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BEFORE THE

ENERGY RESOURCES CONSERVATION AND DEVELOPMENT

COMMISSION OF THE STATE OF CALIFORNIA

CALIFORNIA ENERGY COMMISSION

In the matter of,	)
	) Docket No. 16-RGO-01
	)
Regional Grid Operator and Governance	)

JOINT AGENCY WORKSHOP ON THE PROPOSED

REGIONALIZATION OF THE INDEPENDENT SYSTEM OPERATOR

CALIFORNIA SECRETARY OF STATE BUILDING

FIRST FLOOR AUDITORIUM

1500 11TH STREET

SACRAMENTO, CALIFORNIA

TUESDAY, JULY 26, 2016

9:08 A.M.

Reported By:
Peter Petty

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P R O C E E D I N G S

JULY 26, 2016 9:08 A.M.

CEC CHAIR WEISENMILLER: Welcome to this workshop today. Basically, under SB 350, the California Independent System Operator was given a couple of assignments. And today will be a report on those assignments.

Again, at a very high level, the first one was to prepare Governor's modifications needed to transform itself into a regional organization. And the other was to conduct one or more studies of the impacts of a regional market enabled by such Governor's modifications. Including, overall benefits to ratepayers, including the creation or retention of jobs and other benefits to the California economy, environmental impacts on California and elsewhere, impacts in disadvantaged communities, emissions of greenhouse gases and other air pollutants, and reliability and integration of renewable energy resources.

So, we're going to hear reports from the ISO today, on that. And then, we will take public comments on those reports and the proposal.

We will then give them a chance to respond, and we'll have some discussion up here, among ourselves.

Just to remind everyone, first, that we're going to cover first the studies on the impacts and this afternoon on the governance.

For those of you who are not familiar with the Energy Commission, we have a Public Adviser here, somewhere. Raise your hand.

MR. BARKER: She hasn't shown up, yet.

CEC CHAIR WEISENMILLER: She hasn't shown up.

MR. BARKER: She will be up here.

CEC CHAIR WEISENMILLER: She'll be up there.

MR. BARKER: Yeah.

CEC CHAIR WEISENMILLER: Certainly Kevin, my Chief of Staff. Fill out a card if you want to speak. We'll collect all the blue cards and then call people in order on that. We have three minutes. We're looking for one speaker from each organization in that period of time.

And there will be written comments later so, please, just do sort of a summary as opposed to detail.

And with that, let me turn to Chairman Nichols.

CARB CHAIR NICHOLS: Thank you. It's a new and different sound system. I don't have any opening remarks.

CEC CHAIR WEISENMILLER: Okay. Mr. Florio.

CPUC COMMISSIONER FLORIO: Yes, thank you.

Appreciate everyone being here today. Looking forward to hearing about the studies and, particularly, the thoughts of people in the audience about the strengths and weaknesses, and your thoughts about the basic conclusions.

We don't have any -- this is not an action item for any of the agencies. We're just providing a forum here, today. So, we're learning along with you and look forward to hearing your thoughts. Thank you.

CPUC COMMISSIONER RANDOLPH: I'll just echo what Commissioner Florio said. I have participated in several of these workshops and I am very interested to hear further dialogue and input on the studies, and the detail that was provided. And I appreciate all the work and stakeholder input that went into that process. Thank you.

CEC COMMISSIONER MC ALLISTER: Sure, I've been looking forward to this. I'll just echo what Chair Weisenmiller said. Certainly, in all my interactions with the ISO I have a lot of faith in sort of their ability to take in lots of different perspectives, and look at all the different angles. And looking forward to what the various studies and ISO presentations have in store for us. So, thanks a lot, everybody, for all your preparation and all of you for being here.

MR. BARKER: So, if I may, just a few more housekeeping remarks. We also, as highlighted by Chair Weisenmiller, before we jump into public comment we do have a government official remarks period. So, if you are a member of Government, either here in California or outside California, here in the room or on WebEx, please, if you're in the room come see me. We can set you up for having remarks there. And if you're on WebEx, Tom Cuccia, from the ISO, he's going to explain for both the government, but then public remarks, how to make comments remotely.

MR. CUCCIA: Good morning, folks. In order to make public comments on the web, we would ask that you hit #2 on your phone to enter the call queue, and we'll get you in order that you've entered the queue.

As well as you can hit the raised "raised hand" button on the top left-hand side of your screen. And depending on what application you're using or what type of computer you're using, it may be at the lower left-hand corner of your screen. And you can adjust your screens.

Accordingly, if you do have questions, feel free to send a note to the operator and the operator will be able to assist you.

CEC CHAIR WEISENMILLER: Actually, just to

check, so why don't you also give them your e-mail so, if per chance, the operator and other issues that they can e-mail you.

MR. CUCCIA: Very good. We'll actually have you send them to Kristina Osborne. So, it would be kosborne@caiso.com. And she'll send a note out to you via the chat service, so that you'll see that on your screen.

CEC CHAIR WEISENMILLER: Okay, Keith? Actually, Keith, why don't you hold on one second so we can see if Commissioner Peterman wants to say a few words.

CPUC COMMISSIONER PETERMAN: Good morning.

(Laughter)

MR. CASEY: All right. Well, good morning, Chair Weisenmiller, Chair Nichols, Commissioners Florio, Peterman, Randolph and Commissioner McAllister.

I'm Keith Casey. I'm a Vice President of California ISO and was tasked with leading this effort to study the impacts of the proposed regionalism under SB 350. And we're here today, of course, to present the results to you.

So, I just have some brief comments before I turn it over to the consultants. Chair Weisenmiller touched on the overall scope of the study effort. So, as you know, SB 350 was a landmark legislation passed

last fall, furthering California's global leadership in addressing climate change through very aggressive climate change policies for 2030.

Importantly, and the reason we're here today, is the provision in the legislation indicating the intent to provide for the transformation of the Independent System Operator to a regional organization. And that that transformation should only occur where it's in the best interest of California and the ratepayers.

And as Chair Weisenmiller noted, the legislation called for the ISO to conduct a study on the impacts of a regional market. The scope of that study was quite extensive to look at the overall benefits of California ratepayers, the impacts on emissions, greenhouse gases, other air pollutants. The impact on the California economy in terms of impacts to jobs and other benefits to the economy. And environmental impacts to California and elsewhere. And, importantly, impacts to disadvantaged communities, and the impacts to reliability, and the integration of renewable resources.

And an important requirement of this analysis also was that all the modeling assumptions, detailed methodology would be made available for public review.

So, I wanted to just highlight for you the consulting team we engaged to do this analysis. We have

a very capable team of consultants, with international expertise in these areas. So, I'll just introduce each of the companies.

The Brattle Group was hired to lead the overall study effort. They also had a specific role of assessing kind of the market efficiency benefits that could come from a regional market.

Energy and Environmental Economics, otherwise known as E3, lead the development of the renewable portfolios and quantifying some of the integration benefits.

The Berkeley Economic Advising and Research, BEAR Consulting, lead the assessment of the impact to regionalism on jobs and overall impact to the California economy, including the economic impact to disadvantaged communities.

And last, Aspen Environmental Group assessed the environmental impacts to California and elsewhere, as well as examining the environmental impacts to disadvantaged communities.

So, before I turn it over to the consultants to present the results, I wanted to just briefly go through the study process that we undertook to do this analysis. We really tried to provide a very robust process, with lots of opportunity for public input along the way. So,

I just kind of wanted to quickly walk you through what that process entailed.

So, essentially, beginning in November we assembled the study team. It started with a review of the existing studies that have been done to date on issues of regionalism and renewable integration.

The team developed a set of scenarios to analyze and a study framework. We had a stakeholder meeting on February 8th to walk through the proposed study framework, and scenarios, and assumptions. And we had stakeholder comments submitted on the proposed study approach. We received over 35 different stakeholder comments, which we thoroughly reviewed.

We issued, in mid-March, a 100-page document responding, summarizing and responding to all the stakeholder feedback we received. And, importantly, we made numerous changes and refinements to the study approach and assumptions that you'll hear highlighted in today's presentation, in response to the stakeholder feedback we received.

Moving on, in March, late March we provided additional documentation to the public, highlighting all the details, analytic inputs that were being used. So, there was a lot of technical documentation that was made available to the public.

And we held a webinar in mid-April to review and discuss all the details surrounding the methodology.

And then, of course in May, May 24th and 25th, we had a two-day workshop at the ISO, it was very well attended, to review the preliminary results.

And shortly after that, in early June, we provided all the detailed analytic inputs, data, assumptions were all made available to stakeholders. most of that was public information that stakeholders could access at our website.

There was a small set of it that, due to confidentiality restrictions and critical infrastructure information, could only be accessed with a nondisclosure agreement. But that's a very straight forward process. We can typically turn around nondisclosure agreements in a few days. So for those who wanted that very detailed confidential information, and many did, they had easy access to that.

And then, subsequent to those data releases in early June, we had a lot of requests for additional details. People were reviewing the data, had questions and clarifications. So, throughout the latter part of June and early July we provided additional detailed modeling assumptions and explanations.

And on June 21, we actually held another webinar

to walk through some of the detailed analyses we did on assessing the ratepayer benefits.

The comments we received, in late June we had over 33 different stakeholders comment on the preliminary results. And we had an opportunity to take that input into consideration in refining and finalizing the material.

And I would note, in late June we also published a very detailed Q&A response to a lot of the detailed modeling questions we received. That was a 40-page document that was posted on our website.

So the final report, that we published on July 12th, is quite an extensive document. It's 12 volumes, almost 700 pages, just to give you an idea of the magnitude of this. Lots of in-depth analyses and explanations of how each of the key areas were examined.

And in addition to the report, we also published a stand-alone, 150-page document responding to all the stakeholder comments we received. And that was made available on July 12th, as well.

So, I just want to really reiterate that we had a very transparent and robust stakeholder process in producing these results. We took seriously all the stakeholder input we received. We took seriously the charge to make all the study assumptions, methodologies

made available to stakeholders. And as I noted, we did that. And did our best to consider and respond to all the stakeholder input we received.

Now, that doesn't mean that every stakeholder recommendation was adopted. Many were not. And I suspect in the public comment today you'll hear some stakeholders express their concern or dissatisfaction that we didn't adopt a specific ask or recommendation that they requested. But, you know, that's kind of the nature of these studies, you get a lot of comments, a lot of requests. Often, the requests are diametrically opposed. And our job is to process all that and, at the end of the day, make a decision on what we think are the best assumptions to incorporate into the study.

And importantly, to the extent we don't incorporate recommendations, explain why we didn't. And we really made an effort to do that.

I would also note that in many cases we were able to address stakeholder recommendations through sensitivities. And as you'll see in the results presented today, in addition to the base cases that we rely on, we'll try to highlight a lot of the sensitivities we ran to test the robustness of the results.

So, at the end of the day I think we feel we had

a very robust and meaningful stakeholder engagement process. And as you'll hear in the presentation today, you'll see numerous changes we made in response to stakeholder feedback.

So, our goal today is to, you know, present to you the final findings from the study. And I want to introduce the speakers we have. We have representatives from each of the consulting firms here today.

Hannes Pfeifenberger is a principal with the Brattle Group. He'll be kind of orchestrating the presentation this morning.

Arne Olsen is a Partner at Energy and Environmental Economics. He'll focus on presenting the renewable portfolios and the renewable integration benefits.

Susan Lee is a Vice President of Aspen Environmental Group and she'll be presenting the environmental analysis.

And last, by not least, David Roland-Holst is Managing Director and Principal for BEAR Consulting and he'll be going over the impacts to the California economy.

So, before I turn it over to Hannes, I did also want to acknowledge and recognize Debbie Le Vine. She's a Director at the ISO and just did an amazing job at

leading this overall effort. We wouldn't be here today without her. So, thank you, Debbie, for all of that.

So with that, I will --

CEC CHAIR WEISENMILLER: Actually, Keith, I was going to ask you a few clarifying questions on process.

MR. CASEY: Sure. Yes.

CEC CHAIR WEISENMILLER: So, first of all, how many parties signed the NDA, roughly? Or, if you don't know, you can just --

MR. CASEY: I'm guessing we probably had a dozen to 20, around there.

CEC CHAIR WEISENMILLER: Okay.

MR. CASEY: I signed most of them, so I'm ball parking just based on my recollection.

CEC CHAIR WEISENMILLER: Okay. You talked about critical infrastructure.

MR. CASEY: Yeah.

CEC CHAIR WEISENMILLER: So that is -- is that a Homeland Security requirement?

MR. CASEY: Yeah, yeah.

CEC CHAIR WEISENMILLER: Okay.

MR. CASEY: We do have NRT standards for protecting information. I know I'm hearing chuckles in the audience, but the details of the electric grid are highly sensitive. And, you know, it's something we have

to be careful and guard, and we're required under Federal standards to protect it.

CEC CHAIR WEISENMILLER: No, I've struggled with that in siting cases to try to make sure that your interconnection studies that --

MR. CASEY: Yeah.

CEC CHAIR WEISENMILLER: -- you know, certainly the applicant has access, some way of trying to have a public discussion --

MR. CASEY: Yes, right.

CEC CHAIR WEISENMILLER: -- realizing the constraints on that.

The next question is how many -- or, I guess, let's start the framing this way. Who asked the most discovery questions?

MR. CASEY: Oh, you want me to reveal names?

CEC CHAIR WEISENMILLER: Yeah, sure.

MR. CASEY: Well, I would say, without a doubt, TURN --

CEC CHAIR WEISENMILLER: Okay.

MR. CASEY: -- it's an advocacy group. We received seven data requests from TURN.

CEC CHAIR WEISENMILLER: Roughly how many questions, roughly?

MR. CASEY: We're guessing around 75 questions.

CEC CHAIR WEISENMILLER: Okay. And who was next?

MR. CASEY: You know, they were really an outlier. I think, you know, we received follow-up data requests from -- the CEC had some questions we followed up with.

CEC CHAIR WEISENMILLER: Right.

MR. CASEY: LSA, Large-Scale Solar, had some questions. Not so much data requests, but specific questions about modeling assumptions. Help me out here, guys? I'm sorry? Union of Concerned Scientists also had some data requests.

And I would note a lot of those, too, in addition to providing the data, we also had conference calls to, you know, kind of walk through what they were wanting and understand -- you know, tried to help them as best we could.

CEC CHAIR WEISENMILLER: Okay. Thanks, that was the major.

MR. CASEY: Okay. Great, thank you.

CEC CHAIR WEISENMILLER: Okay.

MR. PFEIFENBERGER: Good morning. My name is Hannes Pfeifenberger. I'm with the Brattle Group. Thank you for having me here.

In case my accent sounds familiar, I grew up in

Austria, like other people in the State, yeah.

(Laughter)

MR. PFEIFENBERGER: I'd like to give you a brief overview of the study design and how the various modules, and the assignments to each of the four consulting groups fit together.

First of all, a table summarizing, briefly, what we've analyzed. These are the six specific requirements in SB 350. The overall benefits to ratepayers, the greenhouse gas and other air pollutant impacts, job and economic impacts, environmental impacts, impacts on disadvantaged communities, and reliability and renewable integration impacts.

Our study was focused on California. But as you can see here, in the second column, we have to a fair amount also analyzed WECC-wide impacts. But we have tried to not get into individual other states, or other utilities. Even within California we have focused on California as a state, rather than the individual utilities or regions.

Overall benefits to ratepayers. There are two main components, the operating cost savings, the fuel cost savings, the efficiencies of better planned dispatch. And then the capital savings, fewer investment dollars needed in a regional market

environment.

The metrics, I won't go through all of them. But the cost of producing and purchasing power, net of off-system sales made by California utility, a big factor of the operating cost savings. And on the capital cost savings, we really are mostly talking about reduced investment needed for renewables because the renewables are higher quality or are not as frequently curtailed in a regional market environment.

Greenhouse gas and other impacts are fairly understandable.

Next, there are different analyses that had to be pieced together. We basically had four major thrusts. The one, which is in the upper left corner, is the renewable energy portfolio analysis. In the regional market, on the different scenarios, you have different options of procuring the renewables to get to 50 percent. And E3 has used its Resolve model to optimize that procurement, depending on whether it's more state focused or more regionally focused, in both a stand-alone environment and a regional market environment. And I'd like to stress that even in a regional market you can choose to procure renewables more on a state-focused level.

Once that portfolio was determined, we could get

into the product cost simulation. That's a detailed transmission line-by-transmission line, power plant-by-power plant simulation of the entire western market. And that flows into many of the ratepayer and environmental impacts.

We also took a load diversity analysis because as you have a market that has more diverse load patterns, you actually need less generating capacity to serve the loads in that region.

And lastly, I would like to stress we reviewed about two dozen other studies on regional market and renewable integration and we used the insights from those studies, both as a reality check to our results and in the study design.

CARB CHAIR NICHOLS: Do we have printed copies of the design that --

MR. PFEIFENBERGER: Yes, we do. If somebody could --

CARB CHAIR NICHOLS: Thank you.

MR. PFEIFENBERGER: A quick word on how we used stakeholder input in the study design. We received a lot of very valuable input on our February presentation, on the proposed study design and on our May presentation, on preliminary results.

Obviously, many of these changes were made in

response to the February comments. But we refined the portfolio. We changed the analyzed hypothetical footprint. I'll show you that in a second. We have gone from a CAISO-focused analysis to a State of California analysis. We estimated WECC-wide production cost savings, emissions and load diversity.

We added many sensitivities, including different footprints, different degrees of lateral flexibility, different carbon pricing in the rest of WECC, outside California, a high energy efficient scenario, a high RPS scenario, and a scenario without the renewables beyond RPS that I will explain in just a second.

So, there are probably, a least a dozen or so scenarios that have been analyzed in response to stakeholder requests.

We also updated the case that we started out with, which was a WECC planning case, to factor an additional coal retirement announcements and conventional planned additions. Oregon and other states have increased their renewable portfolio standards. We have factored that in and made sure there is enough renewables in the whole region to satisfy all the states' standards.

We changed the reserve and load following requirements in accordance with the renewable build out.

We've included the municipal utilities, California's requirements. And we updated all input assumptions to be consistent with the CEC's 2015 Integrated Energy Policy Report, the CPUC's 2016 Long-Term Procurement Plan, and then the renewal of the Federal Production Tax Credit and ITC.

Quickly, on the footprint, we analyzed a small footprint near term, 2020. It doesn't have to be 2020 per se, but 2020 as a proxy for the near term, the initial start of a regional market. That just includes CAISO plus PacifiCorp. Those are the red circles.

And then a larger footprint for 2030, when 50 percent renewables need to be procured in California. And there, initially, we wanted to analyze the entire U.S. WECC. People felt that it was an unrealistically large footprint. So, we created a hypothetical footprint that is less than the region and that, in this case, excludes the federal power marketing agencies. It's not an indication that we know whether the power marketing agencies would be a part of the regional market or not. As you know, WAPA in fact has joined the SPP in the east. But just for the illustration, a large regional market that's less than the entire western power market.

And lastly, in about April of this year we

received data from the Berkeley, Lawrence National Lab, on renewable developments in the west and the rest of the country by region. And it shows, which is consistent with studies, finding that regional, not regional markets, that include low-cost renewable areas have developed renewables much faster than other regions.

And you see here that in the Midwest, in Texas, in the last five years we have about 16,000 megawatts of wind developed, just in the last five years, that goes beyond any renewable portfolio standards. This has not happened in the west.

And based on this data, we have also made a similar assumption that this facilitation of regional market to develop renewables would also happen here. And we've conservatively assumed that about 3 percent of additional renewables, serving about 2.6 percent of retail sales, would be developed in the west as part of the regional market. And we think that's a conservative assumption.

With that, let me turn it over to Arne Olsen to talk about the portfolio selection.

MR. ARNE OLSEN: Thank you, Hannes. Good morning, Mr. Chair, Madam Chair and Commissioners. I'm Arne Olsen and I'm a Partner with E3.

And my section is on the renewable portfolios, under a regional market, that would help California to meet its 50 percent renewable portfolio standard targets.

And I just want to say at the outset that this is an -- the portfolios that were -- that I'll describe are to help California meet its 50 percent RPS. So, as Hannes mentioned, this has really been a study that's focused on the benefits to the California ratepayer of a regional market.

We haven't, here, tried to go and say how would a regional market help Washington, or Oregon, or any other state meet its RPS targets? Although, undoubtedly, there will be benefits to those states, as well. But this is really a California 50 percent RPS portfolio analysis.

So, to do that we developed optimal portfolios of renewable resources and renewable integration solutions to meet a 50 percent RPS. And the model had available to it energy storage, flexible capacity, and other solutions in addition to the renewables, which becomes important as you get to higher levels of penetration.

Renewables are added to meet the 50 percent RPS target. And the target is met in all cases. We do find

that in some cases there's curtailment of renewable resources because there simply isn't enough load, or there's over-supply conditions and we can't absorb all the renewables. And in that case, the model over-builds the California renewable portfolio. It builds in more capacity to make sure that the delivered quantity of renewable energy actually meets the California 50 percent RPS target.

MR. AGUIRRE: Excuse me, do you have any numbers to go along with this?

CEC CHAIR WEISENMILLER: Wait. We're having the presentations now. We're not taking questions from the audience. You'll have your comment period later.

MR. AGUIRRE: Do you have a numbers here?

CEC CHAIR WEISENMILLER: Well, please, as I said right now we're not taking comments or questions from the audience. Thank you.

MR. AGUIRRE: So, there's no numbers, I guess --

CEC CHAIR WEISENMILLER: Let's -- thank you.

MR. AGUIRRE: Do we have those?

CEC CHAIR WEISENMILLER: There's volume somewhere. But again, that's not a -- no comments at this stage. That's fine.

MR. ARNE OLSEN: I'll be showing a lot of numbers as we go through my presentation and Hannes will

have lots of numbers to show, as well. There was a lot of calculations done in the study, believe me.

I want to highlight on the over-build piece that this is really an environmental benefit that the regional market provides. It allows more renewable resources to be delivered to the grid. It allows fewer megawatts of capacity to be built to meet the same RPS target.

Now we're not, in the study, claiming any CO2 benefits from this because, in all cases, we're over-building the renewable portfolio to get the same quantity of delivered renewables.

But this really -- so, we're showing the benefits of this as a cost savings, not as an environmental benefit. But to me it really is an environmental benefit. And I think that's an important thing to keep in mind as we go through the discussion about the CO2 emissions is that this really helps California meet its GHG and RPS targets much more cost effectively.

On slide 17, there are two major effects, we think, of the regional market. And we wanted to test these separately, with different scenarios.

The first effect is just the effect of regional operations. A larger footprint for operations over a

larger part of the west, with load and resource diversity across a large region and we think this gives us increased access to flexible capacity on other systems that may not be fully utilized, today, to help absorb California renewables.

There's a reduction in the quantity of operating reserves that need to be carried to maintain reliability under high renewable cases. Just this effect, alone, it improves the economics of in-state solar resources and in-state wind resources. So just this change, alone, in operations can also have an impact on the optimal portfolio of renewable resources in California.

So, there's a second effect, which is the effect that the regional market has in facilitating access to the highest quality wind resources throughout the west. The model really warrants a diverse portfolio of resources. As you get to higher and higher levels of renewable penetration it's really important to have, and not just all solar resources, but to have as much wind and geothermal as we can. The best wind resources in the west are located over here, on the eastern side of the western interconnection and it's very difficult to get to those resources in the absence of a regional market. And, especially, a regional transmission entity that can identify and plan the transmission additions

that are needed to unlock those resources.

So, we test these two effects separately, with three different scenarios, on slide 18. The first scenario is sort of the counter factual, the current practice scenario where we have current practices in renewable procurement and current practices in operations. So, we're effectively looking largely, but not exclusively, at an in-state renewable build out.

In the second scenario, called Regional 2, we test the effect of regional operations, only. So, we still are procuring a largely, but not exclusively, in-state renewable portfolio but we're looking at the benefits that regional operations can have on the construction of that portfolio.

Then, in Regional 3, we now allow an additional quantity of very high quality out-of-state wind resources to be available to be selected for the California portfolio.

On slide 19, I want to take a couple of minutes on a couple of slides to highlight some of the key assumptions that really drive the results. So on slide 19 it talks about the potential for exports of what we call surplus null power. So, under a 50 percent RPS, as I've mentioned, California's going to have surplus renewable energy during many hours of the year. That

means there will be simply more renewables than California load, on its own, can absorb.

So, one potential option for that is to export some of that energy to our neighbors. We think that the ability to -- that California's ability to export surplus null power to its neighbors is going to be restricted under the current bilateral arrangements with 39 separate balancing authorities, pancaked wheeling charges, the need to arrange physical transmission schedules across multiple systems.

And when I say surplus null power, what I mean there is that we want trading arrangements where California can sell energy to our neighbors, while keeping for ourselves the environmental attributes. Meaning both the renewable attribute and the greenhouse gas attribute. That is, after all, why we're investing in renewables for California in the first place is really because of those attributes. So, what we're selling to our neighbors is really a very low value. It's really just surplus energy without the attributes. So, it's difficult to make those kind of arrangements in today's bilateral system.

We've reflected that with two very simple assumptions about the quantity of this energy that can be exported. In the current practice scenario we've

assumed that that's limited to 2,000 megawatts. And in the regional market scenarios, as we've assumed, that that can be expanded to 8,000 megawatts of exports at any given time.

The next slide, slide 20, highlights the other key assumption, especially for Scenario 3, which is the availability of resources for the California portfolio. You'll see that under both the current practice and Regional 2 scenarios we've assumed that there are some resources from out of state that are available to be selected for the California portfolio.

And this is really despite the fact that there's been very, very little of this type of procurement activity over the last several years on the part of California utilities. But we wanted to be conservative and make sure we weren't overstating the benefits of a regional market, so we allowed up to 5,000 megawatts of out-of-state resources to be selected even under the current practice scenario. And for the Regional 2 case, we kept that same supply curve of out-of-state resources, 5,000 megawatts.

For the Regional 3 case, now this is where we're testing the potential benefits of the market in unlocking remote, high quality wind. So in this case we made available 3,000 additional megawatts of wind

resources from Wyoming and a separate, 3,000 megawatts from New Mexico. Again, a very high quality wind. And these are just resources that are available to be selected. They aren't all always picked across all the cases, as you'll see.

And lastly, before I get into the results, I want to assure you that we really went to a lot of effort to make sure that we incorporated a lot of renewable integration solutions into all of our cases. We didn't just assume that California sat here and did nothing through 2030 and the regional market was the only solution. We added a number of solutions, which I've listed here.

We added, across all scenarios, time-of-use rates that encourage daytime use of power to soak up solar over supply.

We added 5 million electric vehicles with near-universal access to workplace charging, with a lot of that EV charging taking place during the daytime.

We added, manually, 500 megawatts of pumped storage and geothermal into all of the scenarios, all of the portfolios, even though those wouldn't have made it in based on strict economics. So, these are integration solutions that we kind of forced in across all of the cases.

We have 5,000 megawatts, as I mentioned, of out-of-state resources available to be selected on a least-cost basis.

We have unlimited energy storage that can be selected on a least-cost basis across all of the scenarios, including the current practice scenario.

And the last two are a little bit technical, but they turn out to be very important, is that we allow the renewables to provide operating reserves and we allow storage and hydro to provide all operating reserves, as well as frequency response. And this section has the effect of shrinking down the stack of thermal resources that need to be online for reliability during all hours and, really, making room for a lot more of that renewable energy under the current practice scenario and all of the scenarios.

So, all these things tend to reduce the cost of the current practice scenario much more than the regional cases. So, these all help to make our benefit estimates very conservative.

So, I have just a couple of slides on the main results and then I'll take you through the sensitivities. So, on slide 23, we didn't have the non-ISO balancing areas in our Resolve model. So, we effectively hand-picked the portfolios for those

utilities and I've shown you what those look like on slide 23. There's kind of a shift as you go from Scenario 1, across to Scenario 3, of procurement from in-state wind and lower quality out-of-state -- or in-state solar. And lower quality out-of-state towards a higher quality wind from Wyoming and New Mexico. And I'll show you, there's some relatively modest benefits associated with that.

Slide 24 is now where the real action is in terms of the model optimization. So, these are the portfolios to meet the 50-percent RPS for all of California, including the hand-picked portfolios for the non-ISO areas and the optimized portfolios for the ISO areas.

So, there's a lot of numbers on this table. So, rather than walking you through all of them, I'll just highlight a few of them. In the current practice case, the model picks all of the available in-state wind, all 3,000 megawatts. So, it really wants to have diversity in that current practice case. Now, it picks most of the northwest wind RECs, but not quite all of them.

If you move to -- and it adds a few batteries. It adds 472 megawatts of battery storage in that scenario.

If you move to Regional 2, the main impact that

you see is a reduction in California wind and a reduction in northwest wind. So, the Regional 2 is not as constrained. It doesn't need the diversity quite as much in Regional 2 because it can export a lot of that surplus solar to our neighbors. So, actually it enhances the economics of California solar. You see 200 more megawatts of California solar being procured in Regional 2 and a big reduction in the less -- the more expensive and less desirable wind resources.

And you'll also note that there's a reduction just in the pure quantity of resources procured, from 16,600 to 15,300 in Regional 2. That's due to the reduced amount of curtailment.

In the Regional 3, now you see 2,000 megawatts each, roughly, of Wyoming and New Mexico wind coming into the portfolio. And that's displacing, again, more of the out-of-state wind, which was kind of the marginal resource, and a bit of the in-state solar as well. And you can see that the total megawatts needed under Regional 3 are now down to 13,500 megawatts. So, it's a 3,000-megawatt reduction in the quantity of resources that are needed to deliver the same amount of energy to the grid. And again, that's because of reduced curtailment and the improved capacity factor of resources.

Slide 25 shows you the financial savings from that. The total California annual renewable procurement costs are $3.3 billion under the current practice scenario, and they're $2.5 billion under scenario 3, the Regional 3. So, it's a savings of about $800 million per year. And between 1 and 2 it's about $700 million per year.

And I'll just note that these numbers assume that California pays its full share of any out-of-state transmission that's needed to integrate those out-of-state resources in Regional 3.

Just quickly, I'll walk you through some of our sensitivities. It turns out that I can't count. There's actually nine additional sensitivity cases on slide 27, even though it says eight. And I'm not going to go through all of these, I'll just highlight a few of what I think are the key ones.

Some of these we worked with stakeholders on and added after receiving comments at the February workshop and even the May workshop.

B is the high energy efficiency case, on slide 28. So, this is where, if we assume the doubling of energy efficiency efforts under SB 350, we wanted to make sure -- really, across all these sensitivities, wanted to make sure that our results weren't driven by

overly optimistic assumptions in any one of these areas. So, we're testing them kind of one by one.

This shows you that even under a doubling of energy efficiency under SB 350 we still see between $600 and $700 million of annual renewal procurement benefits under the regional market. So, the energy efficiency reduces the benefits a little bit, but they still are quite substantial.

Slide 29 shows results of our high rooftop PV sensitivity. So, rooftop PV, because it reduces retail sales, actually reduces the quantity of renewable energy that needs to be procured to meet the 50-percent RPS target. So, we wanted to test does this have -- if we had a lot more rooftop PV, would this have a big impact on the benefits of a regional market? And it turns out that it actually increases the benefits of the regional market. Because when we add 5,000 megawatts of rooftop PV, what you're really doing is adding to that solar over-supply that is a big driver of the benefits. So, you really are increasing the benefits of the regional market as you add rooftop PV.

So, what I take away from this is the regional market is actually really important to helping to integrate rooftop solar. There's a big benefit from rooftop, behind-the-meter solar from a regional market.

These two things aren't in opposition to each other at all.

On slide 30, we worked with the Large-Scale Solar Association on a sensitivity on solar costs. After the February workshop, we went back and look at our solar costs and reduced them for the results that you see today. Even still, we wanted to have a sensitivity of what if the solar costs went even lower, since a lot of our benefits are from out-of-state wind displacing in-state solar.

So, we worked directly with the Large-Scale Solar Association on a sensitivity where we had installed costs dropping to a dollar per watt by 2025. And you can see here that even under this low cost solar case we have $500 million worth of benefits for the scenario 2, and still over $600 million worth of benefits for Scenario 3.

And lastly, we wanted to test, we say that our 50-percent case in the current practice scenario was becoming constrained. So, we thought it would be interesting to see what happens if you go to higher levels of renewables. So, we did a 55-percent RPS case and a 60-percent RPS case just to see what that does to the regional benefits.

So, on slide 31, the middle bar is the results

of the 55-percent case and the golden bar is the results of the 60-percent case. And you can see the benefits are increased dramatically as you go to higher levels of renewables, up to about, you know, up to $1.3 billion per year in 2030, under a 55-percent RPS case. And over $2 billion per year under a 60-percent RPS case.

This, I think, just kind of underscores the point this really is an environmental benefit of the regional market to allow more renewables to come onto the grid easier, and at a lower cost.

So, slide 32 compares the cost of meeting a 55- and 60-percent RPS under the regional market to the cost of meeting a 50-percent RPS under the current practice case. And what we see is that you can actually get to a 60-percent RPS under our Regional 3 case for about the same cost that you can get to a 50-percent RPS under the current practice case.

So, that $3.3 billion, that we've showed you under the current practice case, that's enough to buy you up to 60-percent RPS under the Regional 3 case. And this is just the renewable procurement cost before considering any of the fuel savings and the GHG savings that you would get from going to these higher and higher levels of renewables.

And then, slide 33 just sort of shows you, in

one table, the results of all of our cases. I want to also highlight, quickly here, sensitivity A is the high coordination under bilateral markets. I know there's some stakeholders that think this might be a better baseline. Even under this scenario, we're showing $400 to $500 million worth of renewable procurement benefits, at a 50-percent RPS. So, there's a range of benefits, but they're all substantial, I think, in all cases.

So with that, I'll turn it back over to Hannes.

CEC CHAIR WEISENMILLER: Can I ask you just a couple of clarifying questions? The first question was on page 19 you talk about a current practices scenario of a 2,000 megawatt export number. What are the historic level of exports from California?

MR. ARNE OLSEN: Yeah, Hannes or Keith can speak to this, too. But we've never seen net exports from California, across all the data that I've looked at. I've seen exports going in one direction to the northwest, but during all of those hours we always have imports coming in from the southwest. So roughly, the minimum amount of imports we have today are about 4,000 megawatts.

CEC CHAIR WEISENMILLER: Okay.

MR. ARNE OLSEN: So, even this 2,000 megawatts of exports is a turnaround of 6,000 megawatts from what

we see today to this future grid, where we're exporting up to 2,000 megawatts.

CEC CHAIR WEISENMILLER: And so that's the conservative assumption?

MR. ARNE OLSEN: Yeah, we think that's a conservative assumption. That's challenging to do under the current bilateral framework.

CEC CHAIR WEISENMILLER: Yeah, I was going to say, is there any mechanism to do that flip, other than regional market, or EIM, or something?

MR. ARNE OLSEN: Yeah, I mean there is bilateral trading that goes on today, on a day-ahead basis. This requires all this energy to be scheduled as exports on a day-ahead time frame. It's renewable, so it's variable and it has to be firm. It certainly is possible to change the way that things are being done today. And I think there's some uncertainty about just how much you could rely on our neighbors to soak up -- how much we want to rely on our neighbors to soak up this over-supply in the current bilateral market.

We thought, the study team thought, the 2,000 megawatts was a reasonable case as our base case. But again, we wanted to test the sensitivity of that. So, we have the high bilateral flexibility case assumes that you can get to the 8,000 even under the bilateral

market. And we still see significant benefits of a regional market.

CEC CHAIR WEISENMILLER: Did you have a sense of the magnitude if you were assuming more the historic number, the magnitude to the impact?

MR. ARNE OLSEN: Yeah, we didn't run that case but it would be -- yeah, I mean you see how constrained Case A is. As you add more renewables, the benefits get larger and larger. So, I think you would see the same thing. If we restricted the amount of exports back to historical levels, I think you'd see a very large increase in the benefits of the regional market.

CEC CHAIR WEISENMILLER: Okay. Now, when you talk about in-state and out-of-state renewables, if a renewable connects to the California Balancing Authority is that considered in-state or out-of-state?

MR. ARNE OLSEN: If it connects to the California Balancing Authority that's considered in-state, as far as the modeling goes.

CEC CHAIR WEISENMILLER: Okay. So, because right now, my recollection, we have about 25 percent of our renewables have that sort of direct connect from out of state?

MR. ARNE OLSEN: It's been shrinking because some of those deals have rolled off. So, when we looked

at it, there were about 2,000 megawatts, maybe 2,300 megawatts of out-of-state resources that are either directly connected or scheduled into the ISO on a --

CEC CHAIR WEISENMILLER: On a dynamic scheduling.

MR. ARNE OLSEN: -- dynamic transfer basis, yeah.

CEC CHAIR WEISENMILLER: Yeah. The other one is you talk about, on page 21, you know, you sort of have what's actually sort of an aggressive list of things we're trying to accomplish, like the 5 million electric vehicles, et cetera.

Do you have a sense, again -- so, what's the magnitude, the impacts of those assumptions? You know, time of use, et cetera, storage. I mean, I'm just trying to get a sense of how conservative or how optimistic your numbers are.

MR. ARNE OLSEN: Yeah, these are very aggressive. And if you roll them off one by one, then I think, again, you'd see much larger benefits from the regional market.

We did run a low portfolio diversity case, where we took out the 500 megawatts of manually added pump storage and geothermal, and we saw the benefits increasing by about $200 million per year once we did

that.

CEC CHAIR WEISENMILLER: Okay.

MR. ARNE OLSEN: You know, the other thing I wanted to mention on this is that all of these things require effort and capital investments. Whereas, the regional market returns benefits from production from fuel cost savings before you even get to the renewable integration benefits.

So, all these things are costlier than the regional market. But we assumed they were all done first and the regional market was done last. Again, that's really in an effort to be conservative and make sure that we weren't overstating the benefits of the market.

CEC CHAIR WEISENMILLER: And if you were, you know, God knows how you could achieve it, but if you were assuming the PMAs were to join, again, do you have a sense of the magnitude of the impacts?

MR. ARNE OLSEN: Yeah, I think Hannes is going to address that in his talk. But in the production simulation modeling, he's assumed that all of the out-of-state hydro really isn't moved at all by the regional market, so whether it's PMAs or not. So, that's a very, very conservative assumption.

And if you could get the capability of the hydro

system brought to bear, both the federal and the other systems, I think you'd see, potentially, a big increase in the benefit to the market.

CEC CHAIR WEISENMILLER: Okay. Thanks.

CPUC COMMISSIONER PETERMAN: Hi, I have some follow-up questions, as well, about the RPS assumptions here. So, my recollection of the study was that the 5,000 megawatts of out-of-state wind was going to serve needs in other states, not California. Is that accurate?

MR. ARNE OLSEN: Yeah, maybe, let me clarify that quickly. So, on slide 20, this is a different 5,000 megawatts, okay. So, these are 5,000 megawatts of out-of-state, it's both wind and solar. And these are available to be selected for California ratepayers. So, again, this is a very California ratepayer-centric analysis.

Separately, Brattle has, through their investigations, you know, learned that regional markets have, in other places, incented renewables to come online without the benefit of an RPS. So, resources that are added just purely based on economics because the regional market gives you a place to sell that energy and, you know, gives you liquidity.

So, those are separate from these resources.

There's no California ratepayer benefit claimed from the beyond RPS renewables. These are the ones that we added and were able to be selected for California ratepayers.

CPUC COMMISSIONER PETERMAN: Okay, so there is an assumption in Cases 2 and 3 that part of the 50-percent RPS in California is met with some out-of-state resources, as per this slide?

MR. ARNE OLSEN: Yeah, these are the resources that are available. And then on slide 24, it shows you what's selected for the portfolio from among those resources.

CPUC COMMISSIONER PETERMAN: And in terms of what's selected for the portfolio, so in terms of the availability of in-state renewables to meet the 50-percent RPS, do you see an infrastructure constraint to that or is that technically California could do that, but in terms of economic dispatch this would be the preferred outcome? Or, are there some transmission or infrastructure limitations?

MR. ARNE OLSEN: The big limitation on California meeting a 50-percent RPS, alone, is the availability of non-solar renewable resources. So, we found there's about 1,800 megawatts of geothermal available in our supply stack. There's a few hundred megawatts of biomass that are available. That we

assumed 3,000 megawatts of wind is available for development in California. And CALWEA told us that was too aggressive.

So, really, you know, that's all there is that's not solar. Now, we do have fantastic solar resources in California, some of the best solar resources in the world. What that creates is an operational challenge. It creates the challenge of being able to absorb all that solar, which always produces only when the sun shines, and is very heavily concentrated in the April, May, June, July kind of a time frame.

So, that's what's really driving the benefits of Regional 2, which allows you to export more of that solar, and Regional 3, which allows you to bring high quality Wyoming wind as a part of the portfolio in addition to California solar.

CPUC COMMISSIONER PETERMAN: Okay, so that answers my last question. So, I'm trying to figure out, in terms of the economic benefits to the State and as it pertains to the RPS, is it mostly about the export of excess solar or the opportunity to import out-of-state wind, and it sounds like it's a combination?

MR. ARNE OLSEN: It's a combination. And we tested those two things separately. So, if you can refer to slide 33, it has both of those sets of benefits

listed for you. So, Scenario 2 versus 1a here, that's the benefit of the operations of increased ability to export. You can see that's probably most of it.

But then, if you go to Scenario 3, the incremental from 2 to 3 is the additional benefit that you get from the Wyoming and New Mexico wind.

CPUC COMMISSIONER PETERMAN: And you may touch on this more when we talk about greenhouse gas benefits, but I'm interested to what extent is the reduction in coal-fired generation, outside of California, dependent on one of these two conclusions? And it seems like it's mostly dependent on the development of the out-of-state wind. And so, I'm interested in the sensitivities around that.

MR. ARNE OLSEN: Yeah, I think Hannes will address those.

CPUC COMMISSIONER PETERMAN: Thank you.

MR. ARNE OLSEN: Uh-hum.

CEC CHAIR WEISENMILLER: Yeah, just one, again, definitional. California, obviously, by law doesn't include large hydro under renewables. If you look at, say, Germany, or if you look at the national level, they do.

I'm assuming all of our labeling of renewables out of state corresponds to the California law and

excludes large hydro?

MR. ARNE OLSEN: Yeah, that's correct that what we've made available are some wind from the northwest, some wind REC-only deals from the northwest, and some solar RECs, and some solar or existing transmission from the southwest. So, it's all RPS-compliant for California rules.

CEC COMMISSIONER MC ALLISTER: So, I have just a couple of questions, clarifications. So, on sort of slides 27 through 29. By the way, I really appreciate your doing a scenario on the high energy efficiency case. You know, obviously, we have a goal to be aggressive and go for our existing buildings, and really increase energy efficiency.

And so, you know, that is a good thing, right, because it actually decreases our obligations under RPS if we reduce -- you know, 50 percent of a smaller number is a smaller number.

MR. ARNE OLSEN: Yes.

CEC COMMISSIONER MC ALLISTER: So, sort of from an economic, a global economic perspective that's sort of towards the optimal.

So, here you've got a slide on 28 that says, you know, that aggressive efficiency decreases the benefit of regionalization. So, I just want to sort of make

sure you put that in context of we're just talking about the regionalization of the ISO, not sort of an overall kind of policy call.

And similarly, with rooftop solar, so, you know, you might argue that over-supply of rooftop is not the optimal from a broad policy perspective, but it does increase the benefits of regionalization because you have to deal with the over-supply from those solar systems. So, two sides of the coin that are a little bit counter intuitive from a broad policy perspective. Maybe you can elaborate on that a little bit?

MR. ARNE OLSEN: Yeah, we really were kind of laser focused on what's the difference between Scenario 2 and 3 versus Scenario 1 under these different kind of assumptions. We're really not trying to draw broad policy conclusions about the benefits of rooftop solar versus energy efficiency, or testing the effect of if I have more or less of those resources how does that affect the benefits of a regional market.

And my conclusion, from the energy efficiency case, is it does reduce it a little bit because you have fewer renewables that you have to procure to come up with a 50-percent RPS. That's a good thing from a societal perspective. But we think the benefits are still very, very significant, even under this doubling,

very aggressive doubling of energy efficiency goals under SB 350.

And similarly, for the rooftops, it actually increases the benefits of a regional market. Again, because it gives you the ability to export that surplus solar, which is now exacerbated by having 5,000 more megawatts of rooftop systems installed.

CPUC COMMISSIONER PETERMAN: I have one more follow-up question. Thank you. Just specifically on the question of accessing out-of-state wind. Did you explore what are the pathways, are there other pathways to access that outside of regionalization?

Because the curtailment issue, I understand, gets to the combined market. But why can't we access the wind through other mechanisms?

MR. ARNE OLSEN: Yeah, and that's a hard one. I mean, we've been looking at these Wyoming wind resources for ten years, right, and doing studies that show there are probably some ratepayer benefits if you were ever able to get that resource developed and delivered to California.

You know, the challenge is that you have to reserve a physical transmission path from Wyoming all the way to California, across two or three different systems. So, there's pancaked transmission rates that

you incur along the way. There's just the need to secure that path, which just doesn't really exist under the bilateral system because there's no available capacity. It's all reserved for the use of the native loads along the way. Or, you have to build a transmission line across two, or three, or four states to get there. And how do you get all of the pieces arranged and all the states coordinated to make that happen?

We see a regional transmission system operator having a very significant benefit at unlocking those resources because it can identify the transmission investments that are needed. It has a way to approve them and allocate the cost of them, frankly. So, there's a mechanism to do that which doesn't exit, even under FERC's best efforts, under Order 1000, which really isn't spurring these kind of lines to get developed.

MR. PFEIFENBERGER: Thank you. So, I'm briefly going to talk about the ratepayer impact and taking the investments that come out of the E3 model, and putting it into the Western Power Market. We've simulated, through production, through hourly production cost simulation at the power plant level, at the transmission line level what the change in fuel costs, power flow

generation dispatch is, and will be. And we did that for all the scenarios.

So, most of the results that I will show you compare Scenario 2 and 3, the regional market scenarios with Scenario 1, the stand-alone case. So, the difference between Scenario 1 versus the other cases is the ratepayer impact or, on the WECC-wide basis, the WECC-wide cost savings.

Before we go to California-specific result, just a brief summary here, on slide 36, of WECC-wide fuel cost savings. They're quite limited in 2020 because we only have PacifiCorp as a member and there's only a 700-megawatt transmission path between the two systems. So, that is very limiting. That really doesn't achieve too much in terms of WECC-wide fuel cost savings, of course.

By the time you have a larger region join the market, the dispatch cost savings, including the integration of additional renewables attracted in a market environment are about $800 to $900 million a year.

If you assume that a market does not attract any additional renewables, which is contrary to what we've seen in other markets, you would still have about $330 million in fuel cost savings WECC-wide alone.

And just to highlight, the NREL/CEERT, High

Carbon Grid Study, came up with about $600 million dollars in fuel cost savings. So, these savings are very much in line with the results from other studies, including in the WECC. So, that's about a four or five percent fuel cost savings.

When we come to ratepayer impact, of course that's more than just fuel costs. What you see on slide 37 is three bars. And if we take one of them, they're composed of the renewable procurement cost saving, that's what Arne just talked about. That's the pale blue bar at the bottom. That's the investment cost savings of not having to procure as much renewables.

On top of that, the dark blue bar is the California cost of producing, purchasing -- producing and purchasing the energy that you need to supply your load, less any revenues that you achieve from off-system sales, from export sales, and things like that. That is calculated consistent with the team methodology, the transmission economic assessment methodology that was developed here, in California.

On top of these production and purchase cost savings you have generation capital cost savings from higher load diversity. In the regional market, everybody can reduce their install capacity requirement because of load diversity. That's that light blue bar,

the third from the bottom.

That is a cost savings that is being realized in other markets already. For example, when Entergy joined the Midwest ISO, they could reduce their reserve margin from 18 percent to 12 percent because of load diversity. So, these are very significant installed capacity cost savings.

And then, on top of that, the cost per megawatt hour of grid operations goes down in larger markets. The ISO has estimated that the share of grid management cost allocated to California customers would decrease as the market increases.

Overall, the ratepayer impact is between a billion dollars a year and $1.5 billion a year by 2030. So, that is a savings of a regional market or the cost of not having a regional market. In some ways, it's easier to understand from a risk perspective, given that these are very conservative estimates, the cost of not being part of a regional market can be between at least a billion and a billion five a year.

We've talked a lot about sensitivities and many stakeholders find that some assumptions would be more reasonable than others. So, we did many sensitivities. All of them are summarized from where we analyzed ratepayer impacts, on slide 38.

And just to highlight a few of them, our baseline assumptions are really quite conservative. One assumption is that we have assumed that California would never have to pay anybody to take the power, so the prices would not drop below zero. That is a very conservative assumption because in many markets, when there's over supply, prices will go negative and that will make it more expensive.

And there is a sensitivity here, to the left of the baseline bar, that says negative $40 floor. If prices go down to negative $40, those savings would increase from $1.5 billion in Scenario 3, to $1.75 billion. It's actually very costly to give power away, if you don't give it away for free, if you have to pay people to take off that over supply. And that is, you know, you already experience it today. You have negative prices, at least in the real-time market, today.

There has been a lot of discussion about, well, maybe we can achieve the same amount of export sales in the current practice, in the bilateral market. There's the higher bilateral flexibility sensitivity that you see the third bar from the baseline. And you see that you do -- the cost of not having a regional market is less if you can achieve that flexibility through other

means, obviously. So, the benefits of a regional market decline marginally, by about going from $1.5 billion to $1.3 billion a year if you can achieve that export -- that level of export sales through bilateral markets that you can automatically achieve in a regional market.

High energy efficiency is about a 5 percent difference in savings. You go from $1.54 billion to $1.48 billion. There has been a lot of discussion about our assumptions about, well, what if the markets cannot attract renewables beyond RPS requirements? That 5,000 megawatts that are on top of anything that California needs.

It doesn't make much difference to California ratepayer impacts. It's more a WECC-wide environmental benefit to attract renewables beyond RPS requirements.

And then you see our sensitivity -- our analyses do include the retirement of Diablo Canyon, but does not include the 55-percent commitment that comes with it. So, if you go to 55 percent or, possibly at some point, to 60 percent, you see that these savings, that these ratepayer savings are increasing very quickly to $2 billion or $2.8 billion a year. So, the cost of not having a market can be quite high.

Lastly, let me emphasize this is a very conservative study. I think the cost of not having a

regional market or the benefit of having a regional market are higher than what we've estimated for a number regions. The Natural Resources Defense Council has actually quantified some of these additional benefits that we did not quantify in the effort of being conservative.

One of it is that there are reliability benefits that have value. We have not quantified the value of that reliability benefit.

More importantly, the physical capability of the existing grid can be utilized more strongly in a regional market than we were able to simulate. For example, just like in the CAISO transmission planning models, there's almost no congestion in the State. There's maybe a million dollars of congestion on COI, when historically there have been $100 million of congestion on COI. So, there are scheduling constraints that are not physical, that are costly to California customers, that a regional market would take care of, that create a benefit beyond what we've simulated.

Because in our model, the model can use all that capacity and doesn't see any of these scheduling constraints that you experience today.

Interregional planning is much easier with a large regional grid operator. Risk mitigation, the more

diversified resources really get you other benefits. For example, we've assumed there's normal weather in the entire west. If you have a heat wave, or a cold snap, or regional differences in weather that are not typical, that will get you additional benefits that are not reflected in our study. That is a very important benefit.

There are no transmission outages in our model. That's how these models run, that's industry standard practice. But I want you to be aware how conservative these models are.

And lastly, our results are consistent with what other studies, in other regions and in the west, have been finding.

So, with that, I'd like to go to greenhouse gas emissions results.

CEC CHAIR WEISENMILLER: Okay, just a couple questions.

MR. PFEIFENBERGER: Please.

CEC CHAIR WEISENMILLER: First, you talked about load diversity and the benefits of that. Just to be a little clearer on that, my understanding is the west is winter peaking, while California is summer peaking. Is that basically what you're trying to get to there?

MR. PFEIFENBERGER: A small portion of the west

is winter peaking, while the rest is summer peaking. But even within the winter-peaking regions or summer-peaking regions, the peaking doesn't occur on the same day and the same hour.

CEC CHAIR WEISENMILLER: Okay.

MR. PFEIFENBERGER: So, by diversifying that within the footprint, the coincident peak of the regional market is less than the sum of the individual peaks of all of the 38 balancing areas.

CEC CHAIR WEISENMILLER: Okay. My other question is when I talk to the Germans, they see a -- I'm assuming your modeling was hourly?

MR. PFEIFENBERGER: Yes.

CEC CHAIR WEISENMILLER: Okay. When I talk to the Germans, they see a big impact on the amount of reserves required for renewables when you go from hourly to five-minute. So, presumably, that's a benefit, again, you haven't really quantified here?

MR. PFEIFENBERGER: That is a very good point. Our simulation is basically the day-ahead market. We didn't want to get into real time because some of the real-time benefits can be achieved by EIM. So, we didn't want to double count anything that EIM may achieve.

But as we know, EIM has its limits relative to a

true, real-time market. So, that difference between what a true real-time market can achieve and what EIM can achieve is not captured in our study.

Please?

CPUC COMMISSIONER FLORIO: I realize that your study focused specifically on California and, you know, that was what you were charged with doing. But I wonder, if we look at slide 36, and compare it with 38, slide 36 shows WECC-wide production cost savings. And in slide 38, the dark portion of the bars reflects that same -- that same benefit for California.

So, could we infer that the difference between the WECC-wide savings and the California ratepayer benefits go to consumers in other states?

MR. PFEIFENBERGER: No, not quite. On slide 37, the dark blue bar is the California production costs plus the purchase costs, net of the off-system sales revenues.

CPUC COMMISSIONER FLORIO: Oh, okay.

MR. PFEIFENBERGER: So, there is -- there is the additional transaction cost savings of purchases and sales that have nothing to do with fuel costs.

CPUC COMMISSIONER FLORIO: Okay.

MR. PFEIFENBERGER: So, it is true that the California production purchase and sales costs are about

$500 million, which seems like most or half of the total WECC-wide fuel cost savings. But the California portion of these fuel cost savings is actually much less than that.

CPUC COMMISSIONER FLORIO: Okay.

MR. PFEIFENBERGER: And, of course, there are WECC-wide load diversity savings that are much larger than California's load diversity savings and a few things like that.

CPUC COMMISSIONER FLORIO: Okay.

MR. PFEIFENBERGER: So, we'd really have to do a complete study. But this is just a WECC-wide metric that is easy to calculate, that comes out very similar in, say, the NREL/CEERT study. But you'd have to do a more comprehensive analysis to figure out what the benefits to other regions are.

CPUC COMMISSIONER FLORIO: Okay. But if someone wanted to do a study of what would be the benefit to PacifiCorp customers, what you've already done gets you a long way toward doing that. You'd just have to look at a different aspect than you look at here?

MR. PFEIFENBERGER: Yes. And look at all the other benefits, too. I mean, PacifiCorp did a study last year and where the study results are overlapping, the results are actually very similar. Obviously,

there's different assumptions being made here. They've been updated for both CEC and CPUC updated assumptions, and so on.

CPUC COMMISSIONER RANDOLPH: In the higher bilateral flexibility sensitivity, how were those flexibilities achieved? What were you identifying as the flexibilities?

MR. PFEIFENBERGER: The main constraint that we have used to capture the limitations of a bilateral market is this export constraint. You know, it's not a physical constraint. We actually don't know what the actual physical constraint is because it's never happened. WECC hasn't even done a study of what the export constraint is.

In the regional cases, we assumed that that simultaneous export constraint would be 8,000 megawatts.

In the Scenario 1, we assumed, as Arne has explained, that California would be able to go from being a net important of 4,000 megawatts to becoming a net exporter of 2,000 megawatts.

So, what we've done in the higher flexibility case, we've said somehow the bilateral market gets you all the way to 8,000 megawatts.

So, now what this study measures is, basically, what are the regional market benefits? If you -- in the

bilateral case, you can swing from being a 4,000-megawatt exporter to being an 8,000-megawatt exporter. So, you're swinging 12,000 megawatts every day, from importing 4,000 megawatts during the night to exporting 8,000 megawatts during the day.

While in the base case, that export has been limited to 2,000 megawatts.

CARB CHAIR NICHOLS: Okay, so to pursue this line a little bit, and I'm not sure if this is the question that the others were trying to get at. But you've been charged with looking at the ratepayer impacts only in California. But at CO2 impacts more broadly, because we care about greenhouse gases, obviously, on a much larger scale.

However, one of the concerns that gets raised, I think legitimately, is a question of whether benefits to an out-of-state utility and its customers, from operating in a way which does not benefit CO2 emissions could lead to behavior which is not going to be helpful overall.

So, I'm not finding exactly where, in the study, you get at that question.

MR. PFEIFENBERGER: I think I'll get to that in this next segment of the presentation. There's been a lot of discussion about coal dispatch in the rest of

WECC, and I have a slide for you that will show you what that looks like.

CARB CHAIR NICHOLS: Okay.

CPUC COMMISSIONER FLORIO: Yeah, just one more question on your modeling. You're assuming that the federal power marketing agencies and interconnected Mexico and Canada are not part of this regional market.

But I believe the model covers the entire WECC. How do you massage that to take those entities out of the market?

MR. PFEIFENBERGER: Well, it is true, we model the entire Western Interconnect, which includes part of Mexico, Canada, and the power agencies that are modeled. We are modeling bilateral transactions between balancing areas that are subject to transmission charges, and bilateral transaction costs and hurdles.

So, the model does trade between Canada and the U.S., and between the larger regional market and the PMAs. But those trades are subject to transactions costs.

With that, let me talk about greenhouse gas emissions. And I'll focus in on some of the questions that have been raised by stakeholders. But slide 41 shows you just the simulation results for 2020 and 2030.

You see that the emissions are actually quite

similar in the case with the regional market and in the case without a regional market. There has been much discussion about the 2020 CAISO plus PacifiCorp case, where the emissions are .3 percent higher than under the current practice case.

The two bars on the left, you see the second bar is just a tiny little bit higher than the first bar. That relates to a dispatch of coal plants that we've simulated in our model. And as we've explained in our report, we've looked into this because that was a concern for stakeholders. And it is mostly a modeling artifact because our model, unlike EIM for example, does not -- when California imports power, it just applies a generic emission rate. And that generic emission rate is that of the combined cycle unit.

So, it gives more of an economic advantage to PacifiCorp coal plants than in reality would exist.

We also don't model the fact that coal plans in the regional markets he really experienced a lot of economic pressure, and there are quite a few coal plant retirements in MISO and the SPP that are triggered by the regional market, by prices being low and by the ability to retire a coal plant, and immediately make up for it at lower cost through market purchases.

You see that in 2030 -- and one thing is clear,

we have not analyzed the rest of WECC as much as we have done in California. So, what the rest of WECC does with RPS, for example, many states have implemented RPS because it's easier to do that in a market than without a market. But we've all held that the same.

Nevertheless, the emission from a regional market in 2030 are decreasing by about $10 million a ton, a year. That's about a 3 to 3 and a half percent decrease in emissions.

So, let's talk about coal plants. This is a chart of the historical coal plant output and the simulated outputs. And you see, irrespective of what's going on with the regional market, dispatch from coal plant is expected to decline substantially. They're down significantly by 2020. They're down even further by 2030.

The impacts of the market is measured by the difference between the two dark bars, either in 2020 or 2030. So, what happens to coal plant is not as much driven by a regional market as it's driven by environmental policies, by state preferences.

We did simulate a modest coal price that will be -- a carbon price that will be applied to the rest of WECC, $15 a megawatt hour. As it turns out, the rest of WECC, in 2030, was not quite CPP compliant. We tested

that, even though CPP has not -- is not effective right now because of the stay by the Supreme Court.

But because the rest of WECC was not quite CPP compliant we said, well, let's try a low carbon price and see if that gets us there. At $15 a megawatt hour, the rest of the region, as a whole, was easily CPP compliant. And you can see the difference between the dark bars and the gray bars, that environmental policies are really critical to what happens with coal plants, more so than whether you have a market or not.

But that small increase in 2020, that we've circled there, it is a small increase. But as I said, it's a modeling artifact because our model cannot apply coal-specific rate on imports of coal power into the State.

So, let's talk about California. California, we see 2020, about 64 million tons a year of carbon emissions associated with serving California loads. That includes imports for California loads.

In 2030, that decreased to about $54 million [sic] a ton, without a regional market, and about 50 million tons with a regional market on the current CARB account rules. That does not account for exports.

If you account for the fact that exports of renewable resources is decreasing greenhouse gases in

the rest of WECC, then the regional market gets you from -- these are the dark blue portions of those bars gets you from 49 down to 45. So, it's about a 20 percent improved or reduction in greenhouse gas emissions associated with California loads.

And I'll show you how that goes across a few sensitivities. We did run several sensitivities. One is carbon pricing the rest of WECC. We did a regional market with the portfolio on the current practices. One, just to hold the portfolio constant to get a sense of how much of the change is due to the change in portfolios that Arne has calculated, versus not.

And then, because it has come up, what would it look like if the regional market does not stimulate additional renewable investments beyond RPS requirements. And you see the results here, compared to historical greenhouse emissions to serve California load. And what we have is that we are about -- in 2020, we're about 40 percent below historical levels. Also, about 1990 levels. And in 2030, we're about 55 to 60 percent below 1990 levels. And in all cases, California easily meets the CPP requirements.

But there, again, you see the impact on the sensitivities. And if you look, that first blue bar on the right, that if a regional market does not attract

additional renewables, as other regional markets have, California greenhouse gas emissions would be slightly higher, as well. Because even if you build renewables in Wyoming for reasons other than RPS requirements, it really reduces dispatch of fossil plants in the entire WECC. And about a third of that would be reduction in California fossil emissions.

You see that -- you also see that implementing greenhouse gases in the rest of the region does not have much impact on California. It's mostly an impact on the rest of the region.

So with that, I would --

CPUC COMMISSIONER FLORIO: Could I ask a question on this coal issue? Your base case assumes coal plant retirements that have already been announced. Is that correct?

MR. PFEIFENBERGER: That's right.

CPUC COMMISSIONER FLORIO: And nothing in the model is set up to retire a coal plant. You assume that those all keep -- are available to run?

MR. PFEIFENBERGER: Right. The model does not change the retirement assumptions in the markets versus the no-markets case. It's held constant. It's an input into the model. The only investment-related costs that change are California renewables.

CPUC COMMISSIONER FLORIO: Okay. But if we add all these additional megawatts of renewables, eventually something is likely to retire, wouldn't you think?

MR. PFEIFENBERGER: Yes, that's certainly the experience in the other markets. If you look at Western ISO SPP, a lot of retirements have been announced for economic reasons because so much renewables have been attracted, way beyond RPS requirements.

CPUC COMMISSIONER FLORIO: Okay, thank you.

CEC COMMISSIONER MC ALLISTER: So, yeah, one further question. So, I want to just build on the WECC-wide carbon question. So, on slide 45, yeah, you've got the --

MR. PFEIFENBERGER: And 45 is California.

CEC COMMISSIONER MC ALLISTER: Yeah, so do you -- can you or do you anticipate producing sort of similar graphic so we can appreciate sort of the WECC-wide carbon implications of this? I mean, given the fact that we are concerned about the carbon across the board?

MR. PFEIFENBERGER: We have the chart on slide 41.

CEC COMMISSIONER MC ALLISTER: Oh, I'm sorry, I must have missed it.

MR. PFEIFENBERGER: And in the report we also

have a table that compares these emissions to CPP requirements.

CEC COMMISSIONER MC ALLISTER: Oh, I got it. Oh, okay, okay.

MR. PFEIFENBERGER: So that, you might also find helpful.

CEC COMMISSIONER MC ALLISTER: Okay, great. A little bit disaggregated in sort of looking at the temporal aspect of this would be good.

MR. PFEIFENBERGER: Yes, most of our study was forward looking. But when this question of, well, how big is a .3 percent increase, really, came up we thought it would be helpful, at least for some of our results, like the coal plant issue on 42, to put in perspective of what the year-to-year fluctuations are historically and what the decline over time would look like.

The only place where we've done this, and there's a slide in the appendix here, as well, is in the CPP compliance test.

CEC COMMISSIONER MC ALLISTER: Okay. I guess, so I'm really looking at these -- on 45, you know, these 20, 30 simulations where you've got all the scenarios kind of broken out in terms of their carbon impact.

MR. PFEIFENBERGER: Yes.

CEC COMMISSIONER MC ALLISTER: And I'm sort of

imagining that the difference in the WECC-wide sizes of those bars would be more diverse, say -- they would be more different, those individuals bars, there would be more variety or variation between them, than in the California case, but I don't know.

MR. PFEIFENBERGER: Yeah, we have all these results in the report and even in some of the appendix slides.

CEC COMMISSIONER MC ALLISTER: Okay.

MR. PFEIFENBERGER: What you see, for example, is on slide 42, a lot of the WECC-wide emissions are driven by coal plant emissions.

CEC COMMISSIONER MC ALLISTER: Yeah.

MR. PFEIFENBERGER: So you can see that even a small carbon price in the rest of WECC has a disproportionately larger impact in whether you have a market or not.

CEC COMMISSIONER MC ALLISTER: Okay, thanks.

CEC CHAIR WEISENMILLER: Well, I guess the other metric to talk about is sort of cumulative greenhouse gas savings. I don't know if you have a sense of what the cumulative number looks like west point?

MR. PFEIFENBERGER: Yes, if you look at this slide, for example, slide 45, the cumulative impact from 2020 to 2030 of having a regional market versus not is

about 20 to 25 million tons of carbon.

CEC CHAIR WEISENMILLER: Thanks. All right.

MS. LEE: Okay, I'm Susan Lee, with Aspen Environmental Group. And Aspen was tasked with the environmental study component.

Just an explanation of the type of work we did, when you're looking at the environmental impacts that relate to development across the entire Western U.S., this is nothing like an EIR or a staff assessment. It's a much more high-level look and, really, a comparative look of among the various scenarios to show what would be different.

The four environmental resource categories that we studied were biological resources, air quality, water consumption and land use. And I'll give examples of each of those studies and also refer you to Volumes 9 and 10 of the much more detailed report.

Just to start out, I wanted to show the conclusions, you know, the big picture conclusions of this study and how each of these conclusions relates to environmental issues.

The first slide is that -- the first bullet here shows that when regionalization happens we're allowing power plants to operate more efficiently. Sorry, I'm on 48 now. And I'll call the numbers out.

So, the more efficient operation of power plants in the environmental world means we have less NOx emissions, the nitrogen oxides, because power plants are starting up less frequently. And we also have less water use because, again, gas-fired power plants are used less frequently.

The second main conclusion, is that regionalization shows that we would build less renewable generation in total, means that we have less new projects being built. And every new project has less land use impact, less impact on biological resources, and construction impacts.

The third big picture issue is that regionalization allows us to access out-of-state renewables. And this is a real tradeoff issue, and there are a lot of tradeoffs in the environmental discussion. But what this does is shift environmental impacts from California to elsewhere. And there are cases in which moving impacts out of California means the impacts could be less severe. So, we'll go through some of that, as well.

As an introduction to our approach, the way that we looked at the environmental impacts within California and within the renewable energy zones, the CREZs, which were defined by the Resolve model, were that we defined

study areas within each CREZ. And the study areas were the way that we could look at impacts that were specific to one geography and not spread across an entire CREZ. Because we didn't want to say that an impact could occur anywhere in Riverside East, because Riverside East has national parks and wilderness.

We defined, within each CREZ, the area where renewable generation would actually be likely to occur. So, that narrowed the study to places that, number one, fit the megawatts that Resolve said would be required in each CREZ, and also put the megawatts in places where that generation could actually be built.

The two aspects of the output from Brattle and E3 that we used. Number one, we used Resolve's build out of the megawatts for each portfolio to define land use impacts. Because the number of megawatts tells you the number of acres we need to develop and also impacts to biological resources.

And then we used the generator dispatch results from Brattle's production cost simulations to look at the air emissions and the water use. And again, those are related to the operation of gas-fired plants.

So, slide 50 shows -- this is one of our first slides filled with lots of data. This shows land use impacts. And we're comparing the acres required for

development of renewable projects across all the various scenarios. And what we're looking for is the overall amount of land required to meet the RPS. And the conclusion is that compliance with RPS would require less land with regionalization, especially in California. That's obviously a tradeoff issue.

If you look at the data in the first three columns, which shows you the data from current practice to Regional 2 and Regional 3, you'll see that the amount of land affected in the renewable buildout in 2030 is lower in California than it is for current practice. So, just looking at California, alone, we've reduced the amount of land required by over 70,000 acres. At the same time, increased the out-of-state land by about 70,000 acres, almost 70,000 acres.

The thing that we're looking at there, when we present these scenarios and the tradeoffs is that the out-of-state land primarily is wind, and the wind is primarily in Wyoming and New Mexico. The difference in the land use and the land value, when you're looking at those states where mainly it's grazing land, is that there's a compatible use of wind and grazing land.

As opposed to building solar in California, where solar occupies 100 percent of its land. So, you're losing, for example, agricultural land or desert

habitat, as opposed to the more likely kind of compatible land use that you can do with wind out of state.

For biological resources and this, of course, is a tough thing to look at across the entire west. But fortunately, the Western Governors Association has developed a really useful tool, called Crucial Habitat Assessment Tool, the CHAT Tool. Where through each of the states' departments of wildlife they've assembled data that really can be looked at across the west in a comparative way. Which, before this tool was available, was very hard to do.

What you see in these two maps, the upper one is California's Central Coast, the lower one is Southeastern Wyoming, is the density of high-value habitat. So, the darker orange. I'm sorry, we're on slide 51. The darker orange color is the highest value, most, called crucial habitat. The lower one is Wyoming, which shows much less density of crucial habitat, which is that dark orange.

The other thing you can see on this map is the black outlines on there. And those, let's see if I can find the mouse, the black outlines here show the bounds of the study areas, within which we studied the biology and the land use for each issue area.

And those boundaries, again, as I mentioned earlier, were defined basically by reality. Those are real proposed wind project areas or areas in California where those projects have the potential to be developed.

So, like the land use, the biology resource analysis comes up with a series of tradeoffs. We acknowledge that while the resource value appears to be greater in California, there are other tradeoffs that don't show up on these maps. And one big one is bird and bat collisions. You know, lots of wind in California or outside of California has potential for this type of impact. And that is a shift of impact. It's not necessarily an improvement.

Okay, this slide is 52, it has lots of data on it. And this basically gives an example of how we did our air emissions analysis. The emissions analysis is based strictly on the production cost simulation. So, the data comes straight out of the Brattle work.

What we show here is we're really focusing on two areas of California in our example, that are areas that have historically persistent air quality problems. This is the San Joaquin Valley Air Basin, which is the one shown in the top two graphs, and the South Coast Air Basin, shown in the bottom two graphs.

So vertically, on the left you see NOx

emissions. And on the right you see PM10 emissions. So, what you're seeing, if you just look very high level at all four of these bar graphs, is a decline, a small decline, but a noticeable decline from the 2020 scenario through the Regional 3 scenarios in every case.

The overall conclusion, in looking at the NOx emissions, in particular if you focus on the left-hand side, is that in Regional 2, as compared with the Base 1, the NOx emissions are almost -- are 6 and a half percent reduction. And the PM2.5 or 4 percent reduction. And the reductions percentage-wise are even greater in Regional 3, and I'll give you an example of that in a second.

To zoom into another component of data on here, the little orange pieces of the bars, on the NOx side, show just the component of the NOx emissions that result from gas unit startups. And this was kind of a separate analysis that we did to show what would -- which component of these emissions came only from that. So, we pulled that out. If you have good eyes or a good hardcopy, you can actually read the numbers in the orange bars, which show a very similar decline in NOx emissions, from startups, that we got from NOx emissions overall. The numbers actually go down from .68 tons per day, that's the unit on all these slides, in current

practice 1, to .55, to .47 tons per day in Regional 3. And again, this happens because in the regional market the number of startups goes down overall.

And then, one point I wanted to make about air emissions discussion in general here is to put this in context of statewide emissions. The generation of electricity in California causes a small part of statewide emissions. And the natural gas-fired electricity generation has a component of 1 to 2 percent overall of the average daily emissions of NOx and PM2.5. So, when you're looking at the percentage reductions we're looking at here, that's a percent of that already very small percent. So, just to put that in the context of scale we wanted that to be clear.

I'm going to summarize some of the key findings here and then I'll give a couple conclusions related to our study of disadvantaged communities. It's hard to condense the results of hundreds of pages of a report into just a few bullets, but we'll kind of highlight some of the important components here.

The first column shows the 2020 scenario. And in the 2020 scenario, there's no new build in California, so we're not looking at a build out because we've got that covered already. So, the biological impacts and the land use impacts would not occur at all.

The 2020 changes in water and air emissions that are driven by small changes in the generator dispatch are also very small. So, the changes there are in the order of 1 to 2 percent.

The more dramatic changes, of course, come in the second and third columns. And this is the Regional 2 and Regional 3 for 2030. And in this case, as I mentioned earlier, so the size of the renewable build out in California is decreasing as we move into Regional 3. So, the number of impacts related to conversion of land use or effects on biological resources does decrease here. These are offset by increases out of California, primarily due to the large wind build out. And, as we mentioned earlier, the transmission that's required to import that wind.

The amounts of water use and the amounts of air emissions from power plants would decrease from the current practice to Regional 2 and 3 scenarios, both in California and outside of California.

And let me leave it at that and move to a summary of what we've done for disadvantaged communities. And this will be covered, as well, in David Roland-Holst's discussion on the economics.

The discussion, the analysis we did for disadvantaged communities was done on a slightly

different scale. We actually mapped the disadvantaged communities on air basins, rather than the CREZs, because that's consistent with the data that is out there, and we could then show how the air basin effects kind of would overlie the areas of highest disadvantaged concentration.

So, what you see on this slide 54 is a map that's showing, in the different colors, just where the 25 percent of highest scoring, which is to say most disadvantaged communities are located in the State.

And what you can see here, and we just reiterate on the next slide, on 55, is that for the most part you see a very large concentration in the Central Valley. This is almost coincident with the San Joaquin Air Basin. And also with the L.A. Basin, there's spotty concentration down there, as well.

Just to help align the air basins with the CREZ analysis, because most of the Resolve modeling output, I'm on slide 55 now, is done with CREZs' in resource areas, instead of the air basins.

The San Joaquin Valley Air Basin includes pretty much all of the Westlands CREZ, and also the Central Valley North and Los Banos CREZ. And then, separately, there's the resource area of Kramer and Inyokern, which is the high desert, basically, L.A. County and Kern

County, east of the Tehachapi's is another resource area with a high population of disadvantaged communities.

To summarize the results of the disadvantaged communities analysis, and here what we're looking at again, we've gone back to air emissions. We're looking for the overlay of where, in particular, the NOx emissions would change in the areas where the disadvantaged communities are focused.

The main two conclusions that we show here, first is that ties with what we've already said, the regional market would result in the reduced use of gas-fired generators. Which means that the emissions are lower statewide and water use is also lower in California.

And second, the regional market would reduce the amount of construction impacts because we're building less new projects in California. And the construction impacts include things like construction vehicle emissions and dust.

And then to zoom in on some examples of that, the table at the bottom of this slide 56 highlights just some of the percentage changes. Again, we're looking at NOx here. And the percentage different, illustrating the statewide reduction in NOx of over 10 percent between the current practice and Regional 3. And both

the San Joaquin Valley and the South Coast totals for Regional 3 are nearly 6 and nearly 13 percent reductions.

So, that is the conclusion of the high level summary of environmental analysis. And as I mentioned, David will speak more about the economic impacts related to disadvantaged communities, as well.

MR. ROLAND-HOLST: Good morning, everyone. I'm David Roland-Holst. I'm an economics professor at UC Berkeley and a Partner in Berkeley Economic Advising and Research. Thank you very much for the opportunity to summarize our economic assessment today. I'd be also happy to answer questions later.

But let me begin by summarizing the main drivers of our results, just to sharpen our intuition. Anything as significant as changing the energy system of the State is going to have very pervasive economic effects. But we focused our assessment on three specific components of the policy.

The first is building out the capacity, obviously renewable capacity. The second is accompanying infrastructure investments that support those buildouts. And finally, we looked at income and expenditure effects of electricity rate changes. Which are, in particular, reductions coming from more

efficient allocation of energy both within the State and regionally.

In terms of actually calculating the impacts, I think this might be familiar to some of you who have seen economic impact assessment in the past. But there are three components -- this is slide 59, by the way, sorry. Three components of effects. The direct effects, which are from a buildout or an investment project are the most transparent. These are the so-called visible impacts or the visible jobs created.

But then there are more pervasive effects going through the economy. Through supply chains, the indirect effects on suppliers of intermediate goods, and materials, and services.

And then, finally, the so-called induced or sometimes referred to as multiplier effects, which are the invisible effects in many ways, the invisible jobs created. And these often outweigh direct effects, so it's very important to take account of them.

In terms of macroeconomic impacts, I know we're pressed for time, so I'm going to go relatively quickly. But the first thing to take account of is in the scenarios that we are reporting, these are all economic stimulus packages, let's be honest. Very substantial commitments to construction activities and buildout of

the energy system. So, there are positive stimuli in every scenario.

But the most positive effects are attributable to regionalization. And the main reason for this, as I'll elaborate in a moment, are the so-called indirect effects through ratepayer savings that are realized under regionalization.

In the three scenarios that we look at, the Regional 2 scenario provides the most stimulus. Up to 100,000 additional jobs in California by 2030, and significant increases in income for workers and enterprises. So, we focused a little bit on this Regional 2 scenario as an important one.

We looked at other sensitivity scenarios. I think someone's already referred to the 1b scenario. This scenario is -- it has some conceptual problems associated with it. It was very ambitious energy export assumptions and also higher ratepayer -- higher rates for electricity ratepayers than the other scenarios. So, these may be problematic. But it provides an interesting bookend.

And we're focusing on policies that we think are probably more within the bounds of what we'd expect to see. And in that context, Regional 2 is the one that provides the most stimulus. The reason for that is it

does a substantial commitment to domestic buildout, but also takes advantage of the efficiency benefits of regionalization.

In terms of employment gains on a sectoral basis, using the BEAR model we have a very detailed composition of employment by both occupation and sector. You can look at those results in the Volume 8 of the reporting.

But first of all, all scenarios stimulate the economy, as I said. Power sector investments create two types of jobs. Temporary jobs, you might call them short-term jobs, during the construction phase. And then, O&M jobs for the longer term.

But the advantage of the so-called induced employment, particularly the ratepayer induced employment creation is that these are jobs that go across the entire spectrum of economics, goods and services of the economy. They're long-term jobs that last as long as the ratepayer savings last. And they target, especially, bedrock employment in the California State economy, which is the service sector.

As you may know, it's what we call the 70/70 rule, 70 percent of domestic demand in California is consumption spending and 70 percent of consumption spending is for services. So, we get two-thirds of our

employment in the State by giving each other haircuts and espresso drinks. The services are a very fundamental characteristic of employment.

And this ratepayer benefit in that way spreads the benefits of regional efficiency across the economy. And in particular to sectors and jobs, service sector jobs which cannot be outsourced. These are, essentially, non-tradable service jobs.

In any case, you can see widespread distribution of employment benefits, particularly in the scenarios for regionalization where ratepayer benefits are substantial.

The same is true of household income effects. In terms of real incomes for households, we see significant benefits across the spectrum. This is 10 deciles of the income distribution in the State. The biggest benefits and percentage terms are for the middle and upper middle income families, who are relatively energy-intensive consumers. But there are benefits across the board and the largest benefits are for the regional scenarios where there's greater efficiency and lower energy costs.

In terms of the composition of statewide job creation, we can look a little bit more carefully at the direct versus indirect job creation. The first three

components of the bars there are the buildout jobs for the various renewable categories, geothermal, wind buildout and solar buildout. And these come directly from the investment schedules of the projects that would be committed.

Ratepayer savings come from estimates of our team members E3 and Brattle. And we incorporate those in the model and carry them out to 2030.

In the regional scenarios, those ratepayer savings are more substantial and they translate into the significant majority of the job creation. As I said, the earlier indirect and induced job creation can be much larger than the direct job creation benefits of policies as significant as this one.

So, we really have to be mindful of the potential to spread employment benefits across the State, along with ratepayer savings which would effect, in principle, every household and enterprise in California.

To look at different in jobs, job creation with a reference of the current practice scenario, this figure, slide number 64, looks at the component differences. So, in both cases we see a smaller wind buildout, for example, in the regionalization scenario since the wind is being imported, rather than produced

domestically.

We see a relatively lower solar buildout in Regional 3 scenario because, again, we're substituting imported wind for domestic solar.

But the ratepayer savings components are strongly positive and outweigh those in both cases. So, a more efficient energy system confers benefits much more widely across the State, and those benefits translate to downstream multiplier effects for workers and other goods and service sectors.

Now, as you know, part of the mandate for this assessment was to look carefully at disadvantaged communities. And we've done that with a relatively high level of spatial detail. The disadvantaged communities have already been defined by Susan, but we use a similar definition of a little bit higher resolution than the environmental assessments.

But we're fortunate because the disadvantaged communities are defined with respect to the census tracts. So, we had very high resolution data on socioeconomic characteristics and that enabled us to disaggregate our economic assessment very carefully, and identify the differences in disadvantaged and non-disadvantaged communities of the buildout and the ratepayer savings effects.

As you can see here, the disadvantaged communities have a lower benefit in absolute terms, but actually it turns out that it's a higher proportional benefit. So that as a percent of, obviously, disadvantaged communities have lower incomes, and it turns out that their income benefit from these scenarios is larger than their initial percentage of income. So, this is what is sometimes called the progressive income effect and we were relatively pleased to see that.

It's most strong, again, in the regional scenarios because there, in that case, you can combine employment benefits and cost of living benefits.

In slide 67, we look at the difference in job creation across scenarios. And in the case of jobs, we have a very similar result. The numbers look different because they're different units. But job creation is beneficial to both disadvantaged and non-disadvantaged groups, but proportionally more beneficial to the disadvantaged communities. And the primary reason for this is that the buildout is occurring in areas that are more likely to be disadvantaged.

As Susan pointed out, the concentration of disadvantaged communities is in areas where the domestic renewables buildout would be more likely to occur. So, once again, we see that the positive effects for

disadvantaged communities are proportionally greater than they are for non-disadvantaged communities, contributing to a reduction in inequality, which we're very happy to see.

Finally, in terms of real incomes across the scenarios, in disadvantaged and advantaged communities the same story, again. Positive in all cases, but more proportionately positive for disadvantaged communities.

Now, we can look at the spatial distribution of these effects with this relatively high resolution data that we have. There are about 70 more slides, where we look at nine different regions, but I can't possibly cover those here. They're in an annex to this presentation, but they're also discussed in more detail in the documentation.

But just to summarize, very quickly, job creation is relatively widespread across the disadvantaged communities. There are positive job impacts in the significant majority of the disadvantaged communities. Very few have any negative job impacts.

But the job impacts, in numerical terms, might look small to you. But the fact is that this sector, itself, is relatively small compared to the California economy.

Let me put this in perspective, with all due

respect to the power sector, total construction spending in California is about 2 percent of gross State product. So, if we up it by the construction -- and increment of construction spending in one sector, electric power, that will have a relatively small effect on the overall economy. We have to accept that.

But having said that, there are lots of jobs to allocate. As you can see, there are hundreds, actually about 1,200 disadvantaged communities. And most of them get, the majority of them get a few jobs from this program.

In terms of Regional 3, we see even larger job benefits and more generously distributed across the disadvantaged communities. Again, we zoom in, in the study to look at these things more closely.

In terms of differences in real income, this is something we have to measure carefully, okay. This is dollars per household of real income change in the community. It does not mean that we're handing out money to each household. Please don't get me wrong here. This is the stimulus to the local community, measured on a per-household unit basis.

So, you get a sense, in terms of an individual household, of how much extra economic activity is in the surrounding community. Most of these benefits go to new

job takers. It's not a handout. It's not a dividend that's accrued uniformly across these households, but it is a direct stimulus to the communities.

And we see, on a per-household basis, if you look at average incomes, that it's a relatively significant stimulus in those regions. Even more so in the Regional 3 scenario.

Finally, let me summarize quickly, in all three of the RPS scenarios we look at there is significant stimulus to the California economy. These are good for California's GSP, they're good for California's workers, whether they're skilled workers or less skilled workers, whether they're in advantaged or disadvantaged communities, whether they're in the trades of the power sector, or whether they're in the service sector, depending on the choice.

But the fact is that the regional scenarios, because they confer greater efficiency on the energy system and that translates into lower energy costs for households and enterprises, that tends to be more inclusive. It creates more jobs, and more diverse jobs, and it delivers them in a geographically more extensive manner across the State. Thank you.

CPUC COMMISSIONER RANDOLPH: I have a question.

MR. ROLAND-HOLST: Yes, please.

CPUC COMMISSIONER RANDOLPH: So, just so I understand your charts with the yellow total jobs bar --

MR. ROLAND-HOLST: Uh-huh.

CPUC COMMISSIONER RANDOLPH: -- there's a couple of different charts that you use that.

MR. ROLAND-HOLST: Are we talking about 67, yeah.

CPUC COMMISSIONER RANDOLPH: Yeah, 67. So, there are -- there's a certain amount of buildout that we -- there are certain numbers of jobs that we assume get lost because of reduced buildout, but then those are offset --

MR. ROLAND-HOLST: They're more than offset by other factors, right.

CPUC COMMISSIONER RANDOLPH: -- by the ratepayer benefits, which creates kind of an overall stimulus, for lack of a better word, is that correct?

MR. ROLAND-HOLST: That's a very good usage. Yeah, essentially they create multiplier effects across a much broader spectrum of jobs.

CPUC COMMISSIONER RANDOLPH: So, the yellow bar reflects the net of the other color bars.

MR. ROLAND-HOLST: That's essentially the net. Yeah, that's the net with reference to the -- it's the different between the current practice, which does have

some indirect effects, too. But this is the additional stimulus over the current practice. And the current practice is good for the economy, too.

CPUC COMMISSIONER RANDOLPH: Uh-hum.

MR. ROLAND-HOLST: And as you can see on slide number -- well, 66 is good enough. You can see that there are ratepayer savings benefits in the current practice, too. So, these would just add on to that. Because they have a bigger component of those multiplier effects because of the ratepayer savings, right.

CPUC COMMISSIONER RANDOLPH: Uh-hum.

MR. ROLAND-HOLST: I mean, hiring construction workers creates downstream jobs, too, because they go and have coffee breaks, and they go to the restaurants, and take their families to the movies, too. But it turns out when you distribute the efficiency gains of regionalism across the whole population, that really spreads the benefits around.

CPUC COMMISSIONER FLORIO: Could you refer back to slide 60?

MR. ROLAND-HOLST: Right here.

CPUC COMMISSIONER FLORIO: I find this kind of interesting that going from Regional 2 to Regional 3 you have about 9,000 fewer jobs, but 4,000 greater real income. And that seems, on the surface, a little

counterintuitive. That if there are fewer jobs --

MR. ROLAND-HOLST: Yeah.

CPUC COMMISSIONER FLORIO: Can you elaborate on that?

MR. ROLAND-HOLST: I'll try to explain that. The first is the difference in jobs. The main cause of the difference in jobs is the direct employment, and because there's a lower buildout.

It turns out that the buildout, although it does stimulate the economy and it's good for the energy sector, has weaker multiplier linkage in the State economy. Because a lot of the materials are imported. So, it's a bit like the carbon fuel supply chain. And I think most of you probably know this, one of the problems with the carbon fuel supply chain is it just doesn't generate that many jobs in-state, and that's true here.

And when the job creation is more focused on multiplier effects of ratepayer savings, then the income effects are more self-contained. The in-state -- these are called the multiplier loops, they're more in-state, because of the 70/70 rule. Because most households are going to take those savings and put them into services. And those are more of a closed loop process. So, we get a larger net income effect because we retain more of

that income.

Whereas, if we're importing turbines and other kinds of hardware, then those multipliers will find their way outside the State. But that's a very important point. It really, as economists love to say, it depends.

(Laughter)

MR. ROLAND-HOLST: And in this case it really depends on the nature of the spending. So, frankly speaking, ratepayer savings are a very potent catalyst for growth inside the economy. Not just because they target services, but because those are jobs that can't be outsourced, right.

CPUC COMMISSIONER FLORIO: Thank you.

MR. PFEIFENBERGER: So, let me try to wrap this up very briefly. There's another category of impacts that we've measured, reliability and some renewables integration, some transmission related impacts. These are in Volume 11 of our report.

But very briefly, part of the reliability impacts we have quantified. We've talked about load diversity benefits. That is a reliability related benefit that we have quantified.

We also, in our simulations, have factored in that a more diverse regional footprint has a lower need

for flexible resources because a lot of the flexibility need you can achieve by just having a more diverse footprint. Whether it's diverse in terms of load, whether it's diverse in terms of weather patterns, whether it's diverse in terms of where the renewable resources are located. So, some of that we've captured in our production cost savings.

In addition to that there are operational benefits of how you run the system on a day-to-day basis. And we've done a very detailed assessment of the reliability operator functions. And in Volume 11 of our report, and in the appendix slides, you see a summary table where, basically, having a regional market that has full unit commitment, day-ahead visibility, and real-time visibility gives you improved awareness of reliability challenges in your system.

Both real-time awareness, but also day-ahead awareness of weather patterns, improved forecasting and things like that.

I'm not going to go through the whole list of what we've identified. But in that table that we have, you'll see that a lot of what a regional market operator does exceeds NERC requirements and that would certainly have a reliability benefit to the region, beyond the benefits we've quantified.

A brief note on transmission planning. We have not done a transmission plan for each of the scenarios, even though in Scenario 3 there's more transmission in the model because there's more Wyoming and New Mexico renewables. But currently, the transmission planning is done on a sub-regional basis. You see the sub-regions here.

What has been shown in the WECC and in the rest of the country is planning transmission across system operators is challenging. And doing that within a unified regional market has significant advantages. Better planning models, better coordination, and so on.

So, let me summarize the conclusions. We have analyzed all six impacts that have been specified in SB 350. In terms of the impacts we have seen overall benefits to California ratepayers. We think the $1.5 billion a year is a very conservative estimate. In some of our scenarios it's $2.5 billion a year and it doesn't capture improved hydro dispatch, which we have held constant. You know, weather patterns.

A lot of the real-time challenges, like Aliso Canyon, would be an example. It's not reflected in our model that really would make it easier to handle -- these challenges are easier to handle in a larger regional market.

Lower greenhouse gas emissions and other air pollutants, we see about a 5 percent impact. A regional market will not be the primary driver of emissions reductions. It will be the policies and carbon pricing that have a big impact. But we do see some emission impacts.

Job creation, David has just talked about that.

Reduced environmental impact from using land more efficiently and being able to build renewables on land that's not as sensitive.

Reduced impact on disadvantaged communities, some reduced emissions in most of the cases, and also income and jobs.

And then, improve reliability. And generally, going to 50 percent, as the European experience shows, really requires regional market. As you may know, Demark has had a 140-percent generation from renewables this year and they couldn't have managed that without being part of the regional market that includes Nord Pool. That is very hydro-rich and has a lot of flexibility to accommodate that kind of outcome.

So, our report, I encourage you, if you're interested in any specific details about data, as we had the question earlier, we posted about 2,700 megabytes of data of the study results. The report, itself, is

almost 700 pages, with different volumes for the individual topics.

And to the extent you're interested in specific sensitivity results, all the emission results, production cost savings, ratepayer impact calculations are presented in more detail in those report volumes. Thank you.

CEC CHAIR WEISENMILLER: Okay, thank you. Any questions?

Okay, we're going to take a 15-minute break. In terms of reminding everyone, again, if you have comments, we need a blue card. And again, we're going to come back, we'll deal with government officials first in the room, and on the line. And then we'll go to public comment, first in the room and then on the line.

So, three minutes. Three minutes each. And again, you have written comments later that are due. So again, thanks.

(Off the record at 11:22 a.m.)

(On the record at 11:41 a.m.)

CEC CHAIR WEISENMILLER: Okay, let's start again. Commissioner McAllister.

Okay, in terms of government officials, Seattle City Light?

MR. CROMWELL: Well, good morning. Am I live?

Should I get closer? Right up on it. Okay, can you get it up? That would be great. Carpool Karaoke it isn't.

Good morning, Robert Cromwell, Seattle City Light. I'm the Director of Regional Policy and Contracts there.

Just a few comments on the modeling results that you've seen this morning. And I apologize, I have to leave early this afternoon for a flight, but we will be filing written comments regarding governance.

I just want to say that, first off, I appreciate the hard work that's gone into the study results that have been presented here today. I think it's important to recognize that there has been a lot. And I would encourage those who will, no doubt encourage you to tease apart one assumption or another, that the more critical question, ultimately, is whether the Governor of this State and the Legislature have the information that they need to make a material decision regarding the future of the ISO.

And I say that as a utility, representing a utility that's over 90 percent hydro and has been greenhouse gas neutral for a decade. I really can't make my portfolio any greener than it is, but I can help others achieve those environmental goals. And that is one of the reasons why we're here.

So, in sum, I would encourage everyone here to work together, recognizing that perfection is a goal rarely achieved, but our future generations can't afford for us to fail on this. Accepting imperfections, driving for continuous improvement is difficult. It doesn't lend itself to press releases, but it will be that good, hard work that will deliver what we need to do to address climate change. Thank you.

CEC CHAIR WEISENMILLER: Well, thank you. Thanks for being here.

Matt Freedman, you asked some of those questions, so you get the next spot.

MR. FREEDMAN: Hello. Matt Freedman, with the Utility Reform Network. We did ask a lot of questions. We're quite curious and we have a lot of observations about the study. I'll highlight a few.

First, I'd point out that although the SB 350 authorized that the studies must be complete by the end of 2017, they're done now. And we're concerned that the rush to create the results has compromised the process, itself. There's been really a rush to, in our view, ignore a lot of stakeholder comments. Very few changes, almost none were made to the final study, based on the comments on the preliminary study. And we think the results show that inattention to many of the critiques.

In particular, we'd like to highlight one key assumption, which has to do with the beyond RPS wind. The model assumes that only under regionalization 5,000 megawatts of additional wind are developed in Wyoming and New Mexico. None of the costs associated with that wind are attributed to the model or to any particular customers. No transmission costs are assumed. But many of the operational benefits are included in the model.

These really drive the key environmental benefits that are claimed by the study. And it's important to point out that this assumption was added at the last minute and was never vetted with stakeholders. It wasn't part of the preliminary inputs. It never was subject to comments. It just kind of showed up in the study results.

And one of the things that we found, to sort of push back on the notion that these are economically valuable resources, we looked at the value that could be obtained from the New Mexico wind. These are supposed to be resources that are so cheap people will build them just to realize economic value.

It turns out that, according to the CAISO's own modeling, that that New Mexico wind would be selling into the market where 40 percent of the hours the pricing would be negative. And, in fact, the average

price that those wind resources would receive, across their entire generation output, none of which is assumed to be curtailed, is minus $11. So, they'd be paying 11 bucks for every megawatt hour they put in the market. These are supposed to be the resources that are so cheap under a regional market that investors are going to rush to build them.

The problem is that the assumption that these resources show up produces most of the environmental benefits. Without these resources in the model, under the sensitivity, we see really marginal changes in Western greenhouse gas emissions, higher greenhouse gas emissions in California, more coal generation happening in the west than under the base. More natural gas generation happening in California than under the base case.

The bottom line is regional markets actually incentivize the dispatch of coal because it's one of the cheapest resources in the western system. That's what the modeling shows. Unless you add a bunch of free wind that nobody pays for.

We have a lot of other critiques. I encourage you to read our comments, which are voluminous because we asked so many questions. And we will have more comments that we will circulate to decision makers,

stakeholders, and other folks. Thank you.

CEC CHAIR WEISENMILLER: Okay, thank you.

Travis Ritchie, Sierra Club.

MR. RITCHIE: Thank you, Travis Ritchie with the Sierra Club. One of our concerns, obviously, is about greenhouse gas. And we acknowledge that in the 2030 scenario we do see some decrease in greenhouse gases in the regional model. And I want to stress that's a good thing, we like that. We want to find a way to get there. We want to find a way to get those renewables that Matt was talking about on to the system.

The question is, is this what's doing it and what are the costs of doing it?

And what we're seeing in the model is those greenhouse gas reductions in 2030 are largely a result of gas displacement. Again, a good thing because you have renewables coming online.

But one thing the model shows, and both in the near term and the long term, in the near term there's a bump up in coal dispatch increase. You know, PacifiCorp is a very coal-intensive fleet. They have a lot of coal units.

And as the model points out, one of the impacts of this is that that coal fleet will face lower economic and operational hurdles to meet California loads within

a regional market.

Now, today the study presenters talked about a .4 percent increase. When they did a sensitivity in 2020, the immediate impact of WECC-wide was a 3 percent increase in coal dispatch. That's a big increase and that can have an effect.

Commissioner Florio, you mentioned that the models may not take in account retirements from market pressures, that we would see in depressed energy prices. That's true. But what is also true is that as those coal units dispatch more and they get more productive, they're more profitable. They're more profitable in the 2020 time frame, which is when PacifiCorp is facing investment decisions on whether or not to spend up to a billion dollars in capital on its existing coal fleet to keep it operating.

If we create a regional market, if we open up California's market or just share our system in a way that boosts the profitability of those coal plants, we risk tipping the scale in favor of investing in those coal plants, keeping them open for 15 to 20 years once that billion dollars is spent.

So, what we're also looking at is while it's true we may see more retirements coming online because of depressed energy prices, we may also see coal plants

that get a lifeline and are able to operate much longer than they otherwise would without a regional market.

Now, folks talked about how coal increase is a modeling artifact and that we're looking at -- as we start to impose the barrier of importing coal into California, that will be solved.

Well, there are major problems with that assumption. First of all, it assumes right now that it's unspecified power, so it's already applying the unspecified power hurdle to that. It's unclear whether that is even going to be available to California as a policy solution.

The issues going on with the greenhouse gas adder and how that's being accounted for is showing that there is dispatch outside of California that is not being accounted for. It's not being incorporated into the costs. That same problem is likely to be magnified in the day-ahead market. So, that's a big concern for us.

It's particularly a concern because what we're going to talk about this afternoon is that greenhouse gas proposals were stripped out of the governance policy. We're no longer talking about setting up greenhouse gas proposals before we launch this thing, and that's a major concern for Sierra Club.

And I see my time is up. I'll point out one last thing, if I may. Last week, PacifiCorp announced its intentions to sue EPA to try and block the implementation of the Regional Haze Rule for its coal units in Wyoming.

There is active attempts to continue to prop up that coal fleet in Wyoming, in Utah, and we're going to continue to see that. Thank you.

CEC CHAIR WEISENMILLER: Thank you.

Mr. Aguirre?

MR. AGUIRRE: Thank you. In 14 years there will be a $1.5 billion savings due to less capital investments, procurement costs, and less grid management costs. A projection so many years out lacks any real credibility, a 14-year projection.

Even after they were asked for, you have not released the calculations showing how you got to your projected savings. In the report, you promised to do so in Chapter 7, and indicate that you were supplied that in Chapters 3, 4, 5 and 6, but there are no calculations on how you actually got to the $1.5 billion savings in 14 years.

You have not provided the inputs for your modeling because of Homeland Security? That, unfortunately, if you do the legal research, is not an

appropriate objection under the Public Records Act, and under Section 13 of SB 350, for which CAISO is now being sued to try to get that released.

You should have started with the fact that the California IOUs are, on average, 11 percent away from their 50 percent goal, according to the RPS that's in the CALPUC RPS publication.

Your reports assumes that there's no reduction in load due to efficiency. You assume supply continues to serve load and instead of load serving supply.

Weisenmiller, you keep talking about the Germans, but the Germans have discovered that it's not rational anymore to have supply serve load. Load needs to serve supply. Meaning, we have to use efficiencies to get where we need to go.

This proposal does nothing more than support the current plans and the current way that we do business.

I will also remind you that per capita consumption of megawatt hours in California is 6,800. In the U.S., it's 11,772. Meaning that Californians are willing to conserve, are willing to be more efficient. This has nothing built into it with regard to that.

You used a simulation instead of exact analysis of PacifiCorp's coal accepts. And your refusal to answer Mary Nichols' question is another example of the

fact that you are here to advance PacifiCorp's business plan. If any part of the payment -- well, let me stop there.

So, what I mean by that is this is a plan that has been adopted and asserted by PacifiCorp, which has exercised improper control over the ISO, which is supposed to be a nonprofit.

I asked before that there be a determination made by the IRS that this proposal doesn't violate the nonprofit status of the ISO. That still has gone un-responded to.

You have conducted the review of the proposal in private to privatize and to expand the CAISO. You've done that with deceit, with tyranny, with secrecy, instead of allowing a give and take. What a shame. I'm closing. What a shame.

CEC CHAIR WEISENMILLER: Okay --

MR. AGUIRRE: Hold on. You let Sierra Club close. What a shame that we have these wonderful group of people and these fabulous experts who have to kowtow to the corruption that you all represent. And I don't mean Peterman and the other.

CEC CHAIR WEISENMILLER: Okay. Well, you're time's up.

MR. AGUIRRE: The corruption that you represent.

CEC CHAIR WEISENMILLER: So, please, let's go on to Marc Joseph. Marc.

MR. AGUIRRE: The corruption that you represent, instead of allowing a real discussion to advance the welfare of our State. Thank you.

CEC CHAIR WEISENMILLER: Okay, Marc.

MR. JOSEPH: Marc Joseph, on behalf of the State Building Trades Council. I'm not sure if I should thank you for calling me right after that, but thank you.

(Laughter)

MR. JOSEPH: Sure. Is this better? Okay. So, I want to highlight one particular aspect of the studies that you heard about today. And there's the differences between Regional 2 and Regional 3, the two scenarios.

And by way of background, to recap, Regional 2 scenario is consistent with the current portfolio content category or bucket system where new renewable developed is concentrated in California. And the Regional 3 scenario is we spread it out all over the west.

So, I want to highlight the comparison between Regional 2 and Regional 3 in four areas. Costs, CO2 emissions, regional integration and jobs.

If you look at slides 36 and 37 in your packet, you'll see that with respect to costs there's a very

small difference in the cost between the modeled benefits for Regional 2 and Regional 3. And you see that on slide 36. On 37 you see, in the text on the lower right, it's a difference of 2 or 3 percent in the rates. The difference between the two scenarios is maybe 1 percent of retail rates. So, it's a very small difference between the benefits in Regional 2 and Regional 3.

Now, if we turn to page 41, and look at the CO2 emissions, we see again a very small difference between Regional 2 and Regional 3. In fact, Regional 2 is slightly better than Regional 3 in terms of CO2 emission reductions.

Now, with respect to renewable integration, you can't turn to anything in your packet. But in the final report there are several slides. There's a slide, and you can sort of close your eyes and imagine this, there's a slide which shows the base case regional integration -- the over-generation percentage is about 4.6 percent. Regional 2, 1.6 percent, Regional 3, 1.2 percent. So, almost all of the regional integration benefits you get with Regional 2, as compared to Regional 3.

So, on these first three things, regional integration, costs, ratepayer benefits very close

outcomes between 2 and 3.

Now, let's go to the punchline. If you look at pages 63 and 64, you'll see that total jobs for Regional 2 are about 9,000 higher. And in particular, if you look at slide 64, and this is my favorite slide in the entire packet. If you look at the green bar, the solar buildout bar, the real live jobs, with real live people, building real live things here in California. Regional 2, it stays about the same. Not surprisingly because that's the status quo with the current system of the bucket footprint. Regional 3, 10,000 plus jobs per year go away for the period 2020 to 2030, 110,000 jobs. Good jobs, not baristas at Starbucks, but good jobs would go away under Regional 3.

So, it's our view that if we're going to proceed with regionalization and there's still a lot of open questions, if we're going to proceed with it, we should maintain the footprint of bucket one right now, capture the real-live economic benefits without much sacrifice. Thank you.

CEC CHAIR WEISENMILLER: Okay, thank you.

Carl Zichella.

MR. ZICHELLA: Thank you. Can you hear me? Is this okay?

CEC CHAIR WEISENMILLER: Yes.

MR. ZICHELLA: Thank you for the opportunity, Chairman, Commissioners. Carl Zichella with the Natural Resources Defense Council.

A couple of quick thoughts, introductory thoughts. This is an important thing we're talking about. It is about exercising California's leadership across the rest of the western interconnection, helping others reduce their greenhouse gas emissions. And also, enabling us to transform the electricity sector from one that's primary driven by carbon to one that's primarily driven by renewable energy resources.

This is a big thing that we're engaging in right now. It's one that we can really exercise and leverage our leadership on.

I know of no studies that show going to deep penetrations of renewable energy resources can be done without consolidating the balancing areas across the western interconnection, as they have done elsewhere in the U.S.

And where we have seen these RTOs in operation, elsewhere in the west, we've seen very rapid retirements of coal plants, 30,000 megawatts of coal plants have been retired, PJM and MISO in the last five years. Another three gigawatts are projected to be retired in the Southwest Power Pool.

Experience shows us that this is an important improvement in operating the grid. Analysis that NRDC and others, Western Grid Group, and others have done on uncounted benefits from the studies that we're talking about, where we can see up to and possibly beyond $165 million a year.

The benefits themselves are enormous. They are commensurate with what we have seen in other regional transmission organizations. And we can have a lot of confidence in the benefit study that we've talked about because this experience is borne out, the ranges that we've seen.

Finally, it's been said many times already today that the assumptions in these studies are extremely conservative. Think for a minute about 5 million EVs on the road, what that means. The scale of what we're talking about, that really depresses the benefits even further, if there is somewhat of a less of an adoption. I hope we get to those 5 million EVs. But doubling energy efficiency, these things have been studies in sensitivities. They're really, really important to keep these things in mind. They really help us make the judgment we need about whether or not to go forward with this.

And I would submit to you that it's necessary

for us to meet our long-term goals on climate change and renewable energy integration. We will not meet climate change by ourselves. California is not an island, no matter how much people would wish it to be. Any opportunity to engage in other states in a collaborative way, in a market that gives everyone a stake in the kind of goals we're talking about is what we need.

And if we're looking for deeper reductions in carbon and retirement of coal plants, this is what we're going to need to be doing. Experience shows that it works. Thank you.

CEC CHAIR WEISENMILLER: Thank you.

CBE, Communities for a Better Environment, Shana.

MS. LAZEROW: Good afternoon, Shana Lazerow, Staff Attorney at Communities for a Better Environment. Can you hear me okay? It's not so loud in my own ears.

I first just wanted to say, you know, thank you to all the staff who's here today. This is a tremendous amount of work in a very short time. CBE strongly supports the concept and effort of regionalization and regional sharing. We really view it as an important path forward to the energy system that we're going to be needing in the near future and in the middle term future.

I wanted to make just a couple of points. And I apologize in advance if some of these go to the governance portion. I'm not going to be here for public comment this afternoon.

The timing has been problematic for CBE and for many of the environmental justice and public interest groups that have been trying to participate. We really appreciate the amount of public outreach that has been going forward. But it's very challenging to marshal all of our resources in the many studies called for in SB 350. So, to the extent that we can take a little more time so that our researchers can give a deeper look at this information, we would really appreciate it.

I wanted to look at -- we appreciated the slide that specifically called out the impacts from gas startups. When we come to talking about rules for how this could work, I would love to see results and information about rules that limited the number of startups and shutdowns, and forced technology that could provide the services that those startups and shutdowns are providing.

Looking from a regional perspective, we know that there are a lot of technologies that can provide the flexibility and we want to make sure that those really get analyzed and put into a kind of governing or

operating requirements.

We had quite a few questions around the transmission assumptions and what's going to flow from transmission. The Wyoming wind, of course sounds like the dream, and that's where we all want to wind up, being able to use this Wyoming wind.

We had a concern, looking at the sort of historic analyses coming out of CAISO about what happens when you're reliant on a transmission line or two transmission lines that could go down simultaneously. And we're entertaining a concern about creating a local capacity area that is California, where you would have one or two transmission lines that are assumed to be down, resulting in the necessity to procure resources just in-state. The sort of duplicative procurement scenario.

There was also a concern about whether the actual rules concerning reserve margins would be changed to reflect the fact that there would be less need for reserve margins or whether we would continue to procure for the reserve margins that are currently on the books.

And I see my time is up. Thank you so much for the opportunity comment and for all this work.

CEC CHAIR WEISENMILLER: Great. Thanks for being here.

Okay, Solar Energy Industries Association.

MR. SMITHWOOD: Chairman -- is this working? Chairman Weisenmiller, first, apologies for my handwriting. My name's Brandon Smithwood. I am the California State Affairs Manager for the Solar Energy Industries Association.

We are the national trade association for the solar industry, representing over a thousand companies, many of which are based or do business here in California.

I'm going to keep my comments pretty high level. The SB 350 studies, at a high level, their results show what we would expect from a regional ISO. The benefits include integration of higher penetrations of renewable energy, improved reliability of the electric system, and reduced greenhouse gas emissions.

We look at some of the comments about the sensitivities around, you know, if you don't have these 5 gigawatts of beyond RPS, renewable energy deployments, as really not being in line as what we see as the trend lines.

And those trend lines are that there's increasing amounts of renewable energy penetration across the country and within WECC. That's because renewable energy is increasingly the cost-competitive

resource. In quarter one, of 2016, 64 percent of all electricity-generating capacity installed was solar. In 2015, solar capacity, alone, beat gas installs.

According to our Solar Market Insight Report, that we do with Green Tech Media, by 2021, obviously we expect California to be a robust market. But beyond that, we see 20 states with over a gigawatt of installed solar, including many states in the WECC. These states include Arizona, Nevada, Colorado, Utah, New Mexico, and Oregon.

And creating the regional ISO, creating that broader footprint is going to provide an opportunity, not only for California, but for the other states in the WECC to maximize the value of those resources and balance the system.

Thank you for the opportunity.

CEC CHAIR WEISENMILLER: Thanks for being here.

Northwest Energy Coalition.

MR. HEUETTE: Good morning. Thank you. It's Fred Heuette, Northwest Energy Coalition. We represent about 120 organizations in the four Pacific Northwest States, consumer environmental community, and progressive utilities, including Seattle City Light, Puget Sound Energy, Portland General Electric, Emerald PUD.

Naturally, we're very -- we look at this from a northwest perspective, but also looking at it from a regional, west-wide regional perspective because it really is all one big grid.

Really appreciate the work that went into this. I've been in the consulting business and running these kinds of studies, under this kind of timeline, with this kind of complexity and this kind of oversight is a pretty challenging thing to take on. Both the ISO and the consulting groups did a really, pretty terrific job in assembling the data. That doesn't mean we agree with everything, of course.

But as a friend of mine, who's pretty well known in Northern California public power said, when you have people like this producing these numbers, who's really going to question the numbers? I think the numbers are really solid overall.

We can argue about which assumptions and so forth, but the rapid assembly of this information is quite astonishing, actually.

It provides not just a picture, the big picture, and we have a lot more clarity on it, but it also provides focus on some areas, real areas of uncertainty. I would particularly point out the area of transportation electrification, electric vehicles, and

also storage. These are areas where we still really don't have a clear idea whether they would have a very significant impact, potentially, on a regional system operator and what the effect would be.

It really highlights the importance of the RSO concept as maybe not necessarily being a policy driver, but helping to amplify the effects of policy.

We have one main concern, I think, which is that we really do need a full footprint study, including the two power marketing administrations. Obviously, Bonneville, very important in our region, the Western. And also to look at Alberta and especially British Columbia, and Mexico. Although, a very small portion of Mexico is currently in the WECC, there are very important discussions going on between U.S., Canada and Mexico, the "Three Amigos" process, and between WECC and Mexican Power Authorities that may make Mexico much more of an important part of our assessment going forward.

And we have also -- so, I think it would be important, at some point soon, to run a full footprint study, just so at least we can tell what the net difference is with or without the PMAs, and with the Canadians and Mexicans.

I want to add one area that I think would be important to clarify, it's already come up this morning,

which is to take a look at the export constraints going out of California. I think it was a good idea by somebody, I think maybe Hannes, suggested maybe WECC should study that. I think some of us might actually propose that for the next WECC study program. I hope the ISO will support that.

And I would also like to point out this is, obviously, as has been said, a California-centric approach. But there are important aspects that these studies cover that other parts of the region will want to extend, and take this analysis further.

And finally, I think we also have to recognize these studies don't address some important questions. For example, the production cost benefits from this process, will they all flow to ratepayers or, potentially, will market players take some of that consumer surplus? Those are questions outside of the scope, but are very important to those of us who have consumer concerns. Thank you.

CEC CHAIR WEISENMILLER: Okay, thank you.

Carolyn Kehrein.

MS. KEHREIN: Good afternoon. Can you hear me okay? I can't hear myself.

MR. CUCCIA: Pull it a little closer.

MS. KEHREIN: Get a little closer. Okay,

thanks, Tom.

I'm with -- I'm here representing Energy Users Forum. We represent a broad group of energy users in California, both direct access and bundled, all sorts of consumers.

But mainly what I wanted to say is that we applaud staff on the effort that they've undertaken and appreciate the openness of the process.

This is an extremely important issue to customers. And if we are going to move forward with the California State policy of increasing renewable penetration beyond 33 percent, intermittency is going to be -- instead of now it's a big issue, it's going to be a huge issue. And regionalization is necessary to deal with intermittency.

So, it's tied hand-in-hand. Greater renewables in California means we have to regionalize.

There have been a lot of critiques that I've heard today regarding the ISO study. For instance, somebody said that you didn't use real numbers. Well, when we're talking 5, 10, 15 years out, real numbers don't exist, anyway. You have to use assumptions.

And in any study that's done, whether it's done by the PUC, the CEC, the ISO, every study uses assumptions. And you have to make assumptions about,

for instance, what's going to happen with energy efficiency and what's going to happen with load growth.

So, those assumptions have to be made and they're never -- you know, they're never exact. But this team's done the best they can on the broad level of assumptions that they've had to make.

So, yes, the benefits shown are illustrative. But the level of benefits identified, they may not be exact, but they indicate that there are benefits for California ratepayers and everybody across the West, it looks like. And it confirms the need for regionalization.

So, in end, I just wanted to say that regionalization is necessary if we are going to increase the number of renewables.

And lastly, wanted to thank the ISO staff for their diligent -- and the rest of the study team for their diligent effort under what is well beyond extreme pressure, for all different types of pressure.

So, I know the ISO staff is known for doing that, but thank you all very much, once again. Thank you.

CEC CHAIR WEISENMILLER: Thank you for being here.

I think that's everyone in the room, so let's go

to the phones. Actually, one more in the room, okay.

Okay, so Claire Broome, Emory University School of Public Health.

MS. BROOME: Thank you. I'm a Professor of Public Health at Emory, but a California resident and ratepayer.

And I'd like to speak as a professor of public health. I think what you're charged with here is incredibly important. And I think as those of us who look at renewable energy know, regionalization makes a great deal of sense and has succeeded in other areas.

But I think it's really important to think that what we are faced with here is a very concrete proposal for a near-term merger between CAISO and PacifiCorp. And I think the projections that we can rely on are most reliable for 2020.

So, I think it would be really advisable to look hard at what the implications are for adding a great deal of coal generation to our energy mix for 2020.

I also think it's quite important, from the point of view of cost, to again focus on that 2020 timeline and look at the cost of new transmission --

(Phone participant interruption)

CEC CHAIR WEISENMILLER: Hang on. Please stop, we have a public member speaking. Please, mute the

phone. Sorry.

MS. BROOME: So, I think it's very important to look at the cost of new transmission needed for the 2020 projections and whether that's been fully considered, both in the model and in the impacts on California ratepayers.

Finally, I very much appreciate the consideration, but hope that you will take the time to fully look at the implications for California and the global environment. Thank you.

CEC CHAIR WEISENMILLER: Okay, thank you.

So, let's --

MR. BARKER: So, we have the first comment from the phone is someone that didn't think their microphone was going to work, so I was just going to read that comment.

CEC CHAIR WEISENMILLER: Go ahead.

MR. BARKER: This comment comes from Michael Kurnik, from Orion Renewable Energy Group.

His questions is for Arne Olsen. "What were the modeled costs for energy storage? What was the model sensitivity to changes in the price of storage?" And lastly, "For the 5 million electric vehicles predicted, were these modeled as energy consumers, energy storage or both, and what was their capacity?"

And then let's first take -- we have two more people from the public on the phone. Can we have the operator take Caller Number 9? Operator, go ahead.

THE OPERATOR: Caller 9, please state your name and affiliation?

MR. TANSEY: Is this my line?

THE OPERATOR: Yes.

MR. TANSEY: This is Ben Tansey at Clearing Up in Seattle. And at the risk of taking a little bit more of more of my shared time, I wanted to ask, considering that a lot of the stakeholders, especially outside California, are feeling pressure to make decisions about this, given what the folks have been doing the research, the E3 and those folks, I'm just wondering, given what you know and the amount of time that you spent looking at the effects and stuff, I realize I might be going out on a limb, do you have a sense -- and I'm interested in each one of the people who gave presentations this morning responding -- whether in general the benefits of expansion would accrue throughout the west and, particularly, to other states as well?

CEC CHAIR WEISENMILLER: Okay, thank you. At this point we're taking comments. We're not taking questions, actually. We will give the ISO a chance to give very brief comments after this.

But certainly, you can submit written comments, but again just for today.

So, let's go on to the last person on the line, I think Stephanie Chen at Greenlining.

THE OPERATOR: She's put her hand down.

CEC CHAIR WEISENMILLER: Okay. So, anymore comments on the line? Put your hand up or let's --

MR. BARKER: As a reminder, folks, to get into the queue hit #2 on your phone.

CEC CHAIR WEISENMILLER: Let's see, I think we have one more in the room. Please come forward. Please identify yourself?

MR. FURMAN: My name's Don Furman. And I did fill out a card, but that's okay, these things happen.

I represent a coalition called Fix the Grid. And Fix the Grid includes a number of companies and environmental organizations. Let me just tell you a few of them. General Electric, Sun Power, EDP Renewable Energy, EDF Renewables, Pattern Energy.

On the NGO side, Advanced Energy Economy, NRDC, who has already spoken, Union of Concerned Scientists, Volt Solar, and I mentioned NRDC.

The purpose of our coalition is to support, in general, then specifically this transaction for PacifiCorp to be allowed to enter the California ISO.

We think this is the single most important thing that you can do to support de-carbonization of the grid.

Unless you expand to a broader footprint, you're not going to be able to integrate all of the renewable energy that you have now and, certainly, it's going to be a lot harder for those other states, in the Western States, to take on renewables.

You know, this is a moral issue. At the end of the day, we are a very wealthy company in the country because we have an economy that's based on carbon. And driving a Prius is a good thing to do, and I would encourage everybody to do that, who's not already doing it. But unless government acts to change the way this electricity grid is structured, and the way carbon is so deeply embedded into it, it's going to be very hard to achieve the goals that you've set for yourself.

Personally, I'm a former executive of PacifiCorp. I retired quite some time ago. I worked for a number of years in the renewable energy business. I've operated plants in every single organized part of this country.

We have organized markets in every other part of the world that's developed. You can go to Chile and work in an organized market down there. You can do more things in Chile than you can do right now in the rest of

the Western United States.

So, it's a hugely important thing to do. It's important to get it right. There are a lot of things, you can argue with the assumptions that went into the models, but at the end of the day they were very well done. I agree with Fred Heutte's comments.

There are things that are important. We have to have greenhouse gas accounting. There has to be some way for the public to know where their electricity is coming from.

It's very importance the governance is done right. And we're going to talk about governance later this afternoon.

But the point that I would like to make is this broad coalition of companies and environmental organizations, who have their differences, have come together to support this concept. It's an important concept. It requires that it be done deliberately and carefully, but it's the future. It's what has to happen if you want to have a low carbon future. Thank you.

CEC CHAIR WEISENMILLER: Thank you.

Anyone else in the room?

Okay, so ISO, Keith, five minutes. We've had a lot but, again, I'm just looking for high point comments.

CPUC COMMISSIONER PETERMAN: And, Chair Weisenmiller, I'm going to ask another question to be addressed by the ISO in their five minutes.

So, as it relates to ratepayer benefits, particularly the benefits that are outlined in slide 30, the Brattle Group presentation, can you give us a sense of the benefits relative to ratepayer expenditures? I'm just trying to get my head around that is this a one percent increase in benefits, 10 percent? Thank you.

MR. PFEIFENBERGER: Yes, thank you for these comments and thank you for that question. Commissioner, if you don't mind, I will answer your last question, first.

CPUC COMMISSIONER PETERMAN: I don't mind.

MR. PFEIFENBERGER: Simply because it's still in my mind. We have a slide, slide 102, in the appendix that shows the ratepayer benefits as a percentage of retail rates. And it's a 3.1 percent rate reduction relative to the current practices case in the 2030 Regional 3 case.

I'd like to comment on a couple of the points that have been made. The first question that has come up on the renewable, the 5,000 megawatts that we assumed would come in beyond RPS requirements. The study assumption, it was first discussed qualitatively because

many regional markets have been -- market studies have seen that. But we did get some data from LBNL, which I have projected now.

And what you can see there is the WECC has really lagged by the extent to which -- that's slide 13 -- by the extent to which renewables have been developed independent of RPS requirements.

You can see that in the Midwest, that's sort of the Kansas, and Oklahoma areas, and Texas, Western Texas, a tremendous amount of wind has been developed beyond our RPS.

And you might also recall that 60 companies have just committed to purchase 60,000 megawatts of new renewables by 2025, in the U.S. A lot of that will have to happen in the west.

The renewables integration challenges will be significantly more severe than we have simulated in our study because of these additional renewables that invariably will come into the market, and have already come into the other markets. And these are all markets that have sued the EPA over clean power plant.

But, you know, if you have good wind and a good market design, that doesn't hold back the renewable development, and that doesn't hold back the public power companies, and the Googles, and other companies in the

world to sign up for that capacity beyond RPS.

I'd also like to clarify a couple points made about our sensitivity without additional renewables in the regional market case. So, these are the cases where the -- let me see if I can project that larger. This is slide 99. And these are the actual results of Regional 3, without any of those additional renewables beyond RPS.

And Mr. Freedman has pointed out, as I'm trying to point out here, that here the in-state California emissions, greenhouse gas emissions have gone up from 46.2 percent to 46.5 percent. That is not a valid comparison because it excludes all the imports.

As you can see, the total emissions associated with California load actually go down in the Regional Market 3 case, even without the 5,000 megawatts. So, I think that 5,000 megawatts is mostly Red Herring.

The other thing I want to point out, I think the statement has been made that in the rest of WECC emissions go up. But as we can see here, even without the additional renewables in Regional 3, emissions go down. Greenhouse gas emissions go down slightly on the WECC-wide basis.

Moving on to the issue of coal dispatch. It is, of course, a concern that has to be taken seriously. We

did receive comments in response to our May 25 presentation.

And unlike TURN has suggested that we haven't addressed any of these comments, we have run half a dozen additional sensitivities in response to the May comments. We've calculated ratepayer impact calculations for additional scenarios. We've analyzed the coal dispatch in great detail. And we've explained many of our results in our report, in more detail, in the response to the May 25th comments.

One of these topics was the coal dispatch issue. I've briefly addressed this in my earlier comments, so I want to expand on that a little bit.

The issue here is the slight increase inside the circle on slide 42. We have explained, in May, that we believe that is related to the generic import hurdle that's based on a combined cycle unit, not a unit-specific hurdle.

If PacifiCorp was in the market, just like an EIM that would be a unit-specific hurdle, we have done a sensitivity case where we increased the generic import hurdle halfway between a combined cycle unit and a coal unit, and that increase of that import hurdle has eliminated that delta by half.

So, we think it's mostly not effect of the

modeling.

But in addition, we'd like to point out that we have not considered any of the additional retirement pressures that are created in a regional market. These retirement pressures are severe. We've seen coal plants getting retired in the Dakotas because the regional market prices put out a clear, transparent signal that doing so is more efficient.

The other thing I need to note, which I haven't mentioned earlier, we have assumed that under current practices these coal plants are dispatched fully economically, even within the balancing areas.

The reality is that at least some of the coal plants in the west are currently dispatched as must-run units. We have several coal plants in the combined California/ISO/PacifiCorp footprint, some of them are owned by California utilities, that are dispatched at 80 percent baseload factor. There might be fuel contracts and so on and so forth.

In our model, even under the current practices, some of these plants would not run at all or only at 25 percent. So, our current practices case assumes that people will change the dispatch preference away from baseload, which reduces the emissions even in our current practices case.

We've seen that does not happen in many places, unless there is a regional market ready to replace the output of that baseload coal unit.

I think I'll limit my comments to that.

CEC CHAIR WEISENMILLER: No, that's good. I was going to ask just, yeah, I think at this point we're going to have to break for a short lunch, back at 1:15.

And, certainly, one of the things which, you know, I'd encourage the ISO and PacifiCorp to talk about is ways to mitigate in this area on the sort of coal questions.

(Off the record at 12:32 p.m.)

(On the record at 1:23 p.m.)

MR. BARKER: We're going to get started with the afternoon session. Since we jumped to lunch a little early, the Chair has asked Arne to answer one of the questions that was previously asked. Go ahead, please.

MR. ARNE OLSEN: Yeah, the slide deck, is that --

MR. BARKER: Would you like the PowerPoint?

MR. ARNE OLSEN: Yes.

MR. BARKER: You can drive it from there.

MR. ARNE OLSEN: Okay. So, there was a question about what storage costs were used and a question about the electric vehicle assumptions. And so, I thought I

would address these very quickly.

And direct your attention to slide 106, where there are some details about the storage costs. The technology characterization is a little bit complex and hard to summarize because there are a number of different costs components. There's a component that represents a dollar per kilowatt hour, basically reservoir size component. There's a component that represents the power system conversion cost in dollars per kilowatt, basically of capacity. There are some O&M. There's an inverter replacement. So, it's relatively complex.

But we did a lot of detailed sort of research on what storage cost to use. This is one of the things that we updated after the February workshop, going back and kind of sharpening our pencils and making sure we had the most recent information about storage cost which, kind of like solar, had been changing rapidly.

The other thing I'll note is that we assumed a pretty aggressive cost reduction between 2015 and 2030. You can see for lithium-ion it's on the order of, you know, a 40 percent reduction. And for full batteries, it's about a 50 percent reduction in cost between 2015 and 2030.

And that does drive some of the results.

Depending on these battery storage costs, in particular, we might see storage in the portfolio, we might not see it in the portfolio. We might see pumped hydro in the portfolio, depending on the relative cost differences.

With these assumptions, we did see about 470 megawatts of battery storage added in the current practice case, mostly to provide reserves. And those resources weren't needed in the Regional 2 or Regional 3 case, when you had the big regional grid to rely on for some of those services.

With respect to the electric vehicles, the question was whether we had modeled them as being flexible, vehicle to grid, or just one way. The answer to that is that we modeled them as being one way. Basically, charging during both daytime and nighttime hours on a pattern that was identified as kind of a -- you know, it's partly at home because that's when it's most convenient. But assuming that there's universal access to workplace charging so that people are getting a good charge during the daytime as well.

We did not model them as being entirely flexible to the grid. But I'll note, on slide 33, that we did run a sensitivity. Sensitivity C is the high flexible loads sensitivity. So, this is a case where we added 3,000 megawatts of four-hour batteries to all of the

cases. Just to represent if we had a whole lot more flexible load, or a lot more batteries, you know, something, a big, new flexible resources would that severely reduce the benefits of the regional market?

And we find that it does reduce them somewhat because we don't -- you know, there's less for the regional market to do that the current practice case can't do. But we still have benefits of the regional market on the order of $500 to $600 million per year by 2030. And again, these are just the renewable procurement benefits. And on top of these would be all the ratepayer benefits and the production simulation savings that Hannes talked about this morning.

CEC CHAIR WEISENMILLER: Okay, thank you. I'm trying to -- let's move over to the governance issue. We have some constraints from some folks on the dais and I want to make sure.

Dave Olsen, are you going to introduce the staff?

MR. DAVE OLSEN: So, Mr. Chairman, Chairman Nichols, Commissioners, I'm Dave Olsen from the California ISO Board of Governors. As we move into a discussion of regional governance, it's pertinent to say a word about the role of the ISO Board.

We are appointed by the Governor of California

and confirmed by the Senate to provide independent oversight of the ISOs' operations and management.

We have been concerned for several years, we have been working actively as a Board for several years to find ways to advance California energy and environmental policies in ways that protect California policy prerogatives. And you can see that by looking at our strategic plans that we've issued for the last three years.

And as we begin to explore regional governance, we certainly understand the importance of protecting the prerogatives of other state policies as we move forward.

Just a word about these studies. The ISO Board has been involved in the studies, the results of which you saw this morning, from the beginning in the development of assumptions, and in choice of methodology, in review of results, and certainly in monitoring of the process.

We greatly appreciate the amount of stakeholder input and involvement throughout this process. It has really helped us to come up with better results, we think, more robust, stand up to more scrutiny. We thank you all. We know it's been an intense effort.

But most of all, on behalf of the ISO Board, I want to thank Dr. Casey and the ISO staff, and an

outstanding team of consultants for doing an enormous amount of work in a relatively short time. Again, I think it's work that decision makers can really base reasoned conclusions on.

The role of the ISO, really, in this particular case, is to provide analysis and perspective on the benefits and the risks of moving to regional governance. Ultimately, it will be up to the Governor of California, the California Legislature, in our particular case, and up to regulators and political leaders in other states to weigh the benefits, the substantial benefits we've seen this morning against real risk to policy prerogatives.

We have heard from other states and from stakeholders loud and clear that in order for other states to be able to fairly evaluate the benefits and the risks of moving to a regional electric system, we first have to come to some kind of agreement on a framework for regional governance. And that's what we're going to talk about now.

We, once again, have benefitted greatly from a lot of stakeholder comment, from papers from industry experts, and from a lot of conversations with the other states directly. So, we've attempted to incorporate what we have heard into a revised proposal for

governance.

To present that, I'm happy to introduce our Vice President of Regional and Federal Affairs, Stacey Crowley.

CEC CHAIR WEISENMILLER: Dave, I wanted to thank you for your public service and the public service of all the ISO Board members, and leadership on this issue.

And also, remind everyone about blue cards. Those of you who want to speak this afternoon, Kevin, Public Adviser, blue card. Thanks.

MS. CROWLEY: Thank you, Chairman, thank you, Dave for that introduction. Thank you, Chairman Weisenmiller, Chair Nichols, and Commissioners. We appreciate the opportunity to discuss the revised proposals for principles for regional governance.

And to start with, I just wanted to reiterate, Keith Casey went over the intent of Senate Bill 350 in regards to the study work that was conducted and discussed this morning. But I wanted to also explain additional language in that bill that relates to both the study work and the work on governance.

So, this is just a clip, an excerpt of the bill language that says that it is the intent of the Legislature to provide for the transformation of the ISO into a regional organization where it would be in the

best interest of California and its ratepayers.

And it goes on to talk about certain things. It shall not alter the obligation to State laws. We recognize that. It shall maintain open meetings and public access to records, which we do now and we would continue to do. It would be a voluntary transformation, with the approval of other utilities, state or local regulatory authorities.

And that these modifications to governance structure would be needed. And that's what we're here this afternoon to talk about.

And as Governor Olsen mentioned, that was critical to all the states in which we had these discussions throughout the west, that a change in governance was essential to allow for this transformation to occur.

So, I've just talked a little bit about the process here and this is just a simplification of what's in the bill. But it first says that the ISO will conduct the studies and that the three agencies, the Public Utilities Commission, the Energy Commission, the Air Resources Board would then jointly hold a public workshop where the ISO would present the study results and the governance modifications, which is today.

It goes on to say that the ISO would then submit

the studies and the governance proposal to the Governor, and that the Governor then would transmit to the Legislature.

So, we have worked with key stakeholders and the states throughout the past several months, all the way back from the beginning of the year, to conduct the work of the studies and discuss concepts around governance. And so, I'd like to just walk through those with you, today.

The approach that we took in developing these principles we discussed in some of the workshops that we had. But it really was based on the foundation of the discussions we had and the feedback we had from stakeholders, from state officials, which included state energy commissioners, state energy advisors, legislative staff and conversations with even consumer advocate groups within states, and others.

There were also, as Governor Olsen mentioned, conceptual papers that were produced by industry leaders, including the Hewlett Foundation. We had Public Power present a paper. We had some commissioners work very hard on developing key principles. Those papers were presented at a workshop, led by the CEC, on May 6th.

We then, the ISO then presented its initial

proposal, which did take into account comments that were received from the May 6th workshop, both in-person and written comments. And as well as discussions that we've had throughout the year with legislative staff and the Governor's office.

That was followed up by receiving comments from our initial proposal, which were extremely helpful, and broad we had over 42 -- we had 42 sets of comments that were very detailed and very thoughtful. And we submitted then, on July 15th, the revised proposal that we're going to talk about here, today, which does revise the principles significantly to address stakeholder comments.

So, generally, the revised proposal represents sort of three types of changes. One important principle, we removed the principle of tracking for greenhouse gas emissions out of the governance proposal, but we left it in the paper as a discussion of importance. And I'll talk a little bit about that in a minute.

We added a principle at the end and that is really to talk about what we see is the final process for how the final governance plan would become effective. And we also made refinements throughout the paper and the principles to add more detail, where folks

had asked for more detail, and make some changes along the way.

So on -- I'm going to back up here. I wanted to just make a comment about the GHG principle being removed. I know this is an important topic for all of those here, engaged in this process. And while we removed it as a principle from the governance paper, we kept it in, in the introduction, and as a commitment from the ISO to develop a transparent tracking methodology for greenhouse gas emissions within a multi-state ISO. That is important to us. It's important to California and those states that have carbon emission standards and goals, and we think that's important to continue.

We believe that as a regional grid operator we can enhance the transparency of these types of resources used to serve load and, at the same time, support the distinct policies of each state, including allocating any of the associated administrative costs to those compliance obligations. We did hear that from stakeholder comments and we think that's an important principle.

So, while not a governance principle it's a market principle, it's an ISO principle that we are committed to doing. And we will continue to discuss the

greenhouse gas emissions in a future stakeholder initiative that we have underway or about to be underway on this topic.

So, the first principle in the paper is the preservation of state authority which is, by far, the key component to governance of a regional ISO and what we heard across the board from stakeholders. The question is how to do that?

We did hear from stakeholders. We did clarify how some key -- the bylaw provisions would be modified. We refined the restriction on capacity markets. And we developed a process for deciding if a proposed action would be considered at all to diminish state authority. So, those are the key modifications of the first principle.

So, the principle now addresses the idea that -- to ensure that the provisions that are specific to maintaining state authority are upheld. It would take a unanimous approval -- just for clarification, a unanimous approval by both Western States Committee, which I will talk about later, and the ISO Board to make any changes to those provisions that protect state authority.

In addition, the development of a Transitional committee, which I'll also discuss later, will help

develop a process for deciding when state authority is impaired. And that process will involve the consultation with the ISO Board and this Western States Committee.

The revised proposal and principle number one also clarifies the restriction on capacity markets. And this was based on several comments that were made through the process. States indicated the importance of participating in the capacity market, that it was a state decision to do so and that was an important component. And that's why this principle was developed in the first place.

The language that we have ensures that all states would have to authorize such a decision for a capacity market and that the ISO would not, in any way, be able to propose or endorse such a market absent that agreement by all states.

We also enhanced the language to allow states, an individual state to approve participation in other types of forward capacity markets. Again, this was based on stakeholder comments to say there are tools that states might want to use in the future and it would be up to the states to make those decisions, but we didn't want to close the door to those opportunities.

The second principle is about transmission

owners withdraw. And this was a principle that I think generally stakeholders agreed with, that there should be a clear way for participating transmission owners to withdraw from the ISO. We provided some background on how our current withdraw process works in the document. And it emphasized that that withdraw would be voluntary or at the direction of their state or local regulatory authority, and that there would not be any exit fee, per se. There may be some costs associated with leaving that have to do with assets that were developed while they were in the ISO, but there would be no exit fee per se.

We added a reference to the fact that we would need state or local regulatory authority to make that withdraw. We just didn't have the local regulatory authority mentioned there. But otherwise, we did not make any substantial change to this section.

So, this slide just goes into what I said. But it does, our current transmission control agreement does require two years' written notice. The withdrawing owner is required to make a good faith effort to not unduly impair the ISO's responsibilities. And again, it does not impose any specific exit fee.

Most of the other ISOs, we were asked the question whether -- how other ISOs do this. And most

other ISOs have a similar practice. Although we do know that MISO, the Midcontinent ISO, has a provision that existing transmission organizations pay their share of an outstanding bond debt. So, that's the one indication that we saw in other ISOs that had a fee. But most other ISOs do not have a fee.

So, the third principle is the transitional committee of stakeholders and state representatives. Now, this is where we made some significant -- we provided some significant detail over the original proposal. And that was really based on stakeholder feedback. And, really, we wanted that stakeholder feedback to be able to inform, really, the best method for developing this transitional committee and the scope of that work.

So, we did add some language in this revised proposal that provided much more detail about the composition of the group, the scope of their work, the timeline for their work, and some of the decision making processes.

So, the revised principle does set out sort of the structure and composition of this transitional committee. We are proposing that there would be one representative from each state within the expanded ISO footprint.

We do include a footnote as defining the footprint as the footprint in which the ISO currently operates, which is California and part of Nevada, as well as any state in which a utility has expressed interested in joining the ISO, either through an MOU or some similar mechanism. So, as it stands now, with PacifiCorp's MOU and interest that would be a seven-state -- seven states represented in this transitional committee.

And it also included, then, one representative from stakeholders of nine sectors. And these sectors were developed through stakeholder comments. In part, they are sectors that we've used in other ISO selection processes in the past, but we also acknowledged and added some sectors to address stakeholder comments.

We did recognize, through stakeholder comments, that each state would decide how they wanted to select their own representative and that they would do that on their own. Those folks would be brought forward without question.

And then the sectors, what we've done is we've asked that each sector would bring two names forward as potential candidates to the Transitional committee. And that those two representatives or candidates would have to come from two different states.

And what that does is that really encourages the sectors to discuss the candidates and really be comfortable with both of those candidates coming forward. Because ultimately, then, the board would pick one of those two. The current ISO Board would pick one of those two candidates to serve on the Transitional committee. Recognizing and emphasizing regional diversity in that selection as a whole. So, that's a key component of this design.

We also have to recognize that we want a workable size committee. We had experience with the EIM Transitional committee that I think got up to, I think, 13 members. That was a workable size. You don't want to get too much bigger than that. This, I think, stands at 16 as it is.

But we would also -- we also suggest that the ISO Board could make additional appointments to one-per-sector, if regional diversity needed to be met and wasn't that way originally. So, that is more clearly defined in the proposal.

We also suggest that the Transitional committee would work out a plan that is consistent with these principles. So, there would be a charter developed that would clearly describe the work of the Transitional committee so that was clear going in.

We are asking the Transitional committee to work expeditiously. We're suggesting 9 to 12 months. We had originally said six, but recognizing the breadth and the work that we're asking them to do, we think that 9 to 12 months is more realistic.

We also suggest, and importantly, that the plan that's developed by the Transitional committee would need to be approved at least, as we suggest, by each state representative. So, that really brings the states together to reach consensus, and a voice in the process, and a proposal that is broadly acceptable. And that was an important way to reflect stakeholder comments.

We also describe a process, in part we'll get to in the last section of these principles, but that we do expect and would like the Transitional committee to be overseeing the adoption of the proposed governance documents, once they create the plan.

The fourth principle is regarding the transitional period. We make a significant change. We had an initial board concept in this transitional period. But through the majority of the stakeholder comments, they didn't feel that a transition board or an initial board was necessary. Most felt that we should really get right to a new board and under a new selection and nomination process.

So, we removed the concept of an initial board and we provided some details for this transition, in this modified proposal.

So, as we modified it, the board, the current board would transition right into a new board through a new board through a new selection process. And what we've suggested is that as existing board members term out, we would start to develop a nomination and approval process that would bring new board members to the board, with a total of 9 members in total, as we go through the process.

We set forward a timeline. This is just a timeline within which this process could happen. That we would expect the board members would start to be selected within 18 months of the approved process.

We also acknowledge that the Transitional committee, through its work, might decide to extend the terms of the existing board members to provide some consistency and institutional knowledge in the board as its going through and starting the new process of nomination and approval.

The fifth principle is the composition and selection of a regional ISO board. In this revised proposal, we do describe a two-step process that we're suggesting. The core of the regional governance will be

the method, a new method of selecting ISO board members. Currently, we have a nominating committee. That nominating committee brings names to the Governor and the Governor can select from those names or choose somebody else.

What we're suggesting is that there's a nominating committee, made up of stakeholder sectors, and that that nominating committee bring a slate to an approval committee. And we're suggesting that that approval committee is made up of the voting members of the Western States Committee. So, the states really have a significant role in the approval of the initial board.

And we're suggesting this at least at the outset. And we know that as the transitional committee develops more details they might review that on an ongoing basis.

So, again here, this just reflects what I had just mentioned, that a nominating committee would be working with an executive search firm. It would be sectors that would work together to develop a slate of members needing to fill the number of seats that are vacant. And that that slate would be approved by the committee made up of Western States Committee members.

So, to the establishment of the Western States

Committee. First, we changed the name. The name that was originally in the proposal, the body of state regulators. That's currently the name of our EIM body of regulators and that just was a little confusing. But we also addressed stakeholder concerns that each state should be able to choose who they want to serve on that committee, and that person may or may not be a state regulator. So, to have that name, we needed to be more generic in that name and Western States Committee seemed appropriate.

This is an important mechanism for protecting state interests. And we feel that through stakeholder comments, through discussions, and through looking at examples of other ISOs that the establishment of this committee was an important step in the process.

And we revised the proposal, obviously, to change the name. And it also refines the proposal related to the exercise of the committee's primary authority.

So again, the representatives of this committee may be any official selected by the state, themselves. So, they can choose how they do that and who they decide. We are asking that that representative be familiar with utility regulation and energy policy issues.

We also include two non-voting members. One, publicly owned utilities, which we had in the original proposal. And two, we've added a non-voting seat for a federal power marketing administration representative. And that, again, was based on significant stakeholder feedback. PMAs, a power marketing administration, such as Bonneville Power and Western Area Power Administration, play a significant role in the west and we wanted to recognize that in this committee.

This body, I'll just mention, also has, again, while not stated here, has a role in approving the slate of candidates as I mentioned here. That gives states, again, a voice in this process.

So, we also refined the scope of the committee's authority over Section 205 filing rights. And this was an area of significant stakeholder comment. In our proposal we state that the committee has primary authority over specific areas of two market areas, the transmission cost allocation and resource adequacy. That scope, the detail scope of those areas of primary authority will be detailed by the transitional committee, which will have representatives of states, as well as sectors on there.

We also revised it so that even in areas of the primary authority the ISO may file, in limited

circumstances they may file on these two specific issues if there re exigent circumstances, whether that's an emergency on the system, whether reliability is being imminently impacted, or whether there's a period of inaction by the Western States Committee and that may materially impact ratepayers. So, we do provide some possibility for the ISO to file on those two specific areas, should those circumstances occur.

The ISO would not be able to file on those two specific issues without the prior approval of the Western States Committee in all other cases.

The transitional committee will also develop a voting rule for the Western States Committee exercise of primary authority. In our original proposal we suggested what we call the WIRAB model, which is the Western Interstate Liability Advisory Board, made of Western State representatives.

That proposal suggests that something to be -- something that went through approval must be approved by both the majority of the states and the majority of load. We've received a lot of comments on that being too heavily weighted in favor of California. But we also recognize the importance and the proportional load that California serves.

So, we modified the proposal to state that the

transitional committee could develop a voting mechanism or structure that did have weighted voting. So, we know that that's something that the transitional committee will spend some time on. So, rather than formulate a definite rule, such as the WIRAB model, we did leave that to the transitional committee to determine.

Just two notes, important notes. First of all that voting rule would only apply to decisions within the committees primary authority. So, there will likely be other decisions that this committee needs to make, whether it be about funding, or administrative issues, that kind of thing. We are only talking about a weighted voting rule for the areas in which this body has primary authority. And so that the other voting mechanisms can be worked out through the transitional committee and other discussions.

So, the seventh principle is stakeholder processes and participation. We didn't make any substantive changes in this. We did receive comments. Many folks felt that some sort of market or member advisory committee was something to consider. We do state that that's something the transitional committee should consider, but we didn't make any substantive changes to the proposal.

We also think it's important for the

transitional committee to look at the possibility of finding for consumer advocate groups, and any other improvements to our stakeholder processes as we go down the road.

And finally, the eighth principle is a new principle and it deals with the requirement for the plan to become effective. And this starts to set forward a process. And on the last slide, I'll show you a little bit more about what we're picturing.

First, the development of governance details would be developed by the transitional committee. And as we said earlier, that that plan needs to be approved or supported by at least the state representatives on the transitional committee. That there allows and sort of sets the stage that all states need to support the plan going forward.

Then it goes to the ISO board for approval. That the board would give due deference to stakeholder comments and the suggestions by this transitional committee.

And then, the ISO staff would develop the key governance documents, with the oversight of the transitional committee, and obtain any regulatory approvals that it might need. Whether it be review by FERC or another authority.

And then we discuss the approval by the Governor of California. What we're suggesting is that the Governor would certify that the regional governance plan not only complied with the principles that were laid out in the transitional committee, or in the governance language, but also that it continues to be in the best interest of California ratepayers.

This certification is really meant to be additional assurance to California Legislature and ratepayers that the work that was set forth in any potential legislation is done.

So, this slide here, it's slide 26, represents a possible timeline, describing what we put forward in this proposal. And so, it just goes through the various aspects of the proposal and identifies certain time blocks that may be appropriate under each of those initiatives.

First, as we do lay out, we hope that the transitional committee can do their work within 9 to 12 months. That would include both the formation of the committee, itself, which we know will take some time, as well as the developments of all the details around the governance plan.

At that point, then, the ISO board would approve that plan or at least review it for approval. And then

we would go forward developing the governance and go through any regulatory approval processes that the ISO would need to do.

At that point, then, the Governor would be able to certify that the regional governance plan did comply with the principles and was in the best interest of ratepayers. And that it would go on to become effective and a new regional governance plan would be underway. The nomination and approval process would kick in and new board members would be selected.

So that, in itself, is about a two-year process. And that goes to the comments that we've heard throughout the process about sort of are we going too fast? Well, we know this is going to take a while. Certainly, getting to this governance, this governance set of principles took some time and it took a lot of effort by all the stakeholders and the state representatives. But this is only the beginning, there needs to be some more details to work out here.

So, the last slide is just a set of reference materials for folks about the history of SB 350 and some information on the ISO website.

I just want to echo Governor Olsen's comments about the hard work that went into the development of these governance principles. We had extreme engagement

by all the states, really both their commissioners, and energy advisors, and other folks from the states. They really, as we said, rolled up their sleeves. They thought about the consequences and the possibilities of regional governance and really tried to work together to find consensus and solutions.

And I can't thank them enough for all their hard work and real dedication to this effort.

As well as the stakeholders who, throughout the process, were supported and provided very detailed comments, which helped us create the proposal that we have now, which I think is much improved over the initial proposal because of those stakeholder comments. So again, thank you. And I'll take any questions.

CARB CHAIR NICHOLS: This is not a question. I'm going to make some comments at this point, if I may. Thank you for that presentation. It's very helpful to understand your thinking and all the work that's gone into the preparation.

I wanted to make a couple of comments at this stage in the proceeding because I'm going to have to leave to go to a meeting with our Environmental Justice Advisory Committee on the next stage of the Scoping Plan. And I passed over any opportunities to make opening comments, but I actually have more useful things

to say now that I've heard more this morning, anyhow.

So, I would like to just mention that the Air Resources Board is paying very close attention to these issues. We are partners with the Energy Commission, the PUC, and the CAISO in energy planning on a variety of fronts in California.

We do have particular jurisdiction and concern over the air quality and climate change issues that are addressed in the studies.

I would say, first of all, that we are, in general, in favor of regional activities, regional partnerships. We are believers that there's a need to work at a regional level, particularly when it comes to implementing the Obama Administration's Clean Power Plan, which we do believe will move forward under the Clean Air Act in some fashion or another, in the reasonably near future.

And also, we've devoted a great deal of time and effort to designing a cap and trade program. Which, although currently it is not operating at a regional level, is capable of being operated at a regional level and is something that could well be adapted to dealing with some of the issues that we're talking about here.

We are a regulatory agency and so we tend to think in terms of things that can be incorporated into

enforceable regulations and plans that include mitigation measures, if things don't work out as you plan. So, we're not afraid of planning for things that happen 10 or 15 years into the future. Indeed, we're required to do that in order to meet health-based standards.

But we always design our plans with backup measures and provisions that can be put into place if things don't work out as planned.

We understand very well that other states are not eager to sign up for a regional body in which they are going to become subject to California's environmental regulations because we tend to move in a way that is much more aggressive than others may wish to. But we also don't want to be put in a position where we are under any pressure or any expectation that we would be backing off or weakening any of the provisions of our current regulations and programs, either.

So, the governance structure is certainly one important aspect of that, making sure that we don't give up anything in terms of our ability to move forward on our State activities where we have already begun to implement programs that are leading the world and attracting others to think about doing things the same

thing California does, whether with respect to electricity, or fuels, or vehicles.

So, I think that's a given going in. And we've certainly not had any sense of a lack of appreciation or understanding of those issues on the part of the CAISO, as well. But it's nice to see the studies that were presented here today, the level of analysis that's been done, the quality of the analysis. I'm sure there's always more than can be done and things that could be tested, different sets of assumptions and so forth.

But overall, I'm really impressed by the work that we heard here this morning.

Our main issues and concerns going forward are going to have to do with a couple of issues which have been mentioned, but kind of in passing. One of which is the issue of accounting and transparency about greenhouse gas emissions, where they're coming from. Because under our program, any entity that is selling electricity into the California market has to be accountable for having allowances that we issue to cover their emissions.

And if there's any suggestion that we're keeping a double set of books or that we don't understand where the emissions are actually going, that is a problem for our program, and its credibility, and its effectiveness.

And it's something that we've worked very hard to design in.

So, we're going to have to find a way that we can accommodate that. I appreciate very much the commitment that the CAISO has made to deal with that issue. The models have to be able to talk to each other and people have to be able to look at them, and to interpret the information.

And then, the other key point is what happens if our best estimates and projections about how things should work out don't work out. And if, in fact, somehow, for reasons probably completely extrinsic to what we're doing, the old coal plants find a new lease on life and do not go away as we're anticipating that they're going to, we do need to have some assurance, some form of commitment, I think, to a mitigation approach that would make sure that we get the continued progress that we all anticipate and I think everybody wants.

I'm quite confident that with good will we can work these things out. But we're in new territory here because we're basically forming a new constitution for a new entity, and we're asking people to do things on a voluntary basis, including utilities, and generators, and so forth that, you know, we don't have necessarily

the ability to require.

So, while we all want to join hands and jump into the pool here, we all want to make sure that we've also anticipated all the sharks that may be there and, you know, found ways to protect ourselves if and when they emerge.

That's really all I want to say expect that I am leaving behind three extremely capable members of the Air Resources Board staff, who are sitting over there. Rajinder Sahota, who is the lead person working on these issues for Air Resources Board, can operate in my stead here, if you would like to have her come up and ask questions or participate in the discussions. Rajinder, if you don't mind, you can come on up.

And with that, I just want to thank everybody for the seriousness of the effort and the level of participation, it's been terrific. Thank you very much.

CEC CHAIR WEISENMILLER: Thank you.

CPUC COMMISSIONER PETERMAN: Thank you for the presentation. A follow-up question on the voting rule options as it relates to voting related to weighted to load. Were there any more specific proposals provided by stakeholders regarding that, in terms of options, other than the WIRAB model that you expect the transitional committee will be considering?

MS. CROWLEY: Thank you, Commissioner Peterman. Certainly, there was the concept of one state/one vote, which didn't have a weighted voting option. But I think, I'm not remembering any other suggestion for a weighted voting model that came through stakeholder comment. Of course, I could be wrong but -- a super majority.

(Off-mic audience comment)

MS. CROWLEY: The super majority model, yes, that was certainly one. I mean, I think there are other models that the transitional committee can look to.

CPUC COMMISSIONER RANDOLPH: I had a question about the Western States Committee. So, there are three -- there's the two areas of primary authority, resource adequacy and transportation access charge. And then, it has a role in the board selection process.

What other things do you envision that committee doing or is the balance just basic administrative tasks?

MS. CROWLEY: I think we're looking to other ISOs' state committees. We reference the Mid-Continent ISO and the Southwest Power Pool state committees. The Southwest Power Pool is called the Regional State Committee. And MISO is called the OMS, the Organization of MISO States.

And I think it's a body -- outside of those

areas of primary authority, it's also a body for those, in this case those energy regulators to, retail regulators to be educated on some of the issues around the ISO and, potentially, have advisory opinions on things that are outside of those areas of primary authority.

So, they're not defined here, but I think that through examples of those other ISOs that they may decide to have an advisory opinion on things outside those two areas.

CEC COMMISSIONER MC ALLISTER: So, I have a question. So, maybe this overlaps a little bit with this morning, but I think it also goes to governance. So, I want to kind of ask the flip side. So, we have California-specific concerns, right, and so the Energy Commission does the forecast, and three agencies now have this process that works pretty well, where we get together and we sort of select the forecast set that's going to go into the various planning processes that follow on from that at the PUC, and the transmission planning at the ISO, and many people out there in the world.

So, I guess I'm wondering how might regionalization and sort of the evolution towards a more broad-based governance, you know, a geographically broad

governance affect how the ISO approaches those activities that are, indeed, California-specific, California policy-specific in practical ways?

MS. CROWLEY: Well, I just think, practically speaking, we would do that for all the states that had similar processes, which most of them do. Most states operate under an integrated resource plan model.

And so the ISO would, like it does with California, make sure that it reviews the resource portfolios and things, and identifies any areas of reliability issues, that kind of thing.

But I imagine that the ISO would work with all states and states' processes, no matter what they are, to provide that same level of coordination, collaboration, and sort of compliance with state policies.

CEC COMMISSIONER MC ALLISTER: Okay. I mean that makes sense. In particular, you know, I'm concerned about making sure that we have the right information and data that sort of has the right boundaries around it, so that it's functionally relevant to be incorporated in our state-specific processes.

We talked a bit this morning about energy efficiency. Well, as we build that up and say, okay, well, how is that going to affect the demand forecast in

California, I want to make sure there's no sort of cross-pollution with other policies, in other states, so we're not doubling counting and we're sort of keeping everything clean with the right information.

MS. CROWLEY: Right.

CEC COMMISSIONER MC ALLISTER: So, maybe that's more, you know, implementation details, but I think it's important to kind of get out there.

MS. CROWLEY: Yeah, absolutely. And that is being discussed in the context of the Regional Resource Adequacy Stakeholder Initiative, exactly how do we make sure we're comparing apples-to-apples in terms of folks bringing together the right resources to the mix. So, absolutely, it is in the details, but will need to be sort of an agreed upon way of working.

CEC COMMISSIONER MC ALLISTER: All right, thank you.

CPUC COMMISSIONER PETERMAN: Can you speak to what are some examples of circumstances that might result in sustained inaction by the committee that would require ISO to act independently?

And, is there such a provision in other state committees in other markets?

MS. CROWLEY: I'm looking at my lawyers here. But I think in terms of examples, it could just be that

they can't get to a decision. That's sort of what we envisioned. And I don't know if Commissioner Florio, because he's been involved in some of these conversations, can help.

CPUC COMMISSIONER FLORIO: Particularly, if there's a weighted voting or a super majority you could get to a deadlock. And what we were thinking about was, you know, allowing a fair amount of time for some compromise to be reached. But if you ended up, you know, like we used to have with the State budget, where it required a super majority vote. After some period of time, things have to move on. And that would need to be spelled out by the transitional committee.

But it also puts some pressure on, you know, the Western States Committee to come to a resolution and make some compromises. If you just have people hanging on to their entrenched positions, they could lose their right to make the decision. So, it's a little spur in that regard.

CPUC COMMISSIONER PETERMAN: Thank you, that's helpful. Although, I'm mindful that sometimes deadlock is action in itself. And so, I don't want to preclude disagreement to be a signal that that's not the appropriate solution not to move forward in whatever the matter is.

And so, I would just recommend that the transitional committee, if it is approved, moves forward with defining an action that's very clear you would want to do that in circumstances where there is a material impact on ratepayers, as is noted here. But not losing that component of the exception.

CPUC COMMISSIONER FLORIO: Right.

MR. BARKER: So, I think we're at the stage, again, of public comment. And reminder, blue cards. Three minutes, one spokesperson per party.

And we'll start out, once more, with public agencies. Do we have a card from Kevin? Okay, good.

So, let's start out with BPA.

MR. GENDRON: Thank you. Thank you, Chairman, and substitute for Chairwoman, Commissioners. Bonneville appreciates the opportunity to comment on the governance proposal.

My name is Mark Gendron, Senior Vice President for Power Services at the Bonneville Power Administration.

Bonneville's a Federal Power Marketing Agency which markets electric power from 31 federal hydroelectric projects and some non-federal projects in the Pacific Northwest. Bonneville is statutorily obligated to sell wholesale firm power to meet net load

requirements of our utility customers in the Pacific Northwest.

We own and operate nearly 75 percent of the high voltage transmission system in the northwest, providing most of the transmission connections and market access between states as far east as Wyoming and Montana, and connecting to British Columbia and California.

About half of Bonneville's preference customers are directly connected to the Bonneville transmission system. But the other half of our customers receive all or a portion of their electricity through the transmission systems of other utilities, such as PacifiCorp.

As members of the panel know, I believe, Bonneville participated in the Denver workshops on the draft governance principles and submitted written comments. We are committed to engaging in this discussion because of the reliance of an integrated regional system on Bonneville's transmission system, as well as the fact that Bonneville serves load located within the proposed regional ISO.

BPA is pleased with the proposed revisions to the governance principles. The revised draft reflects consideration of the diverse objectives and obligations of western states, while also recognizing the unique

role of federal entities in the region.

BPA is ready to engage in this collaborative effort on the next steps needed to help establish a better foundation from which regional entities can focus on common goals for efficiency and reliability of the Western Electric System.

Thank you for the opportunity to comment.

CEC CHAIR WEISENMILLER: Thanks for being here.

IID, Kevin Kelley, please.

MR. KELLEY: Well, thanks for the opportunity to comment. As you know, IID's opposed. So, too, is our own county, Imperial County. IID's likely to be opposed for some time.

But this particular governance piece is what I'm most interested in speaking about. It seems to me that you're placing a lot, a heavy burden on the people in the building just north of us. And it looks to me like they're only going to get one shot at this and it will be sometime in August. And we don't know about the elements of the structure.

All we really know is that they would be asked to vote on a separate group in charge of governance, in the name of governance, that's going to work the governance out.

I'm also concerned that this insistence that

California should be less California-centric, when it's California's place to be more California-centric. California leads. It doesn't follow.

And these other states that require constant reassurance that they're not going to be led around by the nose, by California's ambitious climate and renewable energy goals, that appears to me to be simply unacceptable.

My suspicion is that the driver in all this is a for-profit corporation. And I don't believe that the ratepayers benefit by exporting jobs outside California. And somehow, they enjoy increased buying power because electric rates go down.

At the same time, it seems counterintuitive that we expect the environmental impacts outside the State and that somehow that benefits disadvantaged communities.

The region of the State that I represent is not only its own balancing authority, it's a disadvantaged community, and it's fiercely independent. And we want to preserve all those things. And under this scenario, I don't see how we can.

So, I would urge you to take the time that's allowed in SB 350 and not to hurry it up simply because PacifiCorp is demanding that you do.

CEC CHAIR WEISENMILLER: Thank you.

Let's go to Seattle City Light.

MR. CROMWELL: Good afternoon. My name is Robert Cromwell. I'm the Director of Regional Policy and Contracts at City Light.

We appreciate the opportunity to participate in this workshop, hosted by the joint agencies, and we'll be providing more detailed written comments.

We would like to express our appreciation for the ISO and acknowledge that its revised principles address many of our previously addressed concerns in our written comments.

We do recognize that in a number of areas the ISO's revised proposal deferred consideration of very significant matters to the transition committee process. We look forward to participating in that process, however it may be most helpful to consideration of those policy questions.

We do remain concerned about a couple of specific areas we wish to address today, which several of you have addressed already.

In terms of the Western States Committee, while we're certainly supportive of publicly-owned utility representation on that committee, it's not clear to us what purpose is served by restricting that

representation to within the current ISO, when the very primary function of this exercise is to consider expansion. And whether entities outside the current ISO footprint would determine whether joining that ISO is in their customers' interests, not simply just participating via EIM.

Second, on weighted voting. We would recommend that the weighted voting question should be a matter expressly reserved to the transmission committee for resolve. We think that not stating as a matter of principle at this time would be preferable.

We'd also recommend that in that transitional committee process you consider whether, if there is going to be a weighted voting approach, whether there's a soft cap on that, that would ameliorate some of the concerns that have been expressed.

With that, and with much to be resolved still, we're certainly heartened by the ISO's responsiveness to the concerns we've raised to date. We recognize that there's also a value in the sense of urgency that we're all feeling around this issue. It's focusing our thinking on what's critical and important to those we represent. Thank you.

CEC CHAIR WEISENMILLER: Thank you.

Let's go on to Tony Braun.

MR. BRAUN: Thank you, Mr. Chairman. I would like to divide the three minutes that I've given. The clock hasn't started, yet, this is good. To have a -- on the governance and a couple of items, and we will provide some detailed written comments and suggestions and then, perhaps, a little bit on the process going forward.

So, on governance there's been a tremendous effort by many, many people to get the proposal as far as it is. And a lot of those people are not in this room. They're over at NARUC meetings right now. But just a lot of time and effort outside of their normal day jobs, and we greatly appreciate that.

A couple items stand out to us. We've been strong advocates for some sort of stakeholder committee, what we call a market advisory committee, highly analogous to what's in other RTOs. And that is one of the matters that has been comprehensively deferred to the transitional committee. And that's getting a lot of attention within the public power community.

I had one CEO of a very, a fairly significant, long hydro utility, say this is my number one issue, and the fact that they're deferring it is not giving me any comfort that this is the organization that I want to be a part of moving forward.

To put this in context, we see Arne and Hannes put up those maps of the Western United States. The ISO is not the only RTO out there. They're having active discussions in other parts of the west, through the Mountain West Transmission Group and other places, where the calling card of the ISO's competition, and I use that term advisedly, is their collaborative stakeholder process.

So, when we, in California, resist that stubbornly, moving in that direction, it really puts us at a position where the chances of getting, achieving the benefits that are being touted here by a broad footprint are greatly diminished. So, I think we need to get over that.

We're also going to have some comments on the transitional committee. We think its scope is a little too broad. I don't think the states are going to think too kindly that a group of stakeholders are going to -- even though they're part of it, are going to decide what their fate is going to be within the regulatory process.

So, we'll provide detailed written comments on these matters.

And finally, going forward. I think we've sat here and we've talked about governance. We've just heard, within the last couple hours, how many unanswered

questions there are moving forward on this. We know that the TAC is still outstanding. We know that RA and GMC issues are in front of us. We know that carbon attribution is going to be a major issue.

We don't have any answers to those questions. We shouldn't be rushing forward, now. Let's not make any mistake. The train is not going to come off the tracks. If we don't have legislation in August, the transitional committee will move forward. The ISO stakeholder processes will move forward. The FERC filings will be made. This train will come off the tracks. Let's not get embedded and embroiled in a discussion in the Legislature about a bill this year. Thank you.

CEC CHAIR WEISENMILLER: Thank you. Actually, it's public comment.

Carolyn Kehrein, please.

MS. KEHREIN: Good afternoon, again. I'll get closer.

The activities of the ISO are very important to the customers of Energy Users Forum. I probably should start off with an introduction. Carolyn Kehrein, representing Energy Users Forum.

As I was saying, the activities of the ISO are very important to customers that Energy Users Forum

represents, as well as all consumers in California.

For that reason, EUF has been active in the stakeholder process going back to the days, you two in the middle can smile, of the Trusted Advisory Committee.

Regionalization is one of the largest issues that is facing the ISO in its history. And EUF and other customer representatives will be involved in various stages of the development and in the regional ISO going forward.

I would like to comment the ISO staff for their efforts and attempts to incorporate stakeholder comments. Based on the comments received, the ISO made modifications in an attempt to address those comments. Unfortunately, those changes were made to meet a need for a quick turnaround.

One area where the ISO made substantial changes was the composition of the transitional committee, where significant detail was added. The prior version only described a broad process and did not have any details.

And what was probably an oversight, the ISO staff left end-users out of the process and limited customer interaction to only the State-sanctioned ratepayer advocate sector, a term which is not defined. And if stretched really thin, might include organizations that represent residential customers and

small commercial customers, such as TURN. But there's no way to stretch that term to represent commercial and industrial, agricultural, institutional and other types of end-use customers.

Historically, all prior structures for anything, for development of policy, design or governance have included positions for end-use customers. I would note, however, that unfortunately the influence of customers was reduced a little bit with respect to the EIM Nominating and Technical Committees. Where, instead of having our own sector, our sector was merged with the public interest group sector. Some interesting discussions there.

I ask that the principles be changed to add another category for nonresidential end-use customers and modify the term "State-sanctioned ratepayer advocates", such that the organization represents clearly residential and small commercial customers -- sorry, so that it represents residential and small commercial customer representatives, such as TURN.

So, to start over again, to modify the term so that it clearly includes folks like TURN, and not just governmental entities.

Okay, thank you very much. And we'll be involved going forward, and appreciate the work of the

ISO staff.

CEC CHAIR WEISENMILLER: Okay, thank you.

Let's go to Rachel Gold.

MS. GOLD: Hi, good afternoon. Can you hear me? Rachel Gold, with the Large-Scale Solar Association. I'm pleased to be here this afternoon and representing the majority of the owners and developers of large scale solar in California, who also have other development interests outside of the State.

First, I wanted to start by saying a very large thank you to ISO staff and their consultants for their continued and ongoing hard work on this, particularly on the governance proposal.

As we have been looking at this issue, there have been really three things that we have been looking for. Will the expansion bring us real integration benefits, real climate benefits, and ratepayer benefits?

And we saw from the studies this morning, and you heard a little bit that we've been asking a lot of questions, along with others, and that's because we want to really understand what the scope of those benefits may be and what they're going to mean for our future development, both in-state and out-of-state.

And I think that as we've seen this development, we really see that there is a range of benefits, but

they're in the positive direction. And we feel comfortable with the progress that has been made to date on the governance structure, that the work can go to the transitional committee and we can work out on some of these other, serious issues that will be critical for making sure we have those benefits. But that the structure really has been developed to a very good point right now.

So, we continue to look closely at all of these issues and look forward to being engaged going forward. But I just wanted to say that we are very interested in seeing a regional ISO that brings real benefits on integration. And that means that we can continue to use our amazing solar resource in the State, and use it really efficiently. So, thanks.

CEC CHAIR WEISENMILLER: Thank you.

Jan Strack, SDG&E.

MR. STRACK: Well, I think as others have said, we're really preparing for the future. We're not just here today, this is for our kids 20 years from now.

And in that regard, I'm happy to report that I have a six-week-old grandson.

(Laughter)

MR. STRACK: And my daughter sent me a video and he was waving his arms around, and he actually hit some

hanging stuffed animals. I think it was intentional, we're pretty sure he's a genius. But let me move on.

(Laughter)

MR. STRACK: SDG&E's been supportive of expanding efficient markets for a long time. I think we're one of the original ones here, in California, and we support it now.

I think one thing that's important to remember is the infrastructure's already in place. We spent a lot of money to set up the ISO. And it turns out, of course, that now that all the institutions are in place, the systems are in place, the building's in place, it doesn't cost much money to expand it. But yet, it returns a lot of benefits. And I think that's what the ISO's results show.

And those economic benefits flow down to customers. Customers have more money, they spend it, not surprisingly. It creates a lot of jobs.

And so, I think the bottom line here is we can get to our greenhouse gas goals at a lot lower cost. And I think people maybe missed the point that if you do it that way, it gives policymakers a lot more maneuvering room. If you can save money and reach the goals, then you've got additional degrees of freedom to pursue those policies even further. So, I think that's

an important point.

And one last set of points here, as we take the next step towards the Legislature. We need to avoid some roadblocks. And there's a couple here that I've identified.

And the first one, I think is preserving state authority. States have historically exercised authority over a number of areas, resource adequacy, procurement, and I think we need to preserve that. I think we support that.

At the same time, we need to recognize that FERC has authority of interstate commerce and I think we have to recognize that that has to be preserved as well, or recognized as well. And to that point, I think this is maybe the one area where our company's uncomfortable with the proposal in as much as it would give the state organization, or the Western States Committee, some authority over transmission cost allocation. I think that's the one we need to re-look at.

And lastly, I think we all need to trust the transmission committee to get the governance right. And I think they will. And when we look to the EIM, I think that provides a really good roadmap of how it can work successfully. And I think our company's willing to entrust that they will get that right.

So with that, let's do this for my grandson, Emmett.

CEC CHAIR WEISENMILLER: Okay, thank you.

Let's go on to Robin Smutny-Jones. Please.

MS. ROBIN SMUTNY-JONES: Good afternoon. Can you hear me?

Robin Smutny-Jones, with Avangrid Renewables, formerly Iberdrola Renewables.

Good afternoon, Chair Weisenmiller, Commissioners, Rajinder.

So, I actually have a three-year-old grandson, and he lives in Utah. And he recently said, Mimi, when are we going to have a regional ISO?

(Laughter and applause)

MS. ROBIN SMUTNY-JONES: Seriously, I wanted to offer a few comments in support today of moving forward with regionalization.

We support regionalization of the ISO and the associated markets because, frankly, they work. I think there was a gentleman earlier this morning who suggested, said a few words, this really is one big grid. And that's really why we're all here, it's the way the grid works.

That's why there's been a proliferation of RTO-like structures across the U.S. and even worldwide

because, frankly, it's physically, economically, and even environmentally logical to do so.

It's not news to any of you or rocket science that taking advantage of a diverse set of generation technology, across a broad geographical footprint, expands options and tools for the ISO to manage the grid. If the wind isn't blowing in California, but it is blowing in Oregon, or Washington, or Wyoming the ISO, if expanded, can have immediate access to that regional generation and possibly avoid having to ramp up natural gas plants, at least not as much. And I'm not saying we don't need natural gas. We probably will for a while.

Clearly, we need to work through issues such as TAC, and resource adequacy, and governance. These are not small issues. But other states have done it and I think that California and the West would be able to do so as well.

In the meantime, I wanted to suggest something and, hopefully, this makes sense. In the interest of maintaining stability in the market and some predictability, it would be helpful if California and the Western States could act sooner, rather than later, to signal their joint intent to move forward with regionalization.

This is not saying we should rush things. I've

heard a lot today and elsewhere that we don't want to rush into things. The details of the TAC and other things will take time. But this might take a couple of NARUC or Western PUC meetings to get it together. But to the extent that you could all sort of agree this is the path we want to move down, that provides a little bit of certainty to the market.

If there's one thing I've learned in the few years I've been in the private sector, it's that the slightest mumblings and -- oops, I'm out of time, sorry. They make a difference.

CEC CHAIR WEISENMILLER: Okay, thank you.

MS. ROBIN SMUTNEY-JONES: Thank you. Thank you very much.

CEC CHAIR WEISENMILLER: Okay.

MS. ROBIN SMUTNY-JONES: Sorry, I have trouble hearing. I've got water in my ear from vacation. So, if I didn't stop, I didn't hear you.

CEC CHAIR WEISENMILLER: Okay. Mr. Aguirre, you're next.

MR. AGUIRRE: You know, I was sitting here thinking to myself don't you think it's kind of weird that we have 3 million pounds of radioactive nuclear waste going in at the shoreline, in San Diego, a hundred feet from the ocean and all of you, after we've asked

you to do something about it, hide behind jurisdictional and constitutional issues.

But yet, in this case, with regard to the governance of this whatever monstrosity that you're hoping to create, you're actually engaging in an unconstitutional delegation of legislative and administrative rulemaking to some nebulous group.

What you're proposing is unworkable. You say each state is going to select someone. Who, in the state? How are they going to select them? Is it the governor? And how can you decide here what some other state is going to do? You can't. It's an unworkable proposal.

And then the other is who appoints all the individuals to the committee? The energy owners and the IOUs? I was so happy to see my dear friends from SDG&E here because you might remember, back in 1997, when SDG&E, and SCE and PG&E surrendered jurisdiction of the CPUC under the deregulation, which resulted in the catastrophe of energy prices going from $7 billion to $28 billion in one year.

And by the way, with regard to the idea of deregulation, this entire proposal was the second stage of deregulation that was enacted in law back in 1999, that was discarded as a debris of that failure that was

a disaster for California.

And it was only glommed onto SB 350, and tried to be resurrected as a renewable energy concept when, in fact, it was the same old exercise of market power.

The EIM is being used as an example but, yet, we know the governing board of the EIM was selected entirely by the energy owners and by what you call the so-called stakeholders.

Your definition of a stakeholder is a very narrow definition. Real stakeholders involve real democracy. They don't try to cut people off. They don't have people like yourselves, Weisenmiller, that everyone can see here, the way that you run the clock is based upon the content of what the person is saying.

If you like what they're saying, then they can go over as far as they want. If you don't like what they're saying, you exercise inappropriate authority to cut that off. That's what's known as censorship.

And what people should understand is this is just the tip of the iceberg about this whole process. Thank you.

CEC CHAIR WEISENMILLER: Thank you. Matt Freedman.

MR. FREEDMAN: Thank you, Commissioners. Matt Freedman on behalf of TURN. We provided oral comments

on the first version of the governance principles, at a workshop that was held at the Energy Commission.

And there have been significant revisions in this version. I think our biggest concern going forward is how many more revisions will there be before it becomes final? This feels like a working draft and the changes happen, you know, certainly in theory taking into account comments that have been put into the record. But it feels like they're happening as results of negotiations of other states that have expressed specific concerns.

I'm not sure where this draft ends up and if the Legislature is being asked to authorize changes in governance this month, don't think anybody has a good sense of where these principles end up evolving into by the time they turn into tariff filings at FERC next year.

In our view, a lot of the changes really go in the wrong direction. First of all, the elimination of all the references to greenhouse gas tracking. I know that perhaps that's not a core issue related to governance. But it is important to recognize the Air Resources Board, itself, has recently recognized that the greenhouse gas tracking approach used in the energy imbalance markets is inaccurate and it doesn't address

resource shuffling concerns. That's something that needs to be figured out before any decision is made to move forward with a regional market.

The allowance for a voluntary centralized capacity market is a little bit puzzling. I'm not quite sure what that means. But capacity markets feel like an invitation to litigation and preemption. That's how a lot of litigation has happened in the east and a lot of challenges between state and federal jurisdiction come through capacity markets. So, we're very concerned about watering down the prohibition.

In terms of the Western States Committee, there seems to be an effort to really limit the scope of what that committee would be able to address. Originally, it was any issue, really, that had an impact on state policy, or costs to be passed through the states. Now, it's transmission, cost allocation, and resource adequacy. That's a pretty major reduction in the scope of review. And there's already several ways that have been proposed for the board to get around any unfavorable outcome from the state committee.

On top of that, the elimination of the load share weighted voting raises a concern about whether California ends up just being the sort of endless wallet for the rest of the west. A lot of other states seem to

think that we'll pay for anything. And if we don't have the ability to block adverse outcomes for California ratepayers, not to force other people to accept our outcomes, but to block bad outcomes, we may be severely taken advantage of in a regional market. Because we're seen as being infinitely wealthy and with an insatiable appetite for whatever folks want to build.

So, what other changes are going to get made after the legislative session is complete, I don't know. But it feels like this is not a document that we could recommend that the Legislature endorse at this time. We think a lot more work probably needs to be done. Thank you.

CEC CHAIR WEISENMILLER: Thank you.

Let's go to Jennifer Gardner.

MS. GARDNER: Good afternoon. All right, can you hear me all right?

Good afternoon, my name is Jennifer Gardner. I'm a Staff Attorney with Western Resource Advocates, or WRA. For those of you who aren't familiar with our organization, we are a regional nonprofit conservation organization. We are based in Boulder, Colorado, but we have offices throughout the Western United States. I, for example, am based in Salt Lake City, Utah and I've been fully engaged on the regional market work,

particularly as it pertains to regional governance.

I do want to clarify that WRA has strongly supported the formation of a regional market throughout this process as we believe it offers the best opportunity for improvement on what we consider business as usual in terms of grid operations.

It also allows the potential for the most effective means to large scale integration of renewable energy, which offers immense environmental benefits from our perspective.

We have submitted a number of comments. I certainly won't be repetitive by speaking to those now. But I would like to start off by offering compliments to the ISO, as well as the California Energy Commission.

We do feel like this process has been very transparent. We feel like stakeholders, representing public interest organizations, that our voice has been heard throughout the process.

We've been pleasantly surprised to see substantive changes from the first version of the governance proposal to the second version, in which a number of our recommendations were taken into account. So, thank you to everybody who's worked so hard on this process, we really appreciate that.

I would like to reiterate that any final

governance proposal that goes to the California Legislature should be as broad as possible in nature. The reason I want to iterate this now is because our concern is that any type of detail that could possibly tie the hands of a future stakeholder committee would work against the successful operation of a future regional market. And so, we do discourage that kind of outcome from actually happening.

Also, we did notice and we do take note that the greenhouse gas language has been removed from the final version. Stacey did an excellent job of clarifying why that language was removed. It's not a governance proposal, per se.

But we do want to take the opportunity to reiterate here that we feel like greenhouse gas tracking on a regional scale is incredibly important as it offers the potential to show one of the many benefits of a regional market. By tracking those emissions reductions over time, we can continue to show how valuable the regional market really is to the Western Region.

All right, I'm running very short on time. Just making sure I haven't missed anything here. It looks like I've covered everything. I do appreciate the opportunity to provide comments. We do look forward to providing written comments, coming up on August 2nd.

And, once again, thank you for your time.

CEC CHAIR WEISENMILLER: Thank you.

Jonathan Weisgall.

MR. WEISGALL: Jonathan Weisgall with Berkshire Hathaway Energy Company. We are the parent company of PacifiCorp, as well as two other utilities.

I want to respond, Chairman Weisenmiller, to your comments at the end of the morning session, inviting comment on the mitigation issue, as well as Chairman Nichols' comments this afternoon.

It's the GHG issue, as Jennifer said, not governance per se, but certainly a very critical one and does deal with some of the governance issues that come up regarding the priority of state principles, and kind of the Golden Rule of, you know, do not -- do unto others as you would not have them do unto you.

With respect to the GHG issues, it's really important to focus on the long term. The studies make very clear that by 2030 we're going to see 4 to 5 million metric ton reductions in greenhouse gases in California, and an 8 to 10 percent reduction in the market. Greater reductions throughout the West. Simply put, this would not happen without a regional market. This is why our company, as well as other environmental groups, believe regionalization is the key to greater,

more efficient, and lower cost renewables, and to GHG emission reductions throughout the West. That's the path that our companies are on.

Look at the energy imbalance market as a small example. We are dispatching, PacifiCorp is dispatching much less coal, now, into that market. PacifiCorp has closed two coal plants for -- excuse me, four coal plants in April and May, in the PacifiCorp territory because of the economics of the energy imbalance market. Due, in no small part, to PacifiCorp's participation in the energy imbalance market, the company's year-to-date carbon emission in 2016 are 18 percent lower than average greenhouse gas emissions for the previous five years.

PacifiCorp's Integrated Resource Plan includes the retirement or conversion to natural gas of approximately 2,800 megawatts of coal generation.

And lastly, the percentage of PacifiCorp's generation capacity that comes from coal is expected to drop from about 60 percent today down to 24 percent by 2035. That's the path the company is on, as well as the other Berkshire Hathaway Energy Companies.

So, we don't see the greenhouse gas emission blip happening, that .2 percent that was raised earlier. But in the unlikely event that regionalization leads to

an increase in greenhouse gas emissions, we will use options available to us to identify and address mitigation issues. It's very important for California. Mitigation has to be defined, of course, and it's unclear exactly what that means, it's got to be tracked. But whatever form it does take, we do intend to work within our six-state regulatory format to deal with that issue.

And I'll lastly say that in our Midwest utility, where we're moving to 85 percent wind, we could not possibly do that without being part of a regional ISO. That kind of goes without saying. Thank you very much.

CEC CHAIR WEISENMILLER: Okay, thank you.

Travis Ritchie.

MR. RITCHIE: Thank you, Commissioners. Travis Ritchie with the Sierra Club.

I want to follow up a little bit more on the greenhouse gas issue. And Sierra Club was concerned to see that the greenhouse gas principles were removed from the governance proposal.

It may not be explicitly governance, but I agree with what Jonathan just said and that it is critically important. And it's critically important that we figure it out in the early stages of this process.

So, Sierra Club submitted written comments on

the draft governance proposals, they're on the docket. So, I won't repeat a lot of that information.

But I did want to go over a few numbers of why this matters. You know, PacifiCorp, while they are making gains, as the rest of the country is, in moving off of coal, the carbon intensity of what we're talking about joining with is great.

You know, California, our greenhouse gas profile from the electric sector, in-state, out-of-state, within CAISO and non-CAISO is about 96 million metric tons. PacifiCorp, by itself, is about 45 million metric tons. So, they're about half our greenhouse gas impact, despite being much, much, much smaller, from both a customer base perspective and from a generation capacity perspective.

So, this is an issue where greenhouse gases, they haven't been addressed in PacifiCorp's territory the way that we have addressed it in California.

And so, we're going to be facing a lot more headwinds in working with states on how to come to an understanding of greenhouse gases.

With respect to coal and their impact on CO2, one thing I very much agreed with Brattle on is their conclusions, is that with the market, without the marketing, sliding, a slight decrease, the thing that

drives CO2 reductions is policy. What are those policies? How do we implement them?

The $15 CO2 price that they modeled had, by far, a greater effect in the region than the market with or without, or whatever else was happening.

So, how is California going to be able to retain the ability to manage those policies and to manage our greenhouse gas issues? There is no off-the-shelf answer for this. People have talked about the greenhouse gas adder in the EIM. It has problems. Those problems are going to take time to work out.

We think that there are ways that those probably can be worked out, but it's going to take a lot of smart people, working in a lot of rooms, for a long time to get it right. We also need to make sure that we do this in such a way so that it makes it into the tariffs and the ISO ahead of time. This isn't something that California can come back in later, and overlay a regulation that's going to apply to out-of-state entities.

This is something that we have to figure out, agree what our fundamental principles are before we open up this market, before we open up this organization to outside states.

Because, finally, I do agree with some of what

the other states have been saying and their concerns. At some point, California is going to have to kind of let this baby go. And we need to set up our clear, fundamental requirements first. And then, once we've done that, we will have clarity on what the greenhouse gas issues are that meet Arne's, and the other states will be able to understand whether or not it makes sense for them to do it.

Trusting to do it later, I think is extremely risky, particularly given how some of the other states of expressed concern for the greenhouse gas issues.

Thank you.

CEC CHAIR WEISENMILLER: Thank you.

Dede Hapner.

MS. HAPNER: All right, thank you. I just want to address three points. In recognition of the time and also the work that I think the ISO has done to refine some of the issues that we've been talking about today. More progress needs to be made and I think others have addressed that.

With respect to the transmission committee, I think there's more meat on the bones with that and it's been tested with the EIM Governance Transition Committee and the EIM Board. It's a process that has worked well.

I would add to that that the transition

committee, in this case, has an even greater responsibility to stay in constant touch, regularly with stakeholders on process, and progress, and getting feedback along the way. This is certainly a different order of magnitude.

And that the people who are selected to serve by their states or by the stakeholder groups, and approved by the ISO board, should be selected with that in mind. That the best transition committee is one that works together, collectively, towards consensus.

The governance and other recommendations that have to be approved by a nominating committee and the Western States Committee, we still don't have a timeline that is necessarily supportive of managing all of those things. It's a short turnaround time for something quite important. But I do understand some recognition from the Legislature that would give states, other states some confident in the ability to work collaboratively with California and move forward.

The second is with respect to the Western States Committee. We appreciate the clarifications and recognition of the role that FERC has in approving a proposal and even the role vis-à-vis the Western States Committee. And the ISO should absolutely reach out to them more and involve them in some of these discussions,

as we did in the formation of the first ISO.

We don't agree that the principle for primary authority really has been limited with the explanation of 205 rights at the primary entity. That 205 rights are virtually anything that deal with cost and a rate change at FERC, and cover a vast majority of the work that the ISO has to do with respect to tariff revisions, and new tariffs, et cetera. So, we really think more work needs to be done on that.

And lastly, I think the certification by the Governor is a good step forward. Hopefully, we'll take some of the heat off the process. Thank you.

CEC CHAIR WEISENMILLER: Thank you.

Jan Smutny-Jones.

MR. JAN SMUTNY-JONES: Thank you very much, Commissioners. And I'm Jan Smutny-Jones, with the Independent Energy Producers. We represent the vast majority of RPS resources here in California, as most of the gas.

We've been generally very supportive of the approach to expand the ISO into the Western Region because we believe it is a way to continue to grow the California renewable market and to, basically, also help clean up the system with additional gas resources, as well.

A couple of points. Earlier today, you know, there was a reference to the impacts of the regionalization on CO2, and whatever. California currently, and has for quite some time, imported about 30 percent of our power. So, to a large extent there's nothing new going on here, other than how efficient we do that.

Our belief is, you know, a significant amount of that power currently comes in as system power, which we believe probably has a significant amount of coal in it. We believe that actually having an expanded market with the ISO will add a level of transparency that will help us more fully understand exactly what is in the resource mix out there.

So, we do have some -- we believe that the parties have made great progress in terms of bringing this. There have been some major improvements here.

Our primary concern has been one of independence of the ISO board, as well as the ability to act expeditiously. And that, you know, the ISO has had a long history of basically following State policy and actually helping advance that State policy goal. And I would expect that in the future, as well. So, I think the issue is largely one of making sure that it's clear in terms of what are those State issues that folks are

concerned about.

We do have some concerns, which we'll make clear in writing, with respect to the question of a super majority in order to approve the governance issue, as well as super majority to basically, if our understanding is correct, to move forward on various 205 filings. We believe that that may be unwieldy and maybe make it very difficult to actually implement timely filings as they may be needed. But we'll basically add that as we go forward.

So, thank you very much for your hard work on this. And by the way, that three-year-old also drives an electric car.

(Laughter)

MR. JAN SMUTNY-JONES: He's looking to solarize it. So, thank you.

CEC CHAIR WEISENMILLER: Thank you.

Northwest Energy Coalition, again.

MR. HEUTTE: Thank you. Fred Heutte from the Northwest Energy Coalition. This morning I talked about our membership. This afternoon I want to mention our mission, which is to promote clean energy and the rapid transition to a low carbon and eventually zero carbon grid that will be reliable, clean and affordable.

Also want to underscore, in that regard, the

comments we heard earlier from Seattle City Light, NRDC, and Fix the Grid.

I read all of the comments, all 42 of them. And I also want to mention your Governor Brown received letters from Governor Inslee of Washington, and my Governor, Kate Brown, of Oregon, in support of the overall direction that this is going.

I think this is very important to start building the multiple state collaboration progress, a good recognition from our part of the country, I think.

I also want to note that with the new revised proposal, my friend Bryce Freeman, from the Wyoming Office of Consumer Affairs, was quoted in the *RTO Insider*, saying, "I will say that the revised proposal appears to be a step towards rather than a step away". I think that's a pretty strong, positive response from a state that has a lot of concerns about this whole process.

It's also very significant that Commissioner Phil Jones, from Washington, sent you 15 pages of very thoughtful comments about the governance issues. And I strongly recommend those who have not read it, to please read that.

There's lots of -- many steps forward in the revised proposal. But I think, particularly,

simplifying the process and making the RSO more of a turnkey approach responded to a lot of concerns about saying we need a clean break between California control and regionalization. So, that was very helpful.

And a clear role for the transitional committee and getting rid of the interim board idea has really clarified things quite a bit.

The change from the Board of State Regulators to a Regional States Committee is more important than it may appear on the surface because that changes the focus of regulatory bodies and regulated entities to broad state interest and policy, and aligns with the overall concept of preserving state authority.

In addition to provide for -- and in so doing, that also helps provide a stronger role for public power through the states. But also, the proposal's more responsive to bringing public power more of a role, and also to the power marketing authorities. As you heard from Bonneville earlier, from Mark Gendron, this is very important for us in the Northwest.

Whether or not the PMAs and public power join the RSO as full participating owners in the future or perhaps we have even a more federated kind of approach, in the Northwest we expect to continue to be trading partners and participants in a broader effort to

increase reliability and bring the value to the system. particularly in the Northwest because we have a hydro-based, and increasingly, not for the non-hydro part, clean energy-based system that will have a lot of flexibility and can provide value not only to California, but to the whole west.

And likewise, that we can take advantage of that in the other direction as well.

So that's all, thank you very much.

CEC CHAIR WEISENMILLER: Okay, thank you.

Claire Broome, do you want to speak again or --

MS. BROOME: Claire Broome, Professor of Public Health at Emory University.

I'm really struck by the changes from the previous version and I wanted to comment that I think we all know we're in an energy system transformation that's really very striking. And the opportunities for regionalization are there, but also the opportunities for distributed energy resources. So, I think we have to be really strategic in balancing those.

As my friends from the CPUC know, we're looking for reliable, least cost, and clean renewable power. It's all three. And when you start out by striking the principle of including tracking greenhouse gases that gets my attention.

I'm really quite concerned that we're asked to trust that there will be transparency of tracking. And even though you say it's not a governance principle, I'd remind you that in the first governance workshop one of the panelists recommended that monetizing environmental benefits would actually be one way of judging how well the regionalization process was working. And I don't see how you can do that without tracking, accurately and transparently, the greenhouse gases.

Secondly, I'm struck that only one of the nine transitional committee members is "public interest" and that's not even specified. So, what the representation for those, who really put their time into renewable energy and environmental issues, is not at all clear in this very important committee, which will also decide what and if there will be any kind of stakeholder input in the process.

So, I would say that it's all very well to trust, but I think you'll be much better served by a governance process which emphasizes inclusion and participation by all relevant stakeholders. And I would put environmental groups very high on the list of those who should be active participants. This is not just about reliable, least cost, it's also about renewable and clean.

Finally, I actually think if you're going to talk about monetizing environmental benefits, you really have an opportunity and, as you look at this PacifiCorp issue specifically, to include the EPA cost of carbon when you decide about the economic dispatch of coal. That may be off governance, but you can assign it to the morning session.

Thank you very much.

CEC CHAIR WEISENMILLER: Thank you.

Could someone get a microphone over to Carl Zichella. Oh, you have one. Okay, please.

MR. ZICHELLA: Thank you, Chairman, Commissioners. A lot of what I was going to say has been said. I just want to begin by thanking the ISO staff and congratulating Jan on his new grandson. And the other Jan, as well, on his electric car-driving grandchild.

A couple of quick things I'd just like to amplify, a lot of what Jennifer Gardner said. We joined her comments, with Western Resource Advocates, so I won't restate a lot of that.

But I think a key thing is the recommendation that we have, in the spirit of what was just said about stakeholder involvement, a member advisory committee that would include market participants, but wouldn't be

limited to those. So, we say market advisory committee or a member advisory committee. I think we're more comfortable with the term member advisory committee because that enables for a larger swath of stakeholders to actually be heard.

And I think a lot of the changes that were made have already been recognized, to the original proposal, indicated a real willingness on the part of the ISO and stakeholders here in California, frankly, to understand the needs of the other states we're trying to work with to try to create this market.

I would say one thing about states that have high percentages of coal in their stacks right now, the regional market is a great way to get at helping to reduce those numbers over time. That's been the experience in other RTOs and I think we would find it to be so here.

So, having an open governance structure that enables these states to participate in a way that they're comfortable with, I understand we have a need to make sure that we're protecting our own interests, as well, in how that's structured. That's an important consideration.

But having a transitional committee begin to work out some of these details, it seems to me is an

imperative thing.

A real improvement over the original proposal, as we're going from something that might have taken five years, to spinning it out to something that could be done in a year. That's a very significant improvement, as far as I'm concerned.

It's going to take a lot of work, as Travis and others mentioned, to really unwind this thing to get it operational. And I would hope that even if we can't do legislation this year, and we still may be able to, that it's a high priority, as soon as possible next year to begin to get this going. I'd like to see how people respond to legislation that finally is offered. We can make that judgment at that time, whether or not we can move forward immediately. But unnecessarily delaying this I think would be a big mistake.

Thank you.

CEC CHAIR WEISENMILLER: Thank you.

So, anyone else in the room? Do we have anyone on the line? It looks like we have no one else on the line and no one else in the room.

I think we've had a lot of conversation on GHG and I was going to ask the ISO if they have any final comment on that. I'm assuming on the governance questions, unless you want to talk about the next steps?

Anybody? I'll just turn it to the ISO to wrap up and then I'll give my folks on the dais a chance.

MR. BERBERICH: Chair Weisenmiller, Steve Berberich. I didn't do anything to it.

(Laughter)

MR. BERBERICH: I guess I really have to be close like a rock star.

Anyway, I'm Steve Berberich, the CEO of the ISO. First, I appreciate everyone coming here today to talk about these very important issues.

As it relates to greenhouse gas, we will commit and we are committing right now, right here, that we will track greenhouse gas emissions in our dispatch. We will have it up and running probably by the end of the year, even well before we move to a regional grid.

So, we wanted to make sure that we had that commitment on the record. It's not a governance thing. So, that's why it came out of the proposal. But I do want to make sure that our organization was on record as being committed to tracking that.

MS. SAHOTA: Steve, before you leave, may I ask a follow-up question? Could you please let me know which of the -- is it the ISO Board or the Western States Committee that would be responsible for setting up the transparent accounting system for the regional

GHG tracking?

MR. BERBERICH: Rajinder, I'm proposing we do it now.

MS. SAHOTA: Okay, so it would -- okay.

MR. BERBERICH: So, it would be in place even before we move to a regional grid.

MS. SAHOTA: Okay, and how does that process -- I'm sorry. How does that process relate to the work that CAISO and ARB already undertaking to resolve the misalignment between California's reporting and cap and trade regulations, and the way that the EIM model is functioning today?

MR. BERBERICH: I'm sure we will work closely with the Air Resources Board to make sure that our reporting is consistent with your regulations.

MS. SAHOTA: Okay, thank you.

CEC CHAIR WEISENMILLER: And just adding a footnote to that is, obviously, our agencies, along with the PUC, will also be working closely. Obviously, one of the 350 requirements is coming up with tracking, for utilities, the greenhouse gas reduction. So one of the things is that, again, we're all working closely together under the IRP process. Looking at Commissioner Randolph on that. So that we have agreement on what those baselines across our agencies for where the

utilities are.

So, we'll go back to take one comment on the phone. Please identify yourself.

MR. TANSEY: Hi, this Ben Tansey, with Energy News Data. According to in terms of a questionnaire or is it a question and comment period so I can now ask a question?

CEC CHAIR WEISENMILLER: Actually, again, I would prefer if you have a question that you identify who you want to question, such as Stacey or E3, or someone. And just call them if you're trying to get a quote for your paper, as opposed to right now.

MR. TANSEY: Okay. Well, I wanted to put my question to the people present, the people representing the studies. But okay, as you wish.

CEC CHAIR WEISENMILLER: Okay. So, let's go across the dais in terms of comments, reflections on the day.

CPUC COMMISSIONER RANDOLPH: A couple of things. I just wanted to echo other thanks for the detailed and important analysis that was done in the reports. It was really useful to see the numbers, see the assumptions, see the projections.

And with regard to governance, I think there have been some positive changes in the proposals. I do

agree that it's important to consider some of the issues that were sort of left to the transitional committee. I think it is important to have some clear indication that weighted voting is going to be part of their analysis and decision making in terms of their recommendations for governance.

And I'm pleased to hear about the commitment to tackle the GHG tracking now. And going forward, if regionalization does take place, to ensure that the board is transparently and consistently tracking that throughout the region. So, that's a key issue.

But I think the benefit study shows that there are a lot of positive opportunities. As we look at incremental opportunities to achieve grid optimization, the bang for the buck that you potentially get with regionalization is a pretty exciting concept. And I look forward to seeing the Legislature tackle this issue and move forward because I think it's an exciting opportunity.

CPUC COMMISSIONER PETERMAN: Yes, thank you for a very informative day. Thank you to the ISO staff and all the consultants for the tremendous amount of work that has occurred over the last several months.

Also, thank you to our staff at the Public Utilities Commission that has been following this

process very closely and providing, I think, very useful commentary to the consultants regarding how some of the assumptions that interface with our work at the CPUC.

In particular, I've been very interested in the extent to which the assumptions align with our RPS portfolios and assumptions, and electric vehicle assumptions. And also, appreciate that these clean tech spaces are changing quickly and so at some point you do have to make assumptions. And so, I appreciate the scenario work that has been done and that's been very helpful.

Every question I have had has been addressed by the consultants and so, again, I appreciate your thoroughness.

When waiting for the benefit study, first and foremost I was looking to see whether the results would be so extreme as to say that this is a no-brainer, or it's a no-starter. And I think it's a positive thing that the results aren't extreme in either direction. There seem to be benefits more, smaller benefits in the beginning, in the near term years, growing over time. But that also, even though there are benefits, that these are still proportionately a small percentage, relatively, you know, 3 percent in the Scenario 3, in 2030, to ratepayer expenditures.

And so I think on some ways it's a positive note because what we're really seeing some disagreement and commentary on has been whether this is worth it. But I think regardless of what direction is taken, we can continue as a State and as a region in terms of de-carbonizing the system and having greater levels of integration.

So, I do hope that whatever happens we will use this information to seek more opportunities for regional collaboration and collective work because I do see some benefits there. Although, I appreciate some of the issues that we need to work through in terms of creating a regional market now.

That being said, I do think that the responses to the comments and the governance proposals are taking steps in a good direction.

I do want to echo Commissioner Randolph's comment regarding the importance around maintaining a principle around weighted load. I find it peculiar, if not concerning, that the WIRAB model, this model of democratic compromise that is suitable, already, for our state house and our congress is seen as a non-democratic or acceptable process by some out there.

And so, I do think it's important to proceed with something that is objectively fair. And I think

about that constantly, as a not only Californian. But also, if I was representing a different state, as well.

What strikes me is that many of the issues that we may face, we really don't have a full handle on at this point because we're talking about some impacts that may come forward in 2030, 15 years or so from now. And that's why it's incredibly important to have a governance structure where you have strong representation from the different stakeholders that will be affected, that can work well together. Because it's hard to anticipate what some of the challenges may be in terms of transmission development, or grid reliability, and there are number of risks that will need a cooperative governance structure to move forward with.

And so, I look forward to seeing the further comments on that.

And then, I'll wrap up by adding, you know, a lot of folks have talked about we're doing this for our children. The Chair reminded me that I've got the youngest child around, due in about 7 weeks. And so I will say, honestly, that he has kicked a lot during the day in response to a variety of comments on all sides.

(Laughter)

CPUC COMMISSIONER PETERMAN: So, I did not get any warning from the future, but there is a lot of

interest.

And then my final comment will be I also have it on good authority that he's already developing blueprints right now for the next electric vehicle.

(Laughter)

CPUC COMMISSIONER PETERMAN: So, each generation does a little bit better than the previous one. Thank you for the day.

CPUC COMMISSIONER FLORIO: Yes, well, I'd like to echo all the thank yous that have previously been expressed. I think, you know, I've been working a lot on this governance and I think the weighted voting issue is one that's going to take some hard negotiation. But I think the case for California being more than one out of six is a pretty strong one. So, we're going to have to continue to work that.

I mean, one of the challenges here, someone mentioned the letters from the Governors of Oregon and Washington. I think if this were just those three states, this would be a lot easier. But the Mountain States have a different set of concerns, a different economic base, a different political culture. And, you know, there's work to be done there, still. But I think, you know, the signs are hopeful.

I guess one question I had in my mind is, well,

what if we don't get legislation this year? I think it was Tony Braun who said, well, the transitional committee can just go ahead and do its work. I'm not sure about that because we don't -- we don't have legislatively approved guiding principles absent legislation. So, there is some risk of having to go back and reinvent the wheel if when the Legislature eventually speaks it has different ideas than those that have been expressed so far.

But I'm going to remain stubbornly optimistic that we can get this done and capture what I think are pretty significant benefits for California and the rest of the West, while protecting all of the values that we want to protect in the process.

So, I'm prepared to keep working and see what we can accomplish.

CEC COMMISSIONER MC ALLISTER: Yeah, so just briefly. I won't echo all of the thank yous, but clearly a lot of work went into the day. And I actually learned a fair amount and I appreciated all of the probing questions and comments from those of you in attendance and on the phone.

So, I'll agree with the voting issue. I mean going forward I think, you know, we need a structure that ensures that as the sort of nuance and the issues

come up, you know, some of them, many of which have been mentioned today, but probably many of which are yet to pop up, we need to have a governance structure that can deal with those things. And come up with answers, make decisions, and move on. And so, I think that just has to be an overriding condition of governance, or a result of the governance decisions.

Again, I'm really very interested in making sure that as a State we can do what we need to do, get the benefits out of any regionalization that might happen but also, you know, not tie our hands in terms of our State environmental policy.

You know, it seems to me today's presentation, in the morning particularly, but really was about -- it was more about an economic benefit than sort of the environmental part. And I think that's reflected in many of the comments. That, hey, what are we going to do about the greenhouse gases? How do we make sure that our policy goals, you know, are respected and treatable under this new, potential regime?

So, I think, you know, having the diversity and all the benefits that presentations talked about are certainly great. But a lot of the tenor has been, okay, we can get where we need to go at a lower cost with some scenarios, than others. And I think that's very good.

But again, the environmental aspects, we just want to make sure that we don't leave those behind.

California has so much innovation going on, it's really mind-boggling. And we're in the middle of this rapid and foundational transformation in technology and in markets, really. So, very challenging to be able to sort of wade into the stream and do something with long-term relevance.

And so, very much appreciate all of the heavy lifting that's gone on, and all of the hard thinking, and all the comments. It's really a key part of the process to get to where we need to go, so thank you very much. I've really enjoyed the day, so congrats.

MS. SAHOTA: And I'll just go ahead and echo the thanks that were previously provided by the folks on the panel. And Mary Nichols essentially made most of her remarks on behalf of the Agency.

I also wanted to thank Kevin Barker, and the folks at ISO, and CPUC, and CEC, the staff that worked to work this day together. It's been a very thorough and enlightening day for most of us, because there were pieces that I wasn't aware of, so it's been very educational for myself.

And I really want to thank the ISO for the commitment, especially the more recent one that Steve

made, to continue working with us on transparency and wanting to resolve the accounting issue, and have a solution before there is a regional board or a regional ISO. And the ongoing support to make sure that California's climate programs are being reflected in a way that works with the EIM model and makes sure that California environmental protection goals and climate goals are going to be successful, and we're able to track our progress towards those goals.

And thank you all for being here today.

CEC CHAIR WEISENMILLER: Yeah, again, I'd certainly like to thank, obviously, my Chief of Staff, Kevin, for helping to pull this together. And, certainly, the hard work of the ISO. And, basically, the participation of all of the public and stakeholders here today.

I think, again, I often go back to the basic issue of we're obviously dealing a lot with climate, greenhouse gas emissions, and remind people that California is one percent of the world's greenhouse gas emissions. So that we cannot solve things ourselves. We can certainly act as a model or example of how you can maintain a sustainable economy and grow the economy while addressing climate issues.

Also, certainly one of the things that comes out

today is that, you know, the power sector is a small part of our greenhouse gas. You know, transportation really is a huge part of what we have to deal with, electrifying that or dealing with that. You know, it's more like roughly 40 percent, the power sector is more like 20 percent, in-state is more like 10 percent. So again, it's -- and even as we look at areas like the South Coast and we go, oh, my God, what can we do to clean it up? Even significant reductions in the utility sector, NOx emissions or PM2 are sort of a real drop in the bucket by the time you look at the bigger picture of, basically, how much of the pollution air is coming from the transportation sector.

I think in terms of opportunities, I come back to thinking of Clean Energy Ministerial. I've been to a couple of those. The last one was in San Francisco. And, also, we had the subset, which was basically the organization we have of over 130 sub-nationals, now, trying to address climate issues.

And, you know, again, as we go forward we're talking to China. We're talking to Mexico. And China and Mexico are working on a lot with EDF, NRDC on trying to address that. And again, it's sort of in many respects on climate it's sort of game over unless we move out of our comfort zone of California and reach

out.

And, you know, frankly, there's a lot of the states in the West who don't have the same climate values we have, the same greenhouse gas, but I think can be enticed by the opportunities associated with clean tech. You know, that at this point certainly solar and wind are best buys. And so, certainly, are LEDs. It's sort of mind-boggling out the cost reductions have been and the opportunities there for energy efficiency.

So I think in terms of trying to enable the rest of the West to embrace clean technology, wind and solar, is a way to addressing climate issues. Although, again, they have their own policies. You know, and frankly, some of the states -- there's Idaho, and it's like when you look at EIAs it will tell you that Idaho is like 82 percent renewable. Well, that's not our definition. A lot of it's large hydro. I mean, but frankly, again, you can't get much better from a greenhouse gas perspective.

So again, I'm hoping that the clean technology options can help unify us, not just in the West, frankly, but globally. And again, when you look around the world it's amazing -- you know, I mean Dubai, we're talking about solar under three cents. I mean, think about it.

Mexico, Mexico did its RFP, 4.7 cents for solar. You know, the cheapest bid I think was around 3.7, levelized. So again, it's just remarkable the opportunities. And I think we have to be really pushing that transformation.

And again, in the Clean Energy Ministerial, I mean people basically understood this was a best buy. But then I'm going to say how do we deal with the grid? How do we deal with the grid issues?

I mean, you know, when you talk to Baja, Baja has one wind machine, 15 megawatts. So they have 15 megawatts reserve for that.

So again, there's a lot of things we can do collectively and to try to build off of this. Now, governance is the toughest issue. I mean, obviously, the ISO is very important to us in terms of maintaining the system reliably as we go forward. Obviously, frankly, we invested in it. You know, you can look at the transitional committee and ask how much money did we invest? We invested a lot.

So having said that, we would like to grow that, get it more used. But again, it's a critical part of our infrastructure from the Governor's perspective.

So, again, this is one of the thornier issues. I certainly appreciate Mike's effort on trying to help

address that more collectively.

And again, I think -- anyway, I think we have a lot of states that have interest in this. But, you know, and basically the utility sector is being transformed, trying to respond to the opportunities of clean technologies and, at the same time, deal with the operational issues.

So again it's sort of a -- it offers us phenomenal opportunities, but also challenges at the same time. Operationally it's challenges at the same time in terms of governance.

But anyway, you know, it's an exciting time to be in State service. So again, thanks for your help.

Looking forward to your public comments, which are due August 2nd.

(Thereupon, the Workshop was adjourned at 3:38 p.m.)

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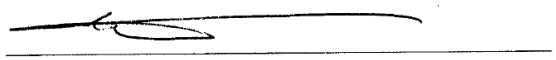

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