you. Stephanie Dashiell, The Nature Conservancy energy associate project director. Thank you to the Commissioners and Mr. Alex for

being here and your leadership on taking the landscape approach to renewable energy planning in the state of California.

I have had the pleasure of being a part of almost all of the gateways that have been mentioned thus far. DRECP, San Joaquin Valley, West Mojave Least Conflict Assessment, Antelope Valley RCIS, provided feedback on the climate console which is just getting launched, and now on the data core group for the offshore wind.

So I'm very familiar with the tool and my confession is, is that I love maps so it's a good fit for me. And I have also worked a number of times with some of the applications and models that are being developed as well and those are also very exciting tools that are interactive and provide transparency into how we're identifying conservation priorities on the landscape.

So go to the next slide.

And so I wanted to touch on three main points today regarding how these collaborative and interactive mapping tools provide benefits. And one is in supporting the facilitation of the landscape approach to renewable energy which we've touched on this morning. And then supporting a new tool for conservation planning in our state, the RCIS, and then how we can incorporate climate change information into these planning processes.

So next slide.

So on the landscape approach, we've discussed this this morning but I just wanted to touch on how these tools, the Data Basin in particular, can facilitate the landscape approach actually in the planning phase. I know Lorelei just touched on how it's useful in the project phase, but I think in the planning phase when we're thinking about broad landscape scale planning, these tools are incredibly important, you can incorporate a lot of data early on to identify conservation priorities that can then be avoided. So you can avoid a lot of the impacts on the landscape. You can identify where resources are in the least conflict places so that you can try to minimize impacts to those resources, and then you can compensate for impacts by focusing in on mitigation enhancements and investments in the conservation priority areas.

So this really reduces risk to developers, investors, and utilities and it provides a framework for processing applications. And Data Basin provides a platform where multiple people can come to consensus about where these conservation priorities are and where the least conflict areas are so that we can avoid fights down the line when you get to that project phase.

So next slide.

So I wanted to touch on my involvement in the

Antelope Valley RCIS. And the regional conservation investment strategies is, you know, has been implemented through AB 2087 and it provides a new tool for doing voluntary conservation planning that would allow for mitigation in advance of impacts from infrastructure.

And this has -- so one of the pilot areas where an RCIS is taking place is in the Antelope Valley where you have renewable energy development, transportation, housing, high-speed rail. And you also have really important ecological areas that have already been compromised by development in the area that we really want to try to prioritize protection ahead of future impacts.

So we've worked collaboratively using the Data Basin platform to come up with a conservation prioritization in this area. And the map on the bottom you see there is a map that I've been working on with prob -- several other environmental and -- environmental groups and other agencies to identify core and linkage areas for different types of species. And this is an example where we had multiple groups working together to basically -- we were working live and each in our different offices to identify these different cores and linkages. And Garry was on this call. And to provide names for these areas. So this is an example of how this tool works in practice and incorporates information from lots of different

stakeholders.

Would also say that for the Antelope Valley, you know, we're really -- we're in the planning phase now but I think Data Basin will be very useful when you get to the project phase and you actually have projects that want to utilize the RCIS framework. They can use this mapping tool to go to the priority areas that have been identified and perhaps there could be a functionality such as an application where you can click on an area in a priority -- in a prior -- identified priority area and that will give you a list of mitigation enhancements that you could do in that area as a project developer. And you could go through that list to develop a mitigation credit agreement that then could generate credits and really streamline your project going through in the future, having that mitigation already secured.

I think there's other counties that are considering doing regional conservation investment strategies. I know San Bernardino as well. And I think Data Basin could be a really useful tool in their efforts to develop an RCIS as well. I'm happy to hear from Scott that the Biological Conservation framework data will be available for use because I think that information will also feed into San Bernardino's efforts to develop an RCIS. So that's good to hear.

So on climate change biology, I wanted to build off what Garry was mentioning on the importance of incorporating data related to species range shifts over time. We're going to see that climate change is affecting species and landscapes all over the place and incorporating in the best available science on how climate change is going to be causing range shifts for different species is very important. For example in the context of an RCIS, we don't want to direct people to generate mitigation credits in places where we might need to -- or we don't want to actually not prioritize areas that might be important refugia species down the line.

So and I also just wanted to mention one specific example of this is that actually in a previous research and development project that the CEC sponsored, UCSB did a assessment of the refugia for a species in the West Mojave and found that the West Mojave was actually a refugia for many of the desert species and had spatial data available that showed where there would be stable ranges for species now and into the future. And that information was incorporated into Data Basin when we were looking at identifying least conflict areas for renewable energy in the West Mojave.

And I think there's other applications of Data Basin as well down the line. Thinking in the desert

context and also in the context of durable conservations on public lands and RCIS's. There's places in the desert such as the Fremont Kramer ACEC where you have varied land use patterns. There's DOD holds land there, Department of Fish and Wildlife, there's private entities, there's mitigation, there's BLM. So there's multiple different land use authorities in one area, and having a collaborative and transparent place to share data and information I think would be really helpful.

So I think there's future uses for this moving forward and I appreciate all of the opportunity I have had to work on many of these to date.

So thank you.

MS. MILLIRON: Great. Thanks, Stephanie, we really appreciate some of those future ideas as well. And we are back on track so time-wise.

I will turn it over to Ed Thompson from the American Farmland Trust.

Thanks.

MR. THOMPSON: Well, thanks very much. And good afternoon to you all. I too have a few people I'd like to thank. First of all the Commission for inviting me here. Second, to the Conservation Biology Institute and Jim Strittholt who has been our partner in this project I'm going to talk about. They just couldn't be better at what

they do and it's a thrill to work with them.

The Strategic Growth Council helped provide the funding for this through the San Joaquin Valley green print and Kern County. Thanks to Lorelei also provided some of the funding and some of our work product hope will be helpful to them in their general plan update. So this really has been a kind of a collaborative process.

The mission of American Farmland Trust is to conserve the resources on which food production depends. And so what you're going to hear about from me is a little different than what you've been hearing thus far today.

The two most fundamental resources which agriculture relies are of course land and water. Neither of which can be dispensed with and you can still produce food, particularly in a semiarid state like California. But often these resources are talked about in silos. There's a conversation about water going on over here and boy it is a very spirited conversation. There's a conversation about land use over here that's not -- it's equally spirited but not quite as visible. But we're kind of missing the point if we think we can conserve resources, maintain our food production capacity only by looking at one or the other in isolation.

So our purpose in doing this project, which is a demonstration project of the San Joaquin green print, is to

see how the land and water resources intersect in California's, indeed the nation's, premiere agriculture region. That is also AFT's principal target.

So I'm going to show you just a very brief set of slides to show you where we're going with this. The project isn't finish yet, it won't be finished for another month or so. But I hope it'll give you an idea of the versatility of Data Basin and what it can be. Not only its mapping capability but its analytical capability as well.

So let's take a look at the first slide here. In looking at the land and water resources, what we were trying to do is measure their value, their relative value, their intrinsic values, and the stresses on them. Obviously, you know, higher value resources just as there are in the natural world have implications and the stresses on the resources also have their implications. So we're looking at both of those things. And I'm not going to read all of these but you can see that when we looked at the land side, there's all the different databases we used to look at the relative quality or capability of the land. I only mention the last one, the crop values, because once we put all this into a logic model to try to define the relative values, we did a ground truthing, if you will, by crosschecking it against where the most valuable crops are produced. And there's a really high coincidence between

the two. So that gave us a lot of confidence in the methodology we had used.

On the water side, we took a little different approach. There are three major sources of water in the San Joaquin: local surface water; imported surface water, which comes from outside the valley's watersheds; and groundwater. And we looked at each of those through the lens of both the reliance in any given DWR planning region, how much they rely on those different sources; and secondly, on the variability or the reliability of those sources. So the more that somebody relies on a particular source and the more variability it is, the higher the stress level.

So without any further explanation of all that, let's just take a look at some of the outputs. And these are all preliminary at this point, subject to change as we continue to tweak this with input both from expert advisors and from people in the field. This is hard to see at this scale, but the way you look at this is the colors indicate whether something is of higher value or lower value. So green is higher value resources. Yellow is moderate. Red -- the shades of red are lower value. And then the intensity of the color indicates the water stress level on those resources.

So you can see areas in very dark green that are

both high value for agriculture because of the characteristics of the land and that are very low stress because they have pretty reliable water supplies. As you move farther south and west in the valley, some of the land is not quite as capable or versatile as other land and certainly the water stress is -- is -- is much higher. So this kind of gives you the spatial output.

Let me take a look at the next slide. It shows you the analytical capability. This is another way of looking at the data. Again, it's -- I don't know if you can see this, I'm having a hard time reading it, it's a little fuzzy. But on the right-hand scale, you see the relative values of the land with the green bars in the foreground being the higher value, and the red bars in the back being the lower value. And then across the front, you have the water stress from low on the left to high on the right. So you can sort of see how the 6 million acres of agricultural land, we're talking mostly crop land now, not up in the, not up in the rangeland areas, how it sort of stacks out in terms of both the land capability or value and the water stress.

And I just wanted to point out the darkest green bar on the farther -- farthest left. And that represents about 12 percent of all the land, water, intersection in the valley. That is the land with the highest value and

the lowest water stress or the most reliable water supply. So it's only about 1 out of 8 acres. And this helps you begin to get a different perspective on that 6 million acres when you start looking at it through that lens. That dark green bar, you know, if you had to draw an analogy to, you know, the natural world would be the equivalent of the endangered species in the San Joaquin Valley with all the implications you would think of in terms of importance of conserving that.

So let's take a look at the final slide here and show you something else we can do. This -- this table looks only at the land that has low water stress. There's about 2 million -- is that 2 million acres -- 2 million out of the 6 million acres. And it further breaks it down across the -- across the top in terms of the value of the land, high on the left, low on the right. And then it further breaks it down in the rows in terms of the development risk which was something else we looked at by looking at general plans, current zoning, spheres of influence, and Williamson participation. All of the things you would -- that are going to influence whether land is likely be developed or not.

And I just call your attention to the percentages at the bottom, on the bottom line. If you look at the first percentage about 18 percent, that is 18 percent of

that 12 percent of that endangered species is at risk of development, one-fifth of it. As you go farther down the line where -- and this is only looking at the land with low water stress or reliable water supplies. You know, the poorer the land, the less the development pressure. And of course this is a reflection of the fact that our agrarian ancestors were smart enough to settle on the best land with the most reliable water. But this presents the challenge, the core challenge for agriculture and conserving resources, that feed us in the San Joaquin Valley.

This was a collaborative process. We did a stakeholder process. We had webinars, in-person meetings trying to reach out to people. I have to say that we were less successful than I had hoped we would be. We did not have the budget for collaboration that the least conflict solar did and I think that made a big difference.

I also think it's -- what we're planning to do now is once we have these findings, and I think are fairly provocative, we are going to take it out into the field through a collaborative process and start teasing out what are the implications for resource management both at the local level and also at the state agency level. I think this is going to offer a really new and important perspective on the resources that are fundamental to our food supply here in California.

So thank you. And thank you again for everybody's support of this project.

MS. MILLIRON: Thank you. That was really interesting. And again I want to echo Scott's thanks to you -- this panel for talking with us and sharing your projects and insights. It's been really interesting. I think to everyone here and again appreciate you actually coming here in person to show us a peek into some of these neat applications that you've found through these interactive platforms.

We do have three minutes or so for questions if everybody's stomachs can handle that.

MS. DOUGLAS: We -- I brought a snack. But I'll try not to go too long since other people are probably very, very hungry.

UNIDENTIFIED SPEAKER: California farmer.

MS. DOUGLAS: So one question for Lorelei and you mentioned this a little earlier in kind of passing but I thought if you could elaborate, it would be helpful. So.

So how does let's say Kern County take the kind of information that Ed's been working on, and I know the county's also been looking at, you know, agricultural land and water and that interface. And so how does that inform where you think you want to see renewable energy and how might the county then act on that?

MS. OVIATT: Well the water conversations right now under SGWA which is what we call Sustainable Groundwater Act is a win-lose. You win, you lose, you win, you lose. Kern County Planning and Natural Resources Department is the win-win part of the county, therefore I am trying to use this data and work with the SGWA entities which is a joint power authority in two parts of my county, to point out to them that a property owner who ends up with small water, not enough water to really farm, has two choices. They're either going to hire water lawyers and we're going to end up in a big fight or the board of supervisors can provide them with other land use options.

And some of that is habitat as well as restoration and some of that could be renewable energy if you're near your transmission. And we are looking at other types of low volume composting, covered composting, all sorts of things that could use less water. Renewable energy is a large part of that, it is very much dependent on the transmission story.

And it is -- it is something that we are actually designing using the information and also looking at the possibilities, you know, if this land is good soil, is there going to be new water someday which is our new term for we're going to clean up all the water underneath the west side or we're going to have water treatment that's

going to reuse. There's only so much new water that we're going to produce, however, so we would be using this information that the American Farmland Trust is helping us with to see if is that another set-aside that needs to be done. Are there incentives that the state or others want to give to these lands that at some point the soil maybe shouldn't be used for renewable energy.

I think this is a whole new arena of conversation. One of the concerns that renewable energy developers have is when you target lands, you raise the price. And I am speaking to the Commission who is very clear that we are in a price sensitive market when it comes to the renewable energy as well as the people behind me who are in utilities.

So we have looked at doing solar overlays, we're looking at streamlining, but we're also looking at perhaps there's another more flexible way of doing this so that we are looking at an area rather than targeting properties where we can address this driving up the land value issue.

So those are just, you know, some of the -- I think that this also feeds into in regards to renewable energy, we are working with the Department of Conservation on -- through CSAC and others on Williamson Act. There are all sorts of new questions about if I'm under the Williamson Act and I lose my water under a groundwater

sustainability plan, what now?

I think this also feeds into conversations about agriculture conservation easements and, you know, CEQA mitigation. All of those are issues which are going to affect the siting of our renewable energy solar projects. And we are looking at all of that and we hope by the end of 2018 as we move our way through the general plan that we'll have a framework for that.

MS. DOUGLAS: Thanks for that. I mean, you're doing so much really amazing cutting-edge work and it's great to see and it's fun to be working with you.

If you are planning on developing applications on the mitigate -- on the, you know, mitigation side, the tracking conditions side, that would be another area that would be great to talk about. Because as you were speaking about that earlier, I just kept thinking, you know, well, that would be nice to have. So. And it would be a fantastic tool.

I remember a very long time ago, pre-Energy Commission, I had the assignment of trying to figure out if we could -- if anyone was keeping track of CEQA mitigations and if we could somehow quantify or even point to a reasonably comprehensive set of examples, and we decided we really couldn't. At least the amount of work it would take made it kind of infeasible and so those ideas. It's where

we need to go. It's pretty exciting.

MS. MILLIRON: Ken.

MR. ALEX: Very quickly. I guess kind of picking up on that CEQAnet which OPR runs will be moving to hopefully completely online by the end of the year so you can now integrate that into what you're doing as well.

We -- we don't keep track of the mitigation project by project. But it's an interesting point, we might want to think about adding that as something that could be done.

I'll also note that the Strategic Growth Council funded something called Urban Footprint which has taken a very long time but it's now pretty close to being fully operable, it's a scenario planning tool. I'm getting a little OPR geeky here but that -- that's a really another thing that can be integrated with the data layers to start thinking about how you do future planning.

Which leads me to my quick question also for Lorelei. Given that you are using Data Basin and this approach for your general plan, do you think it's possible to build a template of the most -- what you think might be the most important data layers that we can share with other jurisdictions that are thinking about their general plan -- recognizing every jurisdiction is different but to give people an idea of how to start in something like this mode?

MS. OVIATT: I will certainly put that into our work plan. I appreciate your confidence in us. We obviously count on Jim at -- and I didn't think of that. That's a good point.

And, you know, I am president of the County Planning Directors Association. This is an issue that comes up a lot. How can we provide better information to our public at a cost that we can afford? And so we're all excited because we think this web-based platform is finally the kind of breakthrough technology and with the support of your office and the support of the Energy Commission leadership, we think we are now into the realm where the public demands GIS. The traditional GIS we have is too expensive, too complicated. Lots and lots of different vendors and different kinds of ways of doing it.

So I will take that under advisement and make sure that we are somehow looking at the essential layers. We note that there are custom modules. We have some very large master planned communities, just Tejon Ranch as one. We are going to create a custom permit system using Data Basin for that particular kind of project. I think those are the things that the -- that the counties and cities are excited about. And I think cannibis is one of the first that some of the cities are going to do.

So I'll leave that with your thought.

MS. DOUGLAS: Well, I think I'll thank the panel very much. And we're a little past lunchtime so we probably better go to it since it is 12:35.

So Heather, we'll be back at 1:30; is that right?

MS. RAITT: That's right, 1:30.

MS. DOUGLAS: All right. Thank you, everybody.

(Off the record at 12:36 p.m.)

(On the record at 1:32 p.m.)

MS. RAITT: For our afternoon session we're going to have a panel on maximizing existing transmission through the use of advanced technologies and targeted resources.

And Judy Grau is the moderator, so, from the Energy Commission.

Thank you, Judy.

MS. GRAU: Actually, correction, I'm not the moderator. It's Carl Zichella, but I'm just going to give a few brief remarks.

Okay. So, I want to begin with a few guiding principles and policy documents going back first to 1988 with Garamendi Principles. And in 1988, in recognition of the value of the transmission system and need for effective long-term transmission corridor planning, Senate Bill 2431 by John Garamendi declared that it's in the best interest of the State to accomplish the following, which are referred to as the Garamendi Principles.

First, encourage the use of existing rights of way by upgrading existing transmission facilities where technically and economically feasible -- justifiable I should say.

Second, when construction of new transmission lines is required, encourage expansion of existing rights of way where technically and economically feasible.

Third, provide for the creation of new rights of way when justified by environmental, technical, or economic reasons as determined by the appropriate licensing agency.

And fourth, where there is need to construct additional transmission seek agreement among all interested parties on the efficient use of that capacity.

The second bullet on the IEPR, we're all familiar with the 2002 statute that created that so I won't elaborate. But the one that may be less familiar to some of you is Senate Bill 1565 from statues of 2004, which requires the Energy Commission in consultation with stakeholders to adopt a strategic plan for the state's electric transmission grid, commonly referred to as the Strategic Transmission Investment Plan or STIP, as part of the IEPR. The purpose of the STIP is to identify and recommend actions required to implement investments needed to ensure electricity, reliability, relieve transmission congestion, and meet future growth and demand, and electric

generation. The Energy Commission produced stand-alone STIP's in 2005, '07, and '09 and then in 2013 and '15 the STIP was included as a chapter in the main integrated energy policy report.

In 2016 staff produced a report titled, The Final Environmental Performance Report of California's Electrical Generation System, which included an assessment of the environmental performance of the transmission system. The staff report identified a number of transmission system challenges and opportunities in addition to the landscape scale planning topics we discussed this morning.

So, with respect to the first three bullets on this slide, interconnection of renewables, integrated generation and transmission planning, and maintaining reliability with the closure of once through cooling plants, we've identified and accessed these in several IEPR cycles and these continued to be addressed by the energy agencies as California seeks to meet its greenhouse gas reductions goals.

The fourth bullet, the western energy imbalance market, which is a real time market, continues to provide significant avoided renewables, curtailment, and greenhouse gas reduction benefits. As of March 31st of this year, the cumulative avoided renewable curtailment since January of 2015 is estimated to be almost 412,000 megawatt hours,

which displaced approximately 176,000 metric tons of carbon dioxide.

The western EIM continues to grow with upcoming entrants including Portland General Electric this fall, Idaho Power in spring of 2018, Balancing Authority of Northern California, as well as Seattle City Light in spring of 2019, and Salt River Project in spring of 2020. With respect to regional coordination California continues to work with neighbors to understand possible day ahead market opportunities. And as you heard during the morning portion of this workshop, offshore wind represents another opportunity for meeting California's renewable and greenhouse gas reduction goals. And so this staff report, the 2016 Environmental Performance Report, formed the basis for chapter 1 of the 2016 IEPR update.

And, so, this is one of the recommendations from the 2016 IEPR Update. The state should continue to work with federal, state, and local agencies and stakeholders to apply landscapesscale planning tools, and approaches to renewable energy and needed transmission. This should include a central platform, such as Data Basin, that includes spatial data associated with renewable energy planning to allow for high level assessments of alternatives that consider potential upgrades to existing transmission facilities, including emerging and

transformative technologies that improve flexibility and optimize transmission, the use of transmission corridors and the right sizing of new transmission facilities to accommodate current and potential future needs.

And that brings us up to this cycle with our 2017 IEPR scoping order, which drew upon the recommendation from the 2016 IEPR Update and it directs the Energy Commission to an include discussion of advanced technologies for new and existing transmission.

While California has been addressing transmission barriers and opportunities, so has the U.S. Department of Energy. In April 2015, the first installment of the Quadrennial Energy Review noted that ensuring the resilient safety and security of the nation's infrastructure is vital to American competitiveness, jobs, energy, security, and a clean energy future. The second installment in January of this year found that the electricity system is a critical and essential national asset and it is a strategic imperative to protect and enhance the value of the electricity system through modernization and transformation.

Two directives related to this afternoon's panel discussion are, first, that the DOE should encourage the cost effective use of advanced technologies that improved transmission operations, and, two, promote the deployment

of advance technologies for new and existing transmission, such as those that enhance reliability, security, and affordability through visibility and control.

And that brings us to our panel today. We're fortunate to have Carl Zichella as our panel moderator for this afternoon. Following Carl's opening remarks to set the stage for today's discussion we'd like each panelist to take about five minutes for their opening remarks. After all our panelists have made their remarks, we will begin the round table discussion with questions from our moderator and from the dais.

So, in just a moment I'm going to turn it over to Carl Zichella, with the Natural Resources Defense Council. And I'd first like to thank Carl and all our panelists for sharing their experiences today on maximizing existing transmission through the use of advanced technologies and targeted resources. And I'm not -- these are the questions on the next two slides that we've asked our panelists to focus on this afternoon. I know it's an eye chart and I'm not going to read these all one by one but they are in the handouts.

So, there are two slides. And so with that, I am going to turn it over to Carl, and I will have Heather advance the slides from here. And if you just say, next, Heather will march on through. Thank you.

MR. ZICHELLA: Well, thank you very much Judy. I'd like to thank Commissioner Douglas for inviting me and also I'd like to thank you for the excellent work your staff has done with me in preparing for this. Jim, Tom, and Judy it's been really a pleasure working with them and I think we're in for a good discussion.

Good to see you, Mr. Alex, again. And say what a pleasure it is to be here with such an experienced group of people who are actually putting into practice many of the things we're going to talk about today. I'm going to do a brief introduction on some of the issues and we can launch into the discussion. I'll try to be as brief as possible because I'd like to reserve some time for the audience interact with us as well today. We've had some wonderful presentations this morning but unfortunately not much audience opportunity to engage. So, I want to try to make sure that we can do that now.

Next slide, please.

We can skip over this. NRDC is the organization I work for, a national environmental organization, climate changes is one of our top priorities. We've actually got about two million members and activists working with us across the country and the electricity system, its reliability, flexibility, and transformation is a major goal of ours.

Next, please.

Today I'd like to address just briefly some of the considerations about extending rights of ways and their life looking at transmission design, consideration, and planning. I think planning is an issue that isn't necessarily on our discussion agenda, but I wanted to touch on it briefly because it definitely intersects with how we make these decisions. Some of the options for extending the life of the existing rights of ways, including shorter and longer term fixes, the three on the chart here reconductoring, reconstruction, and parallel routing, were actually evaluation criteria we used in RETI 1.0 to rank our transmission solutions that we were considering to serve California's renewable energy zones. I think they were -- they leave a lot of things out but those are sort of the things you think about when looking at an existing right of way and how you can squeeze more life out of it.

I realized today we were going to talk about some new innovations to help deal with some of these things but that's where we were just about seven years ago. And one of the key things I think we need to think about is operating the system. We had a previous workshop where we talked about flexibility needs for the system and the role of a regional market in addressing those. I think when you talk about regional markets or expanding the ISO to cover

much of the west, we also need to think about the operations potential that getting the most out of the existing system just by operating the system more efficiently and we can certainly maximize transfer capacity in a system if we do that. We get much better ability to integrate renewable energy resources because there's more transmission capacity to carry it and the system becomes more flexible and reliable.

So, I'm not going to relive that workshop, but I wanted to just note that here as we talk about these technologies, applying them in that kind of a world is a little different than in the kind of world that we're living in now especially across much of the west. We're able to do a lot more with a lot less if we can operate the system more efficiently. Another great benefit of this is that by maximizing existing rights of way we better justify the transmission we do need. And I do think, you know, we're going to need more transmission. The question is going to be how much.

We know how difficult it is -- next slide, please -- to try to address some of these issues environmentally, if you were here for the morning session you know the immense amount of work that's gone into trying to sort out the environmental impacts of planning for transmission. It's extremely tough to do. It takes a long

time to do it. We've been thinking about an incrementalist approach to transmission upgrades, and I think this argues for thinking bigger about future needs. In addition to new technologies, we also have to think about right sizing the lines, building them to a capacity that actually gets us more life and more utilization out of them, and how we operate those lines. Even if they're at a higher rating to meet shorter term needs that then could be more flexibly transformed over to longer term needs.

Mitigation costs for transmission can be enormous. We saw Sunrise Powerlink, and not to pick on anybody, but, you know, $14 million a mile to build and almost a million of that is mitigation costs. That's what it cost to build transmission in much of the rest of the Western United States. So, using the existing rights of ways better when we've gone through the pain and agony of establishing them seems to me to be an imperative that we have to take advantage of. We also need to think about the available transfer capacity in the Western Interconnection from power plant retirements, primarily coal plants that we're seeing drop out of the generation stack; that changes the power flows in the west, and we need to factor that into our planning when we start thinking about do we need a line when we have Four Corners coming out of service, for example.

We need to think about transmission as being scalable and upgradable. Are we building transmission lines that can be increased in their capacity or have their voltage rating increased without having to build new towers, for example. How can we do that? There have been proposals that the ISO's entertained, that PG&E has put forward to build transmission lines with an open position where another conductor can be added later, such as the Gates to Gregg line, which people are getting tired of hearing me talk about unfortunately. But I like the idea very much because that's the kind of optionality -- no, Neil, it's not you -- that's the kind of optionality I think we're looking for here is the ability to have a valuable asset, the transmission right of way be extended for decades. We're going to live with these things for 50, 60 years. It's important that we think not just about the short term meeting of load in a particular pocket, but how this transmission affects the rest of the system and how we can get more out of it.

Next slide, please.

We're also going to talk about the locational aspects of this topic, the geographic location. I think some of the considerations we need to think about in planning involve if we're choosing a right of way to extend or to build a new one, how well will the environmental

conflicts. We have all sorts of tools we've talked about this morning in terms of assessing that, new tools that help us do better at it, how much access do they give us to high quality renewable energy resources, does it facilitate access to available storage or proposed storage, does it optimize the generation shapes of our existing renewable energy fleet, are we going to get access to resources that exacerbate or mitigate, for say, the infamous duck curve.

So these things all lead to judgments in planning that give us the opportunity to make better decisions about power line utilization and upgrading. And by the way, this list, which includes a couple of community or social goals, including economic development and community impacts from pollution, they are things that we could factor into a multiple value analysis for prioritizing transmission upgrades and new transmission that are practiced in other parts of the country already.

So, I think it's a useful thing for us to look at these kinds of criteria in planning to help us guide some of the judgments that we make. Again, not just about a short term meeting of load which may fluctuate based on a variety of different factors

Next slide, please.

These are some more questions about -- I'm not going to go through these because I think we've touched

upon them briefly.

Next slide, please. And save us a few minutes here.

Again, we talk about as we plan transmission are we planning it in order to make it be expandable and do the kinds of things we just talked about.

Next slide, please.

Okay. When we talk about extending right of way life right now and what we want to talk about today is really about some of the newer technologies, advanced power electronics and like that are come into common usage actually in many places. Things like flow controllers, to help reduce congestion and changing the impedance on transmission lines so that power can flow to less congested areas, things that can be reused, the ability to take advantage of synchrophasors, the phase management units that are out there in large numbers now create a real data conflict for us because there's so much information coming in from them that we don't really know how to process this effectively or take advantage of and what goes along with that may be something along the lines of automation, especially in a distribution system, where switching is going to have to happen. Orders of magnitude speeds greater than amounts, greater than what we're doing today. Things like high capacity conductors; eventually there are

a number of conductor types right now that are out on the market, they employ a variety of different compositions. They all have in common that they can do a lot more at the lower voltage ratings which is really useful for us if we're going to reuse some of the towers that are out there right now and could maybe not accommodate higher voltage rating conductors. Something to think about with high capacity conductors.

Also on the horizon, and not here quite yet although they work, the cost profile is exorbitant, is superconductors. We're not going to talk about superconductors today. I just note that there are a number of interests out there extremely eager to try to move this technology forward. We've had some proposals in the western United States to employ them, they have not come to fruition mainly because of the costs involved with them, but they enable us to make much greater use of existing rights of ways if they were economically feasible because they take up so much less space than overhead lines. So it's something that may have a role to play for us in the future.

I'd like to add to the list here strategically located storage, especially in the bulk electricity system. They allow us to utilize the lines better and follow load, also helping to avoid congestion and providing grid

services, like frequency response, that our system wide need, that are going to be more difficult to meet in other ways.

So those are some of the issues that we're teeing up that we need to think about as we talk about these technologies, and I think what we'll probably do is go around the table in the order here that we're in. If I'm getting at Judy's slide right, that's pretty much what she had in mind.

And I'd like to start off with Neil Millar, who's with the California Independent System Operator, great experience in trying to manage this rapidly transforming electrical system. And I'd like to give you each about five minutes to sort of take us over the hurdles on some of the main topics you'd like to raise and then we'd like to address some of the questions that Judy pointed out and teed up. I'd like the conversation to be fairly free-flowing however so we're not slaves to those questions. If there are permutations of them, I imagine that we'll be talking about all of them in one way or another, but we don't have to go down the list is my point.

So, I'm going to hand this off to you right now, Neil, if you could give us five minutes on where you see things shaking out on this.

MR. MILLAR: Great. Thank you very much and

thank you for the chance to be here and speak today.

The first thing I'd like to do is maybe just spend a few minutes on process and some of the fundamental issues behind the new technologies.

First, is that the ISO does most of our transmission planning efforts through our annual transmission process. It's a very participative stakeholder driven process where we really rely on input. Not only in identifying the needs but also looking at possible solutions to help address those needs. Now, over the years we've better aligned that process with the generation interconnection and some of the other requirements so that most of larger decisions that are made can be reviewed and explored through that annual process.

Now, in that process we do consider very seriously the opportunities to rely on existing rights of way and existing transmission facilities to get the most out of the facilities we have. Now, that's through a combination of -- besides the obvious environmental impact and environmental mitigation of not needing to develop new rights of way. There's also the more pragmatic interests of having better costs and other uncertainty issues dealt with. As well as the timing itself that new rights of way, besides being complex and expensive to obtain, also have a higher risk of ultimately being successful.

So for a number of reasons we're always motivated to look at minimizing our use of new rights of way. There are counter balancing forces where at times putting all our eggs in one basket being overly dependent on a single corridor can in itself become a reliability issue. So there are checks and balances on that and there are other exceptions where, you know, from a minimal impact there can be a material cost saving in looking at some new facility that could also drive us. But the general approach is definitely been to minimize to the extent we can, whether through conventional or new technologies, and to this point we've largely relied on more conventional technologies but we're thrilled to see some of the new technologies getting their toe in the door and being able to move towards becoming just another tool in the tool box as opposed to something that has to feel it has to compete and beat out the existing alternative.

So that's the general direction there. When it does come to the newer resources, the new technologies, yes, a big focus for us is to see how some of these new technologies can become, like I said, just another tool in the tool box, something that the planners are confident, the utilities are comfortable moving forward with, and that we can consider right from the get-go as opposed to coming up with one alternative and then having that be the

alternative to beat by a new technology.

Now, to some extent we are in a bit of that latter world right now. But that's also tied to the somewhat unique circumstances we're in. Over the last few years our reliability needs have really been getting dealt with. In the last two planning cycles, we actually canceled in each cycle 13 previously approved projects for a variety of reasons. And right now we are in the midst of reassessing another 15 projects that we put on hold working with PG&E to review and rescope. So, in the course of that rescoping we will also be looking to see what opportunities there are for some of the new technologies in that spectrum. But the goal isn't longer term to have, you know, a conventional solution that then has to be knocked off by new technology. The new technologies should be right there as part of the initial mix in consideration when we're looking at how to move forward.

Now, the other thing though that's really putting a damper on current transmission planning activities and certainly approvals, is that we are in a bit of a calm before the storm, we're on a trajectory towards the 33 percent RPS goals, we're supporting and working with the Energy Commission and the Public Utilities Commission on direction to move beyond 33 percent to 50 percent. But until that policy direction is there, we're really not well

positioned to start moving on the next tranche of what it would take to reach 50 percent or beyond. So for those reasons we're in a bit more of an analytical point right now. But that also gives us the opportunity to sit back and reassess how we're handling some of these issues. So, it's a good time to have some of these conversations, and to see what we can do to refine our processes to make better use of some of these emerging technologies.

I won't bore you with examples because Carl touched on some and I know that some of these are also dealt with in later presentations. So, I'll leave my comments at that for now and be happy to deal with questions later.

Thank you.

MR. ZICHELLA: Thanks, Neil.

Next, we're going to go to Kevin Richardson of Southern California Edison.

Kevin, I don't know if you -- you have a few slides here. I'm just going to hand it off to you. Go for it.

MR. RICHARDSON: Thank you, Carl.

Again, I'm Kevin Richardson from Southern California Edison. I'd like to thank all parties involved for letting Southern California Edison participate in today's panel.

I'd like to talk about advanced transmission technology considerations and also maximizing corridors. And as I kind of reflect on this, I realize more and more how much I have in common with Edison's electric system. We're both getting older, and we're both starting to sag. And sag is not good for transmission lines specifically in the Big Creek corridor.

If we go to slide two.

You can see a simplistic one line diagram over on the right side. The dashed lines are what we're talking about. The two, 220 kV lines from Rector to Vestal to Magunden. We're required to meet minimum clearances for safety and reliability, and we're realizing that these clearances are pretty low and they need to get fixed. This is also a corridor that's been studied many times for other reliability issues. Back in 2008 there was a Central California Clean Energy Transmission project that we worked on together with PG&E with reliability issues or generation issues in the area, possibly connecting both systems. And on the Edison side we looked at tearing down and rebuilding parts of that corridor and some other solutions.

In 2015 we had the San Joaquin Valley solar studies in which people were asking: what's the existing transmission capacity of that corridor, how much more capacity could you get if you maximized the corridor, and

if you expanded the capacity, how much more could you get? And so we did some studies for that. And the same year we also proposed the Big Creek Corridor long-term mitigation plan where under certain N-1's, loss of a single circuit, where we're dealing with some thermal overloads. We looked at various technologies to try to fix this, you know, doing a traditional teardown and a rebuild, Smart Wire tower routers to inject magnetizing inductors capacity -- capacitance to change the impedance so that the line doesn't get overloaded into the outage, phase shift transformers, distributed resources, ultimately at that time we were proposing thyristor controlled series capacitors to kind of change the impedances during the outage to try to reroute power to try to avoid overloads. Last year we proposed the Big Creek Corridor rating increase, in which we employed high-temperature, low-sag conductors to try to deal with this. Since we had to fix the clearances anyway we realized by upgrading a couple of towers we can actually get more capacity out of this corridor, and thus help solve some of the reliability issues that we were seeing. So the high-temperature, low-sag conductors gave us a similar weight and diameter to the existing wires, higher ampacity, lower losses, lower sag, meaning less structures needed to be used, and hopefully less environmental disturbance.

Now as I look at some of the panel questions, there's a lot of them about, you know, when you consider advanced transmission alternatives are there specific characteristics you look for, and how often do you analyze advanced transmission technologies for this type of thing. And when I think about that, I think about trying to train new transmission planners in our group and my fear as a lead would always be I hope I don't miss something in the study process. So I'm tempted to build like a big flow chart of like, hey, when you have an overload consider these five things and just, you know, diligently, you know, upgrade that with like the latest, you know, technologies. But I think we've all kind of dealt with people who are trained that way but kind of look like me. And you'll ask them the question like, hey, have you considered this, and I'll look at you and I'll adjust my glasses, and I'll just kind of look at you and go like, well, that's not our standard. Are you crazy?

And so we want to promote kind of forward thinkers, people that think outside of the box, that don't just do it the same way all the time and that's so much of having a list of what to consider or when to consider it, but just always approach a new transmission issue with an open mind and try to plan things that way.

In one of the ways we try to do that is have

panels like this, don't just put management at the table, put an actual transmission planner so they can see the issues some of the stakeholders, get to meet them, develop relationships, not just put people on the panel but actually bring them along. So, you know, would you all say hi to Nicole Kidrow, one of our other transmission planners. She's planning the Tehachapi Corridor right now. So when she goes back after today, she'll have heard lots of you and your issues, and she'll have a much better mindset when she's doing the cluster studies and proposing the new upgrades. So, we're kind of proud of trying to promote planning that way.

As far as the utilities of being experienced with maximizing corridors and existing facilities -- we go to the next slide. I think a lot of utilities are experienced with trying to do that. I think sometimes we just kind of feel punished when we actually try to employ that. How many times have we, you know, been asked, you know, the courtroom, you know, and the licensing process, you know, trying to justify what we're doing, you know, double circuit one side stronger or something like that, instead of just doing a single circuit line. And the administrative law judge is looking at you like, why are you trying to gold plate the system? You need that right now, do you, really? And it's just really tough to try to

justify certain things.

So, I can see a lot of challenges to maximizing corridors and advance technologies in different arenas. One arena would be nonregulatory collaborative study efforts, like the San Joaquin Solar or RETI 1, RETI 2, the DRECP or things like that. Where a lot of stakeholders want you to like consider DC or, you know, whatever the fancy new technology is and because of the time lines that the technical people are given within those processes, we just can't. So we're just going to give you a nice little paragraph of, like, oh, this will be really nice to try in the future but unfortunately we couldn't get there right now. So, I mean, next time we do one of those collaborative study efforts, if we could really just give the technical people just a little bit more time so that we don't have to regurgitate like, you know, past studies, what to actually do something new and enlightening and, you know, I think that's what we're all kind of like here to do.

The next issue I see is in generation interconnection studies where a new developer will, you know, or the new cluster of generation in the study will trigger a new upgrade, it'll be a line, you know, you might see it as a good opportunity to do some right-sizing, you know, 500 kV construction, 220 kV initial operation or the

double circuit one side stronger or something else, and you've got to have an initial negotiation with your counterpart Cal ISO planner. And the issue tends to be if you kind of include right-sizing immediately in the study process, it might be a little more expensive for the developer, and so to get around that in the past we kind of worked with the Cal ISO like, okay, in the report we'll say, like, a single circuit and we'll put some kind of like a caveat on there saying that, hey, if this goes forward, the utility will try to go with a double circuit one side stronger or something like that and kind of, you know, pay the difference. So we can try to keep the developer in the study process but also still keep the right-sizing elements moving forward.

Another issue possibly could be FERC 1000. If you don't put the right-sizing elements within the bid, it's unlikely that when people bid that, they're going to include that because a lot of times there's probably going to be more expensive.

And with project licensing it'd be nice if regulatory agencies could consider adoption supportive polices kind of like the low cost-no cost steps for EMF reduction that is kind of like baked in, you know, thou shall do no cost or low cost, which is like a certain percentage of the overall project, you-know, if that would

work for like right-sizing possibilities, so that sponsors are not immediately disadvantaged from the cost scope for justification standpoint when they try to include right-sizing or advanced technologies in their proposed projects.

So those are my initial comments.

MR. ZICHELLA: Thank you so much, Kevin. You have a promising career in comedy. I just wanted to say you covered a lot in your brief time there and I wanted to thank you.

One thing that you did mention that I think probably we haven't planned on touching on very much but I'll flag is sort of a policy alignment. To make it okay for people to actually plan this way, to think more about these longer term options, the CPUC's IRP provides an opportunity for that their -- the staff plan's out comment right now. Something to think about in terms because this is the time we're re-examining how we do this. And it seems to me that you've just put your finger on something really important that ALJ shouldn't be giving you the hairy eyeball when you bring this up, they should be saying, that's a good idea. And understanding that we need to look at costs over a different time line perhaps because our goals go out to the middle of the century.

Okay, moving on. Tom Bialek of San Diego Gas and Electric is going to give us his take on this. And I know

you guys have had some really interesting challenges lately to deal with and some direct experience with some of these new emerging technologies. So I'd wish you'd give us your thoughts.

MR. BIALEK: Sure. Well, thank you. So, I appreciate the opportunity to come here and present this to the commissioners and the staff and other intervenors here and talk a little bit about I -- when I read the original sort of questions, I really tried to frame the presentation along that line. I'd really like to talk about alternatives, alternatives to traditional planning, what can be done with existing or not, and then maybe talk a little bit about sort of along with what Kevin had said a little bit, some of the challenges. Because as you heard this morning you see this collaboration amongst organizations to provide all this great dated information about which kind of help siting. And then when you get to the point where, and I think Kevin mentioned it this morning, now you actually get to try to go license or you try to utilize an existing corridor. And then the question is what happens. And often what you find is what happens isn't really what you thought was going to happen. And, you know, those are some of the challenges and so in the context of this whole alternatives discussion to the extent that, you know, certainty certainly plays a large role in

what we can and can't do. And I think that that becomes really, really important.

So you can go to the next slide.

So this here is an example of a potential use of the Smart Wire technology. So basically this is an inductively coupled impedance, which couples on the line, increasing the impedance and; therefore, changes the actual flows in the actual grid. It was proposed originally because of a dual contingency that would occur under N-1-1 conditions. On either two lines and two positions. And the outages would occur if our Sycamore-Penasquitos transmission line was not built in time, which basically is the June 30th in-service date, and if there's inadequate generation in Encina.

So what we looked at the proposal was, and so if you look at the little things where you've got the little X's that's where the outages occur, and we see the -- where you would be putting the actual device, Smart Wire devices actually in highlighted. We looked at it, the original view was as a flexible solution you could probably install it within the six to ten month time frame with an in-service date by June 1st of 2018. But then when we finally looked at, sat down with the developer of this solution, we looked at what we needed to put in place to actually deploy this. And the amount of impedance and reactance we had to

add was such that we had to actually construct additional towers and structures. And so for that our civil engineering folks from a design perspective said, well, jeez, now do we have seismic issues. And if we've got seismic issues, then what happens. And, so, now we need to qualify this technology for a seismic perspective. And, so, if you look at the qualification test and we realized that basically having those tests done would not meet our in-service date of June 1st, 2018. The alternative for us has been that we are looking at how we accelerate and make sure that the Sycamore-Penasquitos line goes in and basically obviates the need for the alternative altogether. So that's one example of a -- try to look at alternative technologies. To say we've done this quite a bit, these are very specific examples.

The next one. And I know Neil's quite aware of this one.

Next slide.

So this is actually a proposal to convert our existing SWPL line into an HVDC corridor, double circuit bi-pole with three terminal configuration. And looking increasing the actual capacity of the corridor from roughly about 1800 megawatts to 3000 megawatts. What comes with this is a lot of additional flexibility. So you hear a lot of talk about inverters and power electronics and what

things they can and can't do, and I think one of the more interesting pieces of it is that you could actually use them as load flow control devices, you can do a lot of different things with them. So from the perspective of, here's an existing transmission line, existing corridor, how can we leverage it and make better use of it. That was the idea and this is the proposal in front of the CPUC.

Next slide, please.

So, again, this is just a big, long laundry list of -- the first little bit says, here's all the things we have to do when we actually go and think about siting a transmission line and actually constructing it. We had -- let me give you an example now. We had a substation where we're looking to provide three 69 kV circuits into the substation. And this is somewhat similar to what Kevin mentioned. Originally these were all within our easements, we thought this was going to be really easy, this was going to be pretty simple to do. But then what we had was -- there was a review of the project and during that review the question was raised, well, you don't -- that substation really isn't overloaded or won't be overloaded for a period of time, and we have got some other resources there that may or may not retire, storage and resources. So, we're not going to give you the CPCN to actually do the third line. We're going to deny that and come back to us when

these overloads occur. And, so, from the perspective of looking at further down the road at alternative perspective that sort of just one of the challenges.

And then the second is an example of a 230 kV line that was built in 2005, 2006. We were looking to convert additional -- put in there an additional 138 kV structure, going from 138 to 230 kV. We thought, given it was our existing easements and giving existing line, that we were literally going to be able to an advice letter filing and actually move forward relatively quickly. Surprise, surprise we found out we couldn't. We had to go for CPCN and that took significantly longer and it added significant additional costs.

So, with that, I will stop and pass the baton to Tony.

MR. ZICHELLA: Thank you, Tom. Being that Tom just passed the baton to you Tony, I'm not going to get in the way of that. Please go ahead.

MR. DELUCA: Hello, thanks Commissioners for inviting me. My name is Tony Deluca. I supervise the T&D engineering group at SMUD. And just a little overview SMUD, being the smallest person at the table here, we're the local municipality, right, we take care of Sacramento and we've done that for about 70 years. Our transmission system is comprised right now of 230 and 115. Although I

kind of consider some of the 69 subtransmission as part of my world. We have about 1800 structures in our system and about 465 miles of transmission. So, again, we're the little guys. But we've been definitely looking at this.

Just a little background on me, I've been in this business, in the utility industry for 33 years. I've worked in both the public and private sector, building up to 500 AC and DC lines, and been a planner and been an operational engineer, done a lot of different things but this is my core competency, is design. So, our experience with -- and consideration of advanced conductors. I guess I misread. I was sort of thinking it was focused on this. So I feel a little bit underprepared but I'll just go through a couple of situations where we looked at using advanced conductors.

The first example, we did quite an exhaustive analysis, brought in some help to help us do this, and this was in support of the Iowa Hill project, which you may or may not have heard about, 400 megawatt plant. And we call advanced conductors high-temperature, low-sag conductors, there are a few different types. I think Carl mentioned -- touched on this. All generally use some kind of a modified core. So the core can be a modified steel, ceramic alloy, carbon fiber, et cetera. So we looked at all of them. There was a lot of scrutiny on us for this particular

project, so. And we have not yet today used any of these in our system. And as you probably heard also Iowa Hill did not go forward. So this is just a really expensive exercise.

But one of the things we learned, several things we learned that barriers to considering advanced conductors in this particular situation was the high initial cost of the conductor. So, this used to be about seven to ten times normal conductors cost and -- but it has been coming due to more use in the industry. As well as higher labor install costs. Special handling is required for some of these conductors because the core is somewhat less flexible and you've got to be careful about the bending radius of the conductor. So it's, for us it wasn't a direct, you know, replacement option.

The second point is inability to realize substantial cost savings over time due to the high initial cost and limited capacity upgrade capability, which is why you'd want to do this, because of the existing type of conductors used in our territory. So high-temp, low-sag conductors are best utilized as replacements for ACSR conductors, that's aluminum conductors steel reinforced. We only use ACSR for upper American River Project, which is the -- takes us to the run of river project up in the mountains there. Everywhere else we use all aluminum. And

so consequently why that's important is all aluminum conductors are lighter and the structures that are used to support them are lighter and were initially cheaper. And, so, if I try to go and string ACSR replacement type conductor on structures that were not designed for it, I overload the structures. So we can't just go out there and do that without considering potential upgrades or replacement of the structures, which we did in the Iowa Hill project. We were able -- but because that, the UARP lines were designed for ACSR.

So, the last, kind of an important point, hard to quantify is that there's minimal long-term data on how well these conductors hold up over time. The type we settled on for potential use in Iowa Hill and what we recommended was a product made by 3M called ACCR, and that's aluminum conductor composite reinforced. It's a quasi-ceramic core. What's nice about that is it's strands, its -- there's more than one failure mode. So I like that being an engineer. I don't like things to fall down.

Smart Wire also recently introduced a similar type of ACSR called ACCR/T7, doesn't have as much time in the saddle as the 3M product, but I liked it because honestly Western adopted it as a standard conductor which told me a lot. So that's why I thought, well, that was a fair and safe bet. Because utilities generally don't like

to make changes to new technologies unless there's a real good reason and they're well proven and they're going to be up. Because from the perspective of what it cost to build a transmission line, the conductor cost is about 30 percent maybe. So if it fails, you've got to go out and you've got to do it again. So we like to make sure that we do it right the first time if we can. Minimize that -- that having to go back out.

The second project that we looked at, that's kind of a positive note for advanced conductors, is we did look at another line to upgrade to mitigate a potential contingency where we considered the high-temp, low-sag conductors. This one was different because this was actually a structure used or a line that uses all aluminum. And in this situation we were able to find a conductor that would meet the requirements. It wasn't a massive increase in capacity but it was light enough that it still stayed within the structure capabilities so that made it feasible. Still would have been more costly but still a feasible project.

So, that's all I've got for right now.

MR. ZICHELLA: Thank you, Tony. It's clear that, you know, we're constrained by the investments we've made previously in a lot of these things and the judgments we've made about what we're going to need in the future. It's a

really interesting set of issues to look at when you want to innovate and you have these limitations based on the previous technologies and structural capabilities of towers, et cetera. Another thing to keep in mind as we try to plan.

MR. DELUCA: Something to mention as -- I'm not sure a lot of people recognize this. But a lot of the lines out there are grandfathered and able to be used as is without fussing around with it, but when you touch them, I get asked all the time to put things on our structures or do some things, when I do that now all of a sudden I must meet the current codes. And if they, you know, if they were grandfathered in, they're okay, don't mess with them. Sort of like remodeling your bathroom, you don't want to change everything, you know, if you do you're going to GFI and you've got to do all these extra things that you didn't have to do before. That's the situation we have.

MR. ZICHELLA: Yeah, I understand. It's another policy question. If we want to emphasize this, we may have to think about how we facilitate and encourage that.

We're going to move to Wendy Zhang of Pacific Gas and Electric Company now. And Wendy take it away.

MS. ZHANG: Okay. Thank you, Commissioner, for the opportunity to speak here. My name is Wendy Zhang, supervisor for PG&E transmission system planning.

Can you go to the next slide. Thank you.

The new technology add new flavors for this concept that maximizes use of the existing transmission grid. But, in fact, in the common utility practice we follow this concept for many years. We have the traditional way how to implement this idea that -- instead of building new lines we do reconductoring, right. And especially for the aging asset. Anyway, maybe that's because of the age of our PG&E system and how in some areas it's pretty old and it should -- regardless if there's overloads or not from the reliability study, they have to be replaced in the short term. So, replace the conductor or still extend the use of the right of way, or voltage conversion, that's another thing. We have some approved -- ISO approved the TPP project. We do the voltage conversion and instead of building new lines. And that's also another way to extend the use of the right of way. And the some of the voltage conversion, just in the probably replace or change the insulation of the lines. And then some, of course, require to replace the conductor.

And when we talk about the power flow controller, we also have a traditional power flow controller is our series reactor. And one of the reason ISO approved product in PG&E Fresno area, that’s at a series reactor on the Warnerville-Wilson 230 kV line, and that's a very long

line. If we do reconductor -- and I think around maybe 30 miles somehow it's going to be very expensive. And so install of a reactor will be much cheaper than reconductoring. And so we have some traditional flow controller, of course, now we have the new technology, for example, Smart Wire. I think probably several utility all has more or less some experience how to use this or try how to explore how to use the new technology. And PG&E also has some experience on that in the last two years.

So when we think about the new technology, we need to think -- I think there's multiple points we need to consider. For example, the line condition, the age. One of the -- PG&E has a pilot, Smart Wire project, that are in-service and that's a pilot project. It's kind of a research type of a project. And initially that plan to install on the Las Positas to Newark 230 kV line. The later change it to Ravenswood to San Mateo 115 kV line. One of the reason why the plan has been changed is the age of the line as it cannot hold the weight for that Smart Wire device. And it's easy to break. Could be break. So that's the age and also the length and how long -- if in the shorter length how many towers or how many spines they need to install this device to mitigate or targeted overloads.

So, if it's a very short line, we cannot

install much and the mitigation power probably reduced. And, so, the age of the lines and the location of the conductor are -- and one of the reason that Las Positas to Newark 230 kV line plan has been changed is that line is close to the coastal and the salt air or in the area. And that could also probably reduce the life for Smart Wire device. So this is like age lines location of the -- that's relating to the line condition. And also system topology. Smart Wire is push power to other lines. And if it's a radial system, you cannot use it at all. And also to push flow to other lines you need to think about other whether it triggers other line overloads. Whether trigger new overloads, right.

So, that's all this we need to -- all this are things to consider before we really implement this new technology and overload the percentage. The pilot project for PG&E Smart Wire project that is only install 90 units, mitigate one percent, one percent of the line flow. It just one percent. So you think if you have much more like 20 percent overload, this is not the right solution.

Type of contingencies and what contingencies causing the issue where driver the issue and whether that's a good solution. And also compare with the treatment we have SPS or RAS, and that's also low, like a low cost solution. And compared with reconductoring, new lines.

But SPS that -- for some location, for example, Greater Bay Area, that's a high density area, per ISO planning standard, which should not trip load for no matter whether N-1 or N-1-1. So the SPS cannot be applied.

All of this is just things we should consider when we think about the new technology. And the right sizing I think Carl already mentioned, the Gates-Gregg, that's one example we do consider or like the tower and the -- with just the string on one side.

Can you go to next slide, please. Thank you.

We talk about that's the new technology, right, and here is the DER. DER is another way to try to maximize the existing transmission usage. And, so, but -- also there's things is more study, more in-depth study than the traditional transmission planning study need to be done when we consider the DER or we need to understand, for example, understand the area of customers and the load characteristics and what customer and what DER we can explore from these customers. And the load portfolio and the load -- load profile, for example, how many of the load curve, like, peak hours. Some area maybe just like two hour to four hours peak time. But some area we do see maybe eight to ten hours, that's flight peak hours. And so in that case, what DER could mitigate 10 hours, energy storage, right now the technology is maybe four hours, can

last four hours. So if you have special case that has ten hours of peak hour, then how you mitigating. So this is all we need to think about it. And the peak demand and the frequency of the peak, how many times in a day that peak is going to show up at what critical hour. Also projected the load growth, the load forecast. And when we really think about DER because different type of DER only offer you a minor, or maybe like a couple of megawatts. So when you are load forecast, we have to make load forecast very accurate. We're trying to get as accurate as possible. And because if your load forecast is off, five to ten megawatts, then your solution for the DER will be off.

And also system limitation. What's the limit and how much load do you want to offset from the gross load. Type of contingencies is sometimes for simultaneous or nonsimultaneous contingencies we should apply different type of DER or like a demand response you call the customer, maybe that apply for N-1-1. But for N-1 we don't have time to -- we should have like a different type of DER energy -- energy efficiency where solar or DG that probably is good for N-1 but for demand response I think they only apply for N-1-1.

So that's the type of contingency and operating solutions, like a load transfer, or that's on the top of the DER and can we do some load transfer or after the first

N-1 to prevent the overload violations for the second -1. And another thing is the mix of the resources and the each of the category of the DER only offer you a little bit and they have their limitations. So maybe we can combine all the demand response, and energy efficiency, DG, storage, that kind of mix of all these resources. And to mitigate some higher overloads if we only rely on one that could just offer you just a little bit one percent. May not be adequate.

And also the regulatory process. And so far I heard internally or externally there are a lot of discussion about the process, it's how to collaborate it with the CPUC, utility, ISO was the process. Who should go to procure or take a lead on this process, there's a lot of discussion on this, and looking for here some of the discussion related to process also here. So all this is just a -- when we really want to implement this idea regarding DER where the new technology and we -- our traditional transmission planning study may not adequate. We should like explore more on that. So that's --

MR. ZICHELLA: Yes, thank you, Wendy. Really excellent list. You remind me of my motto: It's harder than I thought. Whenever you look at these things they seem so simple up front and so logical, but when you start to peel back what's needed to actually make them happen,

there's quite a bit of work there, you know. It's a -- people don't realize how hard the ducks are swimming as they seem to glide so effortlessly along the water.

The mix of solutions that you mentioned on demand response and distributed energy resources is reminiscent of the kind type of exercise that Edison had to go through when SONGS came off line and looking at substations,specific solutions and how much DER -- DR really, was going to be needed to be deployed when. It is a very complex analysis. But I do think we've gone through a trial by fire here in some respects with the loss of SONGS and upcoming with what we're looking at to do to replace Diablo Canyon, it's going to inform some of these things.

Moving now to Alex Morris, from the California Energy Storage Alliance. Briefly mentioned storage, Alex, in my intro. It is increasing being seen as a very interesting solution for many different things, there are, of course, many different flavors of storage from fly wheels, to batteries, to pumped storage, compressed air, many different applications that can be put forward to solve. Some of them can do multiple things; others are kind of limited. I'd like to see where you think this could fit in terms of using this technology to extend the life of existing rights of ways.

MR. MORRIS: Okay. Thank you. Again, I'm Alex Morris. Thanks for having me here. I'm the policy director from the California Energy Storage Alliance and was going to just talk a bit about the roles for storage here and kind of frame up a bit of how I think storage is possible. What I'm hearing from my fellow panelists, is that you may have worked in the trenches and you are really dealing with the problems, and I really echo Carl's views that it's probably harder than those of us outside really, truly understand. And transmission from my point of view is often confusing just because it's targeted at contingency planning in many ways. And to the outside observer, we can't always see what those contingencies are, how those affect power flows, and so it's not intuitive to the sort of outside observer. So a bit about energy storage and CESA, you know, we're just a trade group, nonprofit group based in California here focused on making storage part of the tool kit. And as Carl mentioned, storage is arising in many frontiers. But on the transmission frontier, it hasn't quite, I think, propagated into sort of the main tool kit yet. And we're confident that over time, you know, if it's competitive, it will. And just a bit about storage. You know, the way you think of it is, you say, well, what problem am I trying to solve, that's the first step. Because otherwise storage is many

different technologies capable of doing many things. And in the world of transmission, it's about, you know, managing the delivery of electricity through -- so that load is met and, you know, fundamentally at the high level that's really what it's about.

And so how can storage do that? I have some slides here on some of the benefits of storage providing nonwires -- as a nonwires alternative which is our current phrasing for storage as transmission or storage as a distribution asset. And some of the ways you can think about it is that storage can help modulate the flows on it, on a traditional transmission line or solution, and so it can avoid infrastructure siting concerns. And then another key part of storage is that, you know, when you're not using it for transmission, it can do other stuff. And you can't often say that about other transmission resources, for instance, an empty line is just going to be sitting there as an empty line and not utilized. But a storage device may have potential of doing something else, even though jurisdictionally that's a complicated issue. So I call that multiple use applications.

One thing we know about storage is that it's shown that it can be deployed relatively quickly compared to other solutions and in a modular fashion. And so that helps address a tremendous amount of the uncertainty that

I've heard from some of the planners on the panel that you're trying to make your best guess of how to solve a problem, but it's inherently uncertain. And so when you present that to a regulator and ask for approval they may sort of second guess your assumptions. And so approaching it in a more modular fashion can often work around that.

And, I think, finally there's easier local siting and access. We have an engineer on our team who has worked in Australia, and, you know, transmission lines in Australia are very remote and they, you know, so big issue in his mind is, hey, you don't want to send a crew out to the transmission line because that's like a 500 mile helicopter ride or something like that. So, you know, when you have storage and it's able to sort of adjust and be sited more locally, you can solve the problem without having to send a crew to a remote area, in some instances.

And just to let you know where it's at, the next slide talks about a quick case in Presidio, Texas where -- maybe not unlike some of what I've heard here -- there's an aging -- sagging, aging transmission line. It was very sad. And so they said, okay, what are our options, and, you know, we need to get power to Presidio, Texas, no one doubts that, and should we upgrade the line which we do. And where they landed was that if they shifted the load through this storage device it can help with power quality

and then also arbitraging the congestion they were able to avoid upgrading the line. And a key example for this is that you know imagine the load is highest in summer, and so you really just need a solution for two months of the year and otherwise the transmission line is fine. Why should you pay for a 12-month a year solution, when you can pay for a 2-month a year solution. So that type of optionality I think is embedded in storage as a transmission solution.

And then some other key, I think, very noteworthy takeaways is that it took two years from commissioning to operation. So that's my understanding is pretty darn fast in the transmission world. And then they also sort of, I think, made some progress on this jurisdictional split rate issue, where if you have a storage device that's going to be jurisdictionally sitting as a transmission resource, which in California it means it has a cost recovery kind of rate base structure. But then you want it to jump out and work in a merchant market place structure, how do you do that in a way that is reasonable and nondiscriminatory and fair to rate payers. And, so, Texas developed this split-rate structure and, you know, that's another frontier where I think California is very well positioned to tackle that. And even going back to I think it was 2010, you know, California was on the front lines of looking at storage as transmission with an issue -- a case called the western

grid case. And so we're not unfamiliar with this, but I do think it's really something we can continue to work on.

And then, finally, I wanted to speak on this last slide a bit about the narrative of multiple-use applications and storage. And, I think, and, you know, this is my projecting that. Planners inherently love a wire that's going to be available all the time. It makes you feel relatively certain that the resource will be there when you need it, you know. And that's kind of the narrative for transmission is, you know, better be there when you need it and that's how you plan the system. And then when you think of a storage device there's some dubiousness and questions that come up, hey, will it really be there when we need it, what if it's going to try and do something else. And so, you know, we're trying to look at that concern. And I think one way to approach it is, well, are the transmission lines really available all the time? And, you know, this is just a simple snapshot, not saying this is the best data for the case, but, you know, you can see from this NERC filing chart that, yes, transmission is often not there and you can also see that a lot of it's not there in the summer, which presumably is the harder time for the transmission system in many areas of the country.

And, so, I think it's a bit premature to sort of dismiss a solution that's in a multiple-use application

because you're worried it won't be there when we know that utilities have outages, they all have SAIDI and safety outages, and that transmissions go on service both -- they go out of service both as forced or planned outages, you know, with great regularity and predictability and yet we're comfortable with that because we know it.

And, so, my final point to wrap up is, Neil, I heard you mention, you know, there's still this paradigm shift that's occurring where we're still kind of in the old world and we bench mark against the old transmission solutions and you kind of have to outcompete the old solution to prevail, so to speak. And I think, you know, I do see that transmission paradigm shifting, and so I really appreciate that Edison is bringing, you know, the transmission planners of the future here. And, you know, hopefully storage will continue to sort of feed into the options you look at.

So that's all for me. And I have an appendix slide about just another specific storage solution, which it's a FACTS -- a flexible AC transmission system. And, again, it's just like another optionality based thing. It like replicating an existing transmission solution, but has some extra functionality and if we can jurisdictionally accommodate that, and if it was cost competitive, gee, wouldn't that be great. So this is more info on that.

MR. ZICHELLA: Yeah, it's a chicken and egg situation with some of these services because we don't have products for some of them. We don't have a way to compensate people for them. We've taken a lot of the services that the grid takes from existing generation for granted. We don't compensate them. It's kind of bundled in the electricity price, whether it's voltage support or frequency response, or those sorts of things. And I think that when we look at -- and I'm going to open this up in just a minute. If you guys want to ask each other questions too, I encourage that.

But before I leave you, Alex, I wanted to throw a few thoughts out about storage. First of all, DOE is really exploring this issue and what its role can be in grid modernization right now there's a bunch of work happening, if their budgets aren't reduced to ashes, they will be able to continue that work. Good news is I doubt the president in his budget is going to succeed. The bad news is they're going to be very frugal in how they move forward because they're not sure what they will get. But they are looking at how these applications will definitely begin to penetrate. I know EPRI and other are doing a lot of work also in these areas too.

When we talk about adoption, you know, the biggest thing has been cost. You know, we're still in a

supply curve that scares people, although the learning curve on these are really happening pretty fast, whether we're talking batteries or other technologies, costs are coming down fairly rapidly. We went through the same thing with solar when we did the first RETI process. We had to change the supply curve for renewable energy resources twice before we were even done with the process and we were still off because prices were dropping that fast, especially for PV. So, you know, there is this issue of trying to understand when they actually become competitive, and what is it worth paying the premium upfront to help make that happen. And that's a policy question. And California's obviously dove into those waters already.

There's a question of stacked values, and I think you sort of touched upon this, they can do many things but the compensation structure for those many things is not in place. We're not sure. Is it generation? Is it transmission? You know, what are we going to -- how do we monetize the various things that they can do to help increase the value of these resources.

You mentioned what Texas had done about the split-rate as one approach for that. I was wondering if you had some thoughts about what California ought to be considering in terms of taking advantage of what we've learned from the Texas experience. We did adopt their CREZ

process in RETI. As much as I hate to admit, we learned something from Texas.

MR. MORRIS: Very generous.

MR. ZICHELLA: You know, I thought, you know, you might have some insights there into how they're dealing with this monetization issue.

MR. MORRIS: Yeah, I don't know the specifics, but I do know that it's doable. And a very simple example is, you know, how much of a resource cost should be embedded in the TAC; right? Because fundamentally you don't want to have cross subsidization between those two worlds under the current construct. And so, you know, sort of simple example of that split-rate treatment is you say, hey, we have a storage device here with these characteristics, we're willing to -- someone needs to operate it for eight months a year, they can take all the revenues from that. Come all you bidders for that. And so people will bid and say, hey, I think with that device I can make this much money or that much money and they'll bid for that. And then you take the money you recoup from that and you offset your TAC amounts so that you reduce the amount that the transmission side of the equation is paying.

So, there is a way to do it through a market structure, again, it sort of involves one, two steps. I

think for California it will be unclear jurisdictionally who would manage that. But conceptually from a rate-payer point of view, you know, it's a great idea is that, hey, let's save some money and get our transmission system, you know, workable in the right ways. It just seems like a great thing. And if all it takes is some creative thinking on what the market and jurisdictional process are, I think we can solve that. You know, Texas on the one hand does have it slightly easier in that they're kind of self-contained island grid without needing it to go to FERC and sort of abide by some of those additional jurisdictional hurdles.

MR. ZICHELLA: You know, they don't have the geographical diversity that we may have access to in the Western Interconnection because they're FERC allergic.

You batted the ball sort of into Neil's yard a little bit, and I wanted to ask Neil, you know, when we think about this, the system is constantly changing right now, things are coming out of the system, we're seeing power plants retire, we're seeing inertia shift to different areas or finding different ways to meet the kinds of grid support needs that we have. All this affects ourtransmission needs, are right of way usage, and the expected build that we have. As you see the system constantly changing, and I want to just mention, because

people may not realize it, how much innovation that the ISO has tried to do to help integrate some of these technologies. Four, five years ago they had a battery storage test project to try to find what would a tariff might look like there. They're not as stultified as people may think, maybe not as aggressively innovative as I would like sometimes, but I have to say I think no one has a finger better on the pulse of what's needed to keep the system whole as it's changing. And not being in denial that it's changing but looking forward as to where it's going to go.

So, Neil, you know, as we look at these changes, what kinds of technologies do you see on the horizon? And do some of these things -- this industry is so conservative and understandably so at the reliability of the thing that your entire economy runs on is held hostage to it. But we still have to think about how we're going to get to where we need to go and what new things to bring in. It's not a great place for innovation, this electricity space. Although we're doing it more now.

What do you see, Neil, in terms of, are there new technologies that can become viable, or some of the ones we talked about today that are really on the cusp of adoption, you know, what does your crystal ball say?

MR. MILLAR: Well, I think there are -- thank

you, Carl. I think there are a few technologies that really are, as you said, on the cusp. You know even when we're talking about storage. We're recognizing now that there's -- we're planning on through our stakeholder catalog of initiatives process to get this issue of how we address storage that might be a little in rate base and a little out of rate base to get that on the table and see how interested the stakeholders are on jumping on it.

One of the reasons historically we hadn't seen that need to press forward on that particular issue from a policy level was we did see that storage as a local capacity resource was actually working. So unlike a lot of jurisdictions we actually were seeing storage moving forward connected to the subtransmission system everywhere from 10 to 30 megawatt batteries proceeding as local capacities. So there was a vehicle that was working that might not have been how some people felt it should be, but it was getting what we needed. Some of the purely transmission are storages are rate based item as a mitigation for transmission. We've had unfortunately a lot of proposals where they were the preferred resource but they didn't actually meet the technical need. So those were all -- actually disappointing because there was nothing worse for us than to have to study these alternatives and say, you know, nice try but that actually

isn't meeting the basic reliability need. We need more hours. We need more capacity.

One issue that we faced when we studied a number of projects was simply that you had to get that line back in service by night or else you wouldn't be able to recharge and have it for the next day. So looking at fundamental things like, okay, you've got one cycle, then what, was an important part.

So this is an issue that we do see the need though as the local capacity model might come under more pressure, especially with CCA's on the horizon. How will that work? So we do want to see what needs to be done on that issue.

But in terms of the other technologies, you know, the Oakland plant is a potential retirement where working with PG&E we are exploring how we can make a basket of resources work. We've already indicated to stakeholders that should that plant move to retirement, on an age issue, that we are not intending on moving forward on a major transmission solution. We see some inside the substation work that would help with some of the multiple contingency issues. But the larger contingency issues we would be looking for preferred resources, and that's going to be a great proving ground for how can we operationalize these. Because that's actually a key issue. Having them work on

paper and having an operational solution that the control center can rely on is very important.

Now, in that context, we see a lot of these solutions having possibilities. Given the amount of time I have to admit that we sunk into the Old Town-Mission alternative, we were disappointed that we weren't able to get that over the finish line. We saw it being a good project on its own merits, and we also saw it being that critical getting your foot in the door where integrating a new technology generally includes some level of startup. There's some new tools that are acquired for implementation, there's new stores sparing strategy and so forth. You know with Edison, with the ACCC conductor they found a project that’s big enough to justify the rest of the infrastructure that goes along with introducing a new conductor class. So that's great. Once it's established within that area it creates more opportunity. So we're not there yet on the Smart Wires technology but we have to keep looking.

We do see, and this is one of the things our group is really having to focus on, is instead of saying, well, this is just as good as a synchronous condenser or just as good as a conventional resource, we're really having to dial back to look at what are the fundamentals that the solution actually needs to address. When we're

talking about inertia is it that we really need an inertia-like governor response, or is it that we've been counting on some fault current in the area so that the rest of the protection and control works. So we really do have to dissect back to say, well, what is it that we're actually counting on that resource to need and which of these solutions help contribute. You know, inverters can provide excellent governor-type response but they don't provide a lot of fault current if you need to get motors started in the area or need to make sure your protection and controls -- your protections are continuing to work.

So, that's where we've been focusing now is, this year in particular, we're dialing back internally and looking at some of these fundamental issues so that we can better articulate the needs in some of these areas and hopefully get solutions that are more targeted. Not trying to compare themselves to some other solution but actually address the fundamental requirement, right from the get-go.

MR. ZICHELLA: Really good comment, Neil. I think we've seen -- we've underestimated the ability of some of the resources to provide some of the grid services that we need, and, of course, some of the work that ISO and NREL have done with First Solar have helped illuminate some of what's possible from that. Very precise, very fast responses, but, again, not everything you need. When you

need something like reactive power it's very locationally unnecessary, unlike frequency response. So you have to think differently about what's available to you in that location.

So, really good comment.

MR. MILLAR: Can I just add --

MR. ZICHELLA: Sure, please.

MR. MILLAR: -- a tough nut to crack on that though is that while you can get that excellent governor-like response that only works if the product isn't running at its maximum output.

MR. ZICHELLA: Right.

MR. MILLAR: So, backing off even a little to provide that governor-like response still looks like curtailment.

MR. ZICHELLA: Yeah.

MR. MILLAR: It's still lost megawatt hours that could have been produced from a free energy source. So while that's one way to produce that response, it does have its disadvantages when you're watching, you know, free energy being lost --

MR. ZICHELLA: Yeah.

MR. MILLAR: -- to provide that capability.

MR. ZICHELLA: Yeah, there is that head room issue, you know, you can always dispatch down, but

dispatching back up again not so easy.

Does anyone else on the panel want to take a crack at that? That's kind of an open-ended question about where you see things going.

I can see Tom was a -- the wheels were spinning there, Tom. So I want to see what you've got to say.

MR. BIALEK: Sure, no problem.

So, I'll sort of walk back a little bit. You talked about, you know, why is it hard, why aren't the utilities more innovative. And, I think, it really sort of comes back to providing, you know, we're the entities that are seen to provide safe reliable service. And if the system collapses or if there's an issue, then what is the -- if we apply some of the innovative technology and it doesn't work, what are the consequences? If the consequences of failure are that you are going to be punished because of taking those risks, then you can guess that the reality is you're not going to take those risks. So, the question is, what is the environment that allows you to be innovative and how, you know -- and if you are innovative and something goes wrong that's one thing, but if you're innovative and something doesn't, you know, goes right it certainly helps everybody along. I think what you see sort of, you know, following something that Neil was saying, if you look sort of the -- and Wendy mentioned this

as well. If you look at broader DER kind of alternatives that could potentially displace transmission alternatives, et cetera, you get into scenarios under which there was a set of criteria that they have to align to, I mean, certainly size, place, location, performance sort of guarantees, but then you get into what is the individual's incentive, you know.

So, for example, we have lots of discussions on the distribution side about, well, if you move people off of their maximum power point tracking and push back on their power production, well that's an impact on their bill. And they look at that and go, I'm not going to do that. Why would I do that. So, there's this whole question about sort of rates and rate design, how does this -- how does this stuff flow through, you know. Is there values for services that traditionally we're not valuing today that we are bundling. We certainly do that on the distribution level significantly, and I know we do it on the transmission level as well.

And, so, when you start to think about if you unbundle those and that's accepted, then other services can be provide and there would be other kinds of resources available to provide those services perhaps, better than currently existing resources.

And so those are some of the challenges and it

really does require people to stop and take a step back and think about this in a little bit different fashion. And so that's one of the challenges. And I think, you know, Kevin brought that up as well. How do you get people to -- who have been doing the same thing for thirty years to suddenly say, well, no, I might be able to do it a different way.

MR. ZICHELLA: I think the main dynamic is the system is changing and changing quickly. So, you know, doing what we did for thirty years may not be the viable option anymore. But being that you mentioned it, Kevin, I wanted to come back around to you, Kevin, because I know Edison has been a leader in trying to unravel and unpack sort of the distribution system challenges of DER's coming into the system. And also try to make that much more visible and much more controllable and; therefore, much more able to contribute to the operation of the bulk system too. There's a communications issue and a management issue that I know you've been struggling with and, of course, you had a lot of issue with CCA's drawing load away. But you still have this basic pioneering attitude to -- really some fundamental changes to how the distribution system is put together and operated that I think is really interesting. And a transmission-distribution system interface really makes a big difference. If we can get more support out of the distribution system it may enable us to get more out of

the bulk grid and; therefore, more out of our existing rights of way. So I realize it's kind of a bank shot but it is related right now as all of things are. Your views on what your work on the distribution system upgrades and how that might translate into more of an interface with the bulk electricity system.

MR. RICHARDSON: Thank you, Carl.

I think it's definitely a good avenue to pursue and we are pursuing it. But just at this stage I think we're still pretty siloed between transmission and our own distribution unfortunately.

MR. ZICHELLA: Yeah.

MR. RICHARDSON: So, I mean, we have -- we've reworked our company to address a lot of those issues, but the people doing the transmission reliability planning studies or the generation interconnection studies or even on the subtransmission level, they're still kind of isolated separate groups. And I think internally as a company we really need to work on that and work more with our distribution counterparts. But I think also, I think, in the rate case we didn't get a lot of our grid mod approved yet. So, I mean, that's a little disappointing because we're definitely trying to go that area and when we're getting signals of, you now, not getting that type of money approved we have to wonder are we doing it the wrong

way, or is, I mean, do people really want this? So, I think, we're still kind of in the infancy of trying to get there, you know.

MR. ZICHELLA: Thanks for that, Kevin. I know it's difficult. One person's silo is another person's cylinder of excellence, of course. So, you know, it's difficult sometime to break those down because people are used to working in the milieu that they work in and they've actually done a good job. So I say that half in jest and it is really true. I mean, we've come to the level of reliability that we're at because people did really focus in on -- and we had a much simpler system to focus in on at the time. So, anyway, thank you for that.

Any other thoughts? I see Alex you have a hand up.

MR. MORRIS: Yeah, so I think going back -- this has been a great discussion. A key point I'm thinking of in my mind is with the transmission discussions what problem are we trying to solve again. And as you all know, you know, there's different buckets of transmission. There's our main reliability bucket, which I think is what we've focused on. But there's also this policy bucket which is from a transmission perspective what's the smart investments to make to help us achieve our, sort of, renewable policy goals. And anyone who's participated in

RETI knows kind of there's a lot of complexities about how you think, you know, what's the right mix? Where's the good renewables? How much is the transmission upgrade? Is that the right approach? And, you know, we want to see the future and make smart decisions and I commend that. I think, you know, one area where jurisdictional issues show up though is that if you have solar sited in a perfect site but it's, you know, kind of upstream on a skinny transmission line, you know, then you kind of say, okay, jurisdictionally the generator needs to -- does the state want to pay for a policy upgrade, or should the generator have to pay for some of those upgrades to be fully deliverable, or do we want storage upstream of that so they can essentially be fully deliverable but you never have to upgrade the transmission. And so I, you know, I continue to wonder if we have fully dialed in our analytical process to think about this array of options for the policy solutions.

And another key issue I wanted to mention is that, you know, if you go back 50 years and you said, hey, you know, it looks like we need -- we have ten new houses in this area, you know, how are we going to serve them. The utility would say, should we have some new transmission, should we build some local gen, what's the right mix? And they can compare and contrast those one --

against one another.

And now just because of the way we've approached deregulation, transmission is in its own category, and then and as Neil mentioned, hey, it's pretty nice when the local RA make sure the gen is cited locally enough so that you don't have to worry from a transmission perspective. But we don't necessarily, as I can tell, have that head to head competition between the transmission solution and the gen side solution. And storage seems to do that but the one key is then you just have to define, hey, is the storage operating in this jurisdiction or that jurisdiction. But really what it is, is allowing sort of gen style resource to compete with the wires resource.

MR. ZICHELLA: That's a really good point but I also think though it’s very clearly a transmission resource and some of the applications as you mentioned --

MR. MORRIS: Yes.

MR. ZICHELLA: -- before there's all these different flavors. A great example of what you just talked about in terms of strategically locating transmission is a proposal to build a compressed air electricity storage facility at Delta, Utah. It's a well-proven technology. It's been in service, although at a smaller scale, for many years looking at doing 1200 megawatts of it at Delta, taking the coal plant out of service, one of the best wind

sources in North America, just upstream from there it's a -- obviously, variable though high capacity factors. You have a great opportunity there at --biggest salt formation in the west that captures a lot of that excess wind when it's at a really good price and keep that transmission line that was built for the coal plant at IPP operating at a good utilization factor in basically any hour you want it to. It's a wonderful idea but it may not happen.

MR. MORRIS: And why's that? I mean you sold me.

MR. ZICHELLA: You know the reason it may not happen is because it's outside of the box --

MR. MORRIS: I see, okay.

MR. ZICHELLA: -- you know, it's not a traditional look at a resource choice that people have made because you just don't see them, right? How many CAES projects do you really know about in the west? There aren't any. You know, there's one in the Eastern Interconnection that's been working, in Texas they want to employ them. But it hits a specific need about transmission line utilization and resource wheeling that, you know, is not that common.

So, it's just a great example of what you were talking about earlier, and one that I've been keenly aware of. Because I've been a supporter of having that project analyzed at the Western Electricity Coordinating Council

because it was even a struggle to have them analyze it, because it was not something that was, you know, commonly in their wheel house so.

Was there another question?

MR. MORRIS: Let me just wrap up.

Yeah, and that's where I think the IEPR can play a key role of saying, hey, you know, we, the State of California, think this is a problem, we need to be thinking smartly on, and here's some recommendations which agencies can be on point, et cetera.

MR. ZICHELLA: That's a good one. And the transmission line actually delivers power into the heart of Los Angeles basin. So, it's a good one for California to think about.

Wendy, you were itching to say something?

MS. ZHANG: Yeah, just to compensate of what this same topic. When we think about transmitting only wire solution [indiscernible] transmission solution. And that's maybe for many years we think that way after the deregulation generation. And the reason I think more and more people think about wire and the nonwire solutions. And, of course, it's going to take some time for like a transmission planner gradually to start to like to put a nonwire solution as wires alternative. But I see that's -- more and more people think has been educated to think both,

like wire and the nonwire. Of course, the nonwire not only generation that including a bunch of maybe energy storage or generation, new technology, a bunch of things that call nonwire solution.

And as Neil mentioned, in the PG&E we have the 15 projects put on hold and re-scoping the project. And in that re-scoping process we going to consider nonwire solution. And, so, it just going to take some time for people. You need to educate people. And also when we really implement there is there are advantages.

I think Tom mentioned something and I also mentioned something. A lot of the things we need to consider and that's more than regularly we do our normal, traditional transmission planning. For example, if we propose project when we identify a need, we just -- we using the ISO approved base case that's either 1 in 10 or 1 in 5 peak load base case. We run -- that's just one scenario. We run the base case we found, oh, 10 percent overloads we propose in our projects. But in order to implement, for example, energy storage or DER we need to look at very deeply much more information, not only just look at base cases, what is modeled, like what is modeled in the base case.

The four major things we need to look on the load -- only on the load side is, for example, the peak

load, the timing, frequency, magnitude, duration. So all this different characteristics of the load we need to look really, really deeper and to make a decision whether energy storage could be a better fit. And how to size, right sizing of the energy storage. So the overall, if this is cost effective solution, I think utilities willing to look at it and we already do it more and more is starting to do it.

MR. ZICHELLA: Yeah, I think, Wendy, what you said a little earlier about usually there's not going to be one choice, there's a menu of things that we may need to do, there's a variety of things that have to work in concert with each other.

Just this past week BPA announced they're abandoning their I-5 project, which was really high on their list of needs for a long time but they're dropping it in favor of nonwire solutions. And they have a long history, I think, probably close to 15 years of doing nonwires transmission analysis and making judgments about which lines to build on the basis of that. If we can get what we thought we were going to get, we won't build the line. It also helps you justify the line that you eventually need to build, if you do that. It's much easier I think if you have a transmission need and you've gone through that exercise.

I wanted to give Tom and Tony a chance to add, and if they'd like to, and then I'd like to open it up to questions from the audience and on the phone. We've got about, I think, 25 minutes or so. And the first couple of panels we weren't able to incorporate any of the feedback from folks in the room, so I'd like to try to give folks here a shot.

So, Tom or Tony, any thoughts you'd like to add in on this conversation or directions we need to think about?

MR. BIALEK: And I'll put it this way. This morning we, again, we saw a lot of sort of multilayered views of what the world looks like. I think people need to also understand that for a transmission planning perspective it's also a multilayered view. A very technical multilayered view but it does take a long time to necessarily go through some of all of these alternatives. And that a one size -- while a technology may work in one particular area, it may not work in others for a variety of different reasons. Foot print is one. I mean, we've deployed a lot of energy storage. You look at where is the available space and you look at that and go, well, how can I -- where's the free available acres that I have that I can site which will get me around some of the permitting issues that might otherwise have to do if I have to build

brand new infrastructure -- green field infrastructure. And, so, it's in the context of looking at this and trying to understand how we can apply technologies. Technologies enables us to look at these kind of alternatives to try to understand what we can do when we aren't constrained. But they certainly -- we certainly need to think about them in the context of, as we plan and go forward, that they're just another tool in the tool kit that we really do need to look at. Really do need to say, well, isn't this a better alternative than what we've done traditionally.

MR. ZICHELLA: Tony?

MR. DELUCA: I just wanted to add that I think some of the things that I worked on in the past, I was surprised that the transmission system was often times considered to be completely separate from the distribution system, that was really good point. And there really was an a-ha when people said, hey, this actually works, they actually do flow across the boundaries. And there's a lot of regulation and a lot of thought and work that's been done on the transmission side to make sure that we have four second data, received at the control center, there was a lot of automation already in place, there's all kinds of sexy things that are happening at the transmission level and smart grid and all these activities are all about automating things at the distribution level. And I will

say having peeked under the skirt there, it's not really ready for some of that stuff. And volumetrically it's a huge amount of things that you have to do to implement these things. And the reason I mention that is when you start talking about DERs and landing resources down at perhaps the distribution level, what kind of an impact is that going to have and who's going to pay? Because it's really going to float up. If you want to aggregate a whole bunch of things and then roll that up and make use of that at the transmission level, what does that do? So that's only --

MR. ZICHELLA: That's a good observation. Of course, a lot of the investment that we've made over many decades we've been living on for a long time and we're in a big transitional period, and a certain amount of system investment that's going to be required no matter what we do at this point. We're on trends that are not likely reversible with variable generation coming in and a lot of base load falling out because it's not able to compete in markets, even bilateral markets in many cases.

Alex, can you -- you've got a quick one because I --

MR. MORRIS: Yes, just one final point.

MR. ZICHELLA: Okay.

MR. MORRIS: I just wanted to add. I really hear

that the work you guys do is complicated and hard and I recognize that. I wanted to mention that there's a learning curve that's normal, and I don't mean to pick on San Diego. But as part of the CPUC's direction for San Diego to procure storage, you guys looked at a distribution substation deferral project, which I constantly get the substation wrong, I call it Jamacha, but I think I have that incorrect, so. But I think that one of the lessons learned was that, you know, you guys initially spec'd out the RFO and said, hey, we want some storage to help us with a substation deferral and here's the operating specs. And the numbers came in from storage and it was expensive. And you said, why is it so expensive? And it's like, well, because the deferral -- the performance requirements were very high. And, so, maybe -- and I think what I understand is you guys were thinking of redoing that RFO to still pursue the same substation deferral but with more modest requirements on the storage device maybe it's not so over-robust of a solution. And so, I think, that learning curve to me highlights that's fair, that's reasonable, you guys should be able to learn and figure this new stuff out. It's part of the paradigm shift that we're, you know, we seek.

And one final point, is that, there was a bill this year that was really designed for that purpose. It

was called Assembly Bill 914. And it essentially said, hey, we're the state, if you're a utility that's jurisdictional to us, we want you to at least consider some nonwires alternatives. We're not saying you're not doing it already, and we're not saying you're not doing a good job, but we want to see you continue to build that capability by -- and force your people to think outside the box a little bit. So when they go into the CAISO's transmission planning process they at least come with a handful of options. And they may not win, they may not be cost competitive, but we appreciate that you're, sort of, figuring this out and going through that learning curve and sort of developing that change in your culture.

MR. ZICHELLA: This is a tremendous conversation. I want to thank you all. This is -- I could go on for hours talking about this. This has been really interesting. But I don't know if we have any blue cards from folks that have signed up.

Somebody's pointing. Karen, do we have blue cards? Are you pointing at -- who's got them?

Oh, okay. And if there --

MS. DOUGLAS: Right, there was one at the dais. Let me look for it while --

MR. ZICHELLA: Okay. Let me then just ask while Karen's looking if anyone in the audience was -- is

interested in speaking who didn't fill out a blue card that I think we have plenty of time.

Is that yours David?

I think I know whose blue card that is.

MS. DOUGLAS: Found it.

MR. ZICHELLA: Okay. David, why don't you come up to the podium here if you don't mind and identify yourself and give us your question.

MR. TOWNLEY: Sure. Thanks, Carl.

Thanks, Commissioner.

Thanks for the opportunity. This workshop really great kind of play off some wires and nonwires opportunities to get more out of the grid. I'll take about one minute to speak to advanced conductors and to grid efficiency as a means of getting more out of the grid.

Advanced conductors, we like to call them high-performance transmission conductors, you've seen that in our comments. We also have heard high-temperature, low-sag, kind of given the historical use of solving the sag problem. So we've heard it mentioned. We heard an application described to Kevin. This class of conductor has been called high capacity, and it is. But within that high capacity class there are some that are much more efficient within that class. And one of these, ACCC, or A triple C, conductor has been third party certified to

reduce losses, generally about 30 percent reduced losses, line losses. And that's at about a cost of 2 to 2 ½ percent the traditional ACSR. So this reduced line loss translates directly to reduced emissions. Sort of the whole backdrop of -- the discussions that we have around. And it also fewer required megawatts of any generator, renewable or otherwise, that goes in, they're just not serving those losses.

So when SCE energizes the line for line replacement that Kevin described, we are all expecting to see about a 30 percent reduction in line losses across that segment. But I want to use that description of grid efficiency to highlight what I describe as an underutilized emission reduction resource, the electric grid. A 30 percent reduction in T&D losses just from California. It's about a one to two million ton per year CO2 reduction. That more efficient grid reduces emissions, it reduces the amount of renewable energy that we need to put on the grid to serve the loads. So the ASK is, please, consider ways to give guidance or to incentivize an appropriate goal of increasing the grid efficiency. As we otherwise go about our annual processes, looking at T&D reliability issues, from both existing and new lines. So some guidance. And I would ask -- it's not a question, but it's a premise, and so if there's some comments on that certainly like to take

those.

Thanks for the opportunity to make a comment.

MR. ZICHELLA: Thank you, David.

Does anyone else like to add a comment in the room? If not, then I'm going to say something that I always get a kick out of saying. Let's go to the phones.

MS. RAITT: Todd Ryan, I think you had a comment. We will open up the line, if you want to go ahead.

MR. RYAN: Good afternoon, I hope everyone can hear me clearly. I'm Todd Ryan with Smart Wires and I just wanted to thank everyone for participating and bringing this forward. I'm curious if some of the presenters -- or panelists would like to comment on some of the benefit they see in advanced technologies and why they're excited about those advanced technologies coming forward.

MR. ZICHELLA: Anyone want to tackle that?

MR. BIALEK: So, it's Tom Bialek, SDG&E. I would just put it in the context of I think something that you had pointed out originally, Carl. If you look at from inception to completion of a transmission line in a new corridor, the costs, the time, the regulatory process, you know, Sunrise, I think, construction took about 2, 2 & ½ years, everything else took the other 8 years, the stack of papers was, you know, 3 or 4 feet high, and you look at that you go, okay, now I want to do something, I've got a

need, is there an alternative. And if that alternative can utilize the existing right of way then why shouldn't I take advantage of it. Especially if it gets me around a lot of my siting and licensing issues that I may have. Because those become ultimately really key especially if you look at it and say if I want access to a renewable rich resource, then what is it that I have to do, and how do I do it, and how can I do that most cost effective stream line fashion, that has the most minimal amount of impact. And so these technologies, whatever those technologies happen to be, provide you the potential for actually doing that at a, you know, more streamlined fashion at a potential lower cost to actually implement.

MR. ZICHELLA: Thank you, Tom. Well said.

Go ahead, Neil.

MR. MILLAR: I just like -- it's Neil here. I'd just like to add in that the flexibility that we see on the transmission system is also going to become progressively more important, you know, Tom -- I'm sorry, Carl mentioned the infamous duck curve earlier and people tend to think of it as a generation issue but they also have to remind -- we also have to remind people that those resources that are back-filling when the renewables are dropping off are located in a different place. So besides keeping frequency under control, we also have to keep the whole grid stable,

voltages within ranges throughout the transition. Normally just a ride through the peak and then watch load drop right back off.

So the operating flexibility of the transmission grid itself is steadily increasing, that's another area we're hoping to see a larger contribution from more new technologies, FACTS type devices and helping us manage that amount of transmission and volatility at a lower cost and certainly without having to put a lot of new conductor in the air just as a hedge because we are having to deal with a wider range of operating conditions.

MR. ZICHELLA: Yeah, it's also one of the reasons I mentioned regional expansion of the ISO as a tool because you do get the opportunity to use the rest of the system that transmission has committed to this system to its full capacity rather than a just contracted capacity. All of a sudden a lot of options open up to you. It's like you get a bunch of transmission just from doing it. So a lot of things to look at. Some of them don't cost that much; some of them are politically costly like expanding the ISO footprint, which we really have to try to figure out. But we've got a chance here to do some things that for the long term give us a lot of value.

Do you have another comment, Neil?

MR. MILLAR: Well, I was just going to build on

that. One of the issues, that obviously for us was a real concern, in the Smart Wires technology evaluation, was one of the concerns at San Diego Gas and Electric indicated in their recent letter to us was that besides the additional engineering challenges and that opening the door to some permitting requirements, they also identified the potential risk that we were trying to mitigate around the potential delay of a major project, and there was a possibility that by needing some permitting requirements for the Smart Wires solution, it could actually open the door to revisiting the permit for the original project. So, if a mitigation solution ends up for a potential delay causes more delay, that's circular, that's the last thing we could afford to risk. So that was another major part in our consideration of the concerns expressed by San Diego.

MR. ZICHELLA: There is a -- and I'm going to call this to Karen's attention. There is a recommendation to really pay some attention to, because it is something we may be able to do in a regulatory context that could avoid that problem of having to reopen a permit to do something that's really relatively minor in terms of a very fast and cost effective solution. So good comment, Neil.

Any others on the phone? Okay. No other questions.

Last chance in the room.

If not, I'd like to thank our panelists, you guys have been terrific. What a stimulating conversation in a rather arcane topic. And I've enjoyed it tremendously of course. I'd become a grid geek so as my friends tell me. They wish I would shut up about this stuff sometimes, but I do find it incredibly interesting. And working with engineers and not being an engineer and finding them to be extremely interesting problem solvers who love a good challenge. Well, we've got one on our hands right now and I'm really glad having listened to you all as planners and engineers that, you know, we've got a lot of the intellectual heft in this state to get it done, so.

Thank you very much. And thanks again to Commissioner Douglas for convening this session and asking me to help. I appreciate it.

MS. DOUGLAS: Well, thank you for offering to help and I appreciate the participation of all the panelists, the public comment, and I think we did establish there was no other public comment but -- oh.

Fantastic, thank you. All right. So with that, I appreciate everyone's participation this afternoon and this morning and we will be adjourned.

(Whereupon, at 3:23 p.m., the workshop was adjourned)

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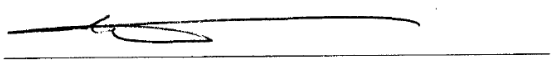

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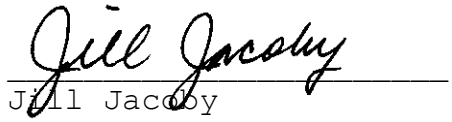

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