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CALIFORNIA ENERGY COMMISSION

IEPR COMMISSIONER WORKSHOP

In the Matter of:	)	Docket No. 15-IEPR-03
Workshop on the Draft AB 1257	)	and 15-IEPR-04
Natural Gas Act Report and the	)	
Revised Natural Gas Modeling	)	
Results and Outlook	)	
	)	

CALIFORNIA ENERGY COMMISSION

1516 NINTH STREET

SACRAMENTO, CALIFORNIA

MONDAY, SEPTEMBER 21, 2015

10:00 A.M.

Reported by:

Kent O'Dell

APPEARANCES

COMMISSIONERS PRESENT

Robert Weisenmiller, Chair, California Energy Commission, Ex Officio Member

Andrew McAllister, Lead Commissioner, IEPR Committee

CEC STAFF PRESENT

Heather Raitt

Catherine Elder

Rachel MacDonald

Ivin Rhyne

PRESENTERS

Rachel MacDonald, California Energy Commission, Energy Assessments Division, Supply Analysis Office

Anthony Dixon, California Energy Commission, Supply Analysis Office

Leon Brathwaite, California Energy Commission, Natural Gas Unit, Supply Analysis Office

PUBLIC COMMENT

Julia Levon, Bioenergy Association of California

Alison Smith, Southern California Gas Company

Ryan Kenny, Clean Energy

Scott Wilder, Southern California Gas Company

Tim Carmichael, California Natural Gas Vehicle Coalition

Tim Tutt, Sacramento Municipal Utility District

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P R O C E E D I N G S

10:07 A.M.

SACRAMENTO, CALIFORNIA, MONDAY, SEPTEMBER 21, 2015

(The meeting commenced at 10:07 a.m.)

COMMISSIONER MCALLISTER: All right. Well, thanks for being with us today. Sparse crowd, but very knowledgeable.

And my name is Andrew McAllister, Lead Commissioner on this year's IEPR, and happy to be getting the latest update on the natural gas modeling for the forecast, and also the AB 1257 update which is sort of an added task for this round. And looking forward to sort of how that's coming -- understanding how that's coming along. I'm sure there will be some ideas throughout the day for how we can package that in a way that makes the most sense.

Happy to share the dais with Chair Weisenmiller, so with that -- who is the lead on Natural Gas. And with that I'll pass it -- the microphone to him.

CHAIR WEISENMILLER: Yeah. I wanted to thank everyone for being here today, and for the kickoff on the Natural Gas Workshop. You know, I want to, of course, remind everyone that at this point natural gas is our marginal fuel, particular in the power sector. It provides a lot of flexibility as we go through droughts or potentially El Nino next year. But we still have the fundamental issues of trying to make sure -- really threshold issues, A, the safety of the natural gas pipeline system has been resolved, and B, that we really have put in place sort of a tight system to deal with leakage from the natural gas system. The Board is doing those evaluations and we'll do those regulations hopefully by the end of the year. But anyway, both of those are real thresholds.

And as we go through our research and this activity, again trying to understand how to make sure particularly that the system is safe with that, let's kick off the workshop.

COMMISSIONER MCALLISTER: I want to -- I want to bring up one more issue, and I guess this is something that I'm struggling with. And I feel like the discussion sort of needs to move a little bit more apace with respect to the longer term; right? So we're faced with making investments in various infrastructures, electric and natural gas over the near term, that actually will have some long-term implications as well. I'm thinking more on the -- well, really on the -- on the bulk generation side, as well as on the retail side. I tend to think more on the retail side, but really both are important.

And so as we look to 2030, as we look beyond 2030 and we start to count the carbon molecules, you know, natural gas certainly is, you know, in terms of fossil is low carbon. But if we're really looking at 80 percent below 1990 by 2050, the ability to utilize fossil at all, including natural gas, either in bulk power -- well, really both bulk power and -- and end uses, we have to be much more judicious about that and some of the investments that get made. In the near term, you know, we may be around by 2050. Certainly as we -- on the retail side we have a little more time because those devices tend to be not quite as long lived as a power plant. But still we need to do the technology development for creating options that are low carbon, either with biogas, retail biogas, or, you know, shift toward electrification. And I think the -- the jury is really out on what the pathway is going to look like in terms of cost-effective technologies that people can actually implement.

So natural gas, you know, there's much -- we sort of still think of, I think as a transition fuel, in a way, toward a low-carbon future. But I think increasingly that looks a little bit reductive, and so we need to sort of unpack that and figure out what the means in specific terms. And so this is not necessarily to load this workshop with solving that problem. But I do think we need to get that on the table for a longer-term discussion, really across agencies and at the policy level, as well. But there's a lot of technology that’s involved in getting there, so I kind of wanted to just bring that up and make sure it was on the table.

So with that I’ll pass it back to Heather so we can get going.

MS. RAITT: All right. Good morning. I’ll just briefly go over the housekeeping items.

If there’s an emergency and we need to evacuate the building, please follow Staff to Roosevelt Park which is across the street diagonal to the building.

Our workshop is being broadcast through our WebEx conferencing system, and parties should be aware that you’re being recorded. We’ll post an audio recording on the Energy Commission’s website in a few days, and a written transcript in about a month.

Today we have three presentations from Energy Commission staff. There will be an opportunity for public comment after Rachel McDonald’s presentation on the AB -- Draft AB 1257 Natural Gas Act Report.

Then we have a slight change in the agenda. We’ll have Anthony Dixon present on the natural gas outlook before Leon Brathwaite’s presentation on modeling results. And there will be an opportunity for -- a second opportunity for public comments after Leon’s presentation.

We’re asking parties to limit comments to three minutes. If you're in the room and want to make a comment, please go ahead and fill out a blue card and give it to me. For those who are on -- the WebEx participants, please use the chat function to tell our WebEx coordinator that you'd like to make a comment during the public comment period, and we'll either relay your comment or open the line at the appropriate time. For phone-in only participants, we'll open your lines at the end.

Materials for the meeting are available at the entrance to the hearing. And written comments are welcome and due on October 1st. And the instructions for submitting comments are in the notice for the workshop.

And with that, if we're ready we can just go ahead and hear from Rachel.

MS. MACDONALD: Thank you, Heather. Okay.

Good morning, Chair Weisenmiller, Commissioner McAllister. My name is Rachel McDonald. I'm with the Supply Analysis Office in the Energy Assessments Division. And today I'm going to give an overview of the Draft AB 1257 Natural Gas Act Report. Comments are welcome, as Heather had indicated, at the end of the presentation, as well as written comments that are due October 1st. And this report is in reference to Assembly Bill 1257 that requires the Energy Commission to identify strategies to maximize the benefits of natural gas an energy source.

And I'll caveat this with the fact that it was a multi-division collaboration between the Efficiency Division, the Electricity Analysis Division, Transportation, Research and Development, as well as coordinating with stakeholders from past workshops as -- and other agencies like the ARB. And present in the audience are quite a few of the chapter authors. So we'll -- if we have questions we'll certainly be referring to technical experts.

So for Chapter 1, it's an Introduction. It's to the things that were addressed in the report. We have the infrastructure, pipeline safety, natural gas generation, combined heat and power CHP, transportation, efficiency as far as heating and cooling, water heating, and appliances, leading into ZNE, the zero net energy buildings, and then biogas and biomethane, and last but not least, fugitive emissions, methane leakage from infrastructure.

So going into Chapter 2, primarily Pipeline Safety and Natural Gas Infrastructure. There's quite a bit of legislation addressing pipeline safety underway with the CPUC and the utilities. The Energy Commission does support this with research and development. And there's quite a bit of activity as far as plans that the IOUs had to submit as far as pipeline safety and infrastructure changes that they're making as far as replacement and inspection programs.

Another infrastructure issue is the southern system minimum. That has to do with the flow requirements through the southern region of California’s SoCalGas area, as well as it serves part of San Diego Gas and Electric as well. The issue is that it’s a very constrained area. It’s isolated. It has limited interconnection and not -- it doesn’t have gas storage.

And so the challenges that are occurring have to do with meeting demand. And it didn’t help having San Onofre going offline as well. That increased the curtailment issues. And as a result, SoCalGas was allowed to make a purchase or make -- make-up gas purchases so where they could buy in frequent small amounts. This was meant to be something temporary, except that what occurred was quite -- quite a few purchases, I believe over 80 purchases in a year -- a year’s time.

This actually is just a graphic showing the red circle, that southern area there with the border of Mexico.

And as a result of those make-up purchases, So Cal put forward an application with the CPUC for the North-South Pipeline. That’s 60 miles of pipeline capacity that they’re proposing to help address the limitations in that area. As well, there have been other projects put forward by Transwestern, TransCanada, and Kinder Morgan that are arguing alternatives, possibly lower costs, possibly faster.

These hearings were heard at the CPUC. And the CPUC is expected to issue a decision by the end of this year.

So one of -- the key takeaway from pipeline safety and natural gas infrastructure was that we need greater transparency and data exchanges between the utilities and all of the state agencies and research bodies that are doing research. It needs to be quite a bit more open and have access to utility data.

We need additional analysis, for example, some repeat conditions. I think the focus is primarily on winter. We need to look a summer peak conditions and curtailments that are occurring during these times, as well. And then lastly, as far as pipeline safety goes we need continued public outreach regarding natural gas safety and infrastructure. And I'll say that, for example, is for diggings, calling the 811. That's one of the most common causes of actual pipeline failure is individuals on private property digging into the ground and causing leaks.

For Chapter 3, going into Natural Gas Generation, the discussion of natural gas generation in California, roughly 40 percent of California's natural gas is from -- is used for generation. Statewide versus national, we obviously have high policy expectations as we move towards renewables. But on a federal level they are looking to reduce the national dependence on coal. And that would be under the Mercury and Air Toxics Standards, as well as the Clean Power Plan. And what that is expected to do is put pressure on natural gas demand in California, even though it primarily effects out-of-state generation. So we need to ensure adequate gas delivery of California natural gas in high-load conditions.

This leads to the reliance and the interaction of natural gas generation and renewables with our goals that we have in California. In 2013, about 21 percent of retail electricity sales were from renewables. Our renewables primarily being wind and solar which is an intermittent resource, and it can vary hour by hour, minute by minute. We've certainly heard from utilities as far as cloud coverage goes and the issues with intermittency and power quality.

Our California Independent System Operator, they have to have enough dispatchable natural gas resources to address the variation from renewables, because we use natural gas primarily to meet reliability needs and ancillary services.

So one of the things that natural -- the operators do of natural gas infrastructure is to meet the conditions as they kind of hedge their actions with either line packing, which is packing the gas in to hold in more gas, the molecules closer together to not exceed the maximum allowable operating pressure. And then the opposite of that is drafting where there's not enough gas in there and it pulls forward to where the demand goes when they need it. The downside of drafting is you can have loss of pressure. But those are two things that system operators do to try to deal with intermittent issues and daily operations. We need to understand these general practices better.

Going into Chapter 4 with Combined Heat and Power in Natural Gas, there's quite a bit of policy direction in regards to CHP and the actual goals that we have for the state. We have roughly 8,500 to 9,000 megawatts currently installed, I believe. We have goals for 4,000 megawatts of installed CHP by 2020. The Governor's Clean Job Plan called for another 6,500 megawatts by 2030. And then there is a CPUC settlement that ordered the IOUs to procure 3,000 megawatts of CHP.

But we still, despite all this policy, we still have quite a bit of lack of movement in the area of new installed CHP. And that is due to economic barriers like non-bypassable charges, standby charges. Grid interconnection is always challenging. And a culmination of these challenges leads to contract difficulties.

Research is needed to better understand the cost benefits, the overall infrastructure costs and operations, and then the regulatory market framework that will help derive the true value of CHP because, as you can see from the slides before, we have quite a bit of policy for it. But I believe at this time there's very little movement as far as CHP projects and the pipeline and moving forward to meeting those goals.

Chapter 5, Natural Gas and Transportation. Transportation accounts for about 36 percent of the state's overall greenhouse gas emissions. There obviously are natural gas vehicles on the market with low-NOx engines that use natural gas or biomethane. Most of these vehicles that we're familiar with are in fleet services in the medium- and heavy-duty sector, like busses you see going down the street. I know UPS, for example, has quite a bit of CNG vehicles. A challenge to natural gas transportation is the lack of fueling infrastructure. It's obviously a barrier to greater overall market deployment.

Research; the Energy Commission does have research, a very active Transportation Research Group. And we will continue to support the ARB's low-carbon fuel standard intensity values.

Expand -- one of the things we're looking at is expanding natural gas and biomethane fueling infrastructure challenges, understanding the methane leakage that comes from infrastructure, which we'll also talk about later in Chapter 9 as far as overall infrastructure and methane leakage, and developing and demonstrating functionality of new technologies with larger natural gas engines, better understanding and quantification of the impacts of natural gas vehicles on the environment.

Going into Chapter 6, this is Natural Gas and Efficiency Applications, this leads itself, I believe, into the ZNE policy which is the next chapter. Here at the Energy Commission, right now we have a strong movement under AB 758. This is our energy efficiency in regards to existing residential and non-residential buildings. We just finalized our action plan, and that includes prioritizing the strategies and approaches to double the rate of efficiency savings in buildings by 2030. And part of that was recognizing the importance and movement to better understanding natural gas efficiency.

So California's households and small businesses make up about one-third of overall natural gas usage for residential applications. This is primarily used for space and water heating. It looks like about 49 percent of that is for water heating. Of that, 95 percent is water storage -- storage tanks, hot water heaters.

And then for space heating, about 70 percent overall of California homes are heated with natural gas. And of that, homes that actually have natural gas hookup, 90 percent of those homes use gas for heating. The other portion is gas in commercial process loads, like water heating for cooking, for industrial processes.

And then there’s the industrial sector that’s about another 25 percent. And the industrial sector definitely has a lot of opportunities for improvement as far as efficiency opportunities.

Research in the efficiency area is needed to understand cost effectiveness as far as switching technologies. For example, a natural gas water heater versus switching out -- you know, electrifying to use solar thermal. We need to understand life cycle and longevity infrastructure and developed methodologies to better value the natural gas versus the electrification and the cost associated with that. Developing technologies, smart appliances that are more efficient, and while we reduce the equipment costs as far as -- and, as well, lowering emissions. And again, improving space heating and cooling technologies and improving efficiency overall.

Chapter 7, Natural Gas Applications for Zero Net Energy Buildings. Moving into the subject of ZNE is one that we believe ZNE buildings, industry-wide there’s quite a bit of difference of opinion on what ZNE is. And our understanding and our explanation of it was that ZNE buildings have high levels of energy efficiency for both the structure and appliances. And that’s combined with clean renewable power generation, in most cases for applications that would be solar.

So one of the main challenges for ZNE is the uncertainty and lack of clarity regarding the overall definition and/or application of a ZNE building. That's something that we need to continue to explore and better understand the end use natural gas applications as we move toward -- to electrifying our homes and businesses throughout the state.

Chapter 8, Biogas and Biomethane. Biogas in itself is raw untreated gas that's produced during the anaerobic decomposition of biomass, and it's composed mostly of methane and carbon dioxide. And biomethane is the actual treated product of biogas, where that carbon dioxide and other contaminants are removed. So some good examples of biogas would be dairies, landfills, wastewater treatment facilities. Also there's a few chicken/poultry farms, I understand, that qualify.

There is policy and legislation applying to allowing this biomethane to be injected into the natural gas infrastructure. That's something that's currently underway with the proceeding, as well, at the CPUC. However, challenges to actual deployment and usage of that resource of biogas is limited or has constraints. And that biogas does contain -- before it's -- it's biomethane you have to remove the contaminants which are -- might be, for example, ammonia, mercury, hydrogen.

There's regulatory uncertainty as far as -- similar to CHP where they have, due to some of the challenges with interconnection and locational constraints, then there's challenges securing long-term contracts. And then locationally, obviously like dairies, for example, a lot of these projects, ideal projects where the biogas or the resources present is not, other than being load serving, it would be more difficult to interconnect due to the isolated areas. And then some locations, because of those areas, might not have enough gas regionally to allow that blending. So as a result a lot of times economically it's not feasible to interconnect the -- and utilize that biomethane because it ends up penciling out that natural gas is more affordable.

Moving into Chapter 9, Greenhouse Gas Emissions, this is primarily methane emissions. The primary source of Co2 emission in California is from combustion, from power plants, appliances, industrial processes, and vehicles. We do recognize that natural gas is necessary for these applications here in California. And we see that it's certainly a better option and a shift away from higher GHG, fuels like coal or gasoline or diesel.

Methane, which is primarily what natural gas is made of, is highly potent, short lived GHG. It's the second most prevalent GHG emitted in California, Co2 being primary.

The -- about 95 percent of the natural gas production that we import is located out of state. And we have -- as a result of all that infrastructure, we are aware of unintentional releases known as fugitive emissions that are coming from multiple sources within the natural gas infrastructure. Those sources might be leaking pipelines, flange seals, compressors, abandoned wells, or just poor operation with inefficient combustion.

At a federal level we have several policies looking to improve our emissions. We have President Obama's Climate Action Plan. In California we have significant and specific policy to address the short-lived climate pollutants, SLCPs they're called. We have Senate Bill 1371, that's the CPUC and the ARB are developing rules to reduce emissions from gas transmission and distribution pipeline, infrastructure primarily, as well as Senate Bill 605, that's with the ARB Developing Strategies. By the end of this year this year that will -- looking to further reduce fugitive emissions -- short-lived climate pollutant emissions, excuse me.

Challenges that we have in this area primarily have to do with measurement and sampling bias. Quantifying super emitters; those are actually locations that have extremely high emissions or leakage. And attributing emissions' values between oil and gas sectors.

Research to reduce the uncertainty of estimating methane emissions, there's quite a bit of research in this area, and in this report. Overall, a theme being that there was a bit of uncertainty, certainly a great need for additional research, and as well as our continued collaboration with our sister agencies, like the ARB. We need to bring convergence between the methodologies in which we do this analysis. There's differences between one approach being top down, bottom up, and great differences in the results. Improving the allocation methods of oil and gas emissions. Improving the overall data and the methods that we have as far as our research studies.

And then there's opportunity, and this actually is being used in pipeline safety, as well, but there's application for early detection as far as infrastructure leakage goes. So it's double -- double use in pipeline safety and leakage in general for emissions. And that is the use of technologies like Picarro, which is the vehicle mounted sensor system that PG&E is deploying, and Pathfinder which is a tool that evaluates and does analysis on aging infrastructure. And overall we need to better understand the technologies so that we can understand the cost benefit of -- of known emission sources and what is out there leaking and how to quantify it.

So I encourage everyone to -- that was just kind of a takeaway from the chapters. The report is obviously much more detailed. I encourage everyone to please read the report. Contact me with questions. This is a draft. We're certainly taking comments and working with stakeholders. And there's the link here to the documents. You can submit comments in writing. You can also submit them via email. And if you have any questions, this presentation is posted online. My contact information is on there, as well. I encourage any questions or any comments or anything you want to talk about, you certainly can contact me and I'll do my best to help.

So with that, I thank you for listening. And I open the floor to any comments.

CHAIR WEISENMILLER: Yeah. Great. Let me start with a couple questions or comments.

The first one is, do we have -- we had an earlier presentation from EDF on their family of studies. Do you have a sense of when their research is going to be completed? Obviously, it's -- it's a little bit slower than I think we had hoped.

MS. MACDONALD: Yes, Chair. The EDF study is actually cited that were in the report, that we're awaiting the results. I believe they were due as of recent. And they're supposed to be due -- it's supposed to be out any day. They were supposed to be out -- I believe the study was supposed to be completed over the summer. And then they've delayed it to the fall, and it's expected to be published soon is what I keep reading and hearing, end of the year.

CHAIR WEISENMILLER: Yeah. Anyway, no, we've obviously been hoping for the 1257 report to get to the results of the EDF study to build into that.

I was also going to note something where the staff should pin down more of the facts. But yesterday at 11:53 in SDG&E a generator tripped offline that caused the transmission lines to start becoming overloaded. And at 1:00 some of the lines were shut down and power interrupted. That was about 150 megawatts of power interrupted at SDG&E. And basically load returned fully at 2:59 p.m. So -- and obviously this was a high-load time there. Under the ISO tariffs my understanding is they can't disclose the operation of specific power plants, so I guess we're left guessing which plant tripped offline. But anyway, it would be good to build that in, that, you know, there are consequences.

I think one of the things I wanted to, as we dig into, get a better understanding of sort of the research needs area. Then I think we need to get a lot more specific. I would note that California has the distinction of having the first terrorist attack on a power infrastructure at Metcalf. There may have been a second one since then. And obviously gas facilities are a lot easier to identify. And so my understanding from the utilities is there are efforts to harden the gas system. But I think as we get into the information flows we have to be sensitive too. We're in a different world now.

I think the other question -- so basically as we dive into that I think I sort of want to understand between the utilities and the researchers exactly what we're talking about in terms of data and that -- make sure we're not getting into whatever.

I think on CHP the one area I would like to see more investigation on is sort of cleaner combinations of CHP. I think the Germans are doing grant programs now for CHP with fuel cells. And you mentioned solar thermal. And again, certainly UC Merced has done a lot of great research on high temperature solar thermal. But the reality is we have sites that have both high electric and high thermal needs. The electricity can come from PV. But if you do PV with an old boiler it's not going to be particularly great from an air quality or greenhouse gas emission site.

So, you know, that gets you back to -- that's the reason why originally we were doing more gas-fired CHP. But it would be good to understand some of the cleaner technology options there, too, along -- along with the gas-fired.

I would note, peaker gen gas-fired CHP projects which have lower emissions than fuel cells. You know, in fact there's one -- we've funded those, and there's one in operation at the South Coast right now. So in terms of just trying to understand what people need for particular industrial sites.

My last comment was I would note on this whole biogas side, PG&E got out of the gathering system business in the '80s for a variety of reasons. It's pretty hard to imagine they want to get back into that. I don't know if anyone ever really picked up that opportunity. But -- Katy's nodding her head, no, remembering the same thing. It was definitely one of those get out of Dodge, and not a great business to be in. So anyway, that's sort of a new opportunity for business lines, but certainly it's not a particularly great business line.

Anyway, Commissioner McAllister?

MS. MACDONALD: Yeah. Just a couple things.

On that last comment, I mean, so does that mean we go electrification. And, you know, the biogas, I guess it seems like an opportunity we've got to revisit given that the policy landscape and kind of the -- the imperatives have changed since back then. And hopefully -- I mean, obviously, the utility kind of leading the pack by necessity is So Cal and the Semper Utilities. But, you know, obviously very relevant for PG&E as well. And again, I mean, that's -- we have to figure out what the potential scale of that is and see if we can technologies in that make it doable at a relatively low cost. And then we've got this sunk infrastructure. You know, the best option would be to take advantage of it.

I guess so on the CHP, I really just have a question, and maybe it's more for the Chair, I'm not sure. But you know, there -- so there are great technologies coming up. We can move over to renewables. I guess what are the remaining barriers, you know, to getting those projects on the ground? I mean, we're not seeing a huge amount of ramping up of CHP. And the legacy ones are kind of winding down a bit. So you know, what's the sort of market play to really try to --

CHAIR WEISENMILLER: It's probably a --

COMMISSIONER MCALLISTER: -- chart a path through them?

CHAIR WEISENMILLER: -- two-by-four to the utility foreheads. They -- they have sort of a genetic inclination that, you know, if they can go home and kill a co-gen project they can put -- chalk it up as a success.

COMMISSIONER MCALLISTER: Uh-huh.

CHAIR WEISENMILLER: Yeah.

COMMISSIONER MCALLISTER: And so it's -- that's interconnection, that's, you know --

CHAIR WEISENMILLER: Interconnect.

COMMISSIONER MCALLISTER: -- some other concerns --

CHAIR WEISENMILLER: That's offsets.

COMMISSIONER MCALLISTER: -- that's --

CHAIR WEISENMILLER: That's contracts.

COMMISSIONER MCALLISTER: You know, so --

CHAIR WEISENMILLER: That's the whole nine yards. Yeah.

COMMISSIONER MCALLISTER: Yeah. Yeah. So I mean, I think as we've got all this great technology potential there's a big wedge of clean energy that we could put in place that's kind of not being realized. So you know, maybe it becomes a political question as well. I mean, the governor obviously has elevated it to the highest level.

CHAIR WEISENMILLER: The governor has elevated it. I mean, in Brown 1 it took literally penalties to the shareholders at PG&E and Edison for them to get off the dime.

COMMISSIONER MCALLISTER: Uh-huh.

CHAIR WEISENMILLER: We may be back at that same point.

COMMISSIONER MCALLISTER: So let's -- let's try to make sure that that -- at least this discussion is fully fleshed out in the -- in the report and in the IEPR, for sure.

So -- and then I guess it really is a question of the sort of potential. You know, being more of an electric person, I mean, I'm a novice on natural gas, obviously. But I guess I'm wondering about the parallels of packing and drafting.

And maybe this is for Katy, but, you know, how much flexibility do the utilities have? You know, in their electric side we think of voltage. You know, there's -- there's a fairly wide range of voltage. You can do conservation voltage reduction. You can things like that. And I guess I'm wondering what the -- how much flexibility it actually gives the utilities for playing with that infrastructure in terms of the service quality that they have to maintain.

CHAIR WEISENMILLER: Well, I'd like Katy to chime in.

But I would note, one of the other issues that's really been in place the last year or two is the safety tests on the pipelines. You know, and basically what you do is flush them, you clean them, and then you do the water testing. And so one of the issues we were running into this summer is there's a major line in So Cal which is going to be -- which has been out for months, which, you know, once you start the safety test it's not like you can say, oh, by the way, there's a peak today, can you start flowing gas in it again? So as we're going through this piece by piece through the system on the safety checks, that's certainly influenced -- there's been operational implications.

COMMISSIONER MCALLISTER: So where -- where, I guess, where do the failures tend to come? Are they on the sort of demand side or on they on the transmission side? I mean, you know, if you really want to pack and you get that pressure up, you know, what -- what's your -- what's you're most specific highest vulnerability, I guess is the question?

CHAIR WEISENMILLER: Yeah. Why don't you come up, Katy.

I mean, but obviously I would -- I would note that an issue on San Bruno was they did pack.

COMMISSIONER MCALLISTER: Uh-huh.

CHAIR WEISENMILLER: You know, so you -- when you do take the pressure up you need to make sure you're not --

COMMISSIONER MCALLISTER: You're not --

CHAIR WEISENMILLER: -- yeah --

COMMISSIONER MCALLISTER: -- overstressing the system.

CHAIR WEISENMILLER: -- you're not overstressing or not taking any parts of it up above its rated level.

COMMISSIONER MCALLISTER: Yeah. I mean, it's -- all it takes is that one -- that one weak link; right?

MS. ELDER: So I actually have given Chair Weisenmiller's note about what happened yesterday in San Diego. I was pulling up the operational numbers for both Sempra and PG&E to see if everything looked okay. It does look like tomorrow Sempra is projecting demand of its system of -- of over 3 BCF per day, which gets you back to that really high level that we saw early in the year with the curtailments.

Today it looks okay. It's about -- it's about 2.9 BCF.

But one of the things that the -- that PG&E posts, Sempra doesn't post if yet, is the inventory level, which goes to the pack and draft question. And so on the PG&E system it's about 10 percent, about 400 MMCF per day, swaying morning to evening that they can tolerate in the system.

What's less than clear and what we've not really been able to get really precise about in terms of analysis is what does that mean for an individual power project. And that's where you get into needing to be able to do that hydraulic analysis at the pipeline/power plant level. And we don't have the data. We, as staff, and public entities don't have the data to do that. Only the utilities do.

COMMISSIONER MCALLISTER: So I mean, we were talking -- well, you know, there are analog -- all of these big infrastructures are either electricity, water or natural gas. You know, they've got specific characteristics. And -- that are -- but there are some parallels; right?

So in terms of monitoring and control, you know, you can envision some analogs with the electric system where you do have, you know, voltage regulation at specific points. Well, you can have those sorts of, you know, automated controls, you know, shut off valves and --

MS. ELDER: Right.

COMMISSIONER MCALLISTER: -- for safety purposes. Just like you have loss reduction in electric utility, you know, you have sort of that -- that fairly robust and quick response kind of control of a natural gas utilities. And I'm wondering sort of are there projects to bring the level of that, sort of not just monitoring? I know that -- I know that they monitor. Actually, I mean, PG&E has got the great new facility there to really look hard at their natural gas system in specific details.

But, you know, bringing it up to snuff in terms of quick response to system failures at -- at distribution transmission, various levels, I guess what -- what's the status of that project at the utilities?

MS. ELDER: I haven't heard of projects like that.

One of the things that we've noodled with or toyed with is say if you had a power project that was really critical, could you build some sort of above-ground gas storage facility that could give you a few hours or even a day's worth of gas? It would be expensive probably, and that's why it's never been done before. But if you think back to the old gas holders that we used to have on the distribution system that we took -- we got rid of because we didn't think we needed them anymore, maybe something like that could make sense.

On the other hand, it could be that with all the other things that we can do with demand response on the electricity side, it's really more of an electricity issue, will electricity storage help us solve this problem? I keep hoping it's an electricity-system solution, not a gas-system solution, because I know how expensive it is --

COMMISSIONER MCALLISTER: Yeah.

MS. ELDER: -- to do the gas system. And I know how slowly gas moves. I mean, that's sort of the critical thing. Gas on a good day moves at about 30 miles an hour.

COMMISSIONER MCALLISTER: Uh-huh. I guess I'm thinking sort of, you know, if you had a relatively new line that's serving a particular area, well, you could pack that --

MS. ELDER: Yeah.

COMMISSIONER MCALLISTER: -- even if you didn't want to pack the transmission pipeline that was older that fed it. And so to do that you'd need, you know, you'd need specific -- you know, you'd need pressurization stations that were more localized and distributed --

MS. ELDER: Right.

COMMISSIONER MCALLISTER: -- and things like that. So there are some in analogs, but I'm probably limited in my thinking by those because, you know, I'm kind of thinking in parallels with the electric system.

CHAIR WEISENMILLER: Well, I think, again another thing -- another type of parallel is there are different -- well, obviously, the gas system, you have the high pressure lines, and then you go down to lower pressure.

COMMISSIONER MCALLISTER: Right.

CHAIR WEISENMILLER: And I assume the higher pressure, you've got more swing, and the lower pressure, again, is sort of older, less understood, and probably a little nervous, more nervous about running high pressures on some of that.

MS. ELDER: And so one of the things, if you think about how you would study this in a hydraulic model, you'd be looking at not only where your high -- high pressure transmission lines are, but then the distribution feeder mains that come off that, and this -- all the different end uses that are fed off that line are going to affect the pressure in the line going to that power plant. And that's why it gets so complex is that the level of granularity needed to measure those pressure flows is incredibly complex. And that's one of the reasons why only the utilities have that data.

COMMISSIONER MCALLISTER: Yeah. Okay.

CHAIR WEISENMILLER: Yeah. My footnote was I remember back in the old original Mojave days that they hired Purvin & Gertz. And Purvin & Gertz used the -- the data, pipeline data that's filed at FERC to do studies of the flow capacity --

MS. ELDER: Yeah.

CHAIR WEISENMILLER: -- of the California system.

So I'm assuming somewhere the data lives, and the question is access.

MS. ELDER: Yeah. Yeah. And, in fact, I have noticed that if you file an application for a pipeline at FERC, you have to provide the -- the hydraulic data along with that pipeline application. It's not clear that FERC will release that to anyone. So it will be interesting to recall how Purvin & Gertz got the data.

CHAIR WEISENMILLER: I suspect that -- well, I know that PG&E and SoCalGas intervened in their pipeline case at FERC. And I would anticipate that SCAD (phonetic) and ARPS (phonetic) --

MS. ELDER: Yeah.

CHAIR WEISENMILLER: -- would have been very happy --

MS. ELDER: Yeah.

CHAIR WEISENMILLER: -- to do a data request for it from them.

MS. ELDER: Yeah. Yeah.

COMMISSIONER MCALLISTER: Okay. Thanks a lot. I appreciate it, Katy. Yeah.

I guess really just a comment on the biogas front. It really seems like the -- we've got to do more to flesh out that opportunity to see how much carbon we can -- we can displace with biogas. So just trying to keep that on the table for some kind of a long-term project.

I mean, do we -- do -- we have contemplated doing, you know, sort of a biogas action plan?

CHAIR WEISENMILLER: Oh, god, there was one already, a Bioenergy Action Plan --

COMMISSIONER MCALLISTER: Oh, all right.

CHAIR WEISENMILLER: -- that was done.

COMMISSIONER MCALLISTER: Okay. That was -- that was a little while back. I mean, in the -- in the pathway study we did look at bioenergy. Unfortunately, that was one of the weaker elements where we had an industry study which, everyone admitted, it was over the top of potential, and we used that.

COMMISSIONER MCALLISTER: Yeah. The 40 percent, that's kind of hanging out there. I guess I still am waiting for details about how that might actually take place and, you know, what -- where those -- where those molecules would actually come from in terms of the physical, you know, the agricultural sector or whatever. But that's seems like a high number. But if it's there, then that would be great. Okay. Great.

Thanks, Rachel.

MS. MACDONALD: Thank you.

Are there comments in the audience at all?

Or, is that you? Sorry, Heather.

MS. RAITT: That's okay. Thanks, Rachel.

I think we have a few blue cards that the Commissioners have.

COMMISSIONER MCALLISTER: Did you want to go to public comment, as the agenda says, sort of morning public comment?

MS. RAITT: Well, that was the way we had set it up. But you are --

COMMISSIONER MCALLISTER: Yeah. That would be fine.

MS. RAITT: -- welcome to change it, if you'd like.

COMMISSIONER MCALLISTER: I think that would be fine. There are three public comments. Let me just call them here.

CHAIR WEISENMILLER: Yeah.

COMMISSIONER MCALLISTER: Okay. Julia Levon from Bioenergy Association.

Hi, Julia.

MS. LEVON: I think you made some of my comments for me. Thank you, Commissioner.

So good morning, Mr. Chairman and Commissioner. Julia Levon with the Bioenergy Association of California.

And, Commissioner McAllister, you did bring up several of the things I wanted to mention. But I'm going to start actually with a really important technical correction to the draft.

Your definition of biogas, which I assume was taken from AB 1900, 2012 legislation by Assemblyman Gatto, actually contradicts your own definition of biogas in the RPS eligibility guidebook. And I would strongly encourage you to use your own definition, which Assemblyman Gatto has also said more recently is the correct definition for biogas generally because it includes not just biogas from anaerobic digestion, but biogas from any conversion method that uses organic waste as the feedstock. That's also consistent with more recent legislation --

CHAIR WEISENMILLER: Could you -- if you have a letter from him --

MS. LEVON: We do.

CHAIR WEISENMILLER: -- if you could support it -- if you would submit it into our record, that would be terrific.

MS. LEVON: I will do that, along with the language from your RPS Eligibility Guidebook, and SB 498, legislation by Senator Lara last year which further elaborated on the definition of biogas.

The reason this is so significant is because more than half of all the eligible organic waste is not suitable for anaerobic digestion. Anaerobic digestion is great for food waste and grass and other non-cellulosic waste. But if we want to get at the massive volume of forest biomass which is critical to reduce wildfire, if we want to get at most of the agricultural waste, and even the majority of the organic waste that we're currently putting in landfills, it's wood waste, it's construction debris, it's prunings, things that are not suitable to anaerobic digestion.

This is really significant because to your point, Commissioner McAllister, about what's really the potential for biogas to replace fossil fuel gas, it is significantly higher if we include all of the organic waste, available waste, and all of the different conversion technologies. That doesn't even include power to gas which is a whole other area of renewable gas that I encourage you to include in the final version of this report.

But biogas alone could provide two-and-a-half billion gasoline gallon equivalents of transportation fuel, or by your own assessment, again from the 2012 Bioenergy Action Plan which as the author of the plan I have to say is horribly out of date at this point, I would encourage you to update it in 2016. I think it's -- it's past time. But that plan found that we could provide 5,000 to 6,000 megawatts of flexible generation renewable power just from technically available organic waste.

So, Commissioner McAllister, to your point, the potential is huge to provide either flexible generation power or the lowest carbon transportation of any kind, and to meet the state's goals to reduce methane from organic waste, and probably even more significantly now, black carbon from wildfire. All of the benefits that we have in reducing black carbon from diesel emissions and cleaning power plants have been obliterated by the increase in catastrophic wildfire in California, and we're seeing the effects of that right now.

COMMISSIONER MCALLISTER: As well as, apparently, the additional unaccounted for emissions for Volkswagen's cars.

MS. LEVON: So the opportunity is huge. I will submit this information in the record. And thank you very much for looking at this.

COMMISSIONER MCALLISTER: Thank you.

Alison Smith from SoCalGas.

MS. SMITH: Good morning and thank you.

Julia already covered some of the biogas issues. But I would also like to add that you've looked in the study at the sources of biogas in California but haven't examined any of the sources that are out of state. And I think that's also important in considering what's the long-term potential to help us greenhouse gas emissions. For example, in the transportation sector the LCFS allows for out-of-state biogas to be brought in and used. And so I think we need to include that area in the report.

Julia also mentioned power-to-gas. And SoCalGas would echo that comment that it's important to add the opportunity for power-to-gas into the report, looking at it as an opportunity for lower carbon natural gas, but also as a way of integrating the electric grid and the natural gas grid in providing long-term storage as we move to more and more renewable electricity.

The other thing that I would like to comment on is, and I think Commissioner Weisenmiller had sort of mentioned this, that we do need to look at prioritizing some of the research that needs to be done. There's a number of things that have been identified. I would concur with Julia Levon's comment that we should update the Bioenergy Action Plan. But there's also items related to CHP and to the development of biogas. And I would like to see the report add in some concrete steps on how we're going to go about evaluating these. These are all things that SoCalGas is interested in and would like to support.

The final area that I'd like to comment on, Commissioner McAllister had brought up ZNE and the long term use of natural gas for residential and commercial. And SoCalGas has been doing studies with Navigant and E3, additional studies with them, that we're just finalizing now. And while they really aren't ready to be included in this report, we think they'll help inform as the Commission starts to look at those policies over the next couple of years to formulate the plan for the 2019 Energy Efficiency Targets. And we think there are some interesting results there about the use of biogas can really help us reduce greenhouse gas emissions more than some of the near term or some of the plans for electrification.

So we're excited about these studies and do want to share them with CEC staff, and we'll be looking to do that over the next few months.

COMMISSIONER MCALLISTER: Great. So if you -- I'm excited to hear about that, as well. And I guess, you know, if you can keep an eye toward the market pathways and the cost effectiveness issue and kind of look out, maybe a little more than you're comfortable with, but help us imagine, you know, what -- what the relative scenarios are between, you know, near-term electrification, potential long-term impacts of that electrification, and sort of similar considerations for gas, I think that would be really helpful.

MS. SMITH: And I will admit that I think we have more work to do on that for our company as well. But those are areas that we definitely want to support the -- the work that CEC is looking to do.

We will be submitting written comments, some extensive written comments on these areas and additional areas that were addressed in the report. And there isn't a lot of time for public comments. We do hope that you'll be able to incorporate as much as the -- of the written comments from the public as possible.

CHAIR WEISENMILLER: Great. One thing that would be useful to talk about in your comments is it’s interesting when you look at the amount of R&D we have through EPIC on the electricity side versus the amount or R&D monies we have for natural gas, it’s really, as you know, much, much smaller. And there was a question about, you know, in fact, I don’t think the electric numbers are high enough but, you know, certainly it’s probably time to have a conversation about whether the gas numbers should be greater. And I think that gets to the question of some of the unmet research needs.

COMMISSIONER MCALLISTER: That’s more -- that becomes a legislative issues; right? Because don’t we have --

MS. SMITH: Or CPUC.

CHAIR WEISENMILLER: It’s the PUC. I think we’ve done enough checking to say that, you know, the legislation basically has a surcharge on gas flows, which includes pipelines in California. And that surcharge, the PUC basically sets the level of the surcharge, or could adjust it up.

MS. SMITH: Thank you.

COMMISSIONER MCALLISTER: Finally, Ryan Kenny.

MR. KENNY: Good morning, Chair Weisenmiller, Commissioner McAllister, thank you for your time. My name is Ryan Kenny. I represent Clean Energy, the nation’s largest provider of natural gas and renewable natural gas transportation fuel. We have over 550 stations nationwide, 154 of which are here in California. And I'd like to briefly comment this morning on Chapter 5, Natural Gas as a Transportation Fuel.

And just reviewing the report, we view it as a positive report. It's a good step in the right direction. We're pleased with the content of it, but we do think it's a little bit conservative. We would like to see a little bit more affirmative statements in regard to both natural gas and natural gas vehicles in the report, including something along -- towards the lines of the state should do more to develop, distribute, and deploy heavy-duty .02 NOx engines. There's nothing else really available right at this time for Class 7 and 8 engines. And we think that going towards -- towards that would be a step in the right direction for the state.

Along those same lines, in the report there isn't -- and then, of course, this isn't the fault of the author, I don't think, but over the last week or so ARB has certified a Cummins Westport .02 NOx engine for Class 7 and 8. And, in fact, it's actually certified at .01, so it beats the optional low-NOx figure.

So we do think that this is a game changer. And we'd like to see this more or less included in the report and a more robust section on maybe improving strategies and recommendations, using that for both natural gas and renewable natural gas.

Just for what it's worth, Cummins Westport does believe that the nine liter should be ready -- well, it's going to be ready in early 2016 after it's been certified. They believe 33,000 units could be possibly produced next year. And then the 12 liter should be ready in 2017.

So like I said, it's a game changer. There are things that can really benefit the state going forward.

Also, I'd like to just reiterate what Alison mentioned. You know, as you know, there are impediments here in California for in-state production of renewable natural gas. And we'd love to see more production but those impediments are cost prohibitive. So we'd love to see more discussion of out-of-state production, as well, and how to use that within the strategies and recommendations going forward.

And also, just for what it's worth, you know, we have 154 stations here in California, as I mentioned, most of which we do provide renewable natural gas as a transportation fuel, just because, you know, we're able to get the LCFS credits and green credits. So we'd love to see more strategies and recommendations regarding renewable natural gas in the report as well.

So those are just our comments. We'll be submitting a comment letter along the same lines, as well, so thank you.

COMMISSIONER MCALLISTER: Thank you for being here.

CHAIR WEISENMILLER: Yeah. Thanks.

Also we have -- Staff hadn't mentioned, but there was obviously the Sustainable Freight Strategy which is kicking off. Basically, goods movement in Southern California is at least 20 percent of the economy, so it's a key resource. And whenever I see Barry Wallerstein's charts of pollutants, certainly that's also a key part or at the top of the scale. You know, it sort of dwarfs the power plant side.

So trying to really come up with ways to keep goods movement viable there, at same time trying to clean up the air, is sort of one of the big challenges of the next decade.

COMMISSIONER MCALLISTER: Okay. Well, thanks.

Let's move on to the next presentation. So that's Anthony Dixon.

MR. DIXON: All right. Good afternoon, Commissioners. Good afternoon everyone. I am Anthony Dixon with the Supply Analysis Office. And today I will be going over our Draft Natural Gas Outlook Report. This is a preview of the major story lines throughout the report. The report should be available in the next two to four weeks. And we will be having stakeholder comments for that, for sure. And we'll be issuing a Notice of Availability when it is ready.

A couple things to note about this year's outlook, it is different from the past outlooks. We will be not addressing as many trends and issues as they are being addressed in the AB 1257 report.

So first look at Henry Hub prices. We do see prices increasing over at our forecast horizon. There will be more detail on this when Leon presents next.

And our price uncertainty, we revamped this a little bit for this year, since the last time. And we do see a range of prices by 2030 ranging anywhere from the high of $9.50 to a low of $2.50.

Some of the changes to this work, we obviously updated with the newer NAMGas numbers. And we dropped three of our forecasts from the report as they were very bias low. That was something that was discussed in the last workshop on this.

Now California, more specific to California, we do see the California main hubs of Malin and Topock trending with the national trend at Henry Hub, even though they are disconnected with each other physically but they are connected in the market. So the Topock is mainly coming from the San Juan basin, and Malin is from the Canadian -- Canada and the Rockies. And more of this will also be discussed in Leon's presentation following mine.

In end-use demand here in California the biggest thing is the forecasts this time are much higher than -- well, they're higher than the last forecast in 2013. This is due to a couple factors. One is the fact that the actuals were higher than what we had forecasted, so it gave us a higher starting point. And then there's also -- and one thing driving down use in the last forecast was a steep price increase that never actually materialized. And then increasing the demand also in the higher growth rates is a higher demand for transportation, for natural gas for transportation.

We do discuss some issues. We do go over some resources and infrastructure issues in ours, it's just we really go over that the legislature, the PUC, and the utilities are all working together along with us to really bring about a new regulatory framework to make sure these pipelines are safe.

And more on our resource infrastructure. We do see an increasing -- excuse me -- increasing resource and expanding resources, which does bring the possibility of exporting LNG. We do have eight approved LNG facilities in the country. But like I said, all of these facilities are outside of California. There are none approved or in the works here in California at this time.

In California storage numbers, we are lining up with our five-year average, which is good because we're coming up on the big draw season. And then for natural gas for power generation is declining across all three IEPR cases here in California, which is different than the rest of the country. The rest of the country sees increasing use of natural gas for power generation due to coal retirements. But here in California we are seeing decreasing use.

And that is all for mine. Any questions, or I guess we'll be going on to the next presentation, so we'll be going on to the next presentation.

CHAIR WEISENMILLER: Well, obviously, I think both of us want to understand much better the fuel price forecast. It seems like we always have that sort of it's coming and it never comes. And so -- but there's going to be more in the next presentation and certainly trying to understand the associated loads with that.

COMMISSIONER MCALLISTER: Yeah. I guess I kind of -- obviously, you know, we talked a little bit about the fact that generation drives much of the demand. And over time, you know, as we look down the road, you know, there are a number of scenarios in terms of like which, how many, where the plants are going to be as, you know, sort of recommissioning or repowering does or doesn't take place, along the coast for the most part and other -- other aged plants. And we're going to continue to see gas consumption go down. The question is sort of what's -- what are the scenarios in the marketplace for, you know, for the various load pockets, etcetera.

So there's obviously a lot -- a lot of overlap between sort of the scenarios that -- for natural gas and those for electricity. Katy kind of referred to that earlier. So I think, you know, some joint work on the electric modeling and the natural gas demand, to dig into that issue and sort of some geographically specific scenarios. Not -- I'm not sort of asking you to do that right now but -- or even necessarily in this IEPR, but sort of a long-term appreciation of the different scenarios for that might be helpful.

CHAIR WEISENMILLER: Yeah. No. I think it's pretty clear that natural gas is the marginal fuel for the power system. But the power system is the marginal loads for the gas system. And even -- well, perhaps I would tend to argue, you know, it's pretty clear that the power loads are going to start -- they're going to keep decreasing even -- and with the repowers it may be more, may be less. But, you know, but it's pretty clear what the broad strokes are.

COMMISSIONER MCALLISTER: Yeah. No. For sure. I guess the -- you know, for a given plant, not that -- not that it's necessarily entirely our job, but to understand sort of, okay, well, how many hours is -- is a plant likely to operate, you know, versus, you know, it could be more or less. And if it's less, then what does that mean for the economics of that and, therefore, for the -- the market structure that might be needed to support some of those plants, or whether they're viable at all.

So I guess I'm really wondering about that more than anything. But in any case, it's all related.

MS. RAITT: Thank you and up next we have Leon Brathwaite.

MR. BRATHWAITE: Good morning, Commissioners, members of the audience. My name is Leon Brathwaite. I work in the Natural Gas Unit in the Supply Analysis Office. So this morning I just want to talk a little bit about the key changes that we have made in our modeling efforts since the preliminary results, or since our preliminary runs. I'll also be talking about some elements of all common cases, the three common cases that we have developed. And we also will be talking about the results, which is probably the main -- my main task this morning. We'll look at demand and supply prices, and any trends that we can discern from our work.

So what were our major activities since the preliminary runs?

Number one, we revised the power generation demand for natural gas in the WECC. Most of that work came from our (inaudible) modeling group. We also incorporated California-specific results from other Energy Commission demand models. Residential, commercial, and industrial demand came from the CED. The transportation demand, which we also have incorporated into our work, came from our transportation model which is housed in the transportation office or the transportation unit.

We also -- excuse me. We also ensured consistency with the U.S. EPA's 111(d) Rule. We verified the coal retirement scenarios that we have constructed, and we verified the Renewable Portfolio Standards' scenarios. Also, there is quite a bit of uncertainty with that rule, so we are trying to deal with that uncertainty in our modeling efforts.

All of these activities so far had to do with demand-side work. We also did one major adjustment on our supply side, and that was we took a harder look at our Canadian supply cost curves. We felt there was a little bit of an issue there. It was definitely producing and supplying too much gas into the Lower 48, so we did adjust those curves and that was incorporated.

As we did in our preliminary work, we developed three scenarios. We have a mid-energy case or mid-demand case. You’ll hear me refer to that as a reference case. We have a low-energy case, a low-demand case. And we have a high-energy or high-demand case.

So these are some of the major inputs that went into our work, into -- into different cases. One minor adjustment I would like you guys to make to this slide, in the -- the very last line where it says “cost environment,” I would like you to switch the location of the words “high” and “low.”

Anyway, the most important thing on this slide is obviously our coal retirement scenarios. In our mid case we retired -- we assumed retirement is going to be around 61 gigawatts. In our low case we assumed 31 gigawatts. And in our high case where we are really assuming some very high, aggressive retirements we assume 121 gigawatts will be retired.

This was a supply cost curve that we have incorporated into the model. Now this particular curve appears nowhere in our model. This is an aggregation of over 400 supply cost curves in various basins and various zones within those basins. As you can see, starting in 2007, going to 2011, 2013, and now we are in 2015, our supply cost curve is shifting to the right. That is technology at work. The expansion of the resource base is occurring. We are having a lot more gas available at lower costs.

So before I get to some of the results I would like to talk a little bit about a blending process that we implemented. So what we did is that we got some data, actually a trade date (phonetic), September 14, 2015, we got this from the NYMEX website, the New York Mercantile Exchange website, and we looked at their price projection, their forward strip. It’s really just a price projection. It’s market information.

So we looked at the price in 2015, 2016, 2017, 2018, and 2019. And we decided after some discussion within the office to blend the NYMEX forecast with our own fundamental forecast. And where we did this was the following: The 2015 and the 2016 NYMEX values became a part of the blended -- the blended forecast as is. Further, for 2017, 2018, and 2019 we took an average of our fundamental forecast and a NYMEX forecast and made that the blended -- the value for the blended forecast.

So what we ended up with was a forecast that reflects both current market information and the fundamental of -- the fundamentals of a forecast that we -- we also have developed.

Now beyond 2019, that is 2020 and beyond, all of those values of the forecast came out of the -- the NAMGas model.

We did equivalent blending for the high case, but we did no blending on the low case. So now let me show you the results of that blend that we did and completed.

As you can see, the high is out of the high -- high demand case. The mid case is all the reference prices, the -- in red. It gives us some prices there that are growing at about 1.8 percent. These are Henry Hub prices that we are looking at. And the low case which was not blended with anything is as it is, growing also at about 1.8 percent.

At the end of all forecasts, by the time we get to 2030 we have the high case showing us prices of a little bit less than $7.00. We have the mid case showing us prices a little bit less than $6.00. And we have the low case showing us prices just about $4.00. Again, all of these are growing between 2020 and 2030, growing at the rate of about 1.8 percent.

If we can take a look -- if we can take a look at U.S. power generation demand, you can see that coal retirements are really pushing demand higher. And this is most evident in the high case, and that is shown as olive in our -- in our -- in this schematic. By the end of the forecast in the high demand case, coal, natural gas demand in the power generation sector is well over 36 BCF per day and growing.

If we can now look at U.S. natural gas production, the highest production in general, we can see that the highest projection -- the highest production is occurring in our low-demand case. Well, that may sound a little bit counterintuitive, but when you think about you can see why. In our low-demand case what we are doing is making Lower 48 production more competitive with Canadian imports.

As a result, we're having a lot more production in the Lower 48, trying to satisfy demand. Now we still do have Canadian imports. The Canadian imports play a very important role in satisfying our demands here in the lower -- in the Lower 48. But because of the fact that we're in a low-cost environment, we now have a lot more production occurring, significant more production occurring in the low -- in our low-demand case.

The reverse is happening in our high-demand case. We have weakened our competitiveness in the high-demand case. Thus, we have seen a lot more Canadian imports occurring in that case. So overall demand is growing and production is growing, reaching over 80 BCF per day by 2030.

How about prices here in California? Well, we looked at two important price points here in California, at

Malin and in Topock. Of course, Malin is in the north, Topock in the south. And the growth rates here are paralleling that of Henry Hub. Now we did do some blending of the prices also here in California. The California prices were also blended with the NYMEX future prices. So we're are seeing growth rates about 18 percent. As we saw with Henry Hub, we are also seeing a similar growth rate with -- with our -- at Malin and at Topock.

How about the differentials? Well, we are seeing two sets of dynamics going on here with our differentials. First, at Malin we are projecting or we are looking at a negative differential throughout our forecast horizon. The reason for that is that at Malin we have gas coming south on GTN. We have gas coming west on Ruby. And these two are colliding at Malin, competing very intensely to satisfy California demand. As a result, it is keeping adding downward pressure to prices, downward pressure, and thus resulting in this negative differential that we are seeing.

Now as to the positive differential at Topock, that's a slightly different dynamic. If you look at a map of the Lower 48 you would see that nearly all of the shale development that we are now seeing that is ongoing in the Lower 48, nearly all of it is occurring in the eastern part of the United States. As a result of that, that is adding more pressure on prices, downward pressure on prices, in the east as compared to the west. As a result, we end up with this positive -- this positive differential that we are now seeing here on this particular schematic.

How about a supply portfolio? How about a supply portfolio for California?

Well, we chose 2025 as a year to demonstrate our point. Now we could have chosen any year. The absolute values would be different but the dynamic would be the same. So mostly California satisfied -- the demand in California satisfied from Malin in the north. But Malin consists of two resource items. We have natural gas coming from Canada and we have natural gas coming from the Rockies. That provides some of our -- our demand requirements. We also have the Rocky Mountains on Kern River, also satisfying some of our demand requirements. And we also have Southwest Gas. We have a variety of pipelines there brining in Southwest Gas. All of these things are flowing into the state to satisfy our demand. In 2025 that’s about five-and-a-half BCF per day.

But the one thing that we should note here is look at our in-state production. When you work it out it’s about two percent of the -- of the demand requirements. And we will see this as a constant all over -- all through our cases. In-state production is declining and has been declining for a few years, and it will continue to do so unless we decide to develop some other resource within the state.

In California overall demand is declining because of the implementation of renewable generation. And if you look at the high case you'll notice that there is virtually no growth, no growth in demand. But if you look at the low case and the mid case or the reference case you will see a distinct decline between about 2015 and about 2025. After the full implementation of the Renewable Portfolio Standard we do see demand creeping back up but they never -- in the low and the mid case it never exceeds a 2015 level.

So the decline rate is occurring at about -- about .6 percent between 2015 and 2026. Overall demand climbs about 5.8 BCF per day by 2030. But that level in our -- in our low and our mid case is below the 2015 level of demand.

Now we just -- I just told you about the decline in demand that is occurring because of the Renewable Portfolio Standard. We see if more evidently here in the power generation sector where each one of our cases, high, mid, and low are all declining because of the implementation of renewable generation. In general, we can say that power generation -- as power generation demand falls, power generation demand falls as renewable generation rises. And this is a phenomena that we expect to continue as the implementation of renewable get into -- into greater -- into greater force here within the state. Now you do see some increase of natural gas demand in this sector at the end of the forecast. But again, it never gets back to the 2015 level.

If we can again look at the supply portfolio across all the cases, in this -- in this schematic you will see that we have Malin represented, the Southwest represented. We also have in-state production. And we do also have Rocky Mountains, I'm sorry, Rocky Mountains represented. And you can see that there's variation across the cases. There's a lot of variation going on at Malin. Malin, of course, is where we have that intense competition between Canadian gas and Rocky Mountain's gas. And that is being reflected by the variation in the supply portfolio.

We chose 2025 as our -- as our year. We can choose another -- we can choose another year. But still, the result will be the same, a lot of -- quite a variation of Malin because of the intense competition occurring at that supply point.

Another important demand for Lower 48 gas comes from Mexico. Mexico has quite a large and growing power generation sector. And demand for natural gas, for U.S. natural gas is becoming quite high. There are several pipelines in the work to facilitate the shipment of gas to the south, to our southern neighbor.

So what we are seeing here is that demand is growing and growing pretty significantly in all cases. It's just following the trend of the historical. In the low -- in the low-demand case, that's -- that's higher than all the other cases. And the reason for that is because development is quite -- gas is cheap, and Mexico is demanding quite a bit of it.

So we're exporting, demand is growing. It reaches a level of four-and-a-half BCF per day in the high case. And by the end of the forecast we see that demand exports -- exports to Mexico have begun to drop -- begun -- begin to drop off. And that is a result of Mexico developing its own resources.

Now this process of developing its own resources begins quite early in the low-demand case. The reason for that is development is relatively inexpensive. So our southern neighbors start the process earlier than in the other two cases.

So what conclusions can we draw from what we have seen here?

Number one, U.S. demand for natural gas grows at a rate of about 1.4 percent between 2015 and 2030, reaching a level of about 84 BCF per day in our reference case. Implementation of renewable -- of renewable suppresses California demand, declining at a rate of about .6 percent between 2015 and 2026 in our reference case. Overall demand does climb back to about 5.8 BCF per day by 2030, but remains below the 2015 level. And we have prices reach about $6.00, 2014 -- using 2014 dollars, $6.00 per MCF by 2030. This represents a growth of about 1.8 percent between 2020 and 2030.

Aggressive coal retirements outside of California contributes to high demand and higher prices. Now remember, those prices will affect here in California because we are connected to the rest of the country, and the rest of the country is connected to the rest of the continent by pipelines, of course.

California production is declining. And across the cases we are just occupying about two percent of the supply portfolio.

We are seeing fluctuations at Malin because of the intense competition between Canadian gas and Rocky's gas. And exports to Mexico are growing, as I just showed you in the schematic, reaching about -- a high of about four-and-a-half BCF per day, and then leveling off, and then beginning to decline.

Well, that brings me to the end of my presentation. I will take any questions from the Chair or from the audience at this point in time. And thank you very much for listening to what I have to say.

COMMISSIONER MCALLISTER: One question. I can't ask questions? I'm just kidding.

I guess I remember last IEPR we -- I mean, this is -- this is a very thankless task, Leon. You know, you get charged with predicting the price trends of natural gas and, you know I feel for you.

MR. BRATHWAITE: Thank you, sir.

COMMISSIONER MCALLISTER: So I guess, you know, part of the -- part of the learning -- or part of the exercise needs to be kind of understanding the underlying dynamics of the price and, well, you know, sort of to the extent we can, open up the crystal ball and sort of polish it up and sort of figure out, okay, well, near term, medium-term, long term, kind of what are the market dynamics.

And I guess I'm wondering, we were sort of chatting, okay, well, you know, in the near term it may be that there's a lot of -- you know, there's -- there's a high elasticity, say, or there's a lot of, you know, supply that's -- that could -- you know, may or may not be exploited, and the price is going to sort of stay down. But at some point that's going to change. And in a relatively short period of time you could have the markets tighten up.

MR. BRATHWAITE: Yeah.

COMMISSIONER MCALLISTER: You could have sort of supply, you know, sort of be -- the low -- the lowest cost supply be exhausted. And in the meantime people have added load, and then you get this tightening, right, so there's slack, and the system kind of goes away. And that happens over a relatively short period. So the -- you know, when you do modeling you're sort of -- you have to make some assumptions. And you intend to get a more linear outcome.

I guess, you know, have you thought about how, you know, those underlying dynamics might affect the various scenarios and generate those, you know, distinguish between sort of medium-term effects and longer-term effects?

MR. BRATHWAITE: Well, yes, Commissioner. This is, I mean, this is something that we -- we -- is always in discussion in -- within the office.

Now one of the things that we are -- that we are in the process of doing is trying to go to a model that will give us a shorter timeframe outlook. I mean, here we're talking about 15, 20 years, or maybe even longer. And we are talking about going to something like more like a three-year outlook. And the reason for that is because of these very issues that you are raising as to what could happen in the short term. I mean, could -- could we have higher depletion rates on some of those things that -- now right now shale is looking very, very good. We have lots of it. We have an abundance of it, as -- as our supply cost curves show. But what if depletion rates are higher than we are right now projecting? And that will speak to your very issue. So the market could tighten up in that regard.

So these are the kind of questions that we are going to try to answer with our short-term model when we could get it fully implemented. But that has been a task, one of the thankless -- thankless tasks that I have not yet completed.

COMMISSIONER MCALLISTER: So, yeah. And I guess then the question becomes, well, does that -- does -- does the hockey stick sort of happen, you know, at 8 years out or 6 years out or 12 years, you know? And I don't think anybody -- it would be unreasonable to expect, you know, a definitive answer on that.

MR. BRATHWAITE: Sure.

COMMISSIONER MCALLISTER: But sort of the form of the curve, I think, you know, I think, you know, our sense is that -- that, well, we're going to have -- we're going to have cheap gas for a while longer; right?

MR. BRATHWAITE: Yes.

COMMISSIONER MCALLISTER: And so at some point -- you know, so the form of the curve is going to be more kind of hockey stick than line.

MR. BRATHWAITE: Right.

COMMISSIONER MCALLISTER: And I guess I'm wondering if the model can -- if you're -- the way you --

the underlying inputs of the model and the way the model works can sort of capture that -- capture that dynamic?

MR. BRATHWAITE: Well, I would have to say the long-term version of the model cannot. But a short-term version of the model safely can --

COMMISSIONER MCALLISTER: Oh. Okay.

MR. BRATHWAITE: -- which could -- we could develop scenarios to look at, you know, varying depletion rates and that kind of stuff and probably tell you when it -- well, maybe I shouldn't say tell, but probably project --

COMMISSIONER MCALLISTER: Yeah. Within a range, right.

MR. BRATHWAITE: -- when a range when the hockey stick, as you -- as you called it, can occur.

COMMISSIONER MCALLISTER: Uh-huh.

MR. BRATHWAITE: We can probably give you a little more intelligence on it than I can at this point in time using the long-term version of the model.

COMMISSIONER MCALLISTER: Okay. So great. That was kind of my general comment.

Maybe Ivin wants to make a comment here?

MR. RHYNE: So thank you, Commissioner.

One of the -- one of the reasons why, actually to go to your question about the distinction between the short and the long term, the fundamentals of the model as it’s set up, and looking at the market where it is today, one of the reasons that we decided to go and blend using the -- the future strip in the near term versus the longer-term fundamentals forecast is precisely because the fundamentals of the model as it’s structured right now, we have a little bit of a harder time capturing that sort of hockey stick movement.

You’re exactly right, and I think Leon has sort of pointed out in his presentation, that largely there’s -- there’s two major forces at play here in terms of on -- we understand the -- the demand side is it starts to shift. There’s a little more -- there’s a little more inertia in that part of the system. We can see some of the long-term dynamics coming into play with the retirement of coal.

But I think one of the -- the more important and fundamental questions is on the supply side. We model using a cost environment that looks back at the historical cost environments of how much does it cost to produce over time in each of these individual, I think it’s over 400 basins, that we --that we look at. The problem that we have is that we’re in a transition between a longer-term history that has relied on conventional gas and a more near-term shift in that cost environment. And so there’s a lot of slack in the system, as you said. And the point at which that tightens up becomes much more difficult to integrate into the model. We would have to go in and sort of place on a year-by-year basis and make a number of changes to individual basins in order to capture that.

But it's -- it's a valid question and one that -- that, as Leon pointed out, I think would be more appropriate to answer in the shorter term, perhaps, effort. But in the meantime we thought it was appropriate to use the -- the information and the foresight of the futures traders in the market, the folks who are in the market today. They have money on the table. They're -- it's sort of in their interest to understand where and how much gas is likely to cost in the near term. And then as we transition we can see that the future strip actually is normal, in other words, it's growing in terms of price. And it doesn't grow exactly the rate of the longer-term forecast. But as we blend and transition up into that you can see we -- we reach a trend line that's -- that's pretty reasonable.

So we -- what we have is 2015 and 2016. And on this chart, up for the red line, that's the reference case, are directly from the NYMEX future strips. Those are the prices that --

COMMISSIONER MCALLISTER: Right. Okay.

MR. RHYNE: Then 2017, '18, and '19 are blended between the -- what the future strip says and what the fundamentals forecast in our -- the fundamentals forecasted is generated in the NAMGas model. So what we've done is essentially combine the information sets that we have from both futures traders and the -- the information in the model that we've --

COMMISSIONER MCALLISTER: Yeah.

MR. RHYNE: -- that we've garnered from a number of stakeholders and -- and from our other sources.

COMMISSIONER MCALLISTER: Okay. Great. Thanks, Ivin.

Chair?

CHAIR WEISENMILLER: Yeah. A couple questions.

I would be really interested in comments, either now or in the file from the utilities, on how they do gas price forecasts. My recollection from a couple years ago, and again, when I came back into public service I had done due diligence on a number of projects. And certainly the notion of using the future strip was sort of conventional, you know, and packed without blending in that sort of newer term. But certainly that's how everyone went forward was always using a future strip to start.

And if I recall correctly that seemed to be what the utilities were using, and again, just trying to get that in. And I don't think any of the utilities -- well, I think PG&E at the time might have been using a model similar to this. But I think we concluded that the differences in the assumptions were so large we could never do any cross-comparisons.

So again, trying to just -- because, you know, I just -- I don't think anybody is necessarily that comfortable with the nature of the increase, although, you know, again it's pretty -- forecasting -- I think it's Heisenberg who said forecasting futures is -- "Forecasting is difficult, particular about the future." So you know, that -- that's certainly the case here.

So anyway, I think it would be good to get much more from the utilities on exactly how they do the price forecast, where it does line up, and trying to get a sense of how consistent or inconsistent we are, at least with their perspectives, and why.

I would note, in Mexico when I was there a couple of weeks ago, there is certainly a lot of interest, you know, in natural gas. You can see, you know, you can see a major shift from oil to natural gas. Texas is really trying to push very heavily for a shift on the power side and more towards natural gas. People say that in terms of shale gas formations or offshore, you can see where the border is by just -- on one side you see oil and gas development, the other side you don't, you know, and it just stops at the border. So there's a lot of interest in moving forward.

But at the same time there was certainly a lot of interest looking at solar and wind. Mexico has a couple thousand megawatts of wind, particularly down in the peninsula, like 50 megawatts of solar. I mean, for what's really a world-class solar resource, it's amazing how little solar is developed at this point. And certainly one of my jobs was to try to encourage them to think a little bit beyond the box on both solar and the wind side, an geothermal.

So anyway, but I think big market, lots of opportunities. I don't think any of us have a sense yet of how the split will be between gas and cleaner technologies, but certainly a major shifting between coal and petroleum.

MR. RHYNE: We do know, and I'll just speak to the -- the Mexico demand question a little bit, we do know from the pipeline companies who have come in and done presentations at past Natural Gas Stakeholder meetings that they certainly see a tremendous opportunity in Mexico. There are a number of pipeline proposals on the table to get gas from various sources down into Mexico. It's a little bit of a foot race as to see exactly how it's all going to play out.

But the question -- the bigger question of how the gas versus cleaner technologies ultimately develops in Mexico is one of the big questions yet to be seen. And we're going to have to continue to monitor and perhaps make some assumptions about some -- more explicit assumptions about in our next forecast for the next IEPR.

CHAIR WEISENMILLER: Yeah. The definition of clean technologies is one where the Mexican legislature is concerned with that at this moment. So it's not by any means resolved. Then in the week after I was there the Governor of Texas was there with three themes. One was immigration is bad. Two, drugs are bad. But C, we have lots of great natural gas for you from Texas.

MR. BRATHWAITE: And, Commissioner, just to add to your issue about Mexico, just recently the new president just got through the legislature a very big change in their constitution that will allow development by non-Mexican nationals of some of their resources. So in terms of how that effects the -- the portfolio between clean and -- cleaner energy and fossil fuel energy, I really don't know at this point in time. But it does suggest that something is happening in that regard.

CHAIR WEISENMILLER: Oh, yeah. No. When the governor and I were there last year they got it to the congress, the change --

MR. BRATHWAITE: Oh, okay.

CHAIR WEISENMILLER: -- the legislative change. Yeah.

MR. BRATHWAITE: Sure. Okay. Okay.

COMMISSIONER MCALLISTER: Right. Also, you know, the same theme of the gas-electric infrastructure, you know, dynamic applies here, too; right? I mean the restructuring is going to eventually result probably in, you know, in a big DC power line integrating Baja with the rest of Mexico. And that then opens up lots of potential on the generation side. And that will -- and given, you know, there's already an industrial load along the border that is electric and gas, really dependent on -- you know, it's part of the -- the California system really.

MR. BRATHWAITE: Yes, indeed. Yes.

COMMISSIONER MCALLISTER: Now as that evolves and becomes more integrated with Mexico it's going to affect probably the -- the dynamics on all fronts with what you're doing for the IEPR. So --

MR. BRATHWAITE: Without a doubt.

COMMISSIONER MCALLISTER: Yeah. Okay. Great.

MR. BRATHWAITE: Without any more questions, I guess I'll take my seat. Thank you very much.

COMMISSIONER MCALLISTER: Thank you, Leon.

CHAIR WEISENMILLER: Thank you.

COMMISSIONER MCALLISTER: So one more card. Okay.

Scott Wilder from So Cal? Oh, there he is. Great.

MR. WILDER: Hi. I'm Scott Wilder. I'm a Business Economic Advisor with Southern California Gas. And I can just comment briefly on our method for forecasting gas prices. And I'm gratified to know that it's actually very similar to what the CEC is doing.

We blend NYMEX prices two to three years out, and then essentially use the NYMEX future strip two to three years out. And then for about two to three years after that we will blend it. The one difference is rather than a single long-term source for fundamentals, we will tend to average about three sources, and one of those sources is the CEC forecast. And the other two tend to be from EIA, and then a private forecast firm such as either Global Insider or Wood Mackenzie.

COMMISSIONER MCALLISTER: Thank you.

I think we have no more blue cards here.

We have someone on the line who wanted to say something earlier, I believe, is all.

MS. RAITT: Yes, we have one person.

COMMISSIONER MCALLISTER: Oh, Tim Carmichael.

MR. CARMICHAEL: Good morning. It's Tim Carmichael. Can you hear me?

COMMISSIONER MCALLISTER: Yes, we can.

MR. CARMICHAEL: Hi. Thank you very much for taking my comment. I actually wanted to go back to the transportation section. I tried to get a comment in there but I guess you couldn't hear me or see me. But if I could just add a couple of comments that weren't made.

My name is Tim Carmichael. I work with the California Natural Gas Vehicle Coalition. And I just wanted to add a couple of points. I echo the comments that were made by Alison Smith and Julia Levon and Ryan Kenny, but a couple additional points.

Renewable natural gas or biomethane is still a new enough fuel that a lot of people outside of the industry don't realize that it is interchangeable with fossil fuel and natural gas and both blending, but also running in the same engines that are using for compressed natural gas or liquefied natural gas in the fossil form. And I think that's a point that we can't say often enough as we're still educating people on the potential of this fuel. And I would encourage the report to add that -- that point.

I think it was Commissioner McAllister was asking about a Bioenergy Action Plan. And I wanted to note that there is a Renewable Natural Gas Roadmap under development, actually almost finished. It's a partnership between U.C. Davis, ITS, and the Energy Commission. And it's undergoing peer review right now, so I expect it to be released this fall sometime.

And finally, I just wanted to echo support for the research recommendations that are in the draft report. We think all of those make sense.

Thank you very much for taking my comments. And we will be submitting written comments as well.

COMMISSIONER MCALLISTER: Great. Thanks very much. And sorry for missing you the first round.

MR. CARMICHAEL: No worries. Thank you.

COMMISSIONER MCALLISTER: Okay. Do we have anybody else in the room who wants to make a comment?

It looks like Mr. Tutt.

MR. TUTT: Good morning, Chair, Commissioner. Tim Tutt representing Sacramento Municipal Utility District. And I'd just like to discuss a little bit the issue of marginal fuel.

I think there's no doubt that in all hours of the year, or at least nearly all hours of the year, the marginal fuel in California for producing electricity is natural gas. But I also think that the state's Renewable Portfolio Standard kind of complicates the picture of how that, in fact, is used in additional analysis.

So if we're going to add a million electric vehicles in the state in the next 10 or 15 years, all of that load is not going to be met by natural gas necessarily. When each vehicle is plugged in, yes, the additional load will be met by natural gas on a marginal basis. But because of the Portfolio Standard you can't add all of that additional load and it come up with the same amount of natural gas in aggregate. Somewhere else somebody is going to have to do renewables and turn down a natural gas power plant in another hour.

I don't know how you deal with that in a variety of analyses. But I just wanted to make sure that point was there. Thanks.

CHAIR WEISENMILLER: Thanks. I've been encouraging everyone to read Ed Kahn's book, particular the chapter on production cost modeling since most people don't understand production cost modeling.

But having said that, we often are talking about over gen. Well, over gen would be when renewables are on the margin.

MR. TUTT: Yes.

CHAIR WEISENMILLER: So again, it's something where, and I'm not sure I'd even say 100 percent now, I would tend to guess more like 80 percent now, but that gets into -- if you line up all the modelers in one place you can get variations across that. But having said that, over time certainly renewables are going to be more and more in the margin. But that gets to your timing or piecing of stuff.

COMMISSIONER MCALLISTER: Yeah. This is all about --

CHAIR WEISENMILLER: Right. Yeah.

COMMISSIONER MCALLISTER: -- demand response and storage. And that -- those are mechanisms to increase the number of hours that renewables actually are on the margin; right? So --

CHAIR WEISENMILLER: Well, actually, storage could take the renewables from an over gen, store it and bring it back --

COMMISSIONER MCALLISTER: On the margin.

CHAIR WEISENMILLER: -- on peak when, you know, it would not be on the margin --

COMMISSIONER MCALLISTER: Oh, right. Sure.

CHAIR WEISENMILLER: -- (inaudible) peak.

COMMISSIONER MCALLISTER: Yeah. Yeah, exactly.

CHAIR WEISENMILLER: I mean, the way some storage works --

COMMISSIONER MCALLISTER: Yeah.

CHAIR WEISENMILLER: -- is you -- you have to match the area, correcting for losses, between sort of your lowest load periods and your highest load periods --

COMMISSIONER MCALLISTER: Correct.

CHAIR WEISENMILLER: -- matching the energy of the areas with, as I said, after you adjust it.

COMMISSIONER MCALLISTER: Yeah.

CHAIR WEISENMILLER: So basically there's only that load. So basically is you have more -- storage should basically shift renewables from being not over gen to valuable at other times of load.

COMMISSIONER MCALLISTER: For sure.

CHAIR WEISENMILLER: But still the bottom line is over the next ten years it will be a very interesting power grid as we go through things. It's just, you know, right now, the next couple of years, you know, adding more electric load probably means more gas generation, more, you know, offsets, and more greenhouse gas.

I would also note probably one of the most interesting recent statistics is that in 2013 the power sector in California was 20 percent below 1990. So at the CEBA (phonetic) event, you know, basically after one of the economists had talked about how you don't want to have any one sector over meet, everyone sort of applauded the utilities there for doing more than their contribution in taking some of the burden off the other industrial customers.

MR. TUTT: Thank you.

COMMISSIONER MCALLISTER: Thanks, Tim.

Do we have anybody else in the room or online?

MS. RAITT: Oh, we'll go ahead and open up the phone lines.

COMMISSIONER MCALLISTER: Great.

MS. RAITT: So there's a couple of people on the phone. If you had comments this is your opportunity. If not, please mute your line. Okay. I think that's it.

COMMISSIONER MCALLISTER: All right. Well, hearing none, thanks everybody for coming. I think we've kind of gotten all our questions out there, and looking forward to everyone's comments October the 1st; correct?

MS. RAITT: Yeah.

COMMISSIONER MCALLISTER: And thank you very much to Staff for presenting good stuff. Looking forward to seeing things as they evolve going forward. So thanks a lot.

CHAIR WEISENMILLER: Yeah. And thanks, everyone, for being here. Certainly comments on the gas price are welcome. That feeds into the retail rate forecast, and that feeds into the demand forecast. So in terms of all these various pieces, that's the one we're looking for a lot of comments today. Thanks.

COMMISSIONER MCALLISTER: Great. All right. And we are adjourned.

(Whereupon, the California Energy Commission's IEPR Commissioners Workshop adjourned at 11:52 a.m.)

REPORTER'S CERTIFICATE

I do hereby certify that the testimony in the foregoing hearing was taken at the time and place therein stated; that the testimony of said witnesses were reported by me, a certified electronic court reporter and a disinterested person, and was under my supervision thereafter transcribed into typewriting.

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MARTHA L. NELSON, CERT**367

September 25, 2015