CALIFORNIA ENERGY COMMISSION

JOINT IEPR/SITING COMMITTEE WORKSHOP

In the Matter of:	)	
	)	Docket No. 08-GHG-0II-1
Requirements Relating to	)	09-IEP-1P
Greenhouse Gas Emission	)	
Impacts of Power Plants	)	
Preparation of the 2009	)	
Integrated Energy Policy	)	
Report (2009 EIPR)	)	

COMMITTEE WORKSHOP ON THE FRAMEWORK FOR EVALUATING GREENHOUSE GAS IMPLICATIONS OF NATURAL GAS-FIRED POWER PLANTS IN CALIFORNIA

CALIFORNIA ENERGY COMMISSION

HEARING ROOM A

1516 NINTH STREET

SACRAMENTO, CALIFORNIA

TUESDAY, JUNE 23, 2009

9:00 A.M.

Reported by:
Barbara Little
Contract Number:

ORIGINAL

COMMISSIONERS PRESENT

Jeffrey D. Byron, Commissioner

James D. Boyd, Vice Chair

Karen Douglas, Chairman

ADVISORS PRESENT

Laurie Ten Hope

Kelly Birkenshaw

Diana Schwyzer

STAFF PRESENT

Suzanne Korosec, IEPR Lead

Dale Edwards, Transmission Corridor Designation Unit

Mike Jaske, Senior Policy Analyst

ALSO PRESENT

Steven McClary, MRW & Associates

David Hawkins, California Independent System Operator

Nancy Ryan, California Public Utilities Commission

Kevin Kennedy, California Air Resources Board

Noah Long, Natural Resources Defense Council

Matt Barmack, Calpine Corporation

Mark Minick, Southern California Edison

Scott Galati, Pacific Gas and Electric

Antonio Alverez, Pacific Gas and Electric

Robert Anderson, San Diego Gas and Electric

H.I. Bud Beebe, Sacramento Municipal Utility District

Jan Smutny-Jones

I N D E X

P R O C E E D I N G S

JUNE 23, 2009 9:00 a.m.

MS. KOROSEC: Let's go ahead and get started. Welcome to the Workshop on Greenhouse Gas Implications of Natural Gas Power Plants in California. This is a Joint Workshop by the Energy Commission's Integrated Energy Policy Report Committee and its Siting Committee. First, I need to cover a few housekeeping items. Restrooms are out in the atrium through the double doors and to your left, there is a snack room on the second floor at the top of the stairs, under the white awning, and if there is an emergency and we need to evacuate the building, please follow the staff to the park, kitty-corner to the building, Roosevelt Park, and wait there until we are told it is safe to return.

Today's workshop is being broadcast through our WebEx Conferencing System. Parties should be aware that we are recording the workshop. We will make the recording available on our website almost immediately after the workshop and it will be replaced by the transcript once that becomes available, which is about two weeks from today. For speakers and commenters today, please make sure to speak very closely into the microphones so that the people on WebEx can hear you very clearly.

We will have presentations and a panel discussion

this morning, followed by a public comment period this afternoon, during which we will take comments first from parties in the room, and next we will open up the WebEx lines to get comments from those listening in. We do ask that parties in the room fill out a blue card, they are in the foyer out in the lobby -- excuse me, they are on the table out in the foyer -- and you can give those to me during the day and I will make sure those are given to the Commissioners. It is also helpful if you can remember to give the Court Reporter a business card when you are done speaking, so we can make sure your name is spelled correctly in the transcript.

This workshop is being held as a part of the 2009 Integrated Energy Policy Report, or IEPR Proceeding. We are required by statute to prepare an IEPR every two years; it evaluates and assesses energy supply, demand, and other trends in California's energy markets, and it also makes policy recommendations to help us state our goals for reliability, affordability and environmentally benign energy supplies.

And on that note, the topic of today's workshop is a report prepared for the Energy Commission by MRW & Associates entitled *Framework for Evaluating Greenhouse Gas Implications of Natural Gas-Fired Power Plants in California*.

The Energy Commission Siting Committee opened an informational proceeding in October of 2008 to get input from stakeholders on how to satisfy the Energy Commission's responsibilities under the California Environmental Quality Act to assess the greenhouse gas impacts of proposed new power plants. The Committee held workshops in October and November of 2008, and subsequently released the report in March of this year that summarized participants' comments and outlined the committee's perspective on the issue, and made some recommendations to the IEPR Committee for further analytic work by CEC staff. So the report we are discussing today is one of the products of that analytic work. It explores the question of how much, what type, and where in California natural gas-fired generation may be needed given our need to reduce GHG emissions, to expand renewables, and to continue protecting California's environment. So with that very brief introduction, I will turn it over to the Commissioners for opening comments.

COMMISSIONER BYRON: Thank you, Ms. Korosec. Good morning, everyone. I am Jeff Byron and I chair the Commission's Integrated Energy Policy Report Committee, as well as the Siting Committee; however, allow me to introduce my fellow Commissioners who are here with me this morning. To my right is the Chairman of our

Commission, Karen Douglas, who is also on the Siting Committee with me, and to my left is Vice Chair Boyd, who is my co-conspirator on the Integrated Energy Policy Report Committee. All the way to the left is his Advisor, Kelly Birkenshaw, and all the way to the right is Chairman Douglas' Advisor, Diana Manetta (Schwyzer), and my Advisor is in between, Laurie Ten Hope.

Just a few comments to start with. As a result of the passage of AB 32 -- is that almost three years ago now -- we have some responsibilities. Of course, the Air Resources Board was granted most of that responsibility, but until they get the regulations in place, it is incumbent upon this Commission and other organizations to begin to take action, and we have been doing that, we have been doing it for a while. We have got to address greenhouse gas reduction now as we begin to undertake the 28 or so siting cases that are before this Commission. I am told by my colleagues that this Commission really had a lot to do, if you will, with making recommendations early on about reducing greenhouse gases and, as you know, we have opened up an order instituting information last year in addressing this subject.

Today's discussion is framed around the contractor report by MRW, the entitled ***Framework for Evaluating Greenhouse Gas Implications of Natural Gas-Fired Power***

Plants in California. I am very impressed with the collection of speakers that we have got, having read through the questions. I am very keen that we are going to get some interesting discussion and hopefully some resolution around some of these key issues. In a nutshell, I would characterize what we are doing today as trying to answer the question, how can we build any fossil generation under the provisions of AB 32? Now, greenhouse gas reduction is difficult, I wish there were a knob that we could turn, and turn it down, but that is not the case. We have got to look at this in the context of the greater picture; the electric system is a complicated matter in the state and, of course, California is not an island. But we are going to discuss that in more detail today. And, of course, if it worries you to do this, then it would not be very controversial, I guess we would not even be here at all this morning. But if we want to solve it, I note that we need to work together and I really appreciate the involvement and the cooperation of all the parties that I see here today. And we are fortunate to have Commissioner Boyd and Chair Douglas, who understand these issues a lot better than I do, certainly the legal nuanced issues. And I am very eager to hear from them, as well. I think I will just end with that. And I welcome the input from industry, fellow regulators that are here

today, and the environmental interests that are represented in the audience. Madam Chair, any comments?

CHAIRMAN DOUGLAS: A few. I will keep it brief. Thank you very much. I think this is a very important proceeding, one of the most important analyses the Commission has done in the last, say, year or so, and it has gotten us to a watershed moment in our siting process where, when we look at power plant siting cases, we are now explicitly, I think -- we are now providing or looking for a more thorough and greater analytical framework to use in analyzing greenhouse gas implications to power plants. I think doing so, especially given passage of AB 32 and recent evolutions in CEQA law, is very important, and it is also important to recognize that the electricity sector is unique in its own way and has certain characteristics that are very important to consider as a system, as well as looking at the emissions from individual smoke stacks that we will be considering permitting. So the framework that we have before us is a way of taking the system-wide view and asking ourselves specifically not only how much might this plant emit, but what do the characteristics and attributes of this plant say to us about how it will be used in California and whether it will serve a role as potentially advancing and even making possible the transition towards a lower carbon

energy system, or whether it will be, as I think the fear is of many of the community groups and concerned citizens who participate in some of our study proceedings, an impediment to that transition. So we have needed, I think, for some time a framework for addressing head on this question, and the report that we have before us that we are analyzing, and also hearing public review on today, is a first step at creating that framework. I look forward to both seeing the presentation of the report and, of course, hearing from all the speakers we have here, but also hearing from public comment because this is the sort of thing that you do not always expect to get perfectly right on the first try, and we very much look forward to hearing what public commenters have to say today, as well. So with that, thank you, and welcome to the Energy Commission.

COMMISSIONER BYRON: Vice Chair Boyd, thank you for altering your schedule to be able to be here today.

COMMISSIONER BOYD: Oh, I love doing the IEPR. This is my fourth year over the seven and a half years I have been here. In any event, thank you for the opportunity. Thanks to everybody for being here. I think, as you have all discovered, there is nothing we do in the energy field, if not practically everywhere now days, but certainly our discipline is let's not touch

buyer were it does not touch global climate change, greenhouse gas emissions, etc. I guess the production and use of energy worldwide was identified as the major contributor to the issue of climate change, and major contributor through the production of greenhouse gas emissions, CO_2, the major culprit, but all the CO_2 equivalent, as we call them, emissions. As Commissioner Byron said, California has been at it and this agency has been at it for a long time. I guess this agency did the first inventory that, contrary to what the world situation was, i.e., the production of electricity, either using coal or fuel oils of various kinds, was the number one culprit. California, CEC in its inventory, discovered it was the motor vehicle, and electricity production became number 2, thus we are still concerned. So the CEC has a long history of dealing with global climate change, far more than the seven and a half years I have been here. It did a lot of pioneering work before legislation began to impact the automobile, and finally the passage of AB 32, which set the locust of attention on the subject, as Commissioner Byron indicated at the Air Resources Board, with us all working collaboratively on the various components, and we, working with our energy partners at the PUC with the ARB on the electricity sector, and that is what we are here to talk about today. And to this

moment, still, the CEC is active in the climate change area. All the climate research that more or less has led the Climate Action Team, and what have you, has been guided by, if not run by, the Energy Commission and we still are in that position. We still chair the Climate Action Team Research Sub-Group. So all of the agencies represented here are woven into the fabric of dealing with the subject of climate change and, as I have said in other forums, everything we do fits under the umbrella or in the tent of Climate Change -- all the policy drivers we have all individually dealt with now are collected under this one subject because this is a huge system that we have to deal with. So I look forward to the subject today and hearing everybody's input on the subject because it is one of the difficult areas for we in California to challenge, which we Californians are willing to challenge, even in spite of our momentary financial situation in this day -- and I do say "momentary" with a very hopeful expectation that it is just that. So thank you for the opportunity and I do look forward to what I am going to learn here today.

COMMISSIONER BYRON: Thank you.

MR. EDWARDS: Well, I will kick this off to get this thing rolling. First of all, good morning Commissioners and to everyone who is participating here

with us today. My name is Dale Edwards. I am one of the staff persons who helped put this workshop together. And I want to thank all of you for participating in the workshop. We are fortunate to have a well prepared and well received consulting report from MRW & Associates titled ***Framework for Evaluating Greenhouse Gas Implications of Natural Gas-Fired Power Plants in California.*** The report provides information on how the Energy Commission may proceed in the near term. Quoting from the report, "to make the appropriate judgments about a plant's ability to support the integration of renewable resources, or otherwise provide important system benefits." And our goals for today's workshop are to hear from representatives of the Air Resources Board, Public Utilities Commission, and the Independent System Operator, about their current activities related to greenhouse gases and the Electric Generation System, and to go through a set of questions with a panel of experts focused on the MRW's framework report.

By the end of this workshop, we hope to enhance our knowledge about how the Energy Commission can best play its part in reducing greenhouse gas emissions in the Electric Generation System that serves California.

Just a quick note about written comments following this workshop on the report itself, there is a going to be

a slide at the very end of this presentation, or at the end of the day, and the due date for those comments is unfortunately quite short, it is June 30th, so I am giving you a heads up about that now. All the information about where the comments go and all that will come up on the slide later, or it can be available if you need to leave early.

I would like to now introduce Mike Jaske, our Senior Policy Analyst here at the Energy Commission. He is going to provide an overview of the Commission's Greenhouse Gas Order Instituting Informational Proceeding and the resulting Siting Committee Guidance Report that was issued in March 2009, and then we will go on from there. Thank you.

DR. JASKE: Good morning. I am Mike Jaske, a member of the Energy Commission staff and I am going to play two roles here today, giving some very brief opening remarks right now, and then moderating the panel later this morning.

As has been indicated last fall, the Commission opened an OII on the question of how to consider GHG emissions in power plant applications that come before us. Various perspectives were raised in that proceeding, ranging from do not do anything at all, and wait for ARB's cap and trade proposals to emerge, and treat all power

plants alike, new and old; on the other end of the spectrum, treat every power plant coming before the Commission as having significant emissions and mitigate those emissions in its own manner; somewhere in the middle, try to examine the expected consequences of each one of the power plants through some sort of system modeling, and on the basis of those modeling results, proceed to impose some kind of mitigation. Of course, the conclusions out of the committee's report was adopted in March, are basically two-fold, to say that we must treat GHG emissions as part of the CEQA analysis of power plants, and that has, in fact, been happening in the form of testimony in a number of siting cases that started in June, this very month that we are still in. How that will play out during the course of any of those particular siting cases remains to be seen. And the second key conclusion from the Committee's Guidance Report was that power plants should be considered as part of the system. They are not to be examined on a stand-alone basis, but as a component of a large machine that is delivering electricity from many power plants, many locations, to end users.

So what are the implications of this system perspective when we are thinking about emissions from a new power plant? There are a variety of those. If it is

more efficient, then at least some, or a considerable number of the existing power plants, the ones likely to be generating power, in the absence of that plant, then logic says it is going to be dispatched more frequently, and that it will be displacing generation from those less efficient plants. That displacement could result in a reduction in aggregate GHG emissions, and so such a fortuitous outcome, you know, would presumably be recognized in its treatment in that licensing process.

Not all power plants are equal, of course. They have specialized roles, they have different technologies, they have different locations, so a [indiscernible) power plant is going to run much less than a base load power plant, its emissions of all sorts will be less, including GHG gasses. Some amount of power plant capacity with flexible characteristics appears to be necessary as a compliment to the pursuit of intermittent renewables, so one could imagine that some combination of fossil additions and renewable additions collectively is lower GHG emissions than what would otherwise have been built in its place. Could those intermittents be developed to the level, to the degree, without complimentary fossil? That is a key question and we are hoping that analyses that the California ISO is undertaking and Mr. Hawkins, who will speak later this morning, can shed some light on the

nature of ramping, inking and decking turn-off, efficient turn-on from a cold condition, and other such flexible characteristics that seem to be complimentary to the intermittents.

Storage technologies may be able to play some role and avoid the necessity for a fossil plant ramping up and down a lot, but that may be limited both in the near term based on the infancy of those technologies, but also on the sort of dimensions of the cycle with which those plants can operate, perhaps on a daily basis they can operate in that manner, but weekly, monthly or annual fluctuations clearly only pondage (phonetic) hydro seems to be able to satisfy that kind of role. And then, of course, there is the necessity for dispatchable capacity located in load pockets that serves local reliability purposes.

So some or all of these points I have made have been tackled in the report MRW has prepared, and I think they have done a pretty good job of aligning up all of the various preferred policy consequences of the last number of years that the agencies have collectively been pursuing. They have brought things together to a state which has identified roles, and so Chapter 7 of that report and its focus on a number of roles is a key dimension of the questions that we are hoping the panel

will shed some light on later this morning.

As was said a moment ago, the Siting Committee's Guidance Report used logic to reach its conclusions, it made some recommendations for pursuing follow-up analytic work. The MRW Report is just one area of those four recommendations, there are other activities underway by the staff, and those will show themselves later this summer, perhaps in further IEPR workshops, or in IEPR itself. And with that, I think I am complete. Are there any questions from the committee?

COMMISSIONER BYRON: Thank you.

MS. KOROSEC: There is a gentleman named Dale that --

COMMISSIONER BYRON: So we have a question from WebEx.

MS. KOROSEC: Dale, you had your hand up on the WebEx. If you have a question, go ahead and ask it now. Your line is open. Okay.

MR. EDWARDS: Our next speaker is Steve McClary from MRW & Associates, who will present an overview of the draft framework itself.

MR. McCLARY: Thank you, Dale. Good morning, Commissioner Byron, Chair Douglas, Vice Chair Boyd, it is good to be here this morning. My name is Steve McClary. I am a principal with MRW & Associates, the authoring

consulting firm here. Also with me today, I want to acknowledge some of the rest of the team at MRW. My colleague and a familiar face at the Energy Commission, Bob Weisenmiller is here, as is Heather Mehta, who has played a key role in making this report actually happen, and Briana Kobor, who is much of the work underlying the report.

I think Mike and Dale have outlined where this report fits in the efforts that the Commission is undertaking to incorporate the implications of Greenhouse Gas Policy into siting proceedings. It is a difficult question and I would say that what we have tried to do here is provide an overview of where the issue stands as far as getting a grasp on the greenhouse gas emissions from the electricity sector and the different ways in which natural gas-fired plants that come before you, in particular, fit into looking at that framework, and then we try to propose at least the beginning of a specific set of ways to think about plants as they come before you in siting proceedings. That, obviously, is going to evolve as siting cases move forward, but this is, I think, the first step, and it should rightly be regarded as such. What the report is not is a new set of modeling analyses, per se, that I think Mike has referred to as the kind of work that might need ultimately to be done; it is more

pointing in the direction of how those kinds of analyses ought to be performed.

As has already been mentioned, and the reason that this is not an easy kind of a problem, the power grid is complicated. And in California, it is maybe more complicated than just about anyplace else in the country or the world because of our mix of resources, our reliance on imports, the geographic scope, and the policy drivers that we impose on that system here in California. A key part, of course, is renewable resources and the push to do those, the hard fact is that, many of those renewable resources are intermittent in nature, and how we accommodate that in the electricity system is a key element of imposing that policy, which is part and parcel of reducing greenhouse gas emissions from the electricity sector. And that is why we are trying to help the process here of how you think about how natural gas-fired plants play a role in that policy and moving forward.

What I will be talking about today are, first, and I do not want to go into too much detail on the background, but to run through some of where we are, what the legislative and policy initiatives that have led us to this place are, how the generation mix that we have is reflected in that and will be. We looked more closely at the implications of a 33 percent renewable portfolio

standard scenario because that does appear to be the direction we are headed as a key element of our greenhouse gas reduction strategy in this state. We also do an overview of what we know and how we can quantify greenhouse gas emissions from the electric sector. There is a lot of policy interest here, but we are still at a stage of really understanding the ways in which greenhouse gas emissions result from generating electricity and the possible outcomes of different mixes of the electricity in the system. And to that end, we have tried to take a preliminary look at what the greenhouse gas emission implications of several policy driven futures, stemming largely from work performed for the 2007 IEPR here at the Commission, what some of the implications of that would be, and from that identify what kinds of roles gas-fired generation play in those futures, or in the kind of policy direction we are taking, why they are important, why you would need them, and what the emissions implications are of those plants and those policy futures. All of this, of course, takes place against the backdrop of California's energy policy, which is evolving. Here at the Commission, of course, it is the IEPR, which we are part of here today, and the updates that occur in the off-years between IEPRs that set the policy framework that goes to the other agencies in the state.

Overall, the Energy Action Plan that is a joint effort of the PUC and the Energy Commission, establishes an overall framework here for how we look at resources that are added and how we meet our electricity needs, and sets a priority. And one thing that I want to emphasize there is that the first element in the loading order under state policy is, in fact, energy efficiency, not generation. That is really step 1 every time we look at this. Now, this report in this effort is necessarily focused on how you deal with supply resources that come to this Commission and how they fold that into siting. I do not mean for that to imply that that means that the energy efficiency goal is overlooked or unimportant; in fact, it underlies every scenario that we look at. And in the broader energy policy context, this is certainly an element that would be looked at for perhaps increased reliance as part of a greenhouse gas or an overall environmental scenario, policy would be taken here. So while we do refer to the energy efficiency element in meeting electricity needs here, the focus of this report is on resources.

Into all of this, we have now the ARB role in meeting the goals set in AB 32, and that is again -- it has been evolving, there is a lead being taken by that agency, but the Commission certainly continues to play a

vital role in that and, in fact, laid a lot of the groundwork for what the ARB is doing. The ARB Scoping Plan has set certain goals and intents for how they want to move forward on greenhouse gas reduction. Specific goals are also laid out there, but often they are laid out in a manner that is somewhat different from the way this Commission approaches electricity planning, or policy, and that will be one of the challenges going forward, to harmonize those and get them in sync in working together.

One other point on that, and I think Mike touched on this, as well, is there is a timing issue in that some of what the ARB is doing will be laid in place over the next few years and may in fact address some of the implications of specific plants, a cap and trade system, for example, might drive decisions made by developers who bring plants to this Commission. But this Commission has to decide siting cases now, as that framework is being developed, and much of this work is focused on how the Commission can address those issues in the context of siting cases that are coming before them today. I think the number I heard was 28 cases actively before. There is not any realistic prospect of putting those on hold, waiting for a broader system to be imposed.

So where are we now? Well, the generation mix in California, as I said, is diverse, and of course, in any

electricity system, demand varies constantly through the day, during the seasons, response to weather, response to economic conditions, and sometimes response to events on the system itself, for example, transmission lines go down, that obviously has an effect on how the system can operate. One thing looking forward is California has today, in many respects, a system that has quite a bit of fluctuation on the supply side because of the hydro system that we have, we have quite a reliance on that. Looking forward, that is certainly only going to increase, although in the future that will be due more to introduction of renewable resources that are intermittent in nature and have different variations, different patterns of variation than hydro does. But I think as we are looking, going forward, and accommodating these intermittent resources, it is worth remembering that California has accommodated intermittent resources for a very long time and has maintained a very reliable electric system in doing that. Here, we are looking primarily at system-wide impacts, as Mike mentioned, we are trying to get a handle on what the system-wide impacts of new plants being introduced is. Of course, you have the intersection of what are the system-wide impacts of a specific case being brought to the Commission, and this obviously is in many ways driven largely by the impacts of introducing new

renewable resources into that system.

This is perhaps the obligatory pie chart on what California's system looks like, always based on the Energy Commission's data because it is always the clearest and best available, I think. The things to look at here, or to remain aware of, are that the intermittency issue, you could see that roughly speaking, in terms of energy generation, hydro generation in this state is comparable to nuclear generation, very round numbers. Both are very significant resources and very different in their characteristics. A lot of the difference in the characteristics of those two resources is balanced out by a large reliance on natural gas-fired generation, which moves back and forth. The out-of-state element of generation that we rely on in California also includes large hydro, but also includes a fair amount of coal. And for that reason, the out-of-state generation that we use here is actually disproportionately contributing to greenhouse gas emissions that result from use of electricity in California. Thirty-three percent RPS, this is one of the policy overlays resulting from AB 32 and I do not actually need to reiterate what I have said here, it is going to require accommodation of a greater degree of renewables than we have now. Load following and regulation capacity are kinds of resources that are

necessary to let intermittent resources come on to the system. All of this has to be done in a way that maintains reliability at this point, and in many respects we look to the ISO in doing their integration renewable study, their integration of renewable resources work, which is directed at maintenance of reliability which is, of course, their primary charge in operating the system. Going forward beyond 2020 and 2030, looking beyond the 33 percent goal, this is going to be even greater, and frankly very difficult to quantify at this point. We are trying to point a direction in doing that, but things like electrification of the transportation system, new electricity storage technologies, perhaps new transmission technologies that allow resources to move more readily across bigger distances, will have large effects on how we can manage this system, and modeling those at this point is probably an unrealistic prospect, however, allowing ourselves to be able to account for them and accommodate them as they come forward will be important.

Historic greenhouse gas emissions. Much of the framework and the targets that are set for reducing greenhouse gas refers to, say, 1990 levels, or levels set for a specific sector such as the electricity system, which poses the problem of actually getting a good realistic handle on greenhouse gas emissions from those

sectors and how they are evolving, and how they change. That is actually not well settled yet, it is being attacked, and it is being addressed. There are two primary sources that we used in the report here and looked to; the Energy Commission has looked at this issue for quite some time and has laid the groundwork, I would say, for looking at greenhouse gas emissions resulting from electricity production for many years. There is something of either a passing of the baton or bringing a new partner into that with the ARB coming in. I think the roles are still being worked out, but clearly ARB is now taking more of a lead, although I think they lean heavily on work done here, and so looking forward I think that will probably be where we look for the primary source of information on this, but we are not quite there yet. This poses its own set of difficulties for evaluating the impact of different policies going forward on the electricity system and on specific siting cases because we do not always have data that we can pin down well enough to know what the results of our decisions will be. And it varies. It varies a lot. From the Energy Commission work that has been done, it is clear that greenhouse gas emissions fluctuate from year to year for a lot of reasons and, in particular, the imports account for quite a bit of it and there are two categories here, unspecified and specified imports, so

between those two categories, the red and the purple if they are showing up well on WebEx, or seem to be showing up here, that is about half the total greenhouse gas emissions that result from it. Even within the state, you see a lot of variation. Most of that would be due to variations in load, in demand from year to year, and in hydro production from year to year, and drought years when you have less hydro, you generate more from natural gas, hence you get more greenhouse gas emissions. You also have some effect if the nuclear plants are down for an extended period of time. That can have an impact on the overall natural gas make-up power, if you will. That is less of an effect, partly because -- and tends to be less of one now -- partly because outages and refueling outages have been shortened over time, you know, the plants are operating more of the time, and we have not had extended outages, except that we have had steam generator replacements which are planned for, but that does also impact. So operation of nuclear and hydro plants does effect the greenhouse gas emissions.

This is reiterating what I just presaged here. One other issue we do have, in particular on electricity imported from out of the state, we have not had a good set of consistent protocols for determining how much is coming from which source, and how much greenhouse gas emissions

are resulting from those sources on out-of-state resources. We have a much better handle for in-state. This is again something that we will be improving over the next few years since we are not the only state getting a handle on greenhouse gas emission reduction.

So what we did after looking at where things stand and what the state of the data was, was to look at how the different policy futures, the different alternatives for moving the electric system forward, that are under examination here, might affect that. There again, as I said, we relied primarily on existing work and, in fact, throughout the report, we relied on good work that has been done here, the ARB, the PUC, the ISO, and elsewhere. Here, we were looking because of the timing and what is going where we are in the evolution. We have the scenarios worked that it was done as a part of the 2007 IEPR here. Simultaneously with that, a lot of work was being done on the implications of shutting down or changing operation of different plants as part of looking at the impact of what is your cooling regulation. So that was sort of a parallel source of information on resource use in greenhouse gas emission that we could use, and at the same time, now, the ISO is also looking at this issue closely. They have taken a pretty comprehensive look at the 20 percent RPS standard and are in the midst of

putting together and looking closely at the implications of a 33 percent RPS standard, and we will hear more about that ongoing work later today.

What we looked at here were scenarios that stem from work that was done in the scenarios report. What we have called the "frozen policy case" was -- this was one of the cases that was identified in the report as Case 1B there, and I think it is noting, you know, "frozen policy," "business as usual," they are often terms that are bandied about for what happens, what is the policy if we do not change things dramatically from where we are. So one thing that strikes one about the frozen policy case in California is that the frozen policy case has a very aggressive energy efficiency element in it called "ready." It assumes that we will be pushing hard on energy efficiency. So I think what you would call "business as usual," or "frozen policy case" in California might strike regulators in other states as pretty far in the direction of pushing efficiency and conservation and demand response.

We then tried to look at it more qualitatively, tried to start with a quantitative look at an increased renewables generation scenario in the scenarios report, this was described as Case 4A. At that time, we did not have a 33 percent RPS standard set in place. As it

happens, that more aggressive renewables or increased renewables scenario comes close to looking like a potential 33 percent by 2020 RPS case, and can give you some insights into it. Now, it is obviously not precise, but it is actually surprisingly close in many ways to identifying a 33 percent kind of scenario. We also looked at some variations on that to see what the potential impacts of a couple of other policy choices would be. One was to look at an increased renewables development with acceleration of retiring older plants, and another was to look at an increased renewable scenario that would also incorporate increased distributed generation resources being put in place, both CHP combined heat and power and renewable distributing generation. And what we found here was interesting. Again, I want to say -- preliminary. I think what we are trying to say is that these are the kinds of directions that these policy futures lead you, but that more detailed analysis is certainly merited and would be part of this Commission's work on an ongoing basis. But looking at that frozen policy, even without major new initiatives beyond the kind of new initiatives that are already in place, it looks like greenhouse gas emissions would -- you are holding them in place in large part through 2020. In that scenario, the new gas-fired generation that is assumed to be brought online, it is

used primarily for peaking purposes and for quick response for spinning reserve, non-spinning reserve regulation, it is does not include a lot of new gas-fired generation built primarily for economic purposes, for example. The more aggressive kinds of cases that are consistent with the increased renewables scenario looked at in 2007 can reduce greenhouse gas emissions from the electricity sector on the order of 20 percent. And, again, this is not the final answer, but they do address and start pushing us in the direction of actual reductions in GHG emissions from the sector. At our first look, it did not appear that adding accelerated retirements of older plants, or increasing distributed generation -- it actually had a relatively modest impact on that. You had much the same level of reduction in greenhouse gas emissions as in the, if you will, the base increased renewable case. All of this is very -- it is based on existing work, it is not new modeling, it is not new production simulation work, and it gives an idea of what directions would be promising, but there is clearly substantial additional work that is needed to really address and accommodate some key factors. And three of them that I have noted here. Local Reliability. A lot of plants are needed in specific areas because specific areas have transmission limitations, they have local resource

requirements that make it necessary to locate generation there, unless you can build new transmission resources that meet the same reliability goals. This is the bread and butter, I would say, of the ISO in many ways and is one of the primary reasons why their role in looking at renewable integration is so key. Renewable integration is obviously driving a lot of what will happen going forward in the greenhouse gas emissions and the need for natural gas plants. What kind of renewables? What will their supply characteristics be? And what do we need to do to accommodate them? And, in fact, there are some initiatives being undertaken, or some work being done, that could have a substantial effect on this and, again, we may hear from David Hawkins on some of those issues. An example would be wind generation does fluctuate, it fluctuates daily and it fluctuates through the season. One way to address that is to have lots of back-up, or have enough back-up gas-fired generation to accommodate those swings. Another way is to understand better how it is going to fluctuate, forecast it better than we do now. And there may, in fact, be a significant promise in better forecasting methods that can be implemented that will allow us to accommodate that intermittent resource more readily. Some of the kind of thing that needs to be looked at going forward. Transmission issues, I think we

have already seen and will continue to see that building new transmission to accommodate renewable generation, or to improve reliability, will continue to be an issue and a contentious one, a very difficult one. Those who have watched, for example, the sunrise proceeding over the past couple of years know it is not an easy road to do, but, again, it is key to what kind of plants we need to build, and where we will build them.

As I mentioned early on, in the long run, the Scoping Plan that the ARB has put forth will result in specific regulations which may well guide either the presentation of cases to this Commission or how they are evaluated. But that is not going to happen right now and, in the short run, the focus here has to be looking at gas-fired generation that is brought forward to this Commission, and how you balance all of these issues. You have grid operational needs, you have reliability, you are trying to integrate renewable integration, or renewable resources into the system, and allow that to happen, which may require construction of some gas-fired plants. And all of that needs to happen in cases that are happening this month, they are coming forward. The staff has to testify and Commissioners have to make decisions.

So when you are looking at a gas-fired plant, this is where we start to put forward a framework for how you

can look at them, how you can think about specific plants and what roles they play. A key one that has been highlighted again and again is to support renewable generation being brought into the system, whether that is wind, solar, or perhaps others. Another role that gas-fired plants can play on this system is to meet local capacity requirements, and I touched on that, as well. Grid operations support the role of the plant there, it can be somewhat different from local capacity requirements if we need to have specific types of ancillary services, for example, on the system in order to maintain reliable operation and gas-fired plants in some cases can provide those kinds of ancillary services most economically.

The last two categories here are a bit more of the traditional ways that we have though of why gas-fired plants might or might not make sense, one is extreme high demand, or system emergencies. This would be what you would think of as peaker plants, which traditionally in the past were gas turbines that did not operate very much at all, but when you wanted extra capacity for one of these reasons, it was there. They had bad heat rates, they were expensive to run when you ran them, but they were relatively cheap to build. And then the final is, for lack of a better term, General Energy Support. Mike touched on this, as well. The fact is that a lot of our

generation comes from natural gas if you build a new natural gas plant that is more efficient and generates less greenhouse gas for each kilowatt hour that it produces, you do get some reduction in greenhouse gas emissions from that. Now, the trick is going to be to understand how much reduction you are getting, the modeling comes in with truly understanding whether you are truly displacing other gas-fired generation, or perhaps coal-fired generation. And you also do not -- I think, going forward, and this is a longer-term question -- you need to look at whether building plants now is forestalling or precluding policy actions that you might want to take five years, or 10 years down the line, so that you are not kind of walking yourself into an energy future that you did not really intend to lock yourself into today. How you quantify that and look at it in a specific siting case will be difficult to do and quantifying it is very difficult to do, but I think it is a key issue.

So this is where we are going to need to be going. We are going to need to be understanding the local liability restraints, the impact of transmission, development, transmission choke points, if you will, on the need for new construction, the increased need for ancillary services of various kinds that includes a

combination of renewables, but also may well include other kinds of operational needs. Looking in a siting case, what you have to look at is what kind of gas plant is being proposed against these kinds of needs, whether it is a combined cycle, large scale plant, whether it is a peaker plant, perhaps internal combustion gas-fired plant for peaking purposes, or intermediate loads, location, location, location, of course, matters crucially on these, and I know that is an issue in several of the siting cases before you right now, and then which of those roles that we talked about previously this gas plant actually meets. And I want to distinguish a bit between that role and the type because one thing we have come across is that there is a tendency, particularly for those of us who have been around this business for a while, to look at a plant and say, "Oh, that's a peaker." Well, a gas-fired combustion turbine is a different animal today than it was 10 or 20 years ago, and it may not be just a peaker. And so to look at the role and distinguish that from the type of plant, the actual technology, is important.

So we tried to reach some conclusions on this, if nothing else, to show why it matters to start doing such a framework. And I think this is kind of the key to it. Net from the system greenhouse gas emissions will decline if you build -- even building new gas-fired plants, if you

do it for these kinds of reasons and keeping them in mind, a key one is going to be, if we are setting a 33 percent renewable goal and we need to build some gas plants to do that, then they will decline. If that 33 percent goal really reduces net GHG emissions, and I see no reason to believe that it will not, then building some gas-fired generation that then allows that to happen is a key element of meeting that greenhouse gas emission reduction strategy. Improving overall system efficiency, they will decline if that really happens. This is a tougher one that leads more in the direction of doing a system modeling effort in the siting case, which is a problematic kind of direction to go, but may be something that needs to be done for certain kinds of plants, and then really serving low growth capacity needs more efficiently than the existing fleet. Well, that is really another way of saying improving the overall system of efficiency. And that is really where we have gone in starting this effort, but I would emphasize, it is a start. As Mike said, there are several other pieces of this puzzle being put together right now here at the Commission and I expect that, over the next few months, application of some of this framework and the work being done by the staff in specific siting cases on this issue will be instructive, let's put it that way, we will be learning something over the next few

months. If there are any questions, I will be glad to take them.

COMMISSIONER BYRON: Yes, please. Questions or comments? Thanks, Steve.

VICE CHAIRMAN BOYD: I thought the report was very well done, very informative. As you said, it is a beginning, so to speak, and it is a good beginning for us, and it is a long path. I appreciate you repeating in your verbal presentation, as well as in the report, that efficiency, indeed, is job 1, and we have to keep reminding ourselves. But it is just a piece of the whole puzzle.

You, in your presentation, referenced the role of hydro and our dependence on hydro quite a number of times, and you even said that would be greater in the future, yet from where I sit all these years in California climate change issues, the biggest problem for California probably is water and the impacts of climate change on our water supply. Precipitation, the water supply system is plumbed, as is the hydro system to a certain type pattern, snows and big reservoir, everything I have seen in the last several years is that is destined to change, I mean, it is changing now. What we have done in the past with more, what we might do in the future of changing that. So I worry a lot about hydro being depended on as much in the

future, at least the large hydro system we have, so I do not know if you have given much thought to that. I will let you mull that over for a moment while I move on to intermittents, 1) appreciate you driving that point home because, certainly, we and a lot of folks I see in the audience talk about that a lot of late, and we have difficulty, and I think we have identified the need to educate the public on the fact that, when you say renewables are our future, a big chunk of those renewables are intermittent and are dependent on back-up and what have you, and you hit the nail on the head there, that is a big issue that we are addressing, and need to address more. But when you talk about renewables, the report, and you, and most people talk mostly about wind and solar. They are sexy. They are what the focus is on. They are allegedly the cleanest when you think about climate change, you know, the sun is free, and the wind is free. However, the environmental footprint of the facilities has turned out to be quite an issue for us, avian mortality with wind, besides just the footprint of wind farms. Commissioner Byron and I spent the day in the desert yesterday in a siting case for one solar facility and looking at one of our older California solar facilities, and there are significant footprint problems in the eyes of lots of people with regard to siting those. So as

great as they are, getting all we want is going to be problematic, and they are intermittent. But there are other renewables like geothermal and biomass, which I do not hear enough talk about. Geothermal, I think we, as a state, are pushing pretty hard and, you know, the resource is fairly well identified and hopefully will be exploited and developed. Biomass, to me, is an area that we just have not exploited enough, and both geothermal and biomass are base load resources, they are not intermittent, and so it is just a comment and I think maybe we are missing a bet by not thinking about them more. Yes, there are emissions associated with biomass because you are burning something, but the footprint of the facilities and the fuel that you use actually -- the footprint is not that great and the fuel that you use often -- getting rid of it -- solves other environmental problems, so just a comment on that point. And lastly, you did comment we cannot wait for the AB 32 work, and the ARB's work, and as we site facilities. And you are right, I mean, we have a huge caseload, we are moving forward doing the best we can, and yet there is kind of a hiccup in the system, a little pause going on right now, you flirted with it, you mentioned once-through cooling. There is air quality offset issue that is hitting us more and more in the state, most notorious is the South Coast Air Basin and its

so-called priority reserve, but I know from my experience, the San Joaquin Valley is going to -- is becoming worse than L.A., etc. etc., in terms of the problems it has air quality-wise. So we have an intersection, if not a collision, all kinds of policy issues right now. Implementing AB 32 and what we are talking about here today, these other issues, air quality offsets, priority reserves, once-through cooling, RCHP policy, you mentioned repeatedly our need to retire older inefficient facilities. Maybe we do have an opportunity now to wrestle with looking at a greater piece of this system in the context, as I had said before, of everything that is in this great tent that AB 32, i.e., climate change, has created. So possibly, if we can comprehend the magnitude of this problem I described, we have a chance to create some kind of synergistic and complimentary, supplementary solutions to this that involves a lot of what you are talking about today. So it is not just getting people to recognize the intermittence of some renewables and the gas back-up that we know we need, but it is all these other things, as well. Now, with that problem, do you have some simple solutions for us?

MR. McCLARY: Well, I might respond a little bit. On the hydro issue, if I said that I thought we would be relying more on hydro in the future, I misspoke there. I

was actually intending to point to the fact that we rely on a resource that has a fair amount of intermittency in it today and we know how to do it, we will be relying on more intermittent resources. But, in fact, I think you are right, that the hydro that we have today, there is some serious question as to its availability and, in fact, it may be more unpredictable and more intermittent in future years than it has been. And we certainly have had our ups and downs as a state in the past as it has varied. So I think, going forward, yeah, that is a very -- a real issue, how climate change may affect the hydro system we have in place, not to mention the water wars that are not the electric side, I mean, that is another whole issue. On other renewable resources, I think you are right, that that tends to get overlooked. It certainly was not a major focus for us in that there is not so much given or regarded as reasons why you need to look at the impact of gas-fired plants. Geothermal has typically had a minor greenhouse gas emission impact, I believe, but not anything on the scale of a fossil fuel plant. Biomass plants, you know, honestly, we did think about that one and biomass plants, I think, are going to be something that are almost necessarily going to be looked at on a case by case basis because the operation and the fuel source is absolutely key to what you can think about in

terms of the greenhouse gas emissions associated with it, and certainly you will find that there are some biomass developers or operators who look at the resource that they are burning and generating some carbon dioxide as a resource that otherwise might well have generated a methane, for example, so that they would argue they are providing a net reduction in greenhouse gas emissions through operation of the plant. How you can address that on any kind of a generic basis is pretty tough, I mean, it is going to be very dependent on fuel source, how much you can rely on that, and how they are going to operate. And it provides, actually, probably a fair amount of potential, but it is not one that we tackled in any generic way in this first look. Once-through cooling, South Coast, the priority reserve issue, a lot of these issues, yeah, there is a lot -- "intersection" is a good way of putting it as opposed to "collision," maybe, but, yes. It has always been the case, but we do have overlapping and intersecting policy directions and regulation going on, it is a reality of life in our state. In some ways, you are in the front here, you are in the front line because you have people who need decisions on plants now, so you have got to kind of ride out some of those waves as you go.

VICE CHAIRMAN BOYD: Thanks. And I did not mean

in any way to criticize your work, I was just trying to add to the pile that you have identified a big piece of that basis, and your comment about reality and us having to face reality are painfully true, and I will not go too far lest I get in political trouble about the ability of this agency and its sister agencies to face reality vis a vís some other institutions in this city, but we will let it go at that. Thanks.

CHAIRMAN DOUGLAS: A quick question. If I could draw your attention to your final slide where you conclude with the point that net GHG emissions will decline with new gas powered generation, and provided that regeneration helps us reach RPS and improves overall system efficiency and helps us meet load growth and capacity needs with greater efficiency. I think that is a point well taken and it can be backed up by much of the work that this Commission has done over time. You also said, but did not put down in a bullet, that this assumes that we are improving the fossil component of our electricity system without locking ourselves into a system that is perhaps more fossil than we desire for meeting our state's RPS and climate goals, or even that falls short of helping us achieve those RPS and climate goals at the pace that ARB and other state entities are looking at us to achieve. I think I heard you say that answering that question

quantitatively is very challenging, and I agree with you, but I wonder if you could provide us your thoughts with qualitatively what factors might be considered in addressing that question?

MR. McCLARY: Well, I think part of the reason it is hard to do it qualitatively is that it is kind of a temporal question, you know, that you are looking at approving a plant today, but you are also looking at what the implications of that on decisions that you or your successors will make five or 10 years from now, and they will be doing the same. So it may be that the important element to come out of that is some kind of, wow, what would be the right term for it? A look back or a true-up process that says, "Okay, looking back at the decisions that have been made with the goal of improving our greenhouse gas emissions, how did they fit in to do that? Have we done enough? Have we done too much? It is almost a question that you are posing to the Commission five years from now, or 10 years from now, in recommending that you actually be paying attention to what is happening during that intermediate time with this specifically in mind, so that five or 10 years from now, when you or your successors are asked that question, they have a basis for saying, "Yeah, you know, we actually have decided that, at this point, we have…," you know, this is just off the

cuff, "…we have enough of these kinds of gas-fired peakers. And even though we had reasons for approving the ones that we have done over the last few years, we met that goal." Now, the problem is in sort of setting a numeric or a quantitative goal today for that is difficult in a context where you do not really know the nature of, say, the renewable resources that come in, where demand will go over that five or 10 year period, and so you have to constantly be adjusting it. That is one of the advantages to the two-year system here, is that it kind of imposes, in every couple of years, re-looking at the system. But this is just another element of that two-year look that I think will be an important one, and it is needed to be the same kind of focus as in the past.

CHAIRMAN DOUGLAS: Thank you. That is helpful.

COMMISSIONER BYRON: Mr. McClary, one maybe comment/question. It is a good report. And I think we have asked you to do the impossible, but I will be critical of it in one way, and I hope others will provide some critical review, as well, and then ask you a question. And that is this notion, well, just to read from the report, "Because energy efficiency reduces energy demand and/or slows future growth in demand, fewer power plants should be needed, and overall GHG emissions should be reduced." That -- it is a nuance that changed -- it

will be reduced -- it *will* be more efficient. When we put out our procurement numbers for the Public Utilities Commission and the IOUs, it includes our energy efficiency goals, and our goals for renewables. The POUs have shown tremendous progress in this regard. We had a workshop last week and I think we fully anticipate -- I will be stronger -- we expect them to do better than they are currently doing, and they are moving in that direction. So a system nuance issue that we are starting with all of our energy efficiency and renewables in place, and we will be reducing greenhouse gases. Now, the question is, and the impossible task we have given to you, seems as though the default is natural gas. Well, I come with a generation background, I like to generate electrons, and natural gas seems to be the best choice. But there are alternatives and I would like you to maybe just address those to some extent. We have seen some interesting proposals of late for thermal storage, for large closed system pumped hydro storage, there are other more exotic forms of storage. Aren't these possibilities that could be breakthroughs that could change everything? And maybe related to that, you know, there are other countries -- Denmark, Ireland -- how are they addressing this? Is it all with natural gas? Please.

MR. McCLARY: Well, to address your first point,

it should be -- I will confess to probably having a bit of that caveatish consultant vocabulary going on here, so, yeah, it is quite clear that reducing demand -- as I said, it is the first step, and, yeah, you are not generating any greenhouse gas when you are reducing demand. I mean, that is the way to go. I suppose you could come up with scenarios where whatever measures you were taking to reduce demand might increase it, but I am not coming up with any and I am not going to lay them out in the report. So, no, I think that is a given and I think it is a cornerstone of the policy here. So other sources, other kinds of generation --

COMMISSIONER BYRON: Other than the default.

MR. McCLARY: Other than the default of natural gas. Well, it is good question because, in my experience, we have this interesting division and, particularly in this country where we look to the policy goals, but we want them to be the ones that prima facie are economic, and so we end up doing things like arguing over feed-in tariffs that, in many countries and societies, they just do it. They say, "Yeah, okay, it's $.60 a kilowatt-hour, so we wanted to do it, so we did it." And we tend not to take that approach so readily in this country. Natural gas generation has fallen into the category of the most obviously sort of readily available economic thing to do

for a long time, and continues to -- it really in a lot of ways still does feel that -- it has gotten more volatile, no question about it, gas prices have gone up and they have gone down in ways that were not anticipated when many of the current fleets were built. As far as the other things, though, things like thermal storage, which you mentioned, or technologies that we have not really put in place, or, for that matter, transmission technologies that could significantly affect the way the transmission system works and make a lot of the transmission issues that we face now more easy to deal with. Yeah, I mean, I think those all need to be accounted for, and that is part of this whole issue of why the every two-year look at what is going on is so critical to this, is because you can look at it and say, well -- if we were to set, for example, a numeric goal today and say, "We think that X megawatts of gas-fired generation is required," we will be required to implement a greenhouse gas reduction strategy over the next 10 years, and five years from now we had not looked back at it and said, "Oh, well, there is a thermal storage technology that has really come into play and is filling many of those roles, we do not really need to do that." This Commission should do that. I mean, they should look at it and say, "We'll revise that, we'll re-think that," because of those new technologies. You have -- this is

partly where I think this Commission has an interesting role because you have your siting role, but in some of these technologies, you are not siting them, I mean, you set thermal plants, but you have another aspect of your operation as a Commission that does encourage technology development and gives you an insight, I think, into what is going on in technology development that might not be typical of a regulatory agency. And I think that is valuable, and is a valuable part of the bi-annual look.

COMMISSIONER BYRON: Thank you. I think we should move on, I understand, and hopefully we will be dissecting the report more as the morning and afternoon progresses. We have three more important presentations to get to this morning. And thank you very much.

MR. McCLARY: Thank you.

MR. EDWARDS: So next we have David Hawkins with California ISO on the status of renewable integration studies.

MR. HAWKINS: Thank you. Good morning, Commissioners. Thank you. I am Dave Hawkins from California ISO. I am the Lead Renewables Power Engineer. It is my pleasure to address some of these issues with you this morning. Let me say, first of all, compliments to the MRW group and the report that you have done, I thought it was very well balanced, provided a great understanding

of the complexity of the issue, and it was interesting to read and interesting to think about all the implications of it. So my compliments.

Let me also respond to one of the last comments that you all made, which is that, when you think about 33 percent renewables, that means 67 percent is coming from other generation resources and so, even though I am the champion, as you may know, at the ISO for energy storage, energy storage is probably going to address more the peaker facilities because it is a limited storage resource, so it is going to attack that particular part that says we need some peak resources, you know, between 2:00 and 6:00 in the afternoon, or 5:00 and 7:00 in the evening, to meet those things. So it is not going to create any new energy, basically it does some shifting of energy, which, again, I will just champion, then, as to why you make sure you have enough other generation resources basically to fill up the energy storage facilities. So I just wanted to answer that one; I was thinking about it.

As we are thinking about the Grid going forward, my role is to give you just a brief update as to where we are at and what we are doing at the ISO in terms of studying some of the technologies and what we are going to do for implementing these things. We have had a lot of

work in place, as you know, for the last several years looking at 20 percent renewables, and we have launched, now, into our work on 33 percent renewables, started our stakeholder process looking at building new models and so forth, looking at 33 percent, and then looking at also the issues of the greenhouse gas reductions and what happens with the once-through cooling plants coming off line and what technologies and other things that are coming available. Also, we of course have done a lot of work with our market systems and looking at, you know, all the different initiatives that are coming on. Our major focus, of course, has been on what transmission do we need to build to get all the renewables interconnected and not just transmission for the renewables, but basically Grid updates to move the power, and other generation connected that is in the cue, what operational issues do we have, and then finally, what are the market issues, if any, and barriers that have to be addressed in taking up all the large amounts of intermittent resources in energy storage and demand response. And there certainly are barriers that have to be addressed to handle the large amounts of intermittent resources in any storage and demand response. There certainly are some barriers there. The one thing that we have really discovered is that we have one huge advantage in that our market systems are based upon a

five-minute economic re-dispatch and, as you think about limited energy storage systems, it gives us unique ways of handling devices and looking at what is in the bucket for the next five minutes and how we could be managing it, whether it is a fully charged up, or half charged, and so forth, and certainly as we have looked at the New York ISO model for handling energy storage, we think that has some really interesting advantages over utilities where everything is block hourly loaded. So there are some interesting things looking at -- this is just a quick list of all the market enhancements that are going on, a lot of work on trying to improve our ancillary services markets and products and things that are going to be needed for the integration renewables. As we said, we have already done -- a lot of our work has been focused on 20 percent and, you know, again, studying the fleet and looking at what the current generation fleet is capable of doing, and what is going to happen when we look at these large clusters of renewables like the wind coming on in Tehachapi, and the large amounts of solar and geo-thermal that is being proposed. So we have done a lot of work on new tools, strategies, production costing modeling programs, and things that try to provide a more realistic view of how all these resources are going to be dispatched. But we feel that, certainly, 20 percent is

achievable and we are looking at hitting those numbers by 2012. Just another observation is that our energy being delivered this year is down by about five percent compared to previous years, so if the renewables stay operating at this current level, we are certainly going to make progress on our RPS goal because the energy is going down, so the denominator is going in the right direction, so we are achieving, I guess, demand response in a way we had not quite expected to.

The other issue that we looked at a lot is, of course, as we are looking out at 2015, 2015 may even pose more of a challenge for us than 2020, and the reason is that, if the wind generation installations get way out ahead of some of the solar that we are counting on, then we may have much more intermittency problems to deal with in ramping. When we get to 33 percent renewables, we are expecting to see a more balanced portfolio of a lot more solar and, with that, then you will see better transmission loading, you will see generation that is peaking up during the day, as well as some of the wind generation that comes out at night, so I think the whole portfolio by 33 percent may look pretty good, or a lot better than what it would in 2015. So as we think about our transition period, 2015 is probably the one that we also are concentrating on a lot of the individual studies

to make sure that we have got the right things. We are also looking at work with Bonneville on how to look at wide area management and better dynamic scheduling of resources, how can we change scheduling paradigms for imports, and be able to do that inter-hour scheduling vs. just block hourly scheduling. So, again, new rules, new concepts, and also going back to WCC and challenging some of their definitions of what different resources are supposed to do. For example, they are spending reserve definition calls for only generators can do it, and we think in the future energy storage and demand response programs can also hit those things. If they are configured right and they have the right kind of frequency response, and relays, and stuff like that, so there are ways that we think the rules can be changed.

Looking ahead, again, we are looking at how to maximize the fleet flexibility. Another comment is, of course, we also worry about the reduction of hydro and what climate changes on that. One advantage is that, at least from the DOE reports, is that if we ramp up the amount of renewables, it also decreases the amount of water consumption in the west, and so not only do we reduce greenhouse gas, but we also reduce some of the water. So there hopefully will be water available for some of the biomass and other resources that we may need

it for in the future. So anyway, all of these are a work that is in progress. A lot of work is going on in the ready process, trying to leverage the new tools and so forth for state-of-the-art reliability and better transforming our transmission planning functions. So, anyway, a lot of individual work on those and some Smart Grid development work at the same time.

I know we are looking forward, then, as I mentioned, we think 33 percent will be an interesting study as we are going to work on that, and looking to see how all of that plays out with our rules. We are also doing a lot of work with, as I mentioned, production costing programs. One of the -- I think I have a slide for looking at high solar scenarios and high wind scenarios, high import scenarios, and then the result, of course, will be something in between as to what is the actual resources that we are going to have. We all know that 33 percent is really kind of a game changer, where what we are expecting is a lot more distributed resources, whether it is a rooftop solar, other types of renewables, certainly they are going to be spread throughout the state; again, the advantage of the biomass, biogas is that it is very widely disbursed because you do not carry the fuels very far, and so we look forward to, you know, anything we can to help promote that. And so what we are

looking at is a future where we probably have less in the way of large clusters like Tehachapi, and more dispersed generation which will mean things that we are trying to do with Smart Grid, and have visibility throughout the interconnection will be a critical part of building that information infrastructure.

We are looking at also new energy storage facilities, progress is hopefully going to be made on looking at compressed air energy storage, which would give us five to six to seven hours worth of energy. The one thing that we are proposing is to really concentrate on where that would be, so it is like all real estate -- location, location, location. If you put compressed air or large energy storage in a place that would, for example, give the transmission dispatchers the ability to mitigate transmission loading problems on path 15, path 26, so that you had injection points in that midway Vincent area, that may be the best location. We still need energy storage potentially at -- also at the wind farms, or places where we can then make better utilization of the existing transmission by loading it up when there is excess generation available. So there are a variety of scenarios as to how I think energy storage is going to play out, and then also getting demand response coupled up with some of the availability of renewable generation.

Lots of challenges to get the right amount of transmission built, looking at also not just in California, but renewable clusters also throughout the whole region, and then trying to get the regional transmission plans together, and finally looking at the existing transmission of what we can do in terms of improving the overall voltage and stability limits on those ties. One of the key things we have been looking at, of course, with our reports, is looking at ramping issues, load following, how much additional regulation we need, and what are the operating reserves, how are we going to handle the over-generation problems, and one of the areas that we are becoming aware of is that, if you have a power plant that is probably the location somewhere near some of the where the renewables are, and it is out in the bubble for being shut down, you are going to see a lot more cycling of some of these thermal power plants as the renewable resources ramp up or ramp down; and the result of that appears to be a lot more thermal stresses on the generator itself, not just the turbine part, but the actual generator windings, and as the windings start being thermally stressed, we have some fairly ugly pictures of the short circuits on the windings, and so forth. So we could expect to see a little bit more breakage or forced outages on some of the thermal plants

in the future for those that are going to be cycled a lot harder and have not been used to that kind of stress. Lots of operational tools we have been building, and we have got new forecasting programs coming on, new visualization tools for the dispatchers, and those are finally going into production late this fall, so we have got a real chance to really test out how the operators like them.

And finally, one of the major things we have going on underway now is a CEC funded project we are doing with KEMA, looking at how to look at energy storage and actually build a model of all the generators, and we have picked out four significant days, one in each season of winter, spring, summer, fall, and plus one additional day where we add a major generator trip. And, again, what we are looking at is we are setting up a 24-hour dispatch of all those resources plus the imports, and then verifying what the overall response of the fleet is to each of those kinds of events, and these are ones where we have significant amount of wind ramping up or ramping down, and large changes in the system, and then looking at the development of new dispatch algorithms that will take advantage of both what the energy storage could do and how we move with that. So that is kind of a brief summary of what we are trying to do. A lot of work in progress and I

would be glad to answer any questions.

VICE CHAIRMAN BOYD: Mr. Hawkins, thank you. The input of the Independent System Operator with regard to reliability is extremely important. Thank you very much for being here. I believe you are going to continue later on in our panel?

MR. HAWKINS: Yes.

VICE CHAIRMAN BOYD: Thank you very much.

MR. EDWARDS: Our next speaker is Nancy Ryan from the California Public Utilities Commission. She is going to talk to us a little bit about greenhouse gases relative to the procurement process.

COMMISSIONER BYRON: Ms. Ryan, it is good to see you. I think we have been seeing you about every week. It is always nice if it is on a Monday, which means there is maybe a chance to see you twice this week.

DR. RYAN: I will be here twice this week, but not in this building, tomorrow. However, I am looking forward to a double-header next week. Okay, I will speak very briefly about the role or how we consider greenhouse gas emissions in the PUC's procurement process that oversees for the investor owned utilities. So GHG is an important consideration in the procurement process and the Commission has been moving in this direction over at least the last five years to provide both explicit consideration

of both greenhouse gas emissions and opportunities to avoid emissions, the flip side of that in long-term procurement. As I am sure you are aware, the current procurement framework arose from the ashes of the restructuring experiment and has been evolving over the last several years and has become progressively more sophisticated and dealt with as it deals with the greater range of environmental and other issues. Since at least 2004, key commissioners and staff have recognized that the procurement process provides an opportunity to exercise oversight over greenhouse gas emissions from the load serving entities that we regulate and also as a vehicle to enforce the loading wear which is the foundation of our energy policy framework in California.

So today I will mainly focus on the current iteration of the long-term procurement process, and then I will also touch briefly on some changes that we have in the works for the next go-round. Okay, so this diagram, or this pair of diagrams, offers a very simplified schematic of the two intertwined processes that we pursue at the Commission, resource adequacy and long-term procurement. And I will not go through them in detail, but I just want to call your attention to a few elements of them. So, of course, resource adequacy really has essentially a short-term focus, it has got -- there is a

year ahead showing, and then month ahead showings for both system and local resource adequacies, so in other words the load serving entities have to demonstrate that they have adequate resources to meet both their system and local RA obligations, so that is essentially a short-term program. Then, the procurement planning process is really focused both on long-term resource adequacy -- do we build the right plants in the right places, or deploy the other appropriate resources to assure reliability, but also to meet our environmental objectives and to do so at least cost to consumers. So we are balancing all those different considerations in the long-term procurement planning process. Within -- and you will see and perhaps find it gratifying that both of these charts on the far left-hand side of the beginning is the CEC forecast, and that is the point of departure for both these exercises. You will also see that there is a significant role, particularly resource adequacy, for the ISO. I know Commissioner Byron likes this to be an acronym-free zone, and I will use some here, but I do note that there is a complete key at the bottom of this chart. In any event, the California Independent System Operator performs its Local Capacity Requirement Study, which provides a basis for identifying needs for plant or other resources within load pockets, and I will return to that topic, that is a

key issue that feeds -- it is sort of particularly salient in the short-term resource adequacy program, but also is increasingly important within the long-term procurement program. The other thing that I want to point out here is just that there are two important boxes in this bottom part of the chart where there are decision points at the PUC, the third box, CPUC approves long-term procurement plans and authorizes new resources, so this is really the stage where we say, "Okay, LSE, okay Load Serving Entity, does your plan that you have proposed to us comply with the loading wear? Have you in fact maximized energy efficiency and renewable resources before coming to -- and demand response, which I want to come back and talk about more before coming to us to authorize additional fossil procurement. So that is the check for the overall approach. Then the IOUs go out, the investor owned utilities go out and conduct RFOs, they get bids from generators and others, and they come back to the Commission and seek approval of individual contracts or arrangements for utility-owned generation, and that is an opportunity for the Commission to again say, "Okay, are the specific resources that you are bringing to us consistent with the plan that we approved earlier?" And, again, with regard to resource adequacy, as well as the various environmental components that we are pursuing,

including greenhouse gas emissions reduction. So that is the overall framework, and that will not change over time; what we are doing is making it more sophisticated in the next iteration in order to more effectively address the greenhouse gas implications of the procurement decisions that the utilities make.

This is really just a verbal explanation of what I just showed on the last slide, and I will not dwell on it, except to point out that, in the second major bullet that is labeled "RFO Process," that is Request for Offers, Mr. Byron, the second sub-bullet is an example of the kind of direction that the Commission has been giving to utilities and that I expect to see more of in the future, where we are really building on what comes out of the resource adequacy process, as well as the sort of tweaks to the loading order over time, and really give them specific direction about the types of resources that we would like them to include in their mix. And note that the second one of those bullets, flexible resources with shaping and ramping capabilities, well, that could be peakers, but it could also be demand response. So a key element of how we approach this procurement process is really to tell the utilities, these are the characteristics that we want, not the specific resources. And let me say a little bit more about why we do that and why we think that is so

important. So, again, the third consideration in long-term procurement, beyond reliability and environmental performance is, of course, a least cost approach, securing these resources at least cost to consumers. Although the state has, you know, backed away from the restructured framework of the electricity market, or the degree of reliance on markets that was once envisioned, the Commission still very much relies on competition to the maximum extent to secure these cost resources for customers on the generation side, or for substitutes to generation like demand response, and we have a competition first policy where we expect the utilities to go out and exhaust their options to secure resources from independent generators that really, only in cases where there are compelling circumstances would they come forward with utility owned generation, and that was demonstrated dramatically last year when the Commission turned down PG&E's request for the utility-owned Tesla generation and instead directed PG&E to work with Calpine to develop the Russell City project. So in any event, we rely on competition as much as possible and, for this reason, again, we really avoid overly proscriptive requirements and focus instead on characteristics that must be satisfied, including characteristics that would be necessary to incorporate larger amounts of renewable

resources, and so that final bullet there, I think, is particularly relevant. We want the utilities to have as many options as possible when they do their RFOs to be able to secure the best possible deal for their customers.

Okay, so I told you that we were improving the long-term procurement planning process and the current iteration, and what this slide describes is a staff proposal that is currently being, I would say, polished up by the staff at the Commission, and will soon be presented to the Commissioners in a proposed decision. This current cycle of the long-term procurement planning process is focused more on the approach that we are pursuing and how to make that approach more consistent with the requirements of AB 32. And so what you see us doing here is moving in the direction of using more of a scenario analysis approach. These are 10-year plans, and so there will be changes that will occur over those 10 years, beyond our control, and so we have asked the utilities to use a standardized set of scenarios that encompass a range of possible futures that could be expected during that period. All of those scenarios, however, have to comply with AB 32 in the emissions performance standard, so that means higher levels of renewables and higher levels of energy efficiency. But the idea is for them to come forward with portfolios for their own systems that are

optimal portfolios under those scenarios that reflect this balancing of reliability and cost, while meeting our environmental objectives. And the Commission will be able to point to -- select from among these standardized responses of the utilities, will be able to select its preferred portfolio. And these portfolios will then be the basis, again, those will be the approved plans that will be the basis for the utilities to go out and do their procurement. All right, I am going to pass over this -- actually, one point I just want to reiterate is that, again, there is this linkage between the resource adequacy program and the long-term procurement program, and the second bullet is, again, I think consistent with the basic point made in the MRW report, that there is a role for fossil resources going forward, even in a world with 33 percent renewables. But, if I could, I would in real time add another bullet to that, again, just stressing the important role that dynamic pricing and dynamic response can play. I really -- these are under-utilized resources in California and, with the investment that we are making in advanced metering infrastructure, and the enormous investment that the California ISO has put into developing its MRTU markets, we are really going to be well-situated to make much better use of these resources. I think also that the technology is rapidly -- much of it is here or is

coming our way soon to enable customers to really take advantage of the flexibility that we have. And I know that there is enthusiasm for demand response at this Commission, as well as at the ISO, and I really hope to see us tap that resource further.

Finally, on the MRW Consultant report, you know, in general this report is, I think, consistent with the outlook that our staff have about the role of fossil resources going forward. The projections that were described this morning are consistent with, perhaps because they are based upon, those that we developed jointly between our two commissions last year to support the joint decision on strategies to implement AB 32, a frozen policy case with essentially flat-lined emissions from the sector and an aggressive case with the 33 percent RPS and the significant increase in energy efficiency that results in very large reductions in greenhouse gases. The PUC is clearly committed to implementing these policies, in particular, for the load serving energies that are under our jurisdiction and is, I think, working steadily in both areas to enhance the programs that are under our jurisdiction, which leads me to my final point, that it sounds like we -- our staff, at least, this is not something our Commission has taken a vote on -- but our staff, at least, are very much on the same page that this

commission is on in terms of favoring what I think is referred to as the "net greenhouse gas reductions approach," in other words, a system-wide approach to looking at new infrastructure in terms of what are the greenhouse gas -- in terms of assessing the greenhouse gas emissions attributable to new infrastructure, so essentially to ask, how does the addition of this infrastructure, or how can the addition of this infrastructure help us meet the programmatic goals that we are already pursuing via loading order and specific policies like our energy efficiency targets, and the 33 percent RPS, which I would expect to be enacted most likely this year. So with that, I will close. I am happy to take your questions.

VICE CHAIRMAN BOYD: Thank you, Nancy. What is going through my mind may not even fit this discussion, but as you heard in the dialogue with Steve during the presentation of the initial consultant, my concern about the intersection, to adopt that word, or the collision of so many different kinds of issues and problems we collectively face today, not only in just trying to implement things that we plan to head for, such as climate change, and what have you, but in reckoning with the once-through cooling, which we did have some advance notice was coming to the prior reserve issue, which kind of hit us

very shortly, and merging that with all the other mutual policies we have of energy storage, transmission distribution system improvements, distributed generation, can the long-term procurement process accommodate two -- does it facilitate dealing with -- does it have the ability to flash red lights for us when we need to deal with some of these issues promptly and in a timely manner?

DR. RYAN: Well, let me answer a slightly different question and then we will move back to --

COMMISSIONER BYRON: Dr. Ryan, you are at the Energy Commission, not the PUC.

DR. RYAN: That is right, you are not my boss, cannot get away with this when I am on my home turf. You know, the reason I was going to sort of circle around to answering your question is 1) because I like to think out loud, but 2) because -- and I have to think about it -- but, I mean, the long term procurement process is geared to, you know, it is our umbrella process to bring together all these different policy objectives and, you know, it is the case that there are more and more and more what was a challenging problem has become an extremely challenging problem, and by "problem," I mean like a logic puzzle to solve, in that sense. So that is the place where we think that we have to put all these pieces together and look at them. Now, to me, the red light that could come on in

that process is that we cannot -- and I am not saying that we have learned this yet, we do not know how well this process will work because we are throwing more problems at it in this cycle than we ever have before, but the red light that I think this process is geared to generate is one that says, you know, does not compute. You know, basically we cannot do all of these things. There is no solution that optimizes everything that we are trying to optimize. I am not saying that is going to be the outcome, but that is what my sense is of what it is geared to tell us. I understood your question -- perhaps I misunderstood your question, but how I interpreted it was that you were asking, you know, will it tell us if these things are coming or if they are problems, and my sense is that we already -- that we already know that, and that the long-term procurement process does not tell us that. You know, the generators are telling us that. The ISO is telling us that. So you tell me, is that a satisfactory answer? Or did I leave part of your question unanswered?

VICE CHAIR BOYD: No, I think you got to it and I realized as you were answering it, yeah, we know some of these things are coming. My concern is that, when we start being with them in long-term procurement, do we have enough head room? Do we have enough time to deal with them as we identify them and inject them into the arena of

decision-making and policy recommendations we all have to make? I am still looking for the platform, the perfect platform to assist us all in this process, having survived the energy crisis on a day to day basis, and watching us morph into what is the long-term procurement program a long time ago, is it the platform that is going to carry us through all these new crises?

DR. RYAN: Well, I think the one thing that we -- the question that we have to ask ourselves at the Commission is, it is in fact the case that the long-term procurement process takes a long time, and I think that is perhaps more responsive to your question which is, does it move so slowly that, by the time it spits out an answer about what to do, it is not the answer to the question that we have to answer anymore. And I think that that is a fair question and one that we are kind of grappling with right now. And I think what is required at our end is to, you know, inject a dynamic elements into this process to make it -- and I think the scenario-based approach helps with that because it provides sort of a record and a basis to change direction as outcomes unfold before us.

VICE CHAIR BOYD: Thank you.

CHAIRMAN DOUGLAS: Nancy, I thought that I did not have a question, and then as I sat here and listened to Commission Boyd ask his, I realized that I do, and it also

really comes to what you see as the role of long-term procurement process and how the type of analysis that we are embarking on here feeds into that. For context, I would say -- I think I want to start out by saying that, first of all, the MRW report is a very valuable first step for us in thinking about roles and attributes of different kinds of gas generation, and how they feed into the system, and how they help shape the system. I do not think the question is fully answered with the finding of that net benefit, no matter how marginal to the system as a whole means that we are going in the right direction, although, as I said before, I do agree that net benefit is present in, I would say, if not all cases, 99.99 percent of the cases that we would look at. Beyond net benefit, I think we do have to look at the question of how the system itself is, in fact, evolving and whether it is moving -- whether the natural gas generation that we are feeding into the system is helping that evolution in the direction of meeting our policy needs. And so we are thinking about additional work to -- from the ISO, certainly, to help us solidify the analysis and some load constrained areas, and really identify -- at the very least, let's make sure we get this much built in this time frame in order to meet some of our reliability needs. We have got the issue of large combined cycles proposed, outside of load centers,

without some of the shaping and firming capacity that some generation does have, and so what is the need for that? Five thousand of those plants would be way too many; a couple might very well fit in the system that we are thinking about. So those are some of the questions I think CEQA does require us to start looking at. And my question to you is whether the long-term procurement process -- you were looking at some of those questions in the same way and how you see the two processes potentially fitting together.

DR. RYAN: Well, first a disclaimer, I mean, I am not an attorney and I am not going to opine at all on CEQA, although I understand that CEQA obviously, in recent evolution in CEQA law, requires one to -- requires these questions to be considered at some level. You know, the long-term procurement process is, again, really geared towards enforcing a loading order, and the loading order policies are really the principal policies that CARB is relying on to secure greenhouse gas reductions out at the sector. I mean, the RPS, the solar initiative, the CHP initiative, and the energy efficiency programs, alone, will result in significant reductions if fully implemented, and even if not, even if the full goals are not realized by 2020, they will still significantly reduce reductions. And so, you know, that is the sense in which

I think -- given that that is really the backbone of long-term procurement, is enforcing those policies and that then the sort of residual fossil procurement that is permitted for investor-owned utilities, and that is important to know because it is not the entire industry, but the residual fossil procurement that is permitted for investor-owned utilities is going to be developed essentially, you know, in the service of meeting a loading order, a program that will result in significant greenhouse gas reductions. You know, it is not really -- I think the benefit that comes from the MRW and the kind of direction that it provides on the role of gas is more to -- and also what comes out of the ISO's studies of load pockets -- provides sufficient information for the long-term procurement plan to provide direction to the utilities about what types of resources they need to acquire in order to meet their local reliability requirements and integrate intermittent resources. So I understand the concern about, well, what if this Commission permits plants that do not fit the MRW criteria and, if they fully operate it, if they got a contract and they went into operation, would it bust our cap? But at least as far as the investor-owned segment of the industry is concerned and, of course, that is the largest part, by far, I do not really see that happening because

essentially those resources are crowded out, will be crowded out over time by the enforcement of the loading order policies.

COMMISSIONER BYRON: Dr. Ryan, thank you. I made a mistake earlier, I thought it was Monday when I was walking in, but it is Tuesday.

DR. RYAN: I fell for it.

COMMISSIONER BYRON: But I was also taken by one of your points, later points in your presentation about the staff position with regards to GHG reduction, and the Commission has not taken, I believe you said, any direct action. But speaking on behalf of your bosses, they have, and they really have been outspoken, I think, in the adoption of the loading order and the energy action plan.

DR. RYAN: Oh, on that, yes. No, I just meant on the specific question of how to deal with greenhouse gas considerations in the siting process. Yes, they emphatically support the loading order.

COMMISSIONER BYRON: Absolutely. And having talked to all of them, I think we know where they are on this position.

DR. RYAN: Well, I mean, one other point that I would make at the risk of raising a somewhat challenging subject is just, our commission faced a similar question to the one that you are grappling with in the application

of San Diego Gas & Electric's application for the Sunrise power link. And a similar question was raised in the CEQA process there of, you know, whether that line should be looked at as part of a systematic upgrade of the transmission system to achieve the 33 percent RPS, or if that line, you know, a restriction should be placed on the use of that line to assure that that line, itself, was GHG neutral, or better. And that was really one of the essential differences between the two alternate decisions of Commissioner Peevey and Commissioner Grueneich, and of course the Commission voted 4 to 1 for Commissioner Peevey's decision, which effectively endorsed a system-wide perspective. So that is one place where the PUC has spoken on CEQA and GHG that I believe is consistent with the direction that I hear you are headed.

COMMISSIONER BYRON: Good. Thank you.

DR. RYAN: Thank you.

COMMISSIONER BYRON: Good addition.

MR. EDWARDS: And our final speaker of the morning is Kevin Kennedy from the California Air Resources Board. He is going to talk to us about how greenhouse gasses are considered by the ARB in the electric generation system. I want to make one point about the two last slide sets for the two last speakers, they are going to be posted on our Internet website later today for those that came in this

morning, so we did not have time to do that previously.

COMMISSIONER BYRON: Good. Dr. Kennedy, I would like to welcome you, as well. I think this is the first time we have had you back at the Commission before this -- at least before this committee, since you joined the Air Resources Board. And I note that there are few people that are as dedicated to reducing greenhouse gases as you are. I think we lost you at the Commission partially because you wanted to work on this issue, in particular. But I am glad that the State Government did not lose you.

VICE CHAIRMAN BOYD: And we train you while Larry sits at the staff table, still.

DR. KENNEDY: That is right. I figured that since I do not have a presentation that would interest you, I would take the liberty of making myself comfortable and sitting at the table. Thank you, Commissioner Byron, Chairman Douglas, Commissioner Boyd. I am glad to be here, back in familiar surroundings, talking about an issue that I do care about very deeply. As you know, AB 32 set off very ambitious goals for California, and it set off very ambitious timelines for ARB and our sister agencies. We have been keeping on those timelines, having adopted and making sure our reporting is on time, having established a 1990 baseline in 2007 that gives us the target for 2020. Last year, we adopted the Scoping Plan

that lays out the roadmap for how we can get to the 2020 targets, and in keeping with the battle with that, of course, this morning, that roadmap shows a very complicated intersection. And the challenge that you all are undertaking here and that we are taking on at the ARB is how to help the state navigate through that intersection without it turning into a major collision. And I am extremely glad for the work that is going on here at the Commission and elsewhere in the state to deal with these issues. As you all know, one element of the Scoping Plan that we adopted is the cap and trade program that would include the electricity sector and overall which cover 85 percent of the emissions in California. While also being debated at the federal level as to the Waxman-Markey Bill, and they expect to vote on that in the House most likely on Friday by the current work that I have, it also has a federal cap and trade program; if that is in place by the end of the year, there is a good chance that it would include a moratorium that would keep California from implementing its cap and trade program, initially. But either path leads us to a cap and trade program covering California's electricity sector by 2012. And so part of the answer that you guys are looking for does lay in the fact that the Commissions from the electricity sector would be covered by cap and trades starting in

2012. As has been noted before, that does not necessarily help you with decisions in the next few years and, as you also have been grappling with, in I think the discussion today, I find that I will be reprising a lot of the points that have already been made. Relying on the cap and trade programs is only really a partial answer for how to deal with these issues in the context of the electricity sector. The decisions that are being made and that you are wrestling with in the IEPR, in the context of the renewable energy transmission initiative is how do we do the right planning for getting the electricity infrastructure built in the next few years, that are going to help us reach the lowest cost emission reductions between gas and greenhouse gas perspective in California, going forward. The infrastructure you are dealing with is extremely long-lived. The decisions that are made over the next three to five years will have implications not just for the 2020 emissions target, but for how well we continue to get emission reductions as we move towards the 80 percent reductions we need by 2050. So simply relying on cap and trade to answer the questions is not adequate, it is with a systems approach that you guys are talking about in order to understand the full implications for what will be going on in the system, but going on into the future is going to be extremely important. And it is also

extremely important, as has been noted, that California has a loading order for air resources, and ARB has very strongly raised that we see the energy efficiency goals as being extremely aggressive, that those are going to take some innovative approaches to getting the sort of efficiency gains that we are talking about. The two commissions have a very good start in working towards meeting those goals. We think that there is a lot of work that can and still needs to be done on those. The reductions we get from those efficiency goals for meeting those will, in fact, reduce the amount of infrastructure that needs to be built in order to keep the electricity system operating efficiently going forward. So we do think that is extremely important. We have also had a lot of discussion today about the renewables goals, about the CHP goals, all of these are pieces of the puzzle overall.

As we look at all of this, we do recognize at ARB that natural gas power plants are going to play a continuing role in the electricity system going forward for a lot of the reasons that have already been discussed in some detail this morning, and I will not go into sort of -- I will not rehash those, I think there has already been a lot of sufficient discussion around those. One of the things I think is important to note is, when we got to the electricity crisis at the start of this decade, the

Governor and Legislature recognized that there was a missing element in terms of the need for a stronger, more clearly stated energy policy for the state, and gave this Commission the responsibility of the Integrated Energy Police Report to essentially provide that energy policy voice going forward. The issues that you are talking about today, that you are taking very seriously through the siting proceeding, through the IEPR, is doing the hard work that needs to be done. One of the things that I think is going to be extremely important is to increasingly move the IEPR from being simply a policy document, and I say that without meaning to denigrate what it is in any way, it is an extremely important document and has been throughout its existence this decade, to move it increasingly towards a planning document. And that is what I hear you talking about today and I think that is going to be extremely important, how do you turn what are a very complicated set of policy decisions related to the integration of renewables, related to how energy efficiency goals and meeting those goals, interacts with the decisions that are needed for the infrastructure development, how that interacts with the cap and trade program going forward. All of those things need to be worked through and we need to be moving from what the policy needs to be to how do we implement that policy, to

turn this into a planning document going forward. The discussion today and the hard work that underlies it, I think, is an extremely important step. And so I want to sort of provide the support and encouragement of the ARB. We think that these are issues that we do need to navigate if we are going to avoid collisions with the various policies that we are talking about and actually keep the electricity system and the electricity sector moving forward and working in the way it needs to be as we achieve the sometimes competing, but generally consistent policy goals that the state has set. So thank you for inviting me, and if you have any questions, I will be happy to answer them.

VICE CHAIRMAN BOYD: Certainly brief, wasn't he? Commissioner Byron?

COMMISSIONER BYRON: Well trained.

VICE CHAIRMAN BOYD: Thank you, Kevin. Appreciate your comment, particularly since you are a former IEPR program manager yourself, you have seen the process, you probably did share some of our frustration, and it is a really good document, we need to get more people to pay attention to it, and I think your point about making it a planning document, as well, is something we recognize, so I think it is a good point. We appreciate that and just continue to look forward to working with you folks and

you, in particular, but the ARB staff on this subject.

COMMISSIONER BYRON: Dr. Kennedy, the simple question -- I guess the short question is, doesn't cap and trade take care of everything? I mean, the notion of a power plant that might be permitted by this agency that would last up to 40 years with any greenhouse gases, anything that is done in any sector, doesn't cap and trade eventually take care of it?

DR. KENNEDY: In some ways, the simple answer to that is, yes, it does. But I think that what you are seeing in the work that MRW has done, and other work that has been done around this issue, is the interaction of all of the different approaches that you can get to get reductions, understanding what infrastructure you are putting in place, and how that either enables or gets in the way of long-term emission reductions is going to be extremely important. The cap and trade system provides an extremely important price signal that will help steer the infrastructure investment in the right direction, but at ARB we do not believe the cap and trade system is the answer to the entire problem. That is why, when we adopting the Scoping Plan, what we included as an underlying piece, was the cap and trade system that is an incredibly important part of the plan, but we also said we need to be moving forward with specific policies, we need

to be moving forward on energy efficiency, on renewables, low carbon fuel standards, capacity regulations, etc., all of these pieces help steer the investment, it helps steer the direction that the infrastructure will be going in ways that we think complement the cap and trade program. The market interaction provides a lot of the direction that is needed, but it is not sufficient by itself.

COMMISSIONER BYRON: The MRW Report, I do not know if you have had a chance to read it to tell, but it suggests that extensive modeling is going to be necessary to understand precisely how the net greenhouse gas emissions of the system would change under various futures. Do we need to go forward and do that kind of modeling? Does this Commission need to conduct the kind of analysis necessary to determine whether a specific power plant should be built?

DR. KENNEDY: I do not want to sort of proscribe for the Energy Commission what the final answer to --

COMMISSIONER BYRON: To support the ARB.

MR. KENNEDY: That is right. But I do think the understanding of the implications of the sort of policy decisions that you are making around individual siting cases, and sort of the broader policy push that will underlie those decisions is something that needs to be done in the context of understanding how the system is

going to play out going forward. So, precisely what you need to do and where to do, to answer that question correctly, I cannot tell you, but simply relying on future cap and trade system to drive the answer, I think, would be shortsighted in taking on in some manner sort of the difficult policy work and technical work that needs to underlie those policy decisions, I think, is an important piece of the sort of decisions you will be making.

COMMISSIONER BYRON: Okay. Dr. Kennedy, thank you very much for being here. It is good to have you back.

DR. KENNEDY: Thank you.

MR. EDWARDS: Commissioners, I wanted to ask if it would be a good time to take about a 10-minute break before we start the panel.

COMMISSIONER BYRON: There seems to be a consensus. Ten-minute break. So we will re-start at 11:30.

[Off the record at 11:20 a.m.]

[Back on the record at 11:30 a.m.]

DR. JASKE:: Okay, my name is Mike Jaske with Energy Commission staff, and I am going to moderate the panel. Let me first introduce the panel. I will start over here to my left and work my way around. So Bud Beebe with SMUD, taking the place of Mr. Bartholomy, not here today; Antonio Alvarez with PG&E; Scott Galati, PG&E,

Robert Anderson with San Diego Gas and Electric, David Hawkins with the ISO, Mark Minick with Southern California Edison, Noah Long with NRDC, Nancy Ryan with the PUC, and Mr. Barmack, representing IEP today.

MR. BARMACK: Representing Calpine.

DR. JASKE:: Oh, representing Calpine, okay. So if you would -- if you have not yet -- turn your nameplate toward the Committee so they can keep track of you. What I propose to do today is work through question by question, and since it is now a quarter to 12, I am expecting we are probably not going to get all the way through the questions before we will want to take our lunch break, so wherever we are, we will resume after lunch. I have identified people who, just from my own whim, I think are a good lead-off for answering the questions, so I am going to call on a particular person or two to give the first answer and then, you know, to the extent others want to chime in, we will let that happen to some extent. Clearly not everyone can speak about every one of the 10 questions and there certainly are the comment opportunities that Dale Edwards mentioned earlier. So you panelists who have a burning desire to add to something that you do not get a chance to voice orally can do so in writing.

So let's start off with -- oh, and for the benefit

of our WebEx folks, there is sort of a stylized version of the questions, more like a bullet list of topics that will show up on the screen, but will actually be focusing on the questions, so those of you who have access to the materials on the Energy Commission IEPR website can see the questions, themselves.

So the first question focuses on Chapter 7 of the MRW Report, identifies five roles that power plants may play, and so the first question I am really going to -- the 1A part I am going to focus on, Dave Hawkins and Mr. Beebe, as representative of System Operators. So, first you, Mr. Hawkins, do you think that these are the roles for gas-fired power plants?

MR. HAWKINS: Yes. The list is very comprehensive. You know, my slides for this particular area --I added some pieces to it -- but certainly the intermittent resources are one of the big things that we need, is the ability to start up units and shut down units, having gas-fired units that are able to ramp at much faster rates than some of the older combined cycle plants. So ideally, of course, we look at hydro systems as a big help, so having ramp rates of 30 megawatts a minute, and we have got -- some of the units are extremely helpful, the two megawatt a minute unit does not help very much if we are going to do this. So I think units that

are really pushing up to higher ramp rates would be a great help for the intermittents. For local capacity, I think we could do something with -- some of the energy storage could potentially fit into that, as well as gas-fired plants. We provide some voltage support. But the overall grid operation support, the thing that was missing for me a little bit was also the ability to handle transmission congestion relief and the ability to, as we have client overloads or transmission client overloads in a particular area because maybe one ramped up more than we expected, and therefore we could not move our units down fast enough in those areas, having more units in the right location that we could either move quickly to new settings would really help a lot with the grid operation support, plus on the voltage thing. In terms of the emergency piece, you know, again our thinking is that units that you can get online fairly quickly and 10-minute response time would be more ideal than a two-hour response, but at least a two-hour response allows you to deal with low forecast errors and major things that you just missed on where the wind is either walking away, or solar is walking away, and so those are some of the issues. Also, if we are thinking about DC transmission like into San Francisco, and you wanted to do black start, one of the things that you are going to have to have is an AC synchronizing signal at the

far end of that DC link. So if we happen to do a black start into that particular area, we need to have a plant that you can get up on line that is syncronizable, and then you can get the DC lines going again into those areas. In terms of general energy support, again, as I mentioned earlier, with the fact that renewables account for 33 percent, you still have to add 67 percent coming from other things which should be combined cycle, very efficient plants, plus hydro, plus nuclear, plus the biomass and other types of geothermal resources that are much more of a kind of a base load capability. So you certainly need to fill in all of the energy pieces, you know, to make sure that they are there. So, in general, yes, we agree with those characterizations in the report.

DR. JASKE:: Mr. Beebe, does SMUD have anything different to offer?

MR. BEEBE: Well, no, not so much different. I think that David did a good job of doing a summary of the plethora of information that you really have to consider. Having two different descriptions of local capacity requirements and grid op support, those are necessary and important distinctions, however, there is so much interplay between the two that you really need to be especially careful that you do not like smudge one going into the other. I think that, from SMUD's perspective, we

have had some interesting recent play through the REDDY (phonetic) process that shows sometimes that statewide goals and statewide policy are often considered in such a broad perspective that the local piece does not always come through and, of course, with local support and even grid ops, you have got to consider it all because it all has to work, it is just like meeting demand, it all has to work and it has to work at the time that it is needed. So extra care there. The other one I had noticed is that, you know, sometimes when we do these analyses, you have to make certain assumptions about issues, and one is the fast start-up capability to two hours or less. I would keep a real spongy thumb on that one because sometimes you have to do it faster than that, and sometimes you really have a great deal more leeway than the two hours. Our schedulers work with us each day, they know what they have got on the board, and they are comfortable with what they have got.

For long-term planning, you have got to start to think in broader terms and that leads us, really, probably to this item that the role of gas-fired plants, I think, are adequately described here, however, as we look really going down the line, there is a base line assumption that gas is somehow an essential capacity back-up for renewables, and this understanding really has to change

with time as we begin to understand a great deal more about the renewables that we are actually adding to the system. You hear it in other parts of the nation that renewables are too expensive because you have to add fossil fuel to back-up the renewable and it essentially doubles or triples the cost of the renewable, and that is a specious assumption, it really does not hold. As Steven McClary showed, we have been dealing with the problems or issues of having a great renewable resource in hydro in California for a number of years, but it really is an intermittent when you think of it as a seasonal supply, so as you learn more about the actual renewables that are in place, and what their actual capabilities are, I think that we need to get beyond this understanding that gas is just or is always a necessary back-up for every renewable. Thanks.

DR. JASKE:: Let's move to 1b and see if there are other roles not described in Chapter 7, and maybe start with the traditional resource planner, Mr. Anderson. Do you have anything to offer?

MR. ANDERSON: Is this one on? No? Okay. Good morning, Rob Anderson with SDG&E. In reviewing the list, we thought it to be a very complete list. Might there be other things that could get at it? Yes, I do not find them as being so big that this list is lacking in any way.

Part of my reaction was kind of the same thing on the fast start capability. We are really looking for our system right now as more the 10-minute start, the resource that we could put on an off line a couple times a day if we needed to. Something mentioned earlier this morning, we are a bit worried about what that is going to do to overall maintenance cost in the long run, but overall I think it is a pretty good list and it gets us close enough.

DR. JASKE:: Mark, anything to add?

MR. MINICK: Yeah, I am a resource planner, not a transmission planner, but I have some knowledge about transmission planning. And generators, in general, add stability to the grid by inertia, providing it inertia. DC photovoltaic cells do not provide that inertia and, in some cases, GLIM (phonetic) does not provide as much inertia as we would like. So having generators on your grid, especially in the Southern California, does allow you to have enough inertia to basically stabilize the grid and import, so we are going to have to solve that if we do not have resources like this.

DR. JASKE:: That is a good point.

MR. MINICK: The other point is we are not studying planning reserve margins and what these planning reserve margins might change to under a new intermittent

world. Many of us, including Antonio and I, think that the reserve margins should probably be higher. We are not sure exactly how much higher because we are still trying to figure out what the future might look like, but if we have to have one, or two, or three percent more planning reserves, this is basically cheap capacity insurance. And so peakers in some cases are the way to add capacity for California because we peak for a few hours a year. Southern California probably has 50 hours where we need 3,000 megawatts. That is not a lot of hours, less than one percent of the year. So you are going to build a resource that is very cheap and you can use it for those particular instances.

DR. JASKE:: PG&E, you want to add to that?

COMMISSIONER BYRON: Excuse me, the peakers do not necessarily add that kind of electrical stiffness you are talking about, either.

MR. MINICK: Oh, stability? No. They do not have as much inertia as a bigger combined cycle plant does, but they do allow some inertia and, again, I am not a transmission expert, so I cannot say what the proportion is, but it is much better than the DC photovoltaic cell that has got an inverter on it, and/or in some cases one that is so -- they are not adding much inertia to the system at all.

COMMISSIONER BYRON: The concentrate -- solar has nice big slow turbines that add inertia.

MR. MINICK: Yes, solar thermal is an inertia, but it is probably going to be outside the basin, so I am looking at how do I get enough inertia in the basin to allow imports and exports, and it is quite complicated.

COMMISSIONER BYRON: Thank you.

MR. ALVAREZ: In addition to the higher potential planning reserve margin that Mark mentioned, perhaps not a new role, but one that increases the need would be the need to replace retrofit existing steam units that are currently providing some of the integration for intermittent resources, so as we look forward, I think, that needs to be part of the role or definition of the role for new natural gas fire generation.

DR. JASKE:: Is that a separate role or just a stealing of the amount of a role?

MR. ALVAREZ: I struggle with that and I think it is primarily a scaling of the role because I think it fits into one of the five categories that you have, Mike.

DR. JASKE:: Okay, other thoughts from panel members about whether there are roles that are missing? Okay, let's go to question 1C. Maybe, Mr. Barmack, could you offer some thoughts about whether standardized definitions should be offered, potentially as these are

applied in licensing cases, power plant developers are going to have to deal with them, so….

MR. BARMACK: Well, let me answer that question a little indirectly. I guess I was a little frustrated by this part of the report. I thought there could be a clearer distinction between plant attributes, which I view as sort of physical things, and certain wholesale products that may or may not exist now. So should there be standardized definitions of plant attributes? I would argue that, at least for generators in the ISO, there already is, and those are the kinds of things that are in the Master File that the ISO uses to run its markets. Do we have all the products that we need now to accomplish all these procurement goals that we set out for ourselves? I am not sure. But the generic comment is a clearer distinction between the plant attributes and wholesale products.

DR. JASKE:: Okay. Other thoughts along those lines?

MR. HAWKINS: Let me make a comment on that. That is a good point. There is somewhat of a disconnect in that what we are claiming that we really need is a lot of ramp rate capability, even if there is no market for ramp rate, for example. And we do not have a market for rolling support, so there are pieces of the market that

are inconsistent, or missing as we think about the integration of renewables going forward, and then do you pay for fast regulation? And, if so, how do you measure fast regulation? And what is the added value to what plants could provide and how thin would that market be? So just the fact that there might be a market piece that is missing, it may be still such a small piece, or so thin, it may not make sense at this point to create it as a separate market.

DR. JASKE:: Isn't it feasible for the ISO to contract for that if it should be found necessary, but not at a scale that the market would really work?

MR. HAWKINS: Well, yeah, it sort of goes at the whole issue about black start. Do you have an open market for black start? You certainly could and never know. You certainly would have contracts in place that could go for several years to justify the additional capital costs required by a flight operator to provide capital for black start capability that was embedded in the old RMR contracts, and paid for separately, or paid for as part of those contracts. As those contracts have gone away, then the question is, will you substitute any future for those kind of contracting issues. So good questions. To be determined.

DR. JASKE:: Just a follow-up. Is the 33 percent

report that ISO is going to deliver going to address these market product issues?

MR. HAWKINS: Well, yeah. We certainly would include some of the market issues. How comprehensive that discussion is, I would say, is still to be determined. But I certainly think that is an issue and you have to see, you know, what kinds of renewables and what is missing in terms of the ancillary services, or ramp rates, or other types of things, so all of those are certainly open questions at this point.

COMMISSIONER BYRON: Dr. Jaske, before you leave this one, it dawned on me that there might be something more here. As Commissioner Boyd indicated yesterday on siting visit, we decided to escape dinner and spend some time heading out towards Kramer Junction to see settings, and indeed how that plant is operating, and I found it interesting that, of course, there are some natural gas-firing that goes on there, but they were actually throttling that back, their solar, in order to maintain -- it was a good day for the sun -- and in order to maintain their load constant, and they plan to go continuously until 11:00, and I was intrigued that there are different ways you can operate, at least the concentrate in solar, to get these kinds of -- take some of the intermittency out of it. They were actually throttling back slightly.

It was a very high solar flex day. And I was just wondering if there are some definitional opportunities here as we think about these renewables, and defining the kind of attributes we are looking for, at least with regard to the concentrating solar. I do not know if that applies to the other renewables, as well. So I think there is something more in this question that could be explored.

MR. BEEBE: Yeah, very definitely. Bud Beebe with SMUD. I took this question 1C to be really appropriate more to the ISO, certainly SMUD as a balancing authority and as a load serving entity. We are looking at much broader understanding of how the renewables pieces fit together in a much more integrated fashion and, if that means you have to redefine them for a formal process, please do so. We are doing so in-house, not so formally since we are a smaller organization we can deal with this more fluidly, but definitely you have to consider these things not as static, but as a changeable thing. Also, DR. JASKE:, if I could, I saw question 1B as being separate than 1A, 1A was -- I answered just from the balancing authority perspective. And I would like to add to 1B that there are some additional roles for natural gas that we see, and I just wanted to mention, certainly, one of them is the potential for compressed air energy

storage. This is a storage type that is out there, but it really only makes sense from a standpoint of being a portion of a braden (phonetic) cycle that requires a heat piece to be added to the end of it, and that heat piece has always been understood to be natural gas. So to the extent that natural gas would be the fuel of choice for a compressed air energy storage, you ought to consider that. Also, there is other storage media out there, of course, that could feed into the natural gas piece, and we should not forget those. I also think that this is an appropriate time to perhaps mention that, in California, we tend not to think of the carbon capture sequestration as a huge piece. We somehow see that to the coal pieces to the east, and I think that is not very smart as a state. There should be a consideration of natural gas and its conjunctive use with carbon capture and sequestration. Certainly the California company of clean energy systems and other fuel, oxi-fuel, Tech People, Jupiter-Ox, and other people, they have got technology out there that is at least as advanced as some of the renewables that we are considering and pushing into the market at this point, so they could well be a significant increase in natural gas efficiency due to these oxi-fuel technologies, and also the storage piece here in California is something that I think is a state policy issue that requires a much bigger

airing than it has had in the past. So that would be my adjunct to 1B. So thank you.

DR. JASKE:: Other thoughts about additional roles?

MR. BARMACK: I just wanted to pick up on one thing David said. You know, I really appreciate the role the ISO has done on this, David. But I just wanted to sound a note of caution, as well. I mean, if we do not know exactly how the physical requirements necessary to integrate renewables and realize, you know, GHG goals, if we do not know exactly how those are going to be split up and what the boundaries are, you know, maybe we want to be somewhat cautious about proscribing that a certain client is, you know, for this and not for this, because I think this policy area and market design is still very much in flux.

DR. JASKE:: I am going to ask that the panel think about that very point in terms of us eventually getting to question 9 after lunch because question 9 raises the whole issue of the physical attributes of the plant vs. the contractual or market setting in which it operates. And that is a challenge for the licensing process, to think of the hardware in front of it vs. how that hardware might get used over a very lengthy period of time. Let's go to 1D. Any thoughts about the relative

importance of the five roles? Dr. Ryan, any thoughts from your perspective, the PUC's perspective?

DR. RYAN: You know, I think they are all important in different ways. I do not really think that it is possible to rank them.

COMMISSIONER BYRON: I think it is a trick question.

DR. RYAN: Seems like it.

DR. JASKE:: Here is a volunteer.

MR. MINICK: Well, let's try to summarize all these roles, okay? Because I have been in this business for 35 years. I think maintaining a reliable grid operation is number 1 -- and not because you are sitting next to me, okay? I was always taught keep my customers' lights on, okay? So I think that is kind of number 1. Number 2 might be minimizing the cost because I was always told to take care of your customers' costs and they will take care of you, or something like that. So maybe that is number 2. So first let's keep the lights on and let's try to minimize the costs. But we are here talking about RPS and renewable portfolio centers and lowering emissions. I think we have to try to do that, but I think not at the expense of the first two. Some people seem to want to deviate from the second one. And to me, that is very important because I think we want to reduce

greenhouse gasses, but I think we want to do it cost-effectively.

DR. JASKE:: Good. Other thoughts along those lines?

MR. HAWKINS: Well, I think I would like to pick up also on the fact that what we need to do is to find the characteristics that we need for grid reliability and not the specific characteristics of a particular power plant, so that, you know, the challenge always comes back to us, just tell us what you need in order to keep the system reliable, and meet the goals that you have got to do, and we will figure out whether it is an ADC plant, or it is a storage plant, or it is a demand-response program, or whatever. So I think the challenge back to us is to be as clear as we can as to what we need to make all these work from a grid reliability perspective and not being proscriptive about specific plants and what they have to do. So then they can say, "Well, we provide Column A and Column B and it is free from Column C," and whatever.

COMMISSIONER BYRON: Unless, of course, it is a location consideration, as you mentioned earlier like transmission congestion, then specific plants comes into it.

MR. HAWKINS: Yes. That is a good point, thank you.

MR. LONG: Well, if I might add to that, and this is no longer NRDC, I think when we are thinking of specific ones of these attributes, then we need to consider -- and I think this actually relates to question 2, whether in a specific case it is a natural gas plant that we need, or some other either transmission upgrade, or something else can fit that function. And I think that really gets to the point that David was making, which is to say that we look at each of these functions separately and then think about whether it is a plant or something else.

COMMISSIONER BYRON: Well, I just --

VICE CHAIRMAN BOYD: Well, if I can jump in here -- I have been waiting, listening carefully to the discussion of all the components of question 1, and your reference to question 9 even extends my thoughts, or maybe it is a concern. And the concern I have sitting here as a Commission who engages with others and lots of siting and Commissioner Byron and I are the electricity committee, etc., etc., but what goes through my mind, has historically, is when we are talking about gas, okay, gas efficiency is important, I am on the Natural Gas Committee and that has always been a passion of mine, efficient use of natural gas, so you talk about simple cycle and combined cycle, and we talk a lot about peakers,

historically, but now I am hearing more fast start, cramp rates, and the new term, "intermittent support," and I do not know whether intermittent support goes with the gold old theoretical of the past, combining cycle base load plant, and I understand there is a lot of combined cycle systems that can ramp up faster now than they could just a few years ago when I got into this business, and I also know that simple cycles, you know, not as efficient as combined cycle, etc. So we sit here as Commissioners trying to make decisions about the siting of a plant and its need to meet all these needs and I go through -- well, why am I seeing these monster, you know, well, in excess of 500 megawatt peakers when, you know, during electricity crises, you have got 100 megawatt peakers and you were doing good, etc. etc. So I do not know if this is a question, or a statement of the dilemma we face of size, location, type of technology, just -- and the fuel has not been introduced, the multiple fuels, the next question, we will get there, but just worrying about natural gas. I do not know if you can put all these factors together. You know, is a peaker in the traditional sense also that intermittent support that we are talking about now for the renewable system, or is ramping up a little bit more a base load combined cycle plant the way you take care of the intermittent valley that you can predict is going to

show up at the end of the day when the sun goes down, or you may or may not anticipate the wind quite as well, etc. etc. I do not know if that is a question, or a statement of frustration of what it is we have to deal with as you answer these questions, but it is just the tip of the iceberg, as I see it. I do not know if there is a response there, or just add it to the pile of issues that you are going to kick around here.

MR. HAWKINS: I think your point is well taken. The complexity of all these resources has certainly grown, and I think from five, six, seven years ago, the type of combined cycle plants, we are very fairly narrow in terms of their capability. And as the market is now recognizing that they need to be able to start up faster, they need to have greater flexibility, you are starting to see the plant designs that have different characteristics, or more flexibility with the sacrifice, a little bit, of their heat rates, but certainly much faster start-up capabilities in order to capture some of the value. So it is evolving. And I think what we are seeing now is, as you look out to the 33 percent, it is really quite a different world, and therefore trying to make sure that the plant designs and the characteristics then go along with that changing world is really the challenge, and it is a big challenge and I think, as part of this

Commission's work on the IEPR, it is recognizing that as a big key piece.

DR. JASKE:: Mr. Galati.

MR. GALATI: Sharing the frustrations on siting cases with some of the similar questions, I just kind of want to provide a better overview. I think that it is fair and, personally, required for you to ask and the applicant to answer in a particular siting case why they chose their particular technology and what project objectives were they trying to achieve. I also think it is appropriate for you to ask, and staff often does, and there does not seem to be a lot of discussion and evidentiary hearings about it because there tends to be some agreement in this particular area, which is why were other technologies rejected as either not meeting those project objectives, or not reducing impacts. So I think that in the context of an individual siting case, you may not get the broader vision that probably you are interested in, but I do not think you can get it in an individual siting case. I think that maybe the appropriate place to get it would be either in the long-term procurement plan for us, for investor-owned utilities, or in your IEPR work. So I think that, not trying to add to your workload, but I am saying that I think the individual siting case is just not built to

maybe answer the larger planning questions for you, but I do think it is absolutely appropriate for you to ask the applicant, and to require the applicant to explain why this technology vs. that technology.

VICE CHAIRMAN BOYD: Well, that is a good point, however, absent the solution you laid out, then the siting case is all we have got until the IEPR grows into it, or the procurement program grows, as we discussed earlier today. So, yeah, I guess anybody who has me on a siting case with a peaker in excess of 500 megawatts that is a simple cycle, be prepared to answer why.

MR. GALATI: And I think that when we get to the further questions, I think I certainly have some opinions on how I think you can use the work that you have done now in a siting case for purposes of greenhouse gas emissions.

DR. JASKE:: Mr. Minick?

MR. MINICK: Mr. Boyd, you asked what is a peaker and what is, I guess, a base load, and what is an intermediate and, for us planners, we have always had some general definitions of what we call these particular resources. But peaker typically is something that runs at, let's say, 10 or 15 percent capacity factor or less, the intermediate, then, picks up and runs to something like 60 or 65, and a base load runs above that. It is not difficult to take the technology that you are looking at

and sticking it in your production simulation model and looking at a number of years to see how it runs. In most cases, right now we are running wind as a deterministic factor, not a stochastic factor; we are just trying to figure out how to run wind as stochastic factors. And under the higher levels of renewables, both wind and solar that we have looked at in some of our cases that we have run, peakers still remain peakers. They never come in to base load resources -- mostly because it is their heat rate. We are looking at LNS 100ths of a 9,000 heat rate. Well, when you stick in an H-Frame combined cycle plant, it is very efficient and it runs pretty well. In the long term, as you get more and more renewables, you will see some of these close to base load resources drop into the intermediate stage, but we never see them go down to peakers. We see peakers sort of remain peakers, and the intermediates are remaining intermediates.

DR. JASKE:: Okay, let us move on to Question 2 which, in its essence is, all this focus on natural gas, are there other fuels like biogas that we need to think about in the same kind of manner? Who wants to take a crack at that?

MR. BEEBE: Bud Beebe with SMUD. I will specifically mention that we see a great future for being able to gasify biomass and separate out the methane from

that and inject it into a natural gas pipeline, and then use that natural gas or biomass gas contract in your natural gas-fired -- your otherwise natural gas-fired power plant. So that is -- it is a great opportunity to be able to use existing infrastructure to significantly amplify the role of the biomass renewable energy, utilizing our natural gas plants, so that characteristic needs to certainly be -- again could be considered in an IEPR context. The other one that I will mention here is that -- and it may be too soon to be considered specifically, but you ought to put it on your horizon, and that is the role that the change in transportation fuels will ultimately go into stationary resources, as well. People in this room have probably all seen the algae as super fuel of the future, it fuels our transportation, it fuels lots of -- even our pigs, right? So I think that you have to begin to look at the confluence of a changed transportation fuel's infrastructure and potential opportunities in the stationary electricity generation sector to build on one other to be able to get to our end goal.

DR. JASKE:: So let me go back to your first point, maybe it is even applicable to your second, a biogas, a biofuel plant, you know, injecting its product into a pipeline, which then helps provide gas to all sorts

of applications, not just power plants, necessarily; that separates the biomass from the generation the Energy Commission is never even going to see that biofuel plant, probably, in its licensing process. Some other agency will deal with that path, if you will, of what would otherwise
-- or what might be a combustion-type biomass plant. So any thought about the multiplicity of jurisdictions?

MR. BEEBE: Of jurisdictional issues there?

DR. JASKE:: Yeah.

MR. BEEBE: Well, we deal with imported electricity. I think we could deal with imported biogas. I do not know why not. Is that -- and since California is a great agricultural area, why don't we consider exporting some biogas, as well? I mean, that is another thing that I guess we will get to later, and that is that we maybe still consider California moving to all these renewables in isolation, and that clearly is going to change as the federal picture on renewables and greenhouse gas changes.

MR. ANDERSON: If I could add to that -- Bob Anderson here. We actually are doing some things looking at that on the gas side of our house also because -- I think what we are all talking about is, we are going to get a lot of renewable power that is must take whenever it shows up, and we are having to find the flexible resource

to match it, and is there a way to take the renewable resource and turn it into the flexible one. And right now, the real drive is take the biomass, biogas, convert it right there, stick it into a power plant, base load it, which may be adding more to our problems than really helping. So, as the gas company, we are looking at other things we can do to step up to even clean up the gas, to get it in the gas system, so we can take what are now viewed as the natural gas of the dirtier power plants, doing a load falling, and turning it into a clean renewable plant and doing the load fall.

MR. LONG: If I can just add to that a little bit. I would really like to support what both of you just said, but I think the point of this report was really to look at sort of describing all the wonderful things that gas plants can do, just to support the kind of infrastructure that we are all working towards. And a really different report would be necessary to say, well, what are all the things that all kinds of other plants can do to support that infrastructure? And certainly, you know, as I said before, some of those attributes can be met by other kinds of -- first of all, other kinds of fuels, which make gas plants even more wonderful to the extent that they are wonderful here, but also by other kinds of plants. And part of that, I think, you know, is not just by other

kinds of plants, but by using the kinds of plants we have already, and sometimes the renewable plants -- I mean, biogas is a great example, but even intermittent ones that, if we can figure out, like somebody mentioned earlier, studying wind, so if we understand it better, we might be able to use it in a way that does not create as much intermittency problems as it does today. So I think the answer to number 2 is, yes, there are, and which ones there are, further analysis will have to show, I think.

DR. JASKE:: Do you have any thoughts on the point that Mr. Galati raised and maybe even an extension of it? And that is, of course, in any individual siting case you are dealing with what you deal with as you see it has all its specifics, but, from the planning perspective and trying to understand energy infrastructure, or is there a role or something that deals with biofuel plants and giving guidance to other jurisdictions and their consideration of GHG from those kind of plants, because we are dealing with this jurisdictional separation issue.

MR. LONG: Well, I mean, I guess, I mean, it sounds like there is plenty on the table already, but, yeah, I do not see why the Energy Commission is certainly a wonderful place to start doing that kind of work. I do not know that it is the same as doing siting considerations, I think it is somewhat different.

DR. JASKE:: But siting for somebody else, though.

MR. LONG: Right, right.

VICE CHAIRMAN BOYD: Well, before you get off that, Bud has brought up two things that I noted down. I mean, he kind of initiated the bio-methane discussion and this agency actually is probably not as well -- too well known, but pretty deep into the issue of biopower, be it biofuel or biomass use, etc., biomethane is a big component of it. From our perspective, when the RPS was changed to give credits for using biomethane, the utilities suddenly were a lot more interested in helping stimulate it, and that was great, and I think we need a lot more of it and we have got lots of agriculture in the state, there is a lot of methane out there that you can capture and put to good use. So there is a lot of activity going on and I would like to see even more, so when you focus more attention on it, I think it is to the better. The other issue Bud brought up was carbon capture and storage and, actually, this agency and then more recently joined with the PUC in an interest in carbon capture and storage. We are running one of the seven regional projects in the nation on carbon capture and storage. Yes, the national emphasis is on coal; California's emphasis is not on coal, other than we know some of you import coal, and so we would like to see CCS

work better, you know, coal by wire is a concern. But CCS as it relates to natural gas is an issue we have talked about and we are actually talking to some of you about a research project involving gas plants in California, and capture, and potential sequestration just because we know someday AB 32, you know, we will get down the list and we will get to it, so we might as well start with it. But it has been a touch track for California because there is so much emphasis on the coal component. And when I met with DOE recently on this subject that is all they wanted to talk about was coal. And I said, well, I do not want to talk about coal, we do not talk about coal that -- in any event, we struggle with that, but it is a major component, and it has been in our IEPR and probably gets repeated again. But it does have a significant role in California's long-term future.

MR. GALATI: Commissioner Boyd, I worked on a project where we were looking at a biogas and that project ultimately did not go forward for other reasons. But one of the things that we were struggling with from an environmental perspective is clear signals from the Commission would be helpful, for example, what I see tends to happen is, whatever the lowest impact is, let's say PM10 from natural gas, if you could go through this complex and use biogas, and the PM10 were to be slightly

higher -- not much, but slightly higher -- there is at least a concern on the part of applicants that we are bringing something to the Energy Commission, although novel and new, has a trade-off that needs to be made. And you have heard me use that word over and over and over again, and any clear signals from the Energy Commission that such trade-offs could be made, or would be made, I think that would help stimulate -- just like with solar, with wind, there are trade-offs in the environmental perspective. We cannot meet every environmental goal with every technology. There are some that need to be done. And I could tell you that I did work on a biogas project where the emissions profile did not look like what the Commission staff or Commission was used to seeing, and in some cases the emissions were higher, and in some cases they were lower. I think it is a perfectly good project, I think we could mitigate all of its impacts, offset appropriately, meet all the public health standards, would have ultimately been sited. But I can tell you that, in the development community, there is concern with bringing the Commission things like that.

VICE CHAIRMAN BOYD: Yeah, and I appreciate that. And you have brought up a word -- you said it -- "trade-offs" that sends chills through the spines of lots of folks, and I am sorry Kevin left because the Air Quality

community, of which I was a member for 20 years, is quite concerned about the use of the term "trade-off," and any trade-off from among any air pollutant, and that is a dilemma that they are all going to have to wrestle with right now. You bring up some really good points, we have had the discussion internally about, "Wow, look at the incredible amounts of CO_2 equivalent reduction we can get for a little trade-off with something else." We are not there yet and the ARB is going to have to go through that with us, which is why most of the onset power plant ideas using farm generated biomethane have died, because they cannot -- we cannot find the technology in terms of on-site generation, short of a fuel cell, which is prohibitively expensive, that meets the air quality test of the local district in the San Joaquin Valley where most of this material is, which is why we are pushing like crazy the idea, okay, inject it into -- make it biomethane and inject it into the backbone gas system. But not everybody is close enough to the backbone gas system to take advantage of that, so we do have a potential that we are not realizing right now. We keep plugging away at it.

COMMISSIONER BYRON: And there is a cost issue associated with that, as well.

VICE CHAIRMAN BOYD: Indeed. And farmers are into farming or getting a check, not into figuring out how to

run a power plant, or etc. etc. on-site. We have got some people who are beginning to aggregate this and make above-ground, not a lagoon-type, dairy digesters, and what have you, and we are hoping the economic stimulus program will help some of them along to demonstrate some of the European technologies they have been using for years, and we cannot seem to get started here. But that will help us over the long haul.

DR. JASKE: That is a good point, Commissioner. I want to make sure I grasp something Mr. Anderson said about ways to make renewable fuels into the flexible fuel, so I just wanted to make sure I grasped that. Would the example be using it for essentially storage -- compressed air storage? Or hydro or something?

MR. ANDERSON: No. We are thinking --

DR. JASKE: I am sorry -- pump storage.

MR. ANDERSON: More it getting injected into the gas system. And one of the things that we actually struggle with is, is we are trying to meet an RPS goal that is measured in kilowatt hours, and so right now our incentive would be to have that person do the biogas, turn it into electricity, and we buy the electricity. If instead they convert it into biogas and stick it in a pipeline system, is there a way we could then get agreed to, okay, we are going to make an assumption that, then,

all that gas goes through a particular power plant, and that way we could convert, in essence, a cubic foot of gas into so many kilowatt hours, and therefore it would count as much to our RPS, meaning our RPS goal.

VICE CHAIRMAN BOYD: I thought we were already there.

MR. ANDERSON: Pardon me?

VICE CHAIRMAN BOYD: I thought we were already there, but maybe not.

MR. BEEBE: Yeah, we are there. We want to make sure that state policy understands the full potential of this.

MR. JASKE: I observe, it is 12:30. What is your pleasure?

VICE CHAIRMAN BOYD: Well, don't look at me. I kept you away from dinner, even, last night.

COMMISSIONER BYRON: Yes, I still have not had dinner.

VICE CHAIRMAN BOYD: I call beer food, so beer and peanuts on the flight to L.A. last night.

COMMISSIONER BYRON: Dr. Jaske, we are going to come back. Maybe this is a good time to break and then we will resume promptly at 1:30, and that gives every --

DR. JASKE: 1:30 by that clock.

COMMISSIONER BYRON: Yes. And that gives

everybody an hour, a full hour. Thank you. I hope all of our panel will be back.

MR. LONG: I think -- I will not be back, but I will be able to submit written comments. Thanks very much for having me here today.

COMMISSIONER BYRON: Thank you.

[Off the record at 12:25 p.m.]

[Back on the record at 1:30 p.m.]

DR. JASKE: Okay, my name is Mike Jaske. I am with the Energy Commission staff and we are going to resume with our panel, with question 3. So question 3 addresses the summary of the scenario study in the MRW Report and asks whether the high renewables, high efficiency, high both of them, both in and out of California, is sort of the likely range to cover resource development. Any of our panelists care to speak to that study? Mr. Minick?

MR. MINICK: It was a good start. The things I see missing are electrification and Edison, as we informed you, is looking seriously at electrification and how it might impact our load in the future. And on some cases we see rather significant amounts of electrification, both of not only just cars, plug-in hybrids, but of the grid regarding rails and ports, and things like that. So, I do not think they have captured electrification well in here.

Secondly, it appears they are stating quite a high capacity factor for wind and I would like to see that developed first, if we are talking about 32 percent right now, but if they are not capturing enough energy from where there is more wind, more solar, [indiscernible] targets. So I do not think it is quite robust enough to capture some of the extremes.

MR. JASKE: Other thoughts?

MR. HAWKINS: Yeah. I just wanted to echo the capacity factor issue with wind. The number of sites running for the last five years are still averaging about 22 percent of the wind [inaudible] and it does include, obviously, older units which drag down the capacity factors, and there are some months that are really, you know, higher numbers, but overall the average is still about 22 percent. So the new stuff is really going to have to be really outrageously performing in order to hit those kinds of capacity factors.

COMMISSIONER BYRON: Well, so, Mr. Hawkins, what are you seeing as the marginal capacity factor for new wind? Is it -- as new generation gets added, do you have a sense of the ISO as to what that --

MR. HAWKINS: Well, it depends on, of course, the location. But the ones that we have seen, there are some that get into the 30-32 percent as we have looked like at

Solano, and so forth. The thing that probably drags the average down at this point is the Altamont, which is shut down for a significant portion of the year, and also has the older technology. But, so in terms -- (indiscernible) is still there and that tends to drive the averages down.

MR. JASKE: So the PUC just released a major report on 33 percent renewables. Do you have any sense of the assumptions that were used in that analysis?

DR. RYAN: I do not have any sense of the assumptions on the capacity factors, but I was going to make another remark that tiers off of that report, and that is that, I think with the caveat that Mr. Minick suggested, I think these futures bracket up the range appropriately, but you might want to inject some more richness into the cases that you can set up within that range, and what we did in that 33 percent report was to look at a variety of scenarios that would meet a 33 percent RPS, but with different combinations of renewable resources. And my understanding is that those scenarios are also scenarios that will be considered in our long-term procurement process, but the reason that I think they are relevant for this discussion here is just that they are consisting of different mixes of resources and are, therefore, going to have different implications for the complimentary resources needed to integrate them into the

grid.

MR. JASKE: So I believe there is actually an IEPR workshop next Monday on this very subject, so the committee can get a fuller dose of the information about that.

DR. RYAN: I will be returning, too, to speak at that workshop.

MR. MINICK: I think I am here, then, also.

COMMISSIONER BYRON: I will thank you ahead of time.

MR. JASKE: So that sounds like actually an answer to question 4, that there needs to be more variation around the basic themes of high renewables and high efficiencies. Are there other sentiments along those lines that people want to express?

MR. ALVAREZ: Yes. I do have a couple of additional comments. I believe the scenarios assume up to 25 percent of RPS, but if you would like to -- in order to bracket, you know, the need, you probably want to extend it to the 33 percent, and reflect in addition to that the work that will be done by California and ISO in terms of defining what is the integration requirement, and how does that impact the planning reserve margins, and so on. So I think those need to be part of the overall range of need.

MR. JASKE: Okay. Other thoughts on futures that

are worth investigating?

MR. ANDERSON: This may not be the most popular response, but I have seen now three or four of these studies. I have been involved in a couple myself, and they all tend to generally trend the same way. We are not seeing that one study has given us much different answer than the other. They might have different mixes of wind, different mixes of different resources, but generally -- I think we generally know where we are going. And from my view, doing more of these with slightly different input assumptions does not add a lot of value to the discussion. It is really around the integration issues. And where can we begin to learn that, yes, we can handle up to X wind, and then maybe we need to put a bias for different kind of resources. So, in my view, if we are really going to spend our time doing more modeling, it is going to be more on the very detailed short-term integration issues, and not another 10-year study, or whatever, of just if we happen to go to a different mix, will be get more or less GHG.

COMMISSIONER BYRON: And I would note, too -- thank you, Mr. Anderson, for that comment -- I would note, too, having gone to a renewables integration conference, an international conference in the EU, they are moving forward in this area in a substantial way, also groping

with some of the same questions that we are, and maybe there are other studies or research that has been done in the EU, or of what the EU has done, but that is not reflected here. I think there is lots we can always learn outside our own state, certainly countries like Ireland and Denmark are integrating a lot more renewables, and wind renewables, and we are talking about here at this point. And I do not see us learning much from what they have done.

MR. JASKE: Clarification, Mr. Anderson. When you said short-term, did you mean short time interval?

MR. ANDERSON: Yeah.

MR. JASKE: Okay, thank you. Okay, why don't we turn to question 5, and one of the key takeaways, in fact, the very last slide that Mr. McClary presented, you know, identified these three futures in which net GHG emissions would climb. Are there comments panelists would care to make about this interpretation?

MR. GALATI: I am going to keep my remarks related to in the context of processing an individual siting case. In reading the report, I actually think that the report might be getting a little bit of an under-sell. I actually think it is probably -- it is probably a really good report and I think that, as opposed to being a good start, I think it might be pretty close to finished for

purposes of a siting case. So I am going to try to capture why I think that in response to this question. In the siting case, the Energy Commission is going to really basically try to make two findings, right? They make the finding that you comply with laws, ordinances, regulations, and standards, what we call LORS. And I think that you could easily grapple with does a particular siting case impede, comply with some policies or standards. I think that is one analysis that is appropriate that you do, but that you keep that out of the second part of the analysis, which is, does the project result in any impacts, either cumulative, or direct impacts. So on the LORS Analysis, the LORS that currently exist would be things like the loading order, and things of that nature, things like AB 32 and an established program. So I think that modeling would not be necessary from my perspective to determine whether or not you can make those findings. I think you can make those findings by substantially relying on other agencies that also make those findings, as we heard from the PUC in the case of an investor-owned utility, that the PUC makes the findings that projects that ultimately get the contract are approved in the LTPP, those projects are consistent with the loading order. And I think maybe you can rely on that. And we can talk more about the LORS issue. I want

to get to the next one which is from a CEQA perspective. I think -- and maybe someone on the panel can correct me here -- I cannot envision a power plant before the Energy Commission that would not fit into the roles identified in the report, and I think that, while we cannot quantify how much GHG net benefit there is, I think the report concludes that there would be a net GHG benefit, and I do not think for purposes of CEQA it is necessary for you to quantify if you are going downward, or if there is no significant impact. So in the cumulative section, it is -- - is there an impact that is cumulatively considerable. I think the report bore out that natural gas-fired power plant in front of the Energy Commission is very likely to meet those roles, and if it meets those roles, every one of those roles, I think, results in a net reduction. So from my perspective, what I would not like to have to do, and I do not think it would add very much value, is to try to model how much of a benefit in a particular siting case. So I would propose that you could rely on this report and integrate it into the analysis that your staff does on cumulative impacts for GHG, and that this report provides a really good basis for concluding a project that is consistent with the loading order. And one way you could find that is the project either has a contract, or is likely to have a contract for the investor-owned

utilities. We do know, and I think it is well understood that there is no merchant generation in the state anymore, so I think that there is a way for you to help rely on what the CPUC has done and to rely on this report to fulfill both of those findings. So with that in mind, I do not think that additional modeling is necessary. It would be informative and it may be -- in another forum, it may be important for you to know exactly how much reductions we are getting, but I think for CEQA, I do not think we need to quantify it.

COMMISSIONER BYRON: Are you sure, Mr. Galati, there are no merchant plants in the state anymore?

MR. GALATI: Not one that will operate. I do not believe that somebody would come to you at the Energy Commission now, even if they were to propose a merchant plant, and you were to permit it, that they would be able to finance it, build it, and operate it. I do not know how they would do so. And I would defer to my colleague at Calpine, but I do not know how anybody could do that today.

COMMISSIONER BYRON: So I may be wrong, but I thought there are still merchant plants operating in the state. And we do, indeed, have at least one application before us that is without a power first agreement.

MR. GALATI: Yeah and, again, I do think that --

and I am not saying that there are not merchant power plants operating in the state, what I am talking about is anybody coming to you now with an application, or somebody before you right now. I do not see how anyone is going to be able to finance a project and actually build it and operate it without a contract. So some people wait until they have a contract before they come to you, and some people may choose not to wait until they have a contract before they come get a permit. But I think it has been borne out by how many projects you have licensed that did not get built because they do not have a contract.

DR. RYAN: I generally am in agreement with your assessment of the market, I mean, there are other people here who are more qualified to speak to that, particularly the gentleman sitting at my right, so I will let him do that, but I want to go back to the other remark that you made about modeling and really reinforce that point, I mean, particularly based on, again, the experience that we had at the Public Utilities Commission and the Sunrise Power Link case where an effort was made in the modeling there to try to quantify the greenhouse gas impacts attributable to that transmission line. I just think that what you are trying to measure when you are talking about an individual power plant, or an individual transmission line, within the context of the entire western grid, what

you are trying to measure is so swamped by all the other sources of variation within the region, and is so driven by the other assumptions that you make, that I really think it is a complete exercise in futility. And I would definitely discourage you from going down that road on individual siting cases. It is a different story when you do modeling at the system level, you know, as we did jointly last year and as we will ask the utilities to do in the context of the long-term procurement plan where you say, you know, "What is the cumulative effect of this overall investment program that we are asking you to undertake?" That is a meaningful exercise, but looking at individual plants and transmission lines, I think, you learn nothing that you can have any confidence in.

MR. JASKE: So you are distinguishing between modeling for planning purposes and modeling for individual power plants --

DR. RYAN: Yeah, for siting purposes, yes.

MR. JASKE: Mr. Barmack?

MR. BARMACK: Yeah. No, I agree with Scott's characterization. I mean, nothing is getting built without a contract. There are existing plants that do not have contracts.

COMMISSIONER BYRON: Mr. Barmack, would you mind pulling the microphone a little closer to you, that way we

can hear you.

MR. BARMACK: Yeah, sure. Can you hear me now?

COMMISSIONER BYRON: Pull it a little closer. Thanks.

MR. BARMACK: I was just agreeing with what Scott said, that I am not aware of any merchant plants that are being built now. But there are existing plants without contracts and, just picking up on something Julie said, you know, I am concerned that sort of this modeling that might take place in the siting process would slow down a process that is already pretty slow. And I realize each plant is kind of idiosyncratic, but I would just point to the example of our Russell City plant. I mean, that was procured originally through PG&E in its 2004 long-term RFO and, you know, knock on wood, we hope it will come on line in 2012. So, you know, I could easily see this sort of more modeling in the siting process, delaying that by, I don't know, a year.

COMMISSIONER BYRON: Well, I was not here in 2004, but the implication is that that is all the permitting process for --

MR. BARMACK: No, it is not obvious -- it is not all the permitting process, but we do not -- we are not looking for new delays.

MR. JASKE: Mr. Minick.

MR. MINICK: Like Robert said, and I agree with my U.C. friend over here now, modeling for the sake of an individual unit probably has no value whatsoever. I have been modeling for 25 years at Edison and it is almost logical and easy to say that if you are adding a new plant that has a better heat rate than any of -- than some of, or all of the existing plants, it is going to lower GHG emissions, it always does. But the effects are so small for individual plants, especially if they are small, that you will be lost in the minutia of all the numbers that your model is going to spit out and they spit out billions of numbers. So I agree with you that, looking at system changes over time are much more valuable than looking at individual units. The other thing you have to remember is, for we long-term planners, is we cannot forecast the future that well. I have been trying to do it for 25 years. In 1984, I used to forecast oil at $100 a barrel, but you did not get there until a few years ago, correct? My forecast was totally wrong, okay? We cannot forecast the future that well, so when you are looking at this modeling, you are going to have to take a look at different scenarios and say, okay, is there any major change to these scenarios because we simply cannot forecast 10, 20 and 30 years out there.

DR. RYAN: Well, I mean, the last thing I would

add is, the one circumstance I can envision in which at least the last two of MRW's findings would not hold is, if we do have unrestrained load growth, you know, then if you make the system -- if the system is becoming more efficient over time, it does not matter if the system is also becoming bigger. And the point of that is just that we have to keep our eyes on the right ball, and the right ball is actually energy efficiency targets, as well as the RPS.

MR. JASKE: Well, I want to jump in here and ask Mr. Minick's perspective on electrification coming in here because, depending on how one reads the question, net GHG emissions may well decline as transportation and fuels, or industrial fuels are replaced by electrification. That is -- the dimension of this that we suspect is coming, perhaps we are even fairly sure it is coming to some degree, and the degree and the pace are very unknown.

MR. MINICK: I agree.

MR. JASKE: Okay --

MR. BEEBE: Bud Beebe from SMUD. I will note that I think one of the things that we really were understanding here, but maybe I will just try and say it out loud, is that studies and documents like an IEPR are temporal to a context extent, and things can change over time. An individual siting procedure is done in a

particular time, and once the decision is reached -- a power plant can happen or not -- but you can make that decision, I think, quite comfortably within a well constructed policy document like a well constructed IEPR because the IEPR should recognize that power plants have life time, sometimes very long, other times maybe not so long. But the planning process has to understand the lifetime of projects, as well as all the other characterizations that go into place, but the siting process itself is a significant one-time only sort of a piece that happens, that causes other things to happen. Rapping this all up, I am saying that I have a comfortable feel, I believe SMUD has a very comfortable feel, that the life-time of natural gas installations for an existing brown field, or an existing site, is such that, for the time span of interest up through 2050, for instance, you could comfortably pay off a capital asset that is a natural gas generation asset within that time, much shorter than that time. So we should not worry too much about adding capital assets to the existing ability to service load as long as the greenhouse gas piece and the emissions piece locally do not get out of hand, and are in keeping with the general document. But your document is going to get re-done and re-done and re-done, and you need to be able to develop a changing view as you go further

down the line. At some point, natural gas that produces greenhouse gas emissions, as a new source, will no longer be an acceptable thing to do. But that is pretty far in the future. The question you need to think about is, can I say now that a natural gas-fired power plant in an existing brown field, it can go away, and there should not be any whiners by 2050. But at some point in the future, your policy document has to recognize that you cannot add any more of those. We are not at that point here -- not anywhere close. So I think we can all take comfort in that.

MR. JASKE: Okay, let's move to question 6. And perhaps it is an opportunity for Dr. Ryan to elaborate on her remarks this morning about the various roles that gas plants can play, and to say how it is that the PUC's procurement process weeds itself to an assurance that generating resources with those qualities actually gets contracted for and developed?

DR. RYAN: So in my remarks this morning, I talked about two intertwined processes that we pursue at the Commission, the resource adequacy process, and then the long-term procurement planning process. And I indicated that, in the resource adequacy process, though, the focus of it is short-term resource adequacy, month ahead and year ahead showings. It is also the venue in which we

identify load pockets which require where either resources are required specifically in the load pocket to assure local resource adequacy or areas that are candidates for new transmission or, arguably, in my ideal world, areas which would be a focus of developing demand-side resources. So out of that process which is a collaborative process with the Energy Commission and the ISO, comes information about these local resource adequacy needs. You know, we are in the midst of working, again, with the Energy Commission and the California ISO to address additional needs, constraints, resulting from the once-through cooling issue, as well as the priority reserve issues, so those are other examples of localized constraints that need to be addressed in utilities plans. So turning now to the long-term procurement process that is a bi-annual process in which the utilities develop ten-year plans. We start with -- it essentially a top-down process that begins with a determination of a system-wide need, or the net short there, so we take into account what is already in place at the system level, what do we anticipate getting in terms of added energy efficiency and renewables, CHP demands our management over that 10-year planning horizon, and then that tells us what the residual system need is. We also factor in the information about local resource adequacy and other localized restraints.

And that is really the basis, those provide the elements of the plan, or the problems, so to speak, that the Utilities are then asked to solve as they develop their plans and their proposed portfolios, as those are really their preferred approach or approaches to addressing -- to solving that problem with feeding your system-wide need, while also addressing all the various localized constraints, so that is what the plan is. So when they come forward with their plans, the Commissions will, at that stage, just say, okay, is this plan for each utility -- have they checked off all the boxes? Have they addressed all the considerations that need to be addressed here? If the plan is approved by the Commission, then it provides the basis for the Utilities to go out and conduct their RFOs and find resources to fill in all those various gaps, whether that is combined cycle for system need, or some sort of localized solution in a low pocket, or an area affected by a once-through cooling retirement. So it is really -- then they are going to come back with the individual applications in the case of new generation or a new long-term contracts, they are going to come back with the individual applications for those resources, and that is the stage at which the Commission then asks the question, "Is this consistent with the plan that we approved some time ago?" I mean, it is also an

opportunity for the Commission to say, "Has something changed since we approved the plan that we now have to take into account?" And Commissioner Boyd, that, to some extent I think goes to your question of this morning about, you know, are we always sort of fighting the last war, or can we keep abreast of developments. So that is the process by which we work out how do they put the right resources in place to meet both their system needs and the localized needs and -- and this is critically important -- and that what they are, you know, the new fossil resources that they are acquiring are only as much as they absolutely need, that they have maximized the loading order resources first; this is really the framework in which to do that.

MR. JASKE: I think, if I am remembering correctly, it was the fall of '07 that the ISO released its 20 percent renewable integration report and has not yet finished its 33 percent, so in that -- I am speculating that it is yet for the PUC to tackle. Maybe it will happen in this next LTPP cycle, the need for flexible operating characteristics or perhaps the amount, the magnitudes of them needed. But that is going to be one of the next developments of the LTPP process.

DR. RYAN: Right. Dave, do you want to comment on the timing and then I will say a little bit more about

what we intend to do with it?

MR. HAWKINS: Yeah, we are really just getting underway with the 33 percent detailed study now with all the scenarios. The issue for us, of course, is there a common set of resources, types of resources that we are going to need, about whether it is high solar, high wind, whichever the scenario is, and, if so, then it is easy to come back and say, "Yes, we need some degree." The problem has not been qualitative, but we certainly have pretty good ideas qualitatively what there should be in the resource adequacy mix, it has been the quantitative in how much to do you need, do you need 1,000 megawatts of acres or 500 megawatts of acres. That is what we are trying to answer with those questions, by the end of the year.

DR. RYAN: Yeah and one thing that makes that hard to answer is, of course, we do not know when these various types of renewable resources will actually shovel off because of challenges and siting, financing, so on and so forth, so that changes, exactly when and how we would expect that change is exactly when and how the Utilities will want to put resources on their system to accommodate those renewable resources. Oh, I was going to say something about just what we plan to do with this information, so that the 33 percent RPS report that the

Commission's energy division released a couple weeks ago is a preliminary -- is labeled a preliminary report, which is kind of an indirect way of saying it is a draft, but it is also kind of an interim product and what we envision is that there will be a final report that may include some changes to what we have already released. But more importantly that that final report will incorporate the findings from the ISO's 33 percent integration study so that the updated estimates of the cost of doing integration and information about the types of resources, or what is new or different about what resources we would use would be included in that report, as well. And it is also important to note -- and I think I may have said this already, but the 33 percent RPS report is basically an offshoot of this cycle of the long-term procurement planning process, the modeling work, and so on, is also under pending long-term procurement, and so therefore, by extension, that is kind of the vehicle for inclusion of the ISO's work on 33 percent integration.

COMMISSIONER BYRON: If I may, and Ms. Ryan, I asked you this last week, your report is based on the entire state, not just on the three IOU's, correct?

DR. RYAN: The report is based on the entire state, but the long-term procurement planning process will not be for the entire state. It will peel off the

Utilities' systems.

COMMISSIONER BYRON: Okay, likewise, the ISO -- is yours for all service territories? Or just your service territory?

MR. HAWKINS: Ours would be just our service territory.

COMMISSIONER BYRON: How do you bring them together?

DR. RYAN: Well, I think the IOU service territories add up to the ISO service territory, more or less.

MR. MINICK: [Inaudible]

COMMISSIONER BYRON: Say that again, please, Mr. Minick.

MR. MINICK: Oh, I think the IOUs are about 85 percent of the total state requirements. It is not -- we have done some studies both in the statewide basis and on a [inaudible] basis. We are helping the ISO and we are working with them on the ISO's integration study because we have capabilities that we are making available to them. And, as you said, the LTPP will come out with some recommendations. In the past, the LTPP told us in the last LTPP that they will buy up to 1,700 or 1,800 megawatts of resources. We had a solicitation, we got people to look at it, we did our own internal evaluation,

we came up with about 1,700 and 1,800 megawatts, most of them peakers, with combined cycle and [inaudible], so we did our homework. We figured out what would best fit our resource needs in the long-term and we awarded bids that we thought would meet the kind of operations we would anticipate by 2020. I mean, we go out in 2020 when we do our analysis.

DR. RYAN: But I was talking -- and a good example, and this may not be the most recent solicitation -- maybe it was the round before, but one of the projects that PG&E brought to the Commission was a plant in Humboldt using reciprocating engines.

MR. MINICK: PG&E -- I am Edison.

DR. RYAN: Oh, you are Edison, sorry. Okay, PG&E. All right, but this is a good example because this was a local reliability project and, I mean, and at this stage, I think it is correct that we did not really provide direction in the long-term procurement proceeding about local reliability requirements, but that they had been already surfaced in the resource adequacy proceeding. So when PG&E came to us with the results of their RFO, they said one of the things we are buying is this plan at Humboldt with the restocks (phonetics) because it deals with our local RA issue and this is a particularly appropriate technology for the needs in this area, and you

all can elaborate on that. And that is an example of why, I think, we want to be careful not to be too proscriptive; we would not want to just say, "Well, you know, build this kind of plant," but it is more like, "These are the local reliability problems that you have to solve. Come give us the best, and most creative, and most cost-effective solutions to that, that also fits within our environmental criteria."

MR. ANDERSON: If I could add one thing that I think is important on the process we go through, and Nancy described it well, is the fact that we do go through it almost on an every two-year basis. So we are not going out, we are not setting one plan and saying, "Here is our plan for the next 20 years. We are going to go do this." We weigh out a plan, we determine what we need to do, we get authority to do it, and for the most part, we are adding new resources that are less than 10 percent of our peak load, and maybe eight, something like that. We execute on that, and then two years later, we say, okay, what has changed? Do we need to move a little bit more one way, or the other way, do we need a little bit more of that kind of thing? So I think it is not a plan that we go and execute, but it is a plan that we continually update and move through. And I think that is the very important element of what we are doing.

MR. JASKE: Perhaps we should ask Mr. Beebe how a smaller integrated utility tackles these same challenges.

MR. BEEBE: With the publicly owned utilities, we certainly do satisfy state policy and mandates for the state of California. I think we have demonstrated that adequately and we are doing a good job, for instance, with the RPS. SMUD is arguably at 20 percent renewables at this point and that fulfills a Board goal, a Board requirement upon us. But, of course, it is also reflective of state policy and we certainly abide also by SB 1368 and the process put together at the CEC. So we do it differently. It is not quite such a stepwise process where you go from the load serving entity to the PUC in a totally separate adjudication. We do not involve the Board in our final decisions until we are pretty far down the line, of course. But we can, because we are smaller, we can be more adaptive and really, because of the nature of locally owned, publicly owned utilities, we need that kind of flexibility. We have very local requirements that have to be maintained and we are in a very good position to be able to do that, both for the rates piece, as well as for all of the other pieces that need to be put together. So, yes, we do long-term planning, yes, we are interested in greenhouse gas, we are interested in state policies and maintaining state policies as they are

reflected in our local jurisdiction, so hopefully that does it.

MR. JASKE: So why don't we turn to question 7, and start again with Dr. Ryan. You have given us some sort of big picture about how the LTPP, then RFO process works, so how are GHG emissions themselves factored into either the planning or the RFO process?

DR. RYAN: Let me say with kind of a few quick words about sort of history, then turn to the future. So the idea of a GHG adder was something that the Commission introduced about five years ago, where when utilities' bids were being evaluated, bids from fossil plants would be adjusted for evaluation purposes to -- and I think the price was $8.00 a ton based on projected GHG emissions to basically create a bogey relative to other resources. Obviously, all plants have to comply with any contracts, or new plants have to comply with the emissions performance standard. So those are the policies that we already have in place, you know, in addition to is this plan compliant with the loading order. Going forward, I see us being more explicit on the GHG content of plant. And so I actually think that you will see in the next round of the long-term procurement proceeding that we will actually be looking at the emissions associated with overall portfolios, and looking to see what is the trend,

how are the bundles of resources that the utilities are proposing and these various portfolios they put forward -- how do they perform in terms of the overall greenhouse gas emissions on their systems? But I do not see, again, sort of singling out greenhouse gas emissions from individual assets or measures. It is really -- the approach that we pursue is a portfolio approach and how do we move the portfolio in the right direction.

MR. JASKE: Any of the IOUs care to speak to how -- or to what extent at all GHG factors into RFO bid evaluations?

MR. ANDERSON: Sure. And I think the key issue is the portfolio approach. When we do it, we will take our portfolio -- we will take the various bids, we will add each one of those to our portfolio, and then we will look at the total GHG of the portfolio and we do not go back to that particular resource to see what it is because there may be cases where, on a pound per megawatt hour basis, someone that generates a little more GHG may actually fit better with the portfolio and help us lower the total portfolio, so we do look at it strictly on a portfolio basis, not on a plant by plant basis.

COMMISSIONER BYRON: Dr. Jaske, unless you are going somewhere, I would be curious to hear from the developers' perspective if you are considering GHGs in

your activities?

MR. BARMACK: Sure. I will give you an answer that is partially from a developer's perspective and, you know, I also spent some time at PG&E, so I have sort of been on both sides of our hybrid market.

COMMISSIONER BYRON: Well, they have two individuals here to speak from --

MR. BARMACK: Okay. But, in general, new projects now are being developed through bidding in the utility RFOs, and generally what the utilities are procuring are tolling agreements and so what we are selling is, you know, the right for the utility to do whatever it wants with our machine, within limits, and incur all the costs, including emissions costs. So indirectly, GHG costs are a consideration for us if we can sell, you know, the utility -- a machine with a lower heat rate that is cleaner, we should be able to get more money for that, but it is generally the utility that is assuming the risk of GHG costs, even with our machines once they are -- if they are under contract to a utility, they are generally bearing the emissions costs. So I do not know if that addresses your question.

COMMISSIONER BYRON: Thank you.

MR. BARMACK: Sure.

MR. JASKE: For some reason that strikes me as at

odds with first deliverer, a GHG regulation perspective. So as an owner of a bunch of generators that are under tolling agreements with various LSEs, how is it that you can reconcile the impending regulations from ARB that are on you as the owner of the generator, whereas you are describing the control over that plant being in the hands of whoever you have a tolling agreement with?

MR. BARMACK: Well, I mean, obviously that issue has huge financial implications and it is a very important contracting issue, but it is addressed in contracts.

MR. BEEBE: As we -- as SMUD has brought out in other forums at the ARB and at the Joint Commissions, when they were considering greenhouse gas under AB 32, the truth is that the consumer -- the point at which the responsibilities of greenhouse gas for futures, the need to keep costs low, the ability to understand the impact to local infrastructure, these all come together at the LDC level, and that is why it is so important in the AB 32, and perhaps at the federal level, as well, to understand that consumer protection can happen most -- or best -- at the LDC level if the allowance allocation pieces value the total piece that the LDC plays in developing our generation and energy infrastructure, then we are all far ahead. If you put the allowance allocation piece far downstream at the consumer of the electricity, they often

have very little impact on the ability to understand what kind of generation is going to be coming on. So what Matt said is actually very correct. The utilities are still the place at which the action happens, and that is why we have to recognize that and assume that responsibility as a part of our every day responsibilities -- and we do, in our planning.

MR. JASKE: I think we are moving into question 8 here, so -- are there other things the IOUs want to say in terms of how they are taking GHG into account in the RFO design, and then the bid selection process?

MR. MINICK: Well, it is quiet, I will say something. I am actually not involved with our solicitation process, I am in long-term planning on the procurement side of the business. But I do know that we include an adder, in essence, over the solicitations. In the long-term side of planning, we always look for GHG emissions and that is our objective, is to meet all the state goals and objectives, loading order in emissions, the best and cheapest way possible. So we do take a look at total emissions. Pricing them in the long-term planning is not really something that we do. We have run studies to take a look at potential price gaps in the future, like $23 or $40 or $50, and see how it changes our dispatch, and how much it might change emissions. But,

again, I do not deal with the procurement side of it.

MR. ALVAREZ: Let me add from a PG&E side from my experience also as a planner. We did in the last long term plan include as a metric the portfolio emissions for different plans under different scenarios, and I expect that will be the case in the next long-term plan cycle. And we expect solicitations, as Mark said, we do have -- we include an adder for CO_2 and that adder generally reflects Commission direction, either prior decisions, or the CO_2 adder that comes out of the market price reference, you know, was it adopted recently in 2008?

DR. RYAN: And the only thing that I would add to that is the observation that what is today an adder, which is just used for bid evaluation purposes will, in the not too distant future, be a real cost once there is a state regional or federal greenhouse gas market in existence. And then, I think, instead of the Commission -- the Commission will be looking when it evaluates portfolios' resource plans not just at, well, how does this proposed plan perform on an environmental basis, but then it really becomes a dimension of cost. And if we have a utility that, for whatever reason, is assigning up contracts with some new merchant plant, let's say, that is permitted by this agency, that is generating lots of greenhouse gas emissions, well, that is a financial risk or just an added

cost that they are bringing on to their customers, and so we have one more angle to look at it. And I would expect the Commission to do that.

MR. JASKE: Anything more anyone wants to add on question 8? Okay, then let's move to question 9. At least part of question 9 is dealing with the issue of a power plant in front of the Energy Commission has certain technical characteristics, you know, engineering aspects that are not -- once they are known, they are not really under question, but the roles identified in the MRW Report, you know, sort of move in the direction of identifying how it is going to operate, which of course brings to bear the contractual side of whatever arrangement there is between that power plant and the load serving entity to which it is selling powers. So there are a number of points here that have to do with how can one understand the role from knowing the engineering facts, as opposed to the contractual elements that ride on top of that. So, Mr. Galati, do you have some thoughts on this set of questions?

MR. GALATI: Yes. Going back to what I said earlier, I think that it might be difficult for the Energy Commission in an individual siting case to decide exactly how a plant is going to operate, and then to ensure that that plant operates exactly like that for the life of the

plant. But with all bad news, try to follow it with some goods new, is you do know that a project that either has a contract with an IOU, or will have a contract with an IOU, has at least been subject to at least two reviews at the Public Utility Commission that is consistent with the long-term plan. So the long-term plan identified that whatever the net short position was that was consistent with the loading order, and the rest of the policies described by Ms. Ryan earlier today, and then when a particular contract comes back to the Public Utilities Commission, there is also going to be that finding. So from that perspective, I think that I really cannot think of a role that is identified in the report that I could not take one of our projects, either a PPA or an individual project that would not fit that role. So I think, once again, rather than trying to show that the plant is going to play a particular role, I think the report actually shows no need to do that. And I would like to hear from anyone else on the panel who believes there are roles that the plant would not be fulfilling, a new gas-fired plant that would be large enough to come to the Energy Commission, which those are the plants that we care about in siting, wouldn't be fulfilling one or more of the roles identified in the report. I cannot think of a case where that would not be the case. So to put

evidence that we are fulfilling those roles, we certainly can, but I am just not sure that that is that meaningful to you. I think what we would probably do, we would love to see this report finalized, or the IEPR finalized, taking into account the long-term procurement plan process that Dr. Ryan described, so that it would provide a basis for you to rely on to then say that this plant is consistent with the loading order, and it is the loading order that is the fundamental basis behind all the assumptions that get us to a net benefit.

MR. JASKE: So is another way of saying what you just said that the Energy Commission can rely upon the PUC LTPP and procurement process to, in aggregate, bring the right amount of capacity forward? Because they will not issue contracts, or they will not approve contracts for more than approximately the right amount of capacity and associated energy because they are, as Dr. Ryan said several times, taking all the loading order preferences into account in authorizing the amount of remaining fossil capacity that each IOU is allowed to pursue?

MR. GALATI: Yeah. I agree with that statement and I think that is consistent both with CEQA law and LORS findings. It is common for the Energy Commission to rely on another agency to implement the laws that it implements, and it is also common from a CEQA perspective

for an agency to be able to rely on something within the discretion of an agency, another agency. It is okay to rely on an agency that they will do their job. And I think that -- we advocated for a system-wide study, we think this report is a great system-wide study, and we think it bore out what we all intuitively thought.

MR. JASKE: Mr. Barmack.

MR. BARMACK: I just wanted to comment on what I think Scott said. I am a little bit concerned that forcing a developer to come with the CPUC approved contract in hand to this commission for a siting application might create problems in the utility procurement process. I think there is sort of a chicken and egg problem, and if you require people to have contracts before they get sited, you might not have very competitive procurement.

DR. RYAN: I am not sure Scott was advocating for that. Were you?

MR. GALATI: Let me talk long enough and I promise you that I will absolutely confuse everybody in the room. No, that is not what I was advocating.

MR. BARMACK: Okay.

MR. GALATI: What I was advocating, though, is that if you happen to have a contract, certainly the Energy Commission could rely on that at this point. I am

also advocating that I do not think there would be an independent power producer building a project without a contract, and so the Energy Commission can rely on that project will not operate. And it is the operational emissions we care about. There are no emissions from getting a license. It is the operational emissions and that the Energy Commission, based on how procurement works today, it results in the same thing -- you would have a contract before you emitted greenhouse gas emissions.

DR. RYAN: I mean, that is the crux of the matter is that I do not think you will see these plants operating, plants that are sited here operating if they do not ultimately get a long-term contract. Sometimes they get a contract while they are still in the process here; sometimes they are already permitted and they get a contract; I mean, the stories vary, but I think that it would be highly unusual to see an instance where something was contracted here and operated on a merchant basis. The other thing I really want to emphasize is that the importance of really thinking through the potential market power applications of any change in the siting process, that in particular any change that limits the number of plants that get sited. So, for example, if we were -- and I do not hear anybody advocating for this -- but if somebody came forward and did say, "Oh, well, I think you

should not even be able to go to the CEC to seek a permit until you have got a contract from an IOU," well, that is a perfect situation for a hold-up, a confiscatory re-opener. So, I mean, that is not something we would want to set up and you have also heard me stress that, in terms of particularly local resource adequacy where you really do have to be mindful of market power, we would like to see the Utilities have as many viable options as possible so that their customers do not get held up in those cases. So we need to balance and we need to factor those considerations and think them through very carefully.

MS. TEN HOPE: Can I ask a question? Much of the discussion is focusing on how the LTPP process embeds the loading order, energy efficiency was first, and then power plants. I would like to hear some of the panelists discuss how that is incorporated in the POUs, you know, go through the LTPP process, they have the two levels of review at the PUC that Scott was referring to, so the assurances that the policy goals are incorporated is a different process.

MR. BEEBE: Ms. Ten Hope, I hope this responds. We have the long-term planning process ourselves and we have several -- I think that is the right term -- departments within SMUD that are responsible for fulfilling different parts of that plan, and it all comes

together, both at our Management and at the Board level. And I think that is the right way to say it, we have departments working on different parts of it. The plan itself goes long-term in front of a specific acquisition, whether it is a power purchase agreement, or a power plant that we might decide to build ourselves, or any other crazy idea, and then those all come together under Management groups that make decisions, again, with full understanding and accountability to the Board that we are operating within state policies, within the Board's own policies, as they have said, and state law, of course. And then it goes to the Board. So I think that the parallel process, while the lines of communication are shorter, and not at arm's length, are fulfilled adequately and with full understanding of the intent of how this all works together, long-term planning, individual parts of a publicly owned utility operating as they need to operate, coming together in the pyramid of Management responsible to the Board, and then Board consideration, and a fully separate, but admittedly shorter communication path understanding of individual acts of acquisition decisions. So would that do it, do you think? Or was I missing something there? That is our process.

MS. TEN HOPE: And that would be SMUD's process.

MR. BEEBE: Yes.

MS. TEN HOPE: It may or may not be duplicated across the board.

MR. BEEBE: It may or may not be. Would you like to have everyone else come forward?

MS. TEN HOPE: I do not think there is anyone else that I --

MR. BEEBE: I think Scott is here, and Norm was here earlier.

MR. GALATI: I will, just to make sure that it does not look like, or appear that I threw our POU brothers under the bus, because that was the intention, but I can give you, Ms. Ten Hope, some real concrete way to handle GHG emissions in a publicly owned utility project, and that is what was done with the Canyon power project. The preliminary staff assessment was out and the FSA, I think, will be out in a month or so. But in that case, there were very specific questions that staff asked about why did you choose this technology, and what was this technology for, and how does it fit into your portfolio. And so those were answered and, for those cases where there is not an LTPP, maybe it is appropriate to ask some follow-up inquiry to find out how it does fit into the overall portfolio plan. But I certainly think that it would be more difficult for an independent power producer who is going to deliver power under a power

purchase agreement to be able to answer the questions on behalf of the investor-owned utility. That is why I would suggest in that case you look to the PUC. But in the case of a publicly owned utility, usually the people who are the applicants are the people who can answer those questions for you.

MR. BEEBE: I would generally agree with that. I would note that the lumpiness factor in generation acquisitions is always an issue, but the smaller the utility, the more lumpy things get. So that is often where very local considerations are very very important.

MR. JASKE: Okay, I think that probably brings us to question 10, which is our last one, and it sort of observes that the MRW Report says the power plants should be looked at, you know, as part of a system, not stand-alone facilities, and then poses some other settings where the question is asked, is that same system perspective being observed. So, Mr. Hawkins, that question asks about the ISO's interconnection process. Is there a parallel between how you examine a power plant in an inter-connection request process, as a stand-alone, or through its influence on the whole system?

MR. HAWKINS: Well, our current process is basically looking at stand alone process with the exception of some of the clustering that we are doing, so

we look at cluster studies and so forth for the plants. Generally, we are looking at individual interconnection issues, transmission upgrading issues per plant. There are transmission studies that are done, or overall system studies that are done, but it is looking at the impact of individual plants.

MR. JASKE: Okay, and so would it be correct to say that, because what you are doing there is looking at sizing of the interconnection and its --

MR. HAWKINS: Impact on the transmission.

MR. JASKE: -- impact on the first point of interconnection, that that is a focus that lends itself to the stand-alone analysis, and a more generalized power flow studies would be the setting, or you would look at the generation coming down that pipe, and how it might or might not affect the rest of the system.

MR. HAWKINS: That is correct.

MR. JASKE: Let the record show that he nodded, apparently affirmatively. I think I know the answer to this, but, Dr. Ryan, from the PUC perspective? Question B?

DR. RYAN: I have to tell you, I do not actually understand what is being asked in this question.

MR. BEEBE: Question B is a fully integrated question, so you have to understand it in its totality.

DR. RYAN: We need an 18-month proceeding in order to do that. Are you just asking, do we aggregate up individual projects to get --

COMMISSIONER BYRON: Ms. Ryan, would you use your microphone?

DR. RYAN: Thank you. Dr. Jaske, could you please explain what you are getting at with this question?

DR. JASKE: Am I supposed to paraphrase this question for you? I think this question means, when you are establishing the net short situation of the utilities and authorizing some portion of that to the IOUs, are you then asking them to bring forward a portfolio of projects that satisfy that, or conform to that authority?

DR. RYAN: Okay. I think what we really do is, I mean, what we are going to be doing this time around, at least, I think, is saying, bring us a whole portfolio that meets your entire load, net of reductions from energy efficiency and demand response, and then come and tell us what you are going to use to fill in the net short. So I think it is kind of a two-part answer.

MR. ANDERSON: Do you want me to give it a try?

DR. RYAN: Please.

MR. ANDERSON: I would say what comes out of the long-term plans is the net short, which is really a megawatt requirement, and a definition of the

characteristics that we want to have with those megawatts. So it is not project specific, but it is more, yeah, like San Diego, you are authorized to go and get 500 or 600 megawatts, and based on what you showed us that is in your plan, we agree you need quick start peaking resources. Okay, so it is kind of megawatt and what those megawatts should look like. For another utility it might be you need 2,000 megawatts, and based on what you have told us, it is 1,000 megawatts of combined cycle and some peaking. You know, it might be a mix of stuff. But I would say normally the LTPP comes out with a quantity, and then what should that look like. But it is not, "Bring us an exact project that looks like this." We let the market then solve that for us.

DR. JASKE: Mr. Minick.

MR. MINICK: And I will take that one step further, Bob, to say that sometimes being that specific is not beneficial to our procurement people. I will give you a hypothetical. If we say we need 500 megawatts of peaking resources, but we think it needs to quick start and black start, and we are only going to use it for a few short hours based on what we think the economics are, but somebody brings us a project that is much cheaper for energy, we might be able to take somewhat more of an intermediate resource and it still might be a better

choice, and we take it to the PUC and say, "Look, based on market conditions right now and prices, they bid this to us, this is the best resource, fill this application." So I would prefer not to have it so specific that I need an exact megawatt of an exact type and an exact location, which just destroys the market.

DR. JASKE: So you have come to the judgment that this thing that fell out of the sky looked so good from the perspective of how it fits into the whole system -- or into your package of resources?

MR. MINICK: Yeah. Remember, we start with justifying our need. We first go and say we have done all the energy efficiency that we can reasonably do in a reasonable length of time, we are meeting our RPS requirements, Reasonable Portfolio Standard requirements, we have met every other requirement for regulatory purposes, and now we have this end result that something is missing. How do we best fill this? I would love to say, personally, that, hey, there is a solar plant out here that is dispatchable, it has the statutory, it has this, it has that, and it is cheap. Or, I have this window that I have to fill, and now my job is to go out to the market and say, "How can I best fill this to meet my customers' needs for grid reliability and cost, and meeting all the other objectives?"

MR. JASKE: To what extent would that process be improved by better advance signaling about what that package of needs are? Is RFO itself sufficient to provide that signal? Or, you know, is there some packaging of the LTPP results that would prospectively encourage developers to be putting their thinking caps on and putting projects together that do, in fact, have all those -- or more of them than they would otherwise get through the RFO alone?

DR. RYAN: Well, but remember, I mean, the LTPP has been proceeded by ongoing resource adequacy process and so, you know, it is not a secret where the load pockets are. It is not a secret where the once-through cooling plants are, the ones that are, you know, the most likely candidates for retirement? And so there are -- we see developers all the time at the PUC coming by and saying, "Have I got a project for you!" Or, actually, not for me, but -- "Have I got a project for PG&E -- or Edison -- that we would love them to buy, that is going to solve all their problems." And so they are out there thinking about ways to solve the problems and, you know, the LTPP process provides some direction, but the point I am trying to make here is that we try not to be anymore proscriptive than we have to be in providing that direction, and then that gets incorporated in the RFOs, and then the Utilities are going to see what they get and they are going to think

-- so the developers are thinking creatively about what they have to offer, and the utilities, you know, we expect to think creatively about what they can do with it.

MR. MINICK: I think the developers that follow the LTPP kind of know what is going on in our territory. They know, you know, the ISO says I need 8,000 megawatts locally and I have got 10, so with three retires, I am going to need a thousand. I mean, that information is there. And we say in our LTPP, "I am going to need some black start, and I am going to need some ramp," and the ISO is going to say, "We need so many megawatts of ramp," so if they put all the pieces together from the ISO studies and some of the CPUC's studies, and our studies, they are going to get a pretty good idea what is needed out there.

MR. ANDERSON: I was going to say, I mean, any developer, I think, that is surprised by a utility's RFO is not a developer who is going to be in business very long. I mean, Calpine is here, there are a couple of other developers over here, I mean, they are at the ISO every day, they are at your hearings every day, 33 percent renewables is not a surprise. I mean, developers are out feeling for the market and I think they have got a pretty good feel for what the utilities --

MR. BARMACK: I will make a transparent plea for

something that I feel is -- yeah, some more explicit pricing of some of these requirements so, you know, if there is a real requirement for ramp, for example, well, then maybe we will have energy prices that reflect that constraint, or we will have ancillary services that serve that constraint, or we will roll some ramp requirement into a capacity market. But more explicit pricing certainly would help.

MR. JASKE: One last question. So -- oh, I am sorry.

MR. ALVAREZ: I do have -- I always thought the ISOs include at the time of a long-term plan, and this time particularly very important to get their input as part of their integration work, the operating characteristics and the amounts of resources that are needed, to integrate different amounts and mixes of renewable generation; so that information, I expect, will be available to pretty much everyone. So it will be available to developers and it will be very informative.

MR. JASKE: And just to circle that wagon, did I hear you say you are expecting that study by the end of this calendar year?

MR. HAWKINS: That is my current understanding of the project plans. There always will be ongoing further analysis and there will be more studies to be done in the

spring of next year, and some of the operational impacts, but I think at least the project team's current plan is to produce some type of a report by the end of this year.

MR. JASKE: Okay. So one last question probably for you, Dr. Ryan. When the PUC is examining a particular contract before it, what is it looking for? How does it go about that?

DR. RYAN: I think we look at two main things. The first question we ask is, is this contract consistent with the plan? Did you go do what we told you to go do? Did you bring us what we asked for? That is the first part. And then the second part is, I guess, "Is that still what we want?" Hopefully we ask that question first, but, you know, has something happened that has changed the needs? Has there suddenly been a dramatic recession of the load growth that was not anticipated, do we really need another power plant? Or something like that. You know, I am being a little flip because it is the end of a long workshop, but that is an opportunity to reassess where things stand. And the last thing I would say is that, I mean, we also look at do we think you got the best deal and our staff knows what else was bid, and is in a position in a position to make their own assessment of whether they think this was the best choice in terms of not just cost, but other performance aspects.

And, of course, there is also an important bid evaluator who is doing the same thing. So that is how we do it.

MR. JASKE: Okay, concluding observations anyone wants to make? Okay. I believe that brings us to the end of our panel and I think next on our agenda is public comment.

VICE CHAIRMAN BOYD: How about some concluding comments from up here first?

MR. JASKE: Oh, I guess I did not ask that. Questions from the --

COMMISSIONER BYRON: Go right ahead, Commissioner.

VICE CHAIRMAN BOYD: I am struggling. When I look at the context of this hearing and greenhouse gasses and gas plants, and the report, I am feeling pretty good about the discussion today. But when I reflect on all the discussions we have had about how everything is connected, and how do we get input into decision-making process that takes into account all these other things going on around us, and how do we take into account things that are not law or regulation, but have been suggested, let's say, many times by the energy agencies as good energy policy, but they are not quite in law? How do we get this taken into account? Which gets all the way back to my earlier question about the role of the LTPP and the dialogue we had there, and actually just a few moments ago, Nancy, in

your answer where you said, "Did you bring us what we asked for?" That suddenly -- the light bulb went on a little bit in terms of a real key there for us is what you ask for, and you are guided by the loading order which may or may not be -- well, it is not stale, but it may need some freshening in terms of other things have happened that may affect the way it is written up now, or may need to be added to the list. Maybe that is a way for there to be mutual agreement as to what it is you ask for. And I was listening to Bud trying to describe his process there, and I interpreted it maybe wrong, but you were struggling to, gee, we do not have an LTPP, but we have got this process. I think you have got the better process, quite frankly, in terms of simplicity -- a Board responding to the community, you are smaller and what have you, but you can get the policy down there pretty quick if the Board reflects the community and tells you to do it, and you do it, and it probably incorporates all the things that are in law, and all the things that are in policy that your people debate, that these might be good ideas that should be embraced. I think, of course, there can be POU exceptions to your approach to that, and we will not go there. But then, you know, in the investor-owned utility community where they have to reckon with the PUC and pay some attention to policy that we talk about here, but do

not have as many teeth to enforce, and no offense meant, but in this capitalistic society your Board of Directors has many motivations. You want to be good citizens, you want to reflect what is going on, but we need to make a profit for the stockholders, and so on and so forth. So it suddenly became key to me that what the PUC asks for is very critical, and I guess we have to pay a lot of attention to what it is you ask for and agree -- and debate and try to agree on that you are asking for things that there is fairly universal feeling needed to be asked for because we talked about all these other things today -- once-through cooling, that is a just a regulatory thing that will have to be -- that is easy to put a handle on and everybody can translate that to something. The air quality issue in the South Coast is a little more mushy and harder to deal with in terms of how to deal with it because people are not going to admit, "I can't build this plant yet because I don't know whether I'm going to get offsets or not. So should I jump in with an RFO or not?" And then there are the other things, you know, we talk about a lot, well, T&D improvements could maybe offset generation, and, oh, gee, energy storage -- is that a T&D thing? Or is that a generation substitute thing? And we say storage may be good and, oh, we want to get rid of all those old inefficient plants somehow or another. Is the

profit incentive enough to make sure that decision gets made? Or can we marry it with the once-through cooling, etc. etc. I am just showing you the size of the puzzle that we sit here and look at from up here. And I am sure the PUC does somewhat the same sometimes, but I trust our motivations are pretty much -- pretty similar. Anyway, I am just saying with respect to what we talked about today in this hearing notice, I think we have done a good job in dealing with greenhouse gasses and the role of gas. But when we put it in the context of everything else, it is still a difficult thing, and maybe we have stumbled over a few things that will help us work with our sister agencies in guiding what it is that gets asked for, in the first place, to meet the various goals and objectives. So that is not really a question, unless anybody wants to respond to it. It is just kind of I got a lot and I turned over a lot of mental rocks at the same time, and there are problems under them, as usual.

DR. RYAN: Commissioner Boyd, may I make one --

VICE CHAIRMAN BOYD: Please, please.

DR. RYAN: You know, I have been kind of struggling for the right analogy to describe our agencies' prospective roles in this context and I think maybe I have stumbled on one that at least makes sense to my adult brain, let's see what you think. But when you talk about

sort of when I said, "Did you bring us what we asked for," in a sense, I mean, it is important to remember the point I have been stressing all day long which is that, you know, we really look at the fossil procurement as a residual, you know, how do you comply with it -- have you gone as far as you can on energy efficiency, have you gone as far as you can on RPS, on CHP, and so on and so forth. And if we do, indeed, march down those paths, as we have stated as a matter of policy, and increasingly as a matter of law in California, you know, then for fossil plants, it is really like a game of musical chairs. There are going to be more and more chairs going away. You all, as the permitting agency, do not make chairs; what you do is sort of invite people to the party by giving permits and I guess the view that I have been trying to express today is that, as long as we keep the chairs going away, it does not really matter how many permits you give out because there are only so many chairs they can sit in; if they are left standing up, they do not get to emit. So whether there are 10 extra permits, or 10 permitted plants that never get a contract, or 50 permitted plants that never get a contract, it does not make any difference in terms of the overall emissions because the overall emissions are determined by the number of chairs that are still out there.

VICE CHAIRMAN BOYD: That is a good point, except the agencies are probably incapable of permitting 10 extra chairs.

DR. RYAN: So I understand that also, entirely, but in any event that is kind of how I sort of integrate the whole picture.

MR. BEEBE: And if you do get a project sited, you can sit there forever.

DR. RYAN: No, your chair might go away.

MR. BEEBE: The chair can go away even if you are sitting on it, yeah. And people going forward need to have good clear understanding of what state policy is in regards to that. I mean, you see, rather unbelievable to us, but you see people on the East Coast just now beginning to permit coal plants and to build coal plants, and we hope they are doing that with the full understanding of the fact that it should be a very temporal situation in the world we live in.

COMMISSIONER BYRON: Well, Dr. Jaske, I think we have exhausted this panel and I would like to thank you all very much for being here for the entire day and providing input. It is a subject that we will need to revisit some more. I think we have got some public comments to follow and that will be the finish. But I would like to thank you and excuse you. I hope you will

stay for the last few minutes. I do not require blue cards. I think the staff does it so we get a sense of how many folks are here to comment, but I always open it up to everyone that wishes to comment. I have one blue card from a gentleman from the Indiana Energy Producers -- no, I am just kidding, it is Mr. Jan Smutny-Jones from the IND Energy Producers.

MR. SMUTNY-JONES: Rushed in from Gary, Indiana. But I do not plan on singing Music Man, which is good for all of you. Thank you very much. I am Jan Smutny-Jones. I am the Executive Director of the California Independent Energy Producers who have been around since about -- not me, personally, but our organization has been around since 1982, and have been deeply involved in a lot of these issues and we are actually early supporters of these from an industry perspective, of AB 32, because we represent basically 80 percent of the renewables here in California, as well as a large portion of the gas lead with the expectation that natural gas, of course, was going to be one of the tools used to have the state address its global climate change goals. And so we are in general agreement with what we have seen in the report. But I wanted to kind of speak today on a couple of things to sort of set how we are looking at this in the longer term and I assume we will be interacting with the Commission maybe at

greater length on this. And the first one of these is sort of to recognize the realities of our resource mix in California, and I do not think this is generally understood by most folks, but the fact of the matter is that we are precluded legally from building any new nuclear power plants, and so that is not in our future. By way of SB 1368, a few years ago, we are largely precluded from purchasing any new coal resources until, of course, they meet the standard that is based on a combined cycle turbine. There does not appear to be a significant amount of large hydro available to the state, either in state or out of state, which pretty much leaves us to energy efficiency, which I do not think anybody is really disputing here, but from a generation perspective, it is renewable and it is gas, and the state does have a 20 percent renewables standard, which we have supported in the past. We have not been able, as a state, to move off of the dial, we are at 11 percent now, we were at 11 percent six years ago, and --

COMMISSIONER BYRON: Actually, we are making a lot of progress earlier, Mr. Smutny-Jones, that the economic downturn will likely significantly improve the numbers.

MR. SMUTNY-JONES: If we can count on tanking the economy permanently, we have solved lots of problems. But I will let you deliver that message to the Governor. We

will be right behind you, Commissioner, do not worry about it. At any rate, you know, we are faced with what we are faced with here. Obviously, the state does have a loading order which I think people generally recognize. But over the last couple of years, we have been deeply troubled by the natural gas suddenly now turning into the new coal. And that is certainly something that has caused us a great deal of concern. Our view of this is that the competitive process here in California has done a lot to clean the system up, that in fact the competitive process, which is generally driven by efficiency in lowering the heat rate, basically commercialized the combined cycle generation that you see today, and has really driven technology in the gas world and elsewhere. So we view the competitive process as being an integral part of all this, and so we need to be very careful as we move forward in terms of determining how all of this fits into our climate change analysis, and needs analysis, and all these other things, and how it affects basically the competitive process. I do not think we want to be determining winners and losers ahead of that schedule by way of a regulatory process, so we are deeply trouble by that. Obviously, and there was a discussion here earlier today on the role of once-through cooling, which this has been a topic of this Commission for 15 years, at least, in terms of retiring a set of

plants that are out there. And if, in fact, the competitive pressure is put on plants, they begin to retire, get backed out, and there is plenty of data that shows that that is actually how the system operates. We obviously run into this priority reserve problem where people seem to believe that we can just automatically back-fill this with renewable resources on land that we cannot develop, and transmission lines that have not been built. So this is a very real problem and a problem of public expectation, again, in terms of what our resource mixes are. So I think it is very clear that natural gas is obviously needed to back out, a significant amount of that out-of-state coal that is out there today, it basically is necessary to integrate, and I think reports suggest that, suggest intermittent resources. Obviously, it is required to provide for local reliability requirements, which I think are very clear. And, as I said earlier, I think as we build newer more efficient gas plants, they back out older less efficient gas plants and that is all for the good. So in kind of summing this all up, I think we are obviously -- we think the report is generally a pretty good cut at the role of natural gas and its impact on climate change. We have generally supported the Commission's observation that we ought to be looking at the impact of the new gas plant and siting on the

overall system, and I just want to leave you with the final thing, that there is a significant number -- I represent all 45 companies and they, you know, they are competitors, they would like to knife each other, and the reality is that they want to build here in California, and we just need a set -- I think people believe that, as California adopted climate change goals, what that meant was that they were going to build new renewables and they were going to basically use gas to back out less efficient not only traditional fossil generation, but coal, as well. And so I think it is very important for this state to continue to send that signal that we are actually looking for people to invest private capital in terms of building the infrastructure here. Thank you.

COMMISSIONER BYRON: Thank you very much. Thanks for your comments. Is there anyone else that would like to comment in general terms, or in response to any of the discussion from the earlier panel? Do we solicit WebEx? Maybe we should go back to that here. You have to raise your hand. Commissioner Boyd, would you like to make any comments?

VICE CHAIRMAN BOYD: I am through, thank you.

COMMISSIONER BYRON: Well, I will be very brief. I am encouraged from this workshop and the comments that we received today, that we may indeed have the right

analysis in front of us and it may serve the purpose for which it is intended. I am a little bit concerned, though, that we did not have some of the parties here that I think could have provided some of the additional, let's say, countervailing argument or points. I think from the order instituting information that we conducted a couple of workshops earlier, we know there are some who argue that there is a threshold of zero for GHG, and that all new power plants are subject to this kind of threshold and analysis. Clearly, we need to balance the law that we have before us in terms of AB 32, with the laws of physics. I appreciate very much the work done by the contractor, the staff, and all those that are here today. I do not think we are done with this subject. We will begin to investigate it on individual power plant siting cases probably in the not too distant future. But I think, for today, this was a very successful workshop. I would like to thank you. And we are adjourned.

(Whereupon, at 3:10 p.m., the workshop was adjourned.)

CERTIFICATE OF REPORTER

I, TAHSHA SANBRAILO, an Electronic Reporter, do hereby certify that I am a disinterested person herein; that I recorded the foregoing California Energy Commission Joint Committee Workshop; that it was thereafter transcribed into typewriting.

I further certify that I am not of counsel or attorney for any of the parties to said workshop, nor in any way interested in outcome of said workshop.

IN WITNESS WHEREOF, I have hereunto set my hand this 1 day of July, 2009.

Barbara Little

Barbara little