

## DOCKETED

<b>Docket Number:</b>	15-IEPR-03
<b>Project Title:</b>	Electricity and Natural Gas Demand Forecast
<b>TN #:</b>	206544
<b>Document Title:</b>	Transcript of 11/03/2015 IEPR Commissioner Workshop on Revised Natural Gas Outlook
<b>Description:</b>	N/A
<b>Filer:</b>	Cody Goldthrite
<b>Organization:</b>	California Energy Commission
<b>Submitter Role:</b>	Commission Staff
<b>Submission Date:</b>	11/9/2015 4:01:22 PM
<b>Docketed Date:</b>	11/9/2015

COMMITTEE HEARING  
 BEFORE THE  
 ENERGY RESOURCES CONSERVATION AND DEVELOPMENT  
 COMMISSION OF THE STATE OF CALIFORNIA

In the matter of, )  
 ) Docket No. 15-IEPR-03  
 )  
 2015 Integrated Energy Policy )  
Report (2015 IEPR) )

**IEPR COMMISSIONER WORKSHOP ON  
 REVISED NATURAL GAS OUTLOOK**

CALIFORNIA ENERGY COMMISSION  
 FIRST FLOOR, ART ROSENFELD HEARING ROOM  
 1516 NINTH STREET  
 SACRAMENTO, CALIFORNIA

TUESDAY, NOVEMBER 3, 2015

10:04 A.M.

Reported By:  
 Peter Petty

**CALIFORNIA REPORTING, LLC**  
 52 Longwood Drive, San Rafael, California 94901 (415) 457-4417

## APPEARANCES

Commissioners

Andrew McAllister, Lead Commissioner 2015 IEPR

Robert B. Weisenmiller, Chair, Lead Commissioner for  
Electricity and Natural Gas

CEC Staff Present

Heather Raitt, IEPR Program Manager

Ivin Rhyne, Manager, Supply Analysis Office, Energy  
Commission

Also Present/Public Comment

Tim Carmichael, California Natural Gas Coalition

## INDEX

	Page
Introduction	
Heather Raitt, IEPR Program Manager	4
Commissioner Comments	
Commissioner Andrew McAllister, Lead Commissioner 2015 IEPR	4
Chair Robert B. Weisenmiller, Lead Commissioner for Electricity and Natural Gas	5
Revised Natural Gas Outlook Report	
Ivin Rhyne, Manager, Supply Analysis Office, Energy Commission	
Closing Comments	
Chair Robert B. Weisenmiller, Lead Commissioner for Electricity and Natural Gas	41
Commissioner Andrew McAllister, Lead Commissioner 2015 IEPR	42
Public Comments	44
Adjournment	47
Reporter's Certificate	48
Transcriber's Certificate	49

1 P R O C E E D I N G S

2 NOVEMBER 3, 2015

10:04 A.M.

3 MS. RAITT: Welcome to today's IEPR workshop on  
4 the Revised Natural Gas Outlook Staff Report. I'm  
5 Heather Raitt, Program Manager for the IEPR.

6 The housekeeping items, if there's an emergency  
7 we need to evacuate the building. Please follow staff  
8 to Roosevelt Park, diagonal to the Energy Commission.

9 The workshop is being recorded on WebEx. So,  
10 we'll have a recording posted in a few days and a  
11 transcript in about a month.

12 After Ivin Rhyne's presentation this morning,  
13 we'll have an opportunity for public comment. We'll be  
14 limiting it to three minutes. First, folks in the room  
15 and then folks on WebEx can comment. And please use the  
16 chat function if you're on WebEx to tell our coordinator  
17 that you'd like to make a comment.

18 And written comments are welcome and due  
19 November 17th. And the information for providing  
20 comments is on the public notice. And that's it.

21 COMMISSIONER MC ALLISTER: Great. Thanks,  
22 Heather. So, let's see, I guess this is one more step  
23 in the forecasting process for natural gas. I think in  
24 the first workshop we had we really framed the context a  
25 lot and sort of, I think, put across the message of how

1 important this is. And, you know, I think very few  
2 people in the room and probably not that many people on  
3 the WebEx. But it is somewhat of a specialized topic,  
4 but it is really fundamental with where we're going with  
5 energy policy in the State.

6 Natural gas, obviously, kind of what you think  
7 about it depends on where you sit in the marketplace and  
8 in society. But I think there's really no doubt that a  
9 lot of our energy comes from natural gas, both, you  
10 know, from the generation side, much of it at the  
11 margin, as Chair Weisenmiller points out with truth.

12 So, and then also at the end use where we're  
13 really, you know, concerned about the existing buildings  
14 and getting their carbon footprint down. And sort of  
15 both ends of the spectrum are very important and will be  
16 changing over the coming years and decades.

17 And so, understanding that and the dynamic  
18 underneath -- underlying the natural gas markets and  
19 patterns of use is really important.

20 So, I'm looking forward to the update and  
21 hearing what's changed since the last workshop, and what  
22 tweaks and modifications staff has done on the forecast.

23 CHAIR WEISENMILLER: Yeah, I wanted to thank  
24 staff for really drilling down on the gas price forecast  
25 since our last workshop. I think, as we were looking at

1 it the last time, there were at least questions or  
2 concerns. The price forecast is important. It's  
3 certainly a key element in our retail rate forecast.  
4 It's a key element in a lot of our cost effectiveness  
5 for our Building and Appliance Standards.

6 So, we wanted to really drill down some and  
7 understand it a little bit better. And appreciate staff  
8 really going back and taking a second look at some of  
9 the pieces of it. And now, we have the benefit today of  
10 that additional look at stuff.

11 So, again, thanks for digging in and let's dig  
12 into it.

13 MS. RAITT: Okay, so now we have Ivin Rhyne from  
14 the Energy Commission.

15 MR. RHYNE: All right, thanks Heather. I'll  
16 adjust this upwards a little bit here. There we go.

17 So, good morning. My name is Ivin Rhyne and I  
18 am the Manager of the Supply Analysis Office, part of  
19 the Energy Assessments Division here at the Energy  
20 Commission.

21 The Natural Gas Forecast -- sorry, the Natural  
22 Gas Outlook, I should say, is produced by a combined  
23 effort of Natural Gas Unit staff, which is part of my  
24 office, as well as End-Use Demand Forecasting staff,  
25 which is part of the Demand Analysis Office.

1           It also takes inputs from the Transportation  
2 Demand Forecasting group, as well as integrating the  
3 information collected through a stakeholder process.  
4 Which, Commissioner McAllister, you mentioned we had a  
5 previous workshop on September the 21st, and we've  
6 integrated feedback both from internal and external  
7 stakeholders as we move forward with this Revised  
8 Natural Gas Outlook.

9           And what we're going to be -- what I'm going to  
10 be providing today is a summary and overview of the  
11 results which are contained in this Outlook Report.

12           It's important, I think, to keep in mind a  
13 couple of pieces of context. First of all, natural gas  
14 is not disconnected from the remainder of the United  
15 States energy supply in a way that allows us to produce  
16 a forecast that ignores all of the other sectors.

17           Natural gas is an important element. It acts as  
18 a very large and flexible piece of both the power  
19 generation and the end-use demand sectors. It allows  
20 people to -- in the industrial sector to produce a  
21 number of different products, both through direct use of  
22 the chemical structure of natural gas, as well as its  
23 heating properties. And so, it's an important element  
24 of how things are done today in the United States with  
25 regard to the energy sector.



1           It's important to note that a lot of those end  
2 uses, trends and things that are going on in the natural  
3 gas sector are addressed separately in the AB 1257  
4 report, which was just recently finalized, published and  
5 delivered to the Legislature per our mandate.

6           And it's important there to keep in mind that  
7 that compendium of information really takes the place of  
8 some of the previous trend reports that we have produced  
9 in the past.

10           And so we focused this report really on looking  
11 forward at natural gas into the future. And so, with  
12 that in mind, we'll go ahead and launch into it.

13           The important thing, I think every forecaster  
14 who's ever done a presentation has probably quoted Yogi  
15 Berra to the effect to say it's tough to make  
16 predictions, especially about the future.

17           I would suggest that there's another Yogi Berra  
18 quote that is perhaps more relevant to what we're about  
19 to talk about. And he says, "When you come to a fork in  
20 the road, take it".

21           What I think is relevant about that quote is the  
22 fact that we're sitting here today, looking out into the  
23 future, trying to understand where these trends and end  
24 uses, prices, all of those things may go. But the world  
25 is a chaotic and non-linear place. And people will

1 continuously take forks in the road that we don't  
2 expect.

3           And so, as we go through this report today, as  
4 we talk through these results, I want everyone to keep  
5 in mind a couple of things. First of all, we will  
6 present a range of values for both prices and demand  
7 across the United States, and across California, that  
8 represent what we think is a plausible range of possible  
9 values for those end uses. But they are not the only  
10 possible values that we may see in the future.

11           The other thing to keep in mind is that they  
12 represent annual average values. Rather than any one  
13 day's spike, or peak, or valley in prices or demand,  
14 these represent the values that we think we may see out  
15 into the future, spread out and sort of averaged over  
16 the course of an entire year.

17           And so, what may be a headline today may get  
18 washed out by a longer-term trend that happens over the  
19 course of a year, two years or, in the case of a  
20 forecast, ten years.

21           So with that in mind, we've gone through, and as  
22 Chair Weisenmiller mentioned, really drilled into our  
23 results since the last workshop. And some of the  
24 changes that have happened since the last workshop we're  
25 going to talk about.

1           Then, we're going to talk specifically about the  
2 California prices and demand. We'll talk also about  
3 national prices and demand.

4           And, finally, we'll wrap up with a discussion of  
5 where the U.S. level, imports, exports and LNG may be  
6 heading, since the international ties -- natural gas's  
7 ties to international markets can have an effect on  
8 national markets.

9           And, finally, we will wrap up with a discussion  
10 of conclusions.

11           So, in a single slide here, just trying to  
12 summarize some of the changes that have happened since  
13 our September 21st workshop.

14           First of all, we made a choice to pair the high-  
15 cost environment with the low-demand case. Again, I  
16 mentioned that this is done as an IEPR process, where  
17 we've connected the natural gas forecast to other  
18 forecasts that are being produced as a part of the 2015  
19 IEPR.

20           It's important for us to make sure that we keep  
21 things consistent. And in doing so, we realized that it  
22 was better for us to pair the high-cost environment of  
23 production and allow that high price to help drive  
24 demand down in our low-demand IEPR case. And so we've  
25 done so and vice-versa, where we've connected the low-

1 cost environment with the higher demand.

2           It's important to realize that sometimes price  
3 is in the driver's seat and sometimes demand is in the  
4 driver's seat, in the real world. In this case, we're  
5 allowing price to help drive demand.

6           We also, as the Chair pointed out, drilled down  
7 into a number of other assumptions. One of those being  
8 that coal retirements associated with the new Part 111-D  
9 rule issued by the EPA, we were able to dig through  
10 their Regulatory Impact Analysis document and get a  
11 finer-grained estimate of what those future retirements  
12 of coal may look like. But I think, more importantly,  
13 we were able to assess how much of that retirement may  
14 be switched over to gas. And that was sort of the  
15 important element there.

16           We reduced our estimate of what could be  
17 switched over in all three of our cases and adjusted  
18 them downward to be consistent with what is in that  
19 Regulatory Impact analysis.

20           Another change that we made, previously we had  
21 estimated that states outside of the Western Electric  
22 Coordinating Council would be late in meeting their  
23 Renewable Portfolio Standards goals.

24           A review of research being done at Lawrence  
25 Berkeley National Lab, in tracking the progress of

1 states that are -- that have a Renewable Portfolio  
2 Standards goal is showing that, I think in a wonderful  
3 success story, the majority of them are on track to --  
4 the vast majority of them are on track to meet their  
5 goals. And so, we thought it was a more appropriate  
6 assumption to show that the states outside of the  
7 Western Electric Coordinating Council, or WECC for  
8 short, meet those goals on time.

9           In a small adjustment from what we did in our  
10 previous workshop, we still use a forward curve as part  
11 of how we adjust the near-term prices. But rather than  
12 just picking a random day, based on the fact that the  
13 bid week, which is an end-of-the-month sort of massive,  
14 sort of market turnover process, the bid week forward  
15 curve is one of the best estimators of the future price  
16 for the coming month. And so, we used the end of  
17 September bid week, which at the time was the most  
18 recent bid week price curve, as a part of that  
19 adjustment.

20           Finally, we made several small adjustments to  
21 deal with minor modeling issues, including alignment  
22 with U.S. Energy Information Administrative values. And  
23 so, we were able to bring our forecast numbers and our  
24 calibration numbers into alignment with USEIA values.

25           So, let's move into the California prices and

1 demand. And I'll note that these were produced by our  
2 Demand Analysis Office, and so our thanks to the staff  
3 in that office for being a part of this process, as  
4 well.

5           So, California total natural gas demand. We  
6 have what we think is a pretty good story here looking  
7 forward. California natural gas demand in the reference  
8 case is represented by the blue bars. And then our high  
9 and low demand cases are represented by the red and  
10 green lines, respectively.

11           And what we see is that California's total  
12 natural gas demand we expect to decline slightly over  
13 the next six to eight, almost ten years, before starting  
14 a slow climb, again. In part, we think that is driven  
15 by the fact that once we meet our 33 percent Renewable  
16 Portfolio Standards goals, and we see later demand  
17 growth associated with the electric power sector, that  
18 some of that recovery of gas demand will be associated  
19 with needing some additional gas resources. Certainly,  
20 not on the scale as we used to. Some additional gas  
21 resources in order to meet that growth in demand.

22           We do see, in the high-demand case, the  
23 potential for roughly flat natural gas demand overall  
24 until the out years. And then in the low-demand case,  
25 we see the possibility that perhaps we can go beyond 33

1 percent and perhaps really help push natural gas demand  
2 in California down even further.

3 End-use natural gas demand, which is a subset of  
4 total. It's really the commercial, residential,  
5 industrial. It's everything except power generation.

6 What we have on this slide is a graph. The  
7 black line, which is our historic actuals -- sorry, our  
8 historical actuals, I should be careful. And then we  
9 have our projections produced out through 2026, of the  
10 high-, mid- and low-demand cases.

11 Now, the purple line that's sort of hanging out  
12 there at the bottom was the 2013 mid-demand case. And  
13 you'll see that the 2013 case showed that the expected  
14 end-use natural gas demand was essentially flat. And  
15 that was really driven at the time by a presumption that  
16 we would see an increase in natural gas price that would  
17 help keep suppressing natural gas demand.

18 We didn't see that spike in natural gas prices  
19 and we have since adjusted to deal with that reality.  
20 And we have a higher starting point. And so, that's an  
21 important sort of element.

22 We do know that there's always going to be  
23 adjustments of this kind as we go forward, and so we'll  
24 keep an eye on this.

25 Commissioner McAllister, you had a question?

1           COMMISSIONER MC ALLISTER: Yes, a couple  
2 questions. So, I'm looking at the low and the mid case  
3 and it looks like in the out years -- in the early years  
4 they were roughly the same and in the out years,  
5 actually, the mid becomes lower than the low. I'm  
6 wondering kind of what's the underlying kind of dynamic  
7 behind that.

8           And then, on the previous slide, I'm looking at  
9 the last, you know, five years or so when it starts to  
10 creep back up. You know, we're going to have 50-percent  
11 RPS approaching at that time. And then we're going to  
12 have probably lots of storage technologies or whatever  
13 else at the margin. You know, presumably we'll have  
14 succeeded. I think, I'm fairly confident at least, in  
15 narrowing how much natural gas we actually have at the  
16 margin on the generation side. Hopefully, we're also  
17 going to see some technologies coming into our existing  
18 buildings on the electrification front or, you know,  
19 natural gas biofuels, or biogas replacing some of that  
20 fossil natural gas.

21           I guess I'm wondering if the out years, you  
22 know, the last five years there leading up to 2030, is  
23 that transportation or what is that, exactly, that's  
24 causing it to uptick again?

25           MR. RHYNE: So, we do see in the -- these



1 California gas demand values are based on the  
2 preliminary natural gas demand values presented by the  
3 Demand Analysis Office. They are, actually, currently  
4 running a revised set of California-specific numbers.

5 COMMISSIONER MC ALLISTER: Okay.

6 MR. RHYNE: But in their preliminary values that  
7 was the out years. We're driven, to some extent, by  
8 growth in natural gas for transportation end use. And  
9 we think that that is -- we do expect some growth. The  
10 exact value in those outer years I think is a little bit  
11 difficult to wrap our arms around.

12 But a movement away from sort of the  
13 traditional, you know, petroleum-fuels-only model is  
14 part of what we see going out into those later years.

15 And so, one of the things that we're doing, as  
16 the Transportation Forecasting Group, is revising and  
17 sort of streamlining their own estimations of those out  
18 years. And what will become, later on in the final  
19 version of this report, we'll be able to integrate all  
20 of that.

21 But really, to some extent, that's driven -- the  
22 end-use demand that you see in this slide, to some  
23 extent is driven by a transportation, growth in  
24 transportation demand for natural gas, and differences  
25 in the efficiency assumptions across the three cases.

1 COMMISSIONER MC ALLISTER: Okay. And then the  
2 other, the first question on the low and mid, and how  
3 they pretty much track and even switch roles out in the  
4 out years?

5 MR. RHYNE: Yeah, so my understanding, and I'll  
6 have to confirm this with the Demand Analysis Office, is  
7 that that had to do with differences in transportation  
8 demand assumptions.

9 COMMISSIONER MC ALLISTER: Oh, okay.

10 MR. RHYNE: But I will verify that by the end of  
11 the day.

12 COMMISSIONER MC ALLISTER: Thanks.

13 MR. RHYNE: So, an important element for the  
14 Energy Commission is we've really looked traditionally a  
15 lot at the gas demand for power generation in  
16 California. We know that it plays a very important role  
17 here, in the State.

18 And I think one of the success stories that we  
19 think is materializing here is that overall demand for  
20 natural gas, for power generation, is looking to decline  
21 despite the fact that the total electric demand is  
22 remaining, you know, sort of flat. And we know that  
23 that's taken a pretty tremendous effort to keep that  
24 demand flat.

25 What we see in this slide is the growth of

1 renewables picking up a larger and larger share of the  
2 overall electric generation sector. Again, the blue  
3 bars are the reference case, the red and green are the  
4 high and low demand cases.

5           And we think it's appropriate to see, you know,  
6 perhaps in the high case things remain roughly flat with  
7 where they are today. And in the low case certainly  
8 drops from where we are today, which is call it two and  
9 three-quarters billion cubic feet per day, and down in  
10 the low case of just below one and a half.

11           So, we see, as a potential for a sizeable  
12 reduction in natural gas demand for power generation out  
13 into the future.

14           I will caution everyone, though, is that, again,  
15 these are annual average numbers. This is not a  
16 statement about how much a peak day of natural gas  
17 demand might pull, how much stress that might put on the  
18 system or not put on the system, or what kind of  
19 operational constraints that may place on things. But  
20 we do see an overall reduction in the total amount of  
21 energy needed from natural gas resources. And,  
22 therefore, a resultant decline in the total natural gas  
23 demand from power generation sources.

24           CHAIR WEISENMILLER: It's interesting, you're  
25 looking at the high/low as price driven. And actually,

1   since gas is the marginal resource, the real high/low  
2   will be a function of hydro, temperature and sort of  
3   outages.

4               So, you could have incredibly low values if you  
5   have cool, wet years with, say, Diablo at full tilt.  
6   And, conversely, if you have a Diablo outage scheduled,  
7   say, and you know, you suddenly have dry, hot, you know,  
8   you're going to have a pretty great -- you know, a  
9   larger swing than what we're seeing here, or at least  
10  it's going to accentuate the highs and the lows.

11              COMMISSIONER MC ALLISTER:   Yeah.

12              CHAIR WEISENMILLER:   Yeah, yeah.

13              MR. RHYNE:   Yeah, and we do, we agree  
14  completely, Chair Weisenmiller, that when it comes to  
15  gas demand for power generation the price effect is  
16  relatively small overall.   Really, as you mentioned, it  
17  has more to do with its role in the overall portfolio of  
18  what is available in any given year and what gets built  
19  in the out years.

20              And we see a trend towards reducing the overall  
21  construction of new generation facilities as our demand  
22  forecast continues to fall, and our resource base is  
23  solid, and we keep adding renewable resources.

24              But, certainly, price has a small effect but  
25  it's really not the primary driver of the values that

1   you see here on the screen.

2               So, we'll talk for a moment about where  
3   California gets its gas. Currently, we get about 90  
4   percent of our gas from areas outside of California.  
5   About 10 percent, perhaps just a little bit less than  
6   that, from production sources actually here, in the  
7   State. I think it might come as a surprise to folks  
8   who, perhaps, don't follow this well, that California  
9   has traditionally been a relatively resource-rich state,  
10   in part producing some of its own petroleum resources  
11   and producing some of its own natural gas resources.

12              But from outside the State we really have three  
13   major sources. The Canadian natural gas basins, again  
14   sort of as the name would imply, located north of  
15   Washington State, up in Canada. We have gas produced in  
16   the Rocky Mountains. And then, we have gas produced in  
17   the desert southwest, specifically the San Juan Basin.

18              And that's an important sort of mix to keep in  
19   mind. We can buy gas from any of these basins and each  
20   of them have their own costs associated with production.  
21   They have their own unique sort of behaviors, patterns.  
22   They also serve different marketplaces.

23              And so, our demand over the course of any given  
24   day, or any given year, can vary as end-users, as the  
25   gas utilities can buy from different resources.

1           But what we see out in 2025 is overall an  
2 increase in the total percentage of gas that comes from  
3 out of state. Really, growing from about 90 or 91  
4 percent to about 98 percent of our gas coming from out  
5 of state.

6           And then we think that, based on sort of the  
7 overall supply and demand balances, that we are looking  
8 about half of that's going to come through the north, at  
9 an entry point called Malin. It's actually a hub just  
10 north of the border, in Oregon. And Malin can receive  
11 gas either from the Rockies, or from Canada, or it can  
12 come along to other major pathways. One is the Kern  
13 River Pipeline, which brings in Rocky Mountain's gas.  
14 And then, the Southern California border which brings in  
15 gas from the desert southwest.

16           And so, it's about half in the north and about  
17 half of the gas will come in from the south in 2025.

18           Now, the price differentials between the north  
19 and south end of the State really are, historically,  
20 small with the exception of a few excursions where we  
21 had unique market events that were typically very short  
22 lived.

23           And so, this graph doesn't show you a whole lot  
24 because the prices are really on top of each other. But  
25 we've combined a graph that shows what we expect the

1 price to be at Malin, the price we expect at Topock,  
2 which is the Southern California border, along with  
3 Henry Hub. Now, Henry Hub is a key national pricing  
4 point for natural gas.

5 And what you can see, Henry Hub there, in the  
6 light blue, is that both Malin and Topock are very, very  
7 close in price to that Henry Hub. In fact, so close  
8 that it's not really useful, I think, to use this graph.  
9 So, rather, we have plotted these differentials in a bar  
10 graph here, on this slide 10.

11 And what we see is that Topock tends to be  
12 slightly, the Southern California border tends to be  
13 slightly more expensive than the national benchmark of  
14 Henry Hub. And we see that Malin tends to be slightly  
15 less expensive.

16 Now, I want to sort of remind everyone,  
17 California does not get its gas directly from Henry Hub.  
18 But Henry Hub acts as a national price standard against  
19 which everyone else sort of measures their gas prices.  
20 And so, these differentials are important, often called  
21 basis differentials, when we talk about the relationship  
22 to Henry Hub.

23 And what we see is that the San Juan Basin, the  
24 price, the cost associated with getting that gas out,  
25 getting it to the border, it's slightly more expensive

1     than Henry Hub.

2             And then, the price point at Malin is very close  
3     to the prices at Henry Hub. And Malin is an interesting  
4     price hub because it does have those two different  
5     sources of gas. It can get gas from Canada, it can get  
6     gas from the Rockies. And that overall competition  
7     helps keep it very close to the national benchmark,  
8     along with the fact that -- along with the fact that the  
9     Rockies' gas is relatively inexpensive.

10            So, it's an important element. What we see,  
11     though, going forward is that we expect California gas  
12     to roughly mirror the overall price of gas at the  
13     national hub. That would be the key takeaway here.

14            And, finally, this -- when we talk about  
15     California, it's important to talk about storage. And  
16     I'll preface this slide, which this is not a forecast.  
17     This is not a projection. But it is a statement, a  
18     graph that shows where natural gas storage values fall  
19     this year. 2015 is the blue line and it stops there in  
20     August, which is where we had our last set of values as  
21     we were getting this prepared.

22            But the top and bottom lines represent the five-  
23     year range of storage. So, this is average of Bcf a  
24     day, each month. And what we see here is that in 2015  
25     we were essentially at the five-year average mark for



1 natural gas storage.

2 Now, this is slightly different than the natural  
3 average, where the national storage averages were -- the  
4 actuals are pretty high right now. And so, we've got a  
5 lot of gas in storage, nationwide, going into this  
6 winter.

7 And in the short term, right now the market  
8 seems to think that that seems that we will have  
9 relatively cheap gas going into at least this year. We  
10 think that's driven by forecasts that show potentially a  
11 warm winter and, obviously, plentiful gas overall.

12 And so, while that doesn't necessarily tell us  
13 where the 20-year or the 10-year values of gas price or  
14 demand will be, it is important going into at least this  
15 coming winter and the next 12 months or so.

16 So, we're going to move from a California-  
17 centric view of the world to national. And it's  
18 important because California is connected to the  
19 national market and, therefore, really that's an  
20 important sort of outlook going forward.

21 And I mentioned Henry Hub as being sort of the  
22 key price point. This slide is our estimated price, our  
23 three cases for price at Henry Hub. And you can see the  
24 historical values there in the dashed, purple line. And  
25 our reference case is the red. And then our high and

1 low demand are in the green and blue.

2 And I will remind you high demand, in this case,  
3 is associated with the low price. Low demand is  
4 associated with the high price. So, if you're trying to  
5 keep those straight in your head, it's the high is on  
6 the bottom end and the low is on the top end. It's a  
7 little reversed, but it's important to keep that in  
8 mind.

9 And what we see is a relatively steady growth in  
10 price between where we are today and 2030. The  
11 reference case, we see the price climbing to about \$5 a  
12 thousand cubic feet of natural gas. With a low -- the  
13 high demand/low price case actually following a track  
14 really, very much in line with the bid week forward  
15 strip, as it stands today.

16 I will sort of mention here that we think that  
17 this near term low price will probably adjust upward at  
18 some point in the future, and that we reflect that in  
19 the reference case. We think that this sort of -- I  
20 won't say it's a real excess, but there is a little bit  
21 probably more gas supply than there is demand in the  
22 market right now. That's helping to keep prices  
23 suppressed. But we think that's going to balance out.  
24 When exactly that occurs, in the next six months to a  
25 year, that's going to be harder to predict. But we do

1 see that adjusting upward closer to the reference case.

2 COMMISSIONER MC ALLISTER: Yeah, Ivin, do you  
3 know sort of how the EIA's been treating the Clean Power  
4 Plan and sort of what the timeline -- you know,  
5 presumably, coal retirements, there's some national,  
6 there's a trend, you know, to do more natural gas.

7 Any idea sort of -- you know, how have you guys  
8 incorporated that into your view of the world?

9 MR. RHYNE: So, the Clean Power Plan Regulatory  
10 Impact Analysis came out after EIA's initial,  
11 preliminary annual energy outlook. So, in the  
12 Regulatory Impact Analysis they have only two years that  
13 they look at. I believe it's 2025 and 2015. And so,  
14 there's no sense of timing in that impact analysis as to  
15 how that all will play out. And so, we're going to be  
16 paying attention to where EIA makes their assumptions  
17 when they revise the Annual Energy Outlook.

18 But we think we're pretty consistent with them.  
19 In our treatment, those retirements actually begin in --  
20 some retirements begin in 2014, in sort of anticipation  
21 of the plan based on economics. And those retirements  
22 continue on sort of at a steady clip through the life of  
23 this.

24 It's kind of hard to say at this point, unless  
25 you go to a plant-by-plant basis. And for the purposes

1 of price we may not see the effects of any individual  
2 retirement show up in the overall national Henry Hub  
3 price.

4 COMMISSIONER MC ALLISTER: Thanks.

5 MR. RHYNE: Okay. So, again, just Henry Hub  
6 price is growing at a steady, annual rate of about 2.6  
7 percent. We think that that's a reasonable estimation  
8 as we move forward. And that price growth does have  
9 some amount of uncertainty.

10 One of the things that this team has done, that  
11 I think is unique, perhaps, in the forecasting world,  
12 with the exception of EIA, and we'll talk about them in  
13 just a moment, is we've gone back and looked at how well  
14 or poorly our past forecasts have actually approximated  
15 the real-world price tracks.

16 In doing so, we were able to put a range of  
17 uncertainty over and above our high and low price  
18 tracks. And what we see is that any single-year price  
19 we think could range anywhere from \$8.21 to \$1.80 per  
20 MCF by 2030.

21 And what we think is interesting here is that  
22 the overall spread of that uncertainty tracks, we think,  
23 rather nicely with the construction of our three price  
24 cases. And for us, is a pretty good indicator that  
25 we've done a reasonable job of capturing some of that

1     uncertainty.

2             So, total natural gas demand, we think for the  
3     United States overall, is going to remain flat in the  
4     near term, relatively flat in the near term. Growing  
5     only slightly from about 72, 73 Bcf per day, at where it  
6     stands now, to just under 89 Bcf per day out in 2030.  
7     That would be in the reference case.

8             The high and the low demand case you can see,  
9     shown there in the lines. To some extent that is driven  
10    by assumptions about where power generation demand,  
11    economic growth and, specifically, growth in residential  
12    and industrial sectors. And how things like a strong  
13    and robust economy may drive demand in the industrial  
14    sector, specifically.

15            When we look at U.S. power generation demand for  
16    natural gas, coal switching to gas is offset to some  
17    extent by a switch to renewables. There is a national  
18    movement towards the use of renewables. We know that  
19    the current administration's Clean Power Plan really is  
20    emphasizing both efficiency and renewables.

21            And that the combination of those two things,  
22    in the reference case you can see in the near term  
23    continues a slight downward trend in natural gas demand,  
24    with some growth in the later years as overall national  
25    demand picks back up.

1           In our low demand/high price case, we see the  
2 potential for even additional renewables. Renewables  
3 perhaps beyond where current RPS standards are for other  
4 states. And we think there's some amount of spillover  
5 that may occur, where states that are adopting and  
6 seeing a great deal of investment in renewables will see  
7 investment beyond even what a government mandate would  
8 suggest or drive them toward.

9           In the high demand/low price case, that is  
10 driven by seeing more switching from coal to gas, than  
11 perhaps the EIA originally expected. That would be our  
12 high end number. It's about 61 gigawatts of switching  
13 to gas. With not as much offset by the renewables.

14           And so, we see a range here of somewhere around  
15 20 to about 33 Bcf per day possible by 2030 for natural  
16 gas demand, for power gen in the United States.

17           CHAIR WEISENMILLER: You know, and I was going  
18 to say I think the two data points I would give is one,  
19 if you look at SDG&E, which was pretty close to zero  
20 when the first RPS bill passed, and is now at 33 percent  
21 and expects to get to 40 next year.

22           MR. RHYNE: Right.

23           CHAIR WEISENMILLER: And, obviously, 40 was not  
24 a requirement when they signed the contracts.

25           And then Nevada, as I understand talking to the

1 governor's office and PSE there, the utilities are now  
2 buying renewables not because of a mandate, but because  
3 of cost.

4 MR. RHYNE: Right.

5 CHAIR WEISENMILLER: So, they're going past  
6 their RPS targets.

7 MR. RHYNE: We think that changes in the drivers  
8 of new resources, especially in the power generation  
9 side, may alter the landscape exactly as you're  
10 describing, where we switch from the driver being a  
11 regulatory one to being economic.

12 One of the big stories over the last decade, in  
13 the natural gas sector, has been the growth of natural  
14 gas from shale resources. So, these are resources that  
15 historically we've known about in the United States, but  
16 had a difficult time extracting at a cost that is  
17 competitive.

18 And with the growth of horizontal drilling  
19 techniques, combined with new mapping techniques, we've  
20 been able to unlock a lot of these shale resources.  
21 Some of them in the northeast, in the upper Midwest.  
22 And that's sort of moving where a lot of the production  
23 in the United States has come from. It's traditionally  
24 been in the southwest. Now, some of that production is  
25 now moving up into the upper Midwest.

1           The important and interesting piece of that is  
2   that shale gas -- gas from shale, I should say, is  
3   becoming a larger percent of the overall gas portfolio,  
4   from what was nearly nil 15 years ago to a really  
5   significant percentage.

6           And so, on the right-hand scale you can see the  
7   line marking the percent of shale production, as  
8   estimated by Lippman Consulting. And then applied to  
9   their estimate of U.S. production, which are the red  
10   bars. And so, what you end up with are the blue bars at  
11   the bottom, which is an estimate of how much shale gas  
12   will be produced out through 2020.

13          For information purposes we've added our own  
14   mid-case estimate of U.S. production, which is slightly  
15   higher than LCI. And, regardless, we end up with a  
16   situation where we see a couple of interesting things.  
17   First of all, obviously growing percentage of production  
18   from shale.

19          But it's the tapering off and the flattening out  
20   of that growth that I think is interesting overall as a  
21   becoming a more -- the percentage of growth, perhaps, is  
22   not as fast as previously. So, we may be reaching some  
23   sort of a plateau in terms of how much new shale is  
24   brought online.

25          That's not say that it won't grow. Obviously,



1 as overall production grows that fixed percentage means  
2 that shale production will grow with it. But it's not  
3 the sort of exponential growth that we've seen over the  
4 last several years.

5 And finally, the natural gas resources and  
6 infrastructure. What we see is, just taking a slightly  
7 different look at that shale gas, in Bcf per day, our  
8 estimate of where that production will be. You can see  
9 in this stacked graph that, really, the lion's share of  
10 U.S. production of gas will come from shale. We have  
11 type gas production, which is a slightly different type  
12 of play.

13 We have conventional gas. It's the sort of  
14 traditional, you know, big, empty cavern filled with  
15 natural gas that we, you know, put -- sort of in the  
16 industry they say they put a straw in it, and they just  
17 sort of suck it out.

18 And then we have associated gas production.  
19 That's gas production from -- they're going after  
20 something else, typically oil, and they're able to also,  
21 because those reservoirs also contain gas, they're able  
22 to pull it out.

23 and, finally, coalbed methane, which is a small  
24 portion of the overall portfolio. So, this is what we  
25 see in the national production portfolio going out

1 through 2020.

2 Moving on to imports, exports and LNG. I  
3 mentioned that California is a part of the national  
4 market. Well, natural gas is an international market,  
5 overall. And so, the United States is a part of that  
6 larger international market. Specifically, we are  
7 connected and tied to Canada, Mexico and then, in a  
8 growing sense, to the rest of the world through  
9 liquefied natural gas or LNG.

10 So, first of all, Canadian gas has been a pretty  
11 important source of gas for the United States throughout  
12 history. They have plentiful reserves in their basins.  
13 But with the growth of gas development from shale  
14 resources, we've seen a decline in the overall imports,  
15 net imports I should say, from Canada. We always export  
16 a little bit at different times of the year. But,  
17 overall, we are a net importer.

18 And so, in the low demand and the mid -- sorry,  
19 the reference, the mid demand case, we continue to be  
20 net importers of gas from Canada, but in declining  
21 amounts.

22 The interesting thing here is that in looking at  
23 scenarios and estimating what may occur, in our high  
24 demand, which is a low price case, I want to keep that  
25 in mind, where gas production in the United States is

1 relatively cheap, there is a possibility and this aligns  
2 with estimates produced by EIA, where we could in fact  
3 turn to be net gas exporters to Canada. Now, that's  
4 only in a case where we have a real abundance and a low  
5 price for gas, but it's not an impossibility as we look  
6 out into the future.

7 And I just shaded that area there at the bottom  
8 to show when we switch over into being a net gas  
9 exporter, just for the sake of clarity on the graph.

10 So, we see that as a small possibility, but a  
11 possibility nonetheless.

12 Our other physical connection to other markets  
13 is via pipeline to Mexico. Mexico is a growing economic  
14 sort of entity. There's a great deal of movement in  
15 Mexico to connect with the United States in more than  
16 just the traditional sense. There's a great deal of  
17 effort of the part of this administration here, in  
18 California, to support and connect with the industry,  
19 industrial growth and just general improvements that are  
20 going on in Mexico.

21 We know that Mexico has a couple of things going  
22 for it. Number one, they have a growing demand for  
23 industrial uses of natural gas and they have a growing  
24 demand for natural gas for power generation. And, in  
25 fact, there are a number of applications to build

1 pipeline, natural gas pipeline down into Mexico.

2           And so we see our exports to Mexico growing in  
3 all three cases, in the short term. However, in all  
4 three cases we also see the reality that at some point  
5 Mexico will eventually develop its own resources. And  
6 we know that there's changes in their constitution that  
7 will allow investment from outside of Mexico to help  
8 make that a reality.

9           And so, when that development occurs really is  
10 just depending on when it becomes really economically  
11 feasible and viable for PEMEX, which is the Mexican gas  
12 corporation, to undertake that activity.

13           And so, in our low demand/high price case, which  
14 is shown here in the green line, where our production of  
15 gas is relatively expensive, it becomes economic sooner  
16 for Mexico to develop their case. And so, you see that  
17 plateau and downward trend sooner and at a lower level.

18           In our reference and high demand case, where the  
19 cost of gas in the United States is relatively higher,  
20 and obviously in the high demand -- I'm sorry, it's  
21 relatively lower, sorry. In our high demand/low price  
22 case gas is cheap and so, Mexico waits longer to begin  
23 developing its own resource. But in all three cases we  
24 see that occurring out in the future.

25           And so that's, we think, one of those

1 interesting trends that we'll be sort of watching for as  
2 time goes by.

3           Finally, our connection, the United States'  
4 connection to the international market is mainly through  
5 liquefied natural gas. Now, this is really a reversal  
6 from the thinking of where we were a decade ago, where  
7 we thought we had reached a point where we were going to  
8 have to become importers of natural gas via LNG. And  
9 there was a flurry of activity around the possibility of  
10 permitting some of these LNG import facilities.

11           Well, that died out once the price of gas came  
12 back down and then we began developing these resources  
13 here, in the United States. And what we found is that,  
14 quite the opposite of becoming LNG importers, there are  
15 a number of companies out there looking to become LNG  
16 exporters.

17           And there are 14 LNG liquefaction terminals  
18 approved by the U.S. Department of Energy. Jordan Cove,  
19 which is located in Oregon, is expecting its final FERC  
20 approval by the end of this year. Sabine Pass is  
21 expected to begin exporting, actually, early next year.  
22 And Cameron LNG has filed to expand its LNG export  
23 capacity.

24           And overall what this means is that our net LNG  
25 exports are expected to grow in all three cases. In our

1 highest demand/low price case, we end up with a slightly  
2 lower, and our low demand/high price case is higher.  
3 But that has to do with the fact that by exposing  
4 ourselves to international markets, it actually  
5 increases the overall price. And so, that's one of the  
6 sort of twisty pieces of logic as you try and figure out  
7 how we ended up where we ended up.

8 But really, overall in the reference case we see  
9 about 15 Bcf per day of net LNG exports going on by  
10 2030.

11 CHAIR WEISENMILLER: Yeah, and I was going to  
12 say, I've obviously been to both Germany and Mexico.  
13 And in Germany, talking to the embassy folks there,  
14 there was a lot of interest in trying to get U.S. LNG  
15 into Europe, in part to respond to Russia and the  
16 Ukraine issues.

17 And it was just remarkable, when they were  
18 looking through things of saying, yeah, it's going to  
19 take years. And just going through the regulatory  
20 process, even with a pretty big geopolitical imperative  
21 that, you know, it wasn't something that was going to  
22 occur in less than three or four years.

23 And in Mexico, obviously, there's a huge push to  
24 flip the power system from oil to gas. And Texas is  
25 really driving that pretty hard. So, I think, again,

1 you're going to see a lot of shift there.

2           They're obviously looking at renewables, also,  
3 although at this point, at least when I was there last  
4 time, the legislation defining clean energy hadn't  
5 really passed their legislation. And there's a question  
6 of whether gas would be part of that or not part of it.

7           But, you know, there's a fair amount of wind  
8 down in the peninsula, only about 60 megawatts total of  
9 solar. There's a huge potential there for solar. So,  
10 the exact mix is unclear, but there will be a huge shift  
11 over to gas.

12           MR. RHYNE: Thank you. So, the key takeaway,  
13 before we walk into the rest of our conclusions, in  
14 terms of the import/export, is the international  
15 connections of the U.S. market, we don't necessarily  
16 foresee having an immediate or direct impact on the  
17 California market, per se.

18           But the indirect effects on the California  
19 market in terms of price, in terms of changes to the  
20 overall infrastructure, we will definitely see some of  
21 that, especially as these developments continue, the  
22 exports to Mexico, the LNG export facilities, those  
23 types of things.

24           And so, that's one of those areas where we, as  
25 an Energy Commission, and we, I mean as analysts, will

1 have to keep an eye on that and make sure we stay  
2 apprised of how those developments sort of play out.

3 So, finally, hopefully, you're not entirely too  
4 tired of my voice just yet, but we will summarize the  
5 conclusions here.

6 Just numerically speaking, I just want to sort  
7 of summarize a couple of things. Total U.S. natural gas  
8 demand grows at an annual rate of, really, about 1.4  
9 percent between 2015 and 2030, reaching just short of 8  
10 Bcf per day in the mid case. That is really a slow,  
11 steady growth overall in natural gas demand, with some  
12 potential for a little bit of a dip, a little bit of a  
13 decline in the middle years.

14 Total California natural gas declines -- gas  
15 demand, I should say, declines to about 5.8 Bcf per day  
16 by 2030, remaining below its overall 2015 level, again  
17 in the mid case.

18 Implementation of renewables in energy  
19 efficiency suppress California's total natural gas  
20 demand, declining at an annual rate of .63 percent  
21 between 2015 and 2026.

22 Henry Hub prices range between \$4.00 and \$6.87,  
23 expressed in 2014 dollars, per Mcf by 2030, representing  
24 an annual growth rate of about 2.6 percent between 2020  
25 and 2030.



1 Coal retirements outside California contribute  
2 to higher natural gas demand and prices. But as we  
3 mentioned, the retirement of coal is offset to some  
4 extent by the growth in renewables and efficiency.

5 And finally, U.S. exports are expected to grow,  
6 including liquefied natural gas, exports to Mexico, and  
7 even the possibility of increased exports to Canada.

8 So with that, we've reached the point where I  
9 get to stop talking. I will encourage everyone online,  
10 and here in the room, to submit your comments. Those  
11 are due by November 17th. The Energy Commission does  
12 use the new electronic comment system, so you should go  
13 to the website that's listed here, follow the  
14 instructions on this slide and submit your comments that  
15 way.

16 I will also stop for just a moment and I want to  
17 express thanks to all the stakeholders who participated  
18 and commented on the process to date. I think the sort  
19 of quiet nature of the room in here, today, actually is  
20 testimony to the fact that we've done, I hope, a good  
21 job of integrating the information, comments and  
22 feedback from a number of stakeholders. And we will  
23 continue to do so until we issue the final Natural Gas  
24 Outlook.

25 And with that, I will stop talking and open the

1 floor to any questions or comments.

2 CHAIR WEISENMILLER: Yeah. Well, again, I think  
3 we both want to thank you and the staff for going back  
4 through things fairly carefully, and sort of smoothing  
5 out the analysis.

6 Obviously, where we really want people to focus  
7 on is comments on the price forecast going forward,  
8 since that will feed so much.

9 I was going to note on the -- you mentioned the  
10 wide range of uncertainty. I was going to say, I was at  
11 one conference with a bunch of bankers a number of years  
12 ago, and gas prices had hit like \$22 in one month. And  
13 so, they're all just, you know, just you can imagine  
14 wreaking havoc on any number of projects sitting there.  
15 And then some poor soul goes up to do his price forecast  
16 out in the future which is, of course, you know, about  
17 one percent relative to inflation, with plus or minus  
18 one percent. And they're all saying wait a minute, you  
19 know, how could you possibly have that forecast for  
20 volatility, you know, given what we've just lived  
21 through?

22 But anyway, so this, I think, represents better  
23 some of the range. And like I said, particularly if you  
24 think about our highs and lows and, you know, worrying a  
25 little bit about temperature and hydro variability in

1 terms of climate change, we could see a lot lower or  
2 higher gas demand going forward in months/years/days,  
3 which will certainly translate back into that  
4 volatility, again. Just as polar vortex back east has  
5 really hammered the gas price forecast.

6 So, I think we're going to go, moving into a  
7 world of much more volatile gas prices, although the  
8 demand generally is heading downward.

9 So, anyway, certainly appreciate the effort on  
10 this.

11 COMMISSIONER MC ALLISTER: Yeah, definitely. I  
12 mean, I guess, you know, the downside -- so, you know,  
13 it's hard to have a job where you're going to be wrong.  
14 You know, you pretty much know that. And the challenge  
15 is to characterize the uncertainty in a way that is  
16 meaningful. And I think you've done that and it's  
17 really good. So, I want to thank staff and reiterate  
18 what the Chair said.

19 Also, I would just point out that, you know, the  
20 bounds, the upper and lower bound are off by, you know,  
21 a factor of five or so. So, they're different by a  
22 factor of five or so, so that's just sort of an  
23 uncomfortable reality we have to live with.

24 So, I think, really, the way that you deal with  
25 is by engaging with the stakeholders, making sure that

1 you're looking at and aware of all these issues, and  
2 kind of as -- you know, and roll with the punches,  
3 basically, as the market evolves, and things happen, we  
4 hit forks in the road, and sort of making sure that  
5 people out there in the world know that we're looking at  
6 each of those events, and trying to understand them, and  
7 utilize that going forward.

8           So, this is sort of a little bit of -- people  
9 have to understand, I think, that there is a bit of --  
10 you know, there is some crystal ball here, but it is  
11 actually rooted in analytics.

12           And so, I really appreciate your balancing those  
13 competing needs, I think, and uncertainties. So,  
14 thanks.

15           I do look forward to sort of getting more  
16 insight on the impact of the Clean Power Plan. I mean  
17 that's -- I think, California, we're not sort of fearful  
18 in terms of what it's going to ask us to do, because our  
19 goals are sort of more aggressive than the Clean Power  
20 Plan overall. But to the extent that we are subject to  
21 national markets and all that, I think it's important to  
22 understand the trends and how they might impact us on  
23 the price front.

24           So with that, are there any public comments? I  
25 do not have -- oh, there's a -- you have your own blue

1 card. Please.

2 MR. CARMICHAEL: I'll turn it in. I'll  
3 introduce myself. Tim Carmichael, with the California  
4 Natural Gas Vehicle Coalition. Thank you very much for  
5 the presentation.

6 I just had one question. Really, it's a two-  
7 part question. The variation in the lower and upper  
8 bound for natural gas prices surprised me. And I know  
9 we're talking about 15 years out, but it still surprised  
10 me because the forecasts I've seen for petroleum don't  
11 show that much variation by percentage. And so, that's  
12 question one.

13 And then, question two is in your concluding  
14 slide you showed that the Henry Hub expected variation  
15 is actually quite a little bit, a lot narrower than the  
16 California potential price variation, if I'm  
17 understanding correctly. In California, you've got 1.80  
18 to 8 something, and Henry Hub you've got 4 something to  
19 6 something.

20 So, it's two parts, one that compares into  
21 petroleum and one that compares into the national  
22 projection number. Thank you very much.

23 MR. RHYNE: So, to answer your question, and  
24 it's a great question, there's two ways to try and  
25 capture the future variability, the variation in price.

1 One is to build into our assumptions, and into our  
2 modeling and analysis a variety of assumptions about  
3 what that future might hold. And we've tried to do that  
4 in our variations between the reference -- sorry, the  
5 mid case and the high demand/low price, low demand/high  
6 price case.

7 And those variations translate well across all  
8 of the estimates. So, all of the factors that we  
9 presented had all three of those. And so that we've  
10 tried to capture that variation sort of intrinsically  
11 within the model.

12 The slide that I think triggers the most sort of  
13 open question here is this one, where we have  
14 superimposed on top of those intrinsic variations a more  
15 specific analysis that looks only at our estimates of  
16 future Henry Hub price. And we looked at how close we  
17 actually came to meeting -- to matching reality. And we  
18 looked at where we were off and by how much.

19 And then we began -- and then we sort of built  
20 those bands out around that. And so, while we were able  
21 to capture some of the variation in the future Henry Hub  
22 price just by making assumptions about what the future  
23 might hold, this is built entirely on an historical  
24 analysis of how well or poorly we did in matching with  
25 the real world.

1           And so, it's not tied, for example, to the  
2 estimates of petroleum prices or other forecasts'  
3 attempts to capture their own possible futures. This is  
4 simply a statement that says in the real world things  
5 happen that are beyond even our current ability to sort  
6 of estimate. They're discontinuous, they're nonlinear.

7           And in doing so, we end up with things like  
8 major price spikes associated with a hurricane that  
9 happens to roll through the Gulf Coast that we just  
10 couldn't see coming. And so, we end up with a year that  
11 has a large variation out there.

12           And one of the other things that's really  
13 important in general forecasting is that every year that  
14 you're off compounds the next year because every  
15 event -- every time you're off a little bit one year,  
16 well, you're off by that starting out the next year, and  
17 then you're off a little more the following year.

18           And so what we see is that the growth in that  
19 uncertainty sort of balloons out, out into the future.  
20 And so it's actually, and I mentioned this, it's very  
21 rare in any sort of a forecasting activity for people to  
22 sort of throw up their sort of report card, so to speak,  
23 and say this is how well or how poorly we did in the  
24 past. And we take it very seriously here to try and  
25 figure out how wide people, who make planning decisions

1 or policy decisions, should be thinking about what the  
2 possible future prices might be.

3 But we didn't attempt to do this through all of  
4 the metrics that you saw. So, the California price  
5 variations only reflect the variations that we attempted  
6 to create scenarios for, not this overall historical  
7 statistical analysis.

8 So, that's maybe a long-winded way of answering  
9 your question but, hopefully, that answers it.

10 MS. RAITT: Thanks, Ivin.

11 Any other questions in the room? And I don't  
12 think we have anyone on WebEx.

13 COMMISSIONER MC ALLISTER: Okay. Well, great,  
14 thanks everybody. And thanks again to staff. Really,  
15 lots of yeoman's work here. And looking forward to the  
16 next update or the final -- well, I guess the next  
17 discussion we'll have in the IEPR record is the final.

18 So, with that we're adjourned. Thanks,  
19 everyone.

20 (Thereupon, the Workshop was adjourned at  
21 11:06 a.m.)

22 --oOo--

23

24

25

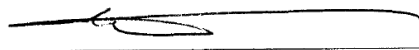


**REPORTER' S CERTIFICATE**

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.

And I further certify that I am not of counsel or attorney for either or any of the parties to said hearing nor in any way interested in the outcome of the cause named in said caption.

IN WITNESS WHEREOF, I have hereunto set my hand this 9th day of November, 2015.



---

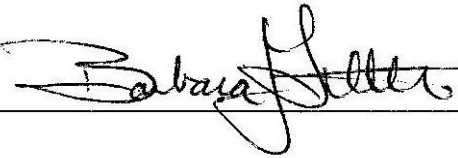
PETER PETTY  
CER\*\*D-493  
Notary Public

**TRANSCRIBER'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 transcribed by me, a certified was under my supervision thereafter transcribed into typewriting.

And I further certify that I am not of counsel or attorney for either or any of the parties to said hearing nor in any way interested in the outcome of the cause named in said caption.

IN WITNESS WHEREOF, I have hereunto set my hand this 9th day of November, 2015.



---

Barbara Little  
Certified Transcriber  
AAERT No. CET\*\*D-520