BEFORE THE PUBLIC UTILITIES COMMISSION OF OHIO

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In the Matter of the Application : of Ohio Edison Company, The: Cleveland Electric Illuminating : Case No. Company, and the Toledo Edison : 14-1297-EL-SSO Company for Authority to Provide : for a Standard Service Officer : Pursuant to R.C. 4928.143 in the : form of an Electric Security Plan:

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Fairfax, Virginia
Friday, October 23, 2015
Deposition of:

## JUDAH ROSE

A witness, called for examination pursuant to notice, at ICF International, 9300 Lee Highway, Fairfax, Virginia, beginning at 2:01 p.m., before Joseph A. Inabnet, a Court Reporter and Notary Public (No. 274024) in and for the Commonwealth of Virginia at Large, when were present on behalf of the respective parties:

questions, we'll open up a confidential line, and I will do my confidential questions. Then we can move on to other parties.
A. Before we get begin, is there -- should I mention the corrections?

MR. KUTIK: Let him ask you questions. BY MR. FISK:
Q. So if we could start with your discussion in your rebuttal testimony about natural gas price forecasts.

Am I correct it's your position that the
Energy Information Administration's natural gas price forecasts are fairly consistent with your own forecast?
A. Do you have a particular reference?
Q. Page 42 . Start there. Specifically you have a discussion there about the EIA reference case, and towards the bottom of the page, line 18, you reference the EIA reference case, has natural gas prices that are fairly close but modestly below my forecast.
A. I do see that.
Q. So you there are referring to the 2014 EIA reference case. Is that correct?

MR. KUTIK: You mean the AEO reference case?

MR. FISK: Yeah, the AEO.
THE WITNESS: Yes.
BY MR. FISK:
Q. Okay. And do you consider EIA's natural gas price forecast to be reasonable?
A. Yes. With the caveat that they are biased downward due to the lack of treatment of CO 2 regulations, as I discuss on page 42.
Q. Okay. And Figure 9 on page 44 of your rebuttal testimony, so the -- there's a series of different lines there representing different gas price projections; correct?
A. Yes.
Q. And the EIA 2014 AEO Base Case forecast is the light orangish line?
A. Yes.
Q. And so leaving aside the issue about the

CO 2 prices when you -- do you believe that that
forecast is reasonable?
MR. KUTIK: Objection. You can answer.
I objected to the form of the question.
THE WITNESS: Okay.
MR. KUTIK: And just so -- unless I
instruct you not to answer, you can go ahead, and, if you can, answer the question.

If you have a problem with the question, tell him that.

THE WITNESS: I do consider the forecast reasonable with the caveat that we just discussed related to CO2.
BY MR. FISK:
Q. Great. And are you aware that -- well, let me step back.

If I say EIA, you would agree that's Energy Information Administration?
A. Yes.
Q. Are you aware that the EIA issues short-term energy outlooks on a monthly basis?
A. I'm aware that they have short-term outlooks.
Q. And do you ever review those outlooks?
A. Sometimes.
(Thereupon, Deposition Exhibit No. 1 was marked for identification.)
BY MR. FISK:
Q. Mr. Rose, you have been handed a document that's been marked as Exhibit 1, which is the natural gas section of the EIA's Short-term Energy and Winter Fuels outlook from October 6, 2015.

Does that appear to be correct?
A. Yes.
Q. And have you ever seen this document before?
A. No.
Q. Do you know whether this is a portion of the type of short-term energy outlook we were just discussing?

MR. KUTIK: Objection. He hasn't seen it before.

THE WITNESS: It says short-term energy outlook. I just have not seen this document.

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    BY MR. FISK:
    Q. Okay. If you could turn to page 3 of the
    document.
                            Do you see in the middle of the page
approximately, there's a header that says Natural
Gas Prices?
    A. Yes, sir.
    Q. And the first sentence says, "Henry Hub
    natural gas spot price averaged $2.66 per million
BTU in September..." Do you see that?
    MR. KUTIK: Note my objection to this line
of questions. To the extent the witness has not
seen this document before, it's unfair to have him
look at the document and answer questions about it.
    I would like to just have a continuing
objection, if you don't mind.
    MR. FISK: Okay.
    THE WITNESS: Could you ask the question
again, please?
    (The record was read back as requested.)
BY MR. FISK:
    Q. Do you see that reference?
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                                    Page 11
    don't have knowledge of the specific average.
Q. Okay. And do you have any knowledge as to
whether EIA has put out any short-term natural gas price forecast since the release of the 2015 AEC?
A. Yes, I believe they have.
Q. Okay. And have you seen those forecasts?
A. I don't remember.
Q. If you look at the last line of the
paragraph on page 3 of Exhibit 1 under Natural Gas
Prices, it says: "The projected Henry Hub natural gas price averages $\$ 2.18$ per million BTU in 2015..." Do you see that?
A. Yes. As part of a sentence.
A. Yes, as part of a sentence.
Q. Is that consistent with your -- would you
have any understanding of what the Henry Hub natural gas spot prices were in September?
A. I don't have a specific recollection for
the average of September.
Q. Okay. Do you know as to whether they were approximately $\$ 2.66$ per million BTU on average?
A. It seems like a reasonable number, but I
Q. Okay. Do you know, is that consistent with what the EIA has projected for 2015 natural gas prices?
A. I don't understand the question.
Q. Do you know as to whether that $\$ 2.18$ per million BTU is approximately what the EIA is currently projecting for natural gas prices for 2015?
A. That's what it says here.

I don't have any other knowledge related to that forecast.
Q. Okay. So do you have any reason to doubt that that is an accurate portrayal of EIA's forecast?

MR. KUTIK: Objection.
THE WITNESS: No. I have no reason to doubt it, but I haven't seen the document before. BY MR. FISK:
Q. Okay. And do you have any knowledge as to what EIA's 2016 -- forecast for natural gas prices in 2016 currently is?
A. Well, now I do because it looks like

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that's what it says in the same sentence, that it's approximately -- it says $\$ 3.05$ per million BTU, but I haven't seen the document before, and that's the only basis I have for that.
Q. Okay. So when you offered testimony in rebuttal regarding EIA's natural gas price forecast, did you do anything to check as to whether EIA had issued any new forecast subsequent to the 2015 AEC?
A. No.
Q. And the two figures that we just discussed on page 3 of Exhibit 1 for the 2015 and 2016 Henry Hub natural gas price projections, those are lower, am I correct, than the figures reported for the ElIA's 2014 Base Case.

## Is that right?

A. I don't have those numbers. If you have a reference, I will be glad to look at it.
Q. The numbers that are referenced in Figure 9 of your rebuttal testimony.
A. Yes. Based on Figure 9, they appear to be lower.
Q. And if you could turn to page 55 of your
rebuttal testimony, lines 11 through 13 , you have a discussion there about natural gas future prices.

Is that correct?
A. Yes.
Q. Okay. And you state, starting towards the end of line 11, "they provide useful information for the prompt two years, less useful information for years three to five, and little to no material information beyond year five."

That's your testimony. Is that right?
A. Yes. You read a portion of a sentence of my testimony.
Q. Okay. And for years three to five, when you say less useful information, what do you mean by that?
A. I mean, the value of the information is less than in the first two years is -- I'm not sure what you're asking.
Q. Do you feel that futures for years three to five have some relevance to evaluating what natural gas prices are likely to be in that time frame?

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A. Some, but not a lot.
Q. Okay. Would you in any way rely on
futures for evaluating gas prices in years three
through five?
MR. KUTIK: Objection.
THE WITNESS: No. Not to the extent that
I would include it in our forecast.
BY MR. FISK:
Q. Okay. Would you consider it unreasonable to rely on gas future prices in any way for evaluating what gas prices might be in years three through five?
A. I would not use them in my forecast.
Q. Okay. But if someone else was using them, would you consider that unreasonable?
MR. KUTIK: Objection, asked and answered.
THE WITNESS: I would not use them, and I would not recommend that anyone do that.
BY MR. FISK:
Q. Okay. And would you consider the EIA a
reliable source of reporting what NYMEX natural gas futures are?
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MR. KUTIK: Can I have the question read, please?
(The record was read back as requested.)
THE WITNESS: I use other sources. BY MR. FISK:
Q. And what sources do you use?
A. SNL.
Q. Any other sources?
A. Not that I remember sitting here right now.
Q. Okay. And when is the -- when have you most recently reviewed what the NYMEX natural gas future prices are?
A. Recently. I don't have a specific date.
Q. Recently being within the last month or --
A. Yes. Within the last month.
Q. Okay. And if you could turn to page 4 of Exhibit 1.

And do you see there's a graph up at the top that says, "Henry Hub Natural Gas Price"?

MR. KUTIK: Note my objection to the reference to this document.

## THE WITNESS: I see that. BY MR. FISK:

Q. Okay. And do you see there's different colored lines, and the green one is labeled "NYMEX futures price."

Do you see that?
A. Yes.
Q. And then do you see the value reported for that, for the NYMEX futures price on the graph above for basically late 2015 through 2016?
A. I see the graph.
Q. Do you know if the green line identifying NYMEX future prices is consistent with your understanding of where NYMEX future prices for gas for late 2015 through 2016 are?
A. You know, I don't know the date of it, and I haven't had a chance to review the document.
Q. Do you have an understanding of what NYMEX future prices for natural gas for 2016 are currently?
A. I have a sense.
Q. Okay. Approximately, what are they?
A. Part of it is what period -- are you asking what they are today?
Q. The last time you looked, which I believe you said was in the past month.

What was approximately the NYMEX future price for gas for 2016?

MR. KUTIK: For 2016 ?
MR. FISK: Yes.
THE WITNESS: My recollection is in the 3 to 3.25 range, but I don't have a specific number memorized, or I'm not sure. I would have to double check.
BY MR. FISK:
Q. And how would you double check that?
A. I would go to SNL.
Q. Looking at the table on page 4 of Exhibit

1 --
MR. KUTIK: The table or the graph?
MR. FISK: Sorry, the graph.
MR. KUTIK: The top graph.
MR. FISK: Yes, the top graph.

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BY MR. FISK:
Q. The line for NYMEX future prices, does that appear to be around $\$ 3$ or so for 2016?
A. Yes. You know, there is no specific number for 2016. It seems like there's a lot of numbers, but it doesn't say -- it's hard to tell. It looks roughly like 3.
Q. So roughly consistent with what you are
recalling regarding NYMEX future prices for 2016; right?

MR. KUTIK: I will object.
You are also mischaracterizing the
document in terms of the confidence interval, which
we haven't really talked about, but go ahead.
THE WITNESS: Can I have the question repeated?
(The record was read back as requested.)
THE WITNESS: I'm just focusing on the
dark green line.
BY MR. FISK:
Q. Yes.
A. And it looks like roughly around 3 bucks,
but it's just -- other than that, I can't say too much.
Q. Okay. If you could turn to page 53 of your rebuttal testimony, line 21.

There's a sentence that says: "EVA's
forecast is 4 percent higher..."
Do you see that?
A. Yes.
Q. What is EVA?
A. EVA is Energy Ventures Analysis, I believe.

It's a consulting firm.
Q. What is the source for EVA's forecast that you are referring to there?
A. It's footnote 66.
Q. So you're referring to an EVA forecast that was reported in the EIA's AEO 2014 document?
A. Yes.
Q. Okay. So Footnote 66 is labeled on -- it
comes at the end of the sentence, and it ends on line 24 of this page; correct?
A. In the middle of page -- of line 24 .

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Q. Yes. Okay. But that -- so that footnote is referring to the EVA forecast and the IHSGI forecast. Is that correct?
A. Yes.
Q. And if you can turn over to page 54 of your rebuttal, starting at the end of line 2 going on to line 3, you say: "Lastly, US EPA gas price projections are also similar to mine."

Do you see that?
A. Yes.
Q. What EPA gas price projections are you referring to?
A. I believe it is their base case
projections, but I would have to double check.
Q. Base case from what?
A. From the most recent EPA base case.
Q. For a certain rule or what -- what source are you referring to?
A. EPA has gas price projections, and they have a base case. And I would have to double check whether it was from that case. But I believe that's where it's from.
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BY MR. FISK:
Q. Do you have any knowledge as to how that gas price projection was developed?
A. I believe it was through the EPA base case process where they establish different assumptions.
Q. And so EPA has some sort of a modeling process they undertake or ...
A. That's correct, yes.
Q. Does ICF to do that for EPA?
A. ICF is involved.
Q. So is this gas price projection from ICF? MR. KUTIK: Objection.
THE WITNESS: It's possible that ICF was
involved, but there are issues as to what the
assumptions were, which would be EPA's. And so -- I
would have to double check.
BY MR. FISK:
Q. Did you have any role in developing this EPA gas price projection?
A. No.
Q. Do you know if this EPA gas price
projection was used in its evaluation of the Clean

## Power Plan?

A. I believe it's related, but I need to double check on that.
Q. Do you know over what time frame this gas price projection covers?
A. It's a long-term, multiyear projection,
but I don't remember the specific years.
Q. Do you know if it goes through 2030?
A. Yes. My recollection is it goes through 2030.
Q. And when did you start working on your rebuttal testimony?

MR. KUTIK: Note my objection.
THE WITNESS: Sometime after I saw the testimony of Mr. Comings and Mr. Wilson. BY MR. FISK:
Q. And you are referring there to their direct testimony?
A. Yes. I believe so.
Q. So sometime after -- are you aware of when the direct testimony was filed?
A. December 22, something like that.

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Q. Do you know how soon thereafter you started working on your rebuttal?
A. No.
Q. Had you started working on it before supplemental testimony was filed in this proceeding?
A. Yes. I believe so.
Q. And did anybody assist you in drafting your testimony?

MR. KUTIK: Well, he'll not answer that question. So go to your next question.

I'm instructing him not to answer the question.

MR. FISK: On what grounds?
MR. KUTIK: Work product, privilege.
MR. FISK: Well, if counsel was involved.
MR. KUTIK: Next question.
MR. FISK: We are allowed to ask if other people besides counsel were involved --

MR. KUTIK: Next question.
MR. FISK: -- in drafting his testimony.
MR. KUTIK: Next question.
MR. FISK: On what grounds can you object

is that they rely on an EIA reference case for natural gas prices which assumes no CO 2 cost?

MR. KUTIK: Objection.
THE WITNESS: That is something that should be adjusted.
BY MR. FISK:
Q. Okay. And what -- well, let's turn to page 44 of your rebuttal.

If you look at lines 3 through 5, starting towards the end of line 3 , it says: "The quantitative estimates by EIA of the impact of CO 2 emission regulations on gas price is not the same as mine would be."

Do you see that?
A. Yes.
Q. How does EIA's quantitative estimate of the impact of CO 2 regulations on gas price differ from yours?
A. One critical issue is that they start
before 2022 to impose CO 2 prices.
Q. Any other differences?
A. The CO 2 prices are not the same as mine.

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Q. Any other?
A. My model is similar to -- in terms of its
treatment of the energy sector, but not the same as -- EIA. And so there's a set of differences associated with that.

My focus is on the first two.
Q. Okay. Any other differences?
A. No.
Q. And so with regards to your factoring a
carbon cost into your natural gas price projection, am I correct that the impact of that carbon cost is to increase your natural gas price?

MR. KUTIK: Objection.
THE WITNESS: Yes. All else being equal. BY MR. FISK:
Q. Okay. And all else being equal, if you had factored in a higher carbon price to your natural gas projection, you would have ended up with higher natural gas prices. Is that right?
A. Higher than what?
Q. Higher than -- take the baseline of your
gas price projection using your carbon price
forecast.
If you assumed a higher carbon price and plugged into your projection of gas prices, your gas prices would be higher. Is that right?

MR. KUTIK: Objection.
THE WITNESS: I would have to run that through the model. I think it does depend on how much higher.

But it's not a lot higher, but higher probably would increase the gas price. BY MR. FISK:
Q. And so a minute ago, I believe you said that the CO 2 prices used by EIA are not the same as what you used; correct?
A. Yes. That's correct.
Q. And the two scenarios that EIA modeled in its 2014 AEO was a $\$ 10$ per ton and a $\$ 25$ per ton carbon price.

Is that right?
A. I believe so. I would have to check and see what year dollars it was, et cetera, but I believe that's the case.

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Q. Well, if you refer -- if you look at footnote 57 on page 43 of your testimony, a reference there to, AEO reports two GHG cases: GHG10 and GHG25.

Do you see that?
A. Yes.
Q. So does that -- am I correct that that -those are referring to $\$ 10$ per ton and $\$ 25$ per ton?
A. I believe so. I would have to double check.

And, as I indicated, I want to check what year dollars it is.
Q. Okay, mark this as Exhibit 2.
(Thereupon, Deposition Exhibit No. 2 was marked for identification.)
BY MR. FISK:
Q. Mr. Rose, you have been handed a document marked Exhibit 2, which is the cover page and the page MT-34 from the EIA's 2014 AEO.

Does that appear to be correct?
A. I see MT-34, and it looks to be a page from the AEO.
Q. Okay. And you have seen the EIA's 2014 AEO before. Is that right?
A. Yes.
Q. And if you could look at that page MT-34, in the right side of the page, the paragraph under the table that says -- it starts with, "Although the AEO2014 Reference case..."

Do you see that?
A. Yes, sir.
Q. And then there's a discussion there about, "potential impacts of the future policies that would place an implicit or explicit value on CO2 emissions are examined in two cases, starting at $\$ 10$ (GHG10) and $\$ 25(\mathrm{GHG} 25)$ per metric ton CO2..."

Do you see that?
A. I do see that.
Q. Is that consistent with your understanding of what the GHG10 and GHG25 scenarios assumed?
A. Yes. And normally we don't use per metric ton. We use per short ton. So I think that was another issue I wanted to check.
Q. And what sort of difference does that

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make, metric ton versus short ton?
A. Approximately 10 percent.
Q. Which direction?
A. To convert it to short tons would be to reduce it.
Q. Okay. So there -- if EIA used a $\$ 10$ per
metric ton price, you would take 10 percent off of that to get the short ton price?
A. Approximately.
Q. So $\$ 10$ per metric ton would be approximately $\$ 9$ per short ton?
A. Approximately.
Q. And EIA, according to this document, says they started that price in 2015 and increased it by 5 percent per year thereafter. Is that right?
A. Yes. But it doesn't say what year dollar is.
Q. But the -- is this consistent with your
understanding of what the EIA 2014 AEO carbon price scenario assumed?
A. Yes. Scenarios.
Q. Scenarios, okay.

So would you agree that a $\$ 10$ per ton CO 2 price starting in 2015 would have a larger upward pressure on natural gas prices than the CO 2 price you used in your forecast?
A. I would have to run it through my model.
Q. So without running it through your model, do you have no opinion as to whether -- assuming a $\$ 9$-- or a $\$ 10$ per metric ton CO2 price would increase gas prices more than what you assumed for carbon?

MR. KUTIK: Objection. Asked and answered.

THE WITNESS: I need more information, and I need more clarity on your question. BY MR. FISK:
Q. What clarity do you need on the question?
A. Well, what year and what price.
Q. Well, we are using the EIA's $\$ 10$ per metric ton starting in 2015 and escalating it 5 percent per year thereafter.

Would that assumption for carbon price have a larger upward effect on natural gas
projections than the assumptions you used for carbon price?

MR. KUTIK: Objection and answered. He told you that he needed to know additional information, including the year.

If you want to move along, move along. If you ask the same question, he's going to give you the same answer.

MR. FISK: You can stop coaching your witness --

MR. KUTIK: I'm not coaching the witness. Why don't you ask a good question? Why don't you listen to his answers so we can move along?

MR. FISK: He asked me to clarify, and that's what I did.

MR. KUTIK: Well, you haven't clarified because he has already told you about the years.

MR. FISK: Thank you for coaching.
MR. KUTIK: I haven't coached him.
Frankly, I'm trying to coach you to ask him the right questions so we can move along. It's your time to waste, Counsel. Go ahead.

MR. FISK: I certainly don't need coaching from you.

MR. KUTIK: Apparently you do because you are still asking the wrong question.
BY MR. FISK:
Q. Mr. Rose, you may answer the question.

MR. KUTIK: Yes, you can if you can.
THE WITNESS: Can I have the question read back, please?
(The record was read back as requested.)
THE WITNESS: I would need more information, and I have to run it through my model. BY MR. FISK:
Q. And what model would you have to run that through?
A. If I had enough information, I would run it through the IPM model.
Q. Okay. So going back to page 60, you -starting at line 8 , you say: "This is particularly problematic for Mr. Comings, who asserts that my CO2 emission allowance price is too low, but relies on the EIA projection without correcting for its

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absence in the EIA AEO approach."
Is that your testimony?
A. Yes.
Q. Okay. And then you go on to say: "He
should significantly increase the EIA projection for
higher CO2 prices and acknowledge my gas price forecast is lower;" correct?
A. Correct.
Q. And did you do any modeling to -- as the basis for your testimony in lines 8 through 11 -- or lines 8 through 12 on page 60 ?
A. I have investigated this issue.

MR. KUTIK: Have you finished your answer?
THE WITNESS: I have investigated this issue.
BY MR. FISK:
Q. Have you done any modeling, is my question?

MR. KUTIK: Objection. Asked and answered.

THE WITNESS: I have investigated this issue with models.

BY MR. FISK:
Q. And what did you do to investigate this issue with models?
A. I compared a model run with zero CO 2 and a model run with a CO 2 forecast.
Q. And what model -- these are model runs that you yourself performed?
A. They were performed at my direction.
Q. So someone at ICF performed them?
A. Yes.
Q. And when were those performed?
A. Over the last two years.
Q. So were they performed for this proceeding?
A. The main model investigation I conducted was for a different case.
Q. What case was that for?

MR. KUTIK: I will instruct you not to answer if it would require you to reveal proprietary information.

THE WITNESS: I would have to check to see whether or not it was public or not.

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BY MR. FISK:
Q. And what --

MR. KUTIK: Off the record for a second.
(A discussion was held off the record.)
BY MR. FISK:
Q. The model run with a higher CO 2 price that you compared to the model run with zero price, what higher CO2 price did you use?
A. I don't remember the specific numbers.
Q. Do you know if it's higher than the one you used in this proceeding?
A. I would have to double check.
Q. Do you recall how big of an impact on natural gas prices using that CO 2 price had?
A. The specific number is confidential, but it was enough to allow me to make the statement that I made.
Q. So looking at lines 8 through 12 of your rebuttal testimony, page 60, do you have any other basis for your opinions stated there besides this modeling that you have referenced?
A. I'm sorry. What lines?
Q. Lines 8 through 12 on page 60 .
A. I relied on the investigations of this issue that I conducted.
Q. Okay. And did those investigations
involve anything besides the modeling that you just referred to?
A. Not that I can remember sitting here. I would have to think about it a little more.
Q. And were there any investigations that you did that were specifically for this case that you're relying here -- relying on for purposes of your testimony from lines 8 through 12 on page 60 of your rebuttal?
A. I'm primarily relying on investigations I conducted outside the scope of this case.
Q. Can you identify any investigations you conducted for this case that you are relying on with regards to this testimony?
A. I did some initial illustrative
calculations in this case, but I was primarily relying on other calculations that I had done.

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Q. And what were the initial illustrative calculations that you did?
A. Some initial illustrative model runs that

I conducted.
Q. Separate from the model run from the other case that we discussed a few minutes ago?
A. Separate and secondarily to the other
case.
Q. Okay. And did those model runs include a CO 2 price?

MR. KUTIK: Objection.
THE WITNESS: Which model runs are you referring to?
BY MR. FISK:
Q. These initial illustrative model runs that you did with regards to this proceeding.
A. Yes.
Q. And what CO2 price did you assume in those model runs?
A. Similar to what I assumed in this case.

But, again, they were preliminary illustrative. I relied more on different analyses.
Q. Okay. So have you done any model run using the CO2 price recommended by Mr. Comings to evaluate its impact on natural gas prices?
A. No.
Q. And have you done any model run evaluating -- strike that.

If you could look at Exhibit 2. It's the EIA 2014 AEO excerpt.

We discussed a couple of minutes ago the GHG10 and the GHG25 carbon price assumptions. Do you recall that?
A. Yes.
Q. Have you done any model run evaluating the impact of the CO2 price assumptions in the GHG10 scenario on natural gas prices?
A. No.
Q. And have you done any modeling run to evaluate the CO 2 price assumptions for the GHG25 scenario on natural gas prices?
A. No.
(Thereupon, Deposition Exhibit No. 3 was marked for identification.)

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BY MR. FISK:
Q. All right. Mr. Rose, you have been handed a document that has been marked as Exhibit 3, which is the AEO 2014 natural gas supply, disposition, and prices chart that includes the reference case, the GHG10 case and the GHG25 case.

Does that appear to be correct?
MR. KUTIK: Objection.
THE WITNESS: It appears to be the case.
I have never seen this document before, and I -- so
I can't really respond to whether it is.
BY MR. FISK:
Q. Okay. You have reviewed EIA AEO 2014 Henry Hub natural gas price projections. Is that correct?
A. Yes.
Q. And for the GHG10 and GHG25 scenarios, you report those prices in Figure 9 on page 44 of your rebuttal.

Is that right?
A. Yes.
Q. Okay. And if you look on Exhibit 3 about
four-fifths of the way down the page, it says, "Henry Hub Spot Price (nominal dollars per million BTU.)"

Do you see that?
A. Yes.
Q. And then it, on these various pages, it
identifies the reference price projection, GHG10
projection and GHG25 projection for each year, 2013
through 2040?
MR. KUTIK: Objection. The witness hasn't seen this document before.

All you are asking is for him to read the document.

THE WITNESS: Please repeat the question.
(The record was read back as requested.)
THE WITNESS: It does. I would have to check the numbers to be sure.
BY MR. FISK:
Q. Okay. If you -- to check the numbers, if you compared the numbers identified as nominal dollars per million BTU for Henry Hub spot price on Exhibit 3 to the chart on Figure 9 of page 44 of
your rebuttal testimony, would that verify whether the numbers in Exhibit 3 are the EIA forecast?

MR. KUTIK: Objection.
THE WITNESS: Are you referring to Figure
9?
BY MR. FISK:
Q. Yes.
A. I would -- to verify the numbers are
correct, I would convert -- I would make sure that they were nominal to nominal, and I would compare the numbers.
Q. Okay. So your Figure 9 on your rebuttal testimony page 44 is in nominal dollars; correct?
A. Yes.
Q. If you could turn to page 8 of your rebuttal testimony.

Footnote 7, there's a reference there to:
"Electric energy revenues account for 70 to 75
percent of total revenues paid to generators since 2010."

Do you see that?
A. Yes.
Q. And if you go over to page 13 , line 7 to 10 -- lines 7 to 8 , there's a reference to electrical energy prices being the overwhelming source of power plant revenues in the wholesale industry, and there's a figure that's 81 to 86 percent. Do you see that?
A. Yes.
Q. Are those referring to the same thing, this cite on page 13 versus footnote 7 on page 8 , or are those different numbers somehow?
A. They are related.
Q. Okay. Is there a reason that the numbers are different?
A. Yes.
Q. What's that?
A. It's explained in footnote 15.
Q. Okay. And what -- what's the explanation?

I guess I don't see the explanation from the numbers on footnote 15 .

MR. KUTIK: So your question is what?
MR. FISK: Is what is the explanation for

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the difference between the numbers on page 13 and the numbers on page 8.

MR. KUTIK: Objection. Asked and answered.

THE WITNESS: The differences are related to the fact that some of the revenues are transmission related, and some are generation related.
BY MR. FISK:
Q. Okay. So the 70 to 75 percent figure on page 8 , is that -- in footnote 7 , does that factor in transmission revenues?
A. Yes.
Q. And the 81 to 86 percent figure on page 13, line 8 , doesn't factor in transmission. Is that right?
A. That's correct.
Q. Okay. Page 14, line 22, you have a
sentence that says: "Lower than expected short-term gas prices have therefore not led to equally lower electrical energy prices; the effects are much more muted."

|  |  |
| :---: | :---: |
| Do you see that? <br> A. Yes. <br> Q. Okay. Am I correct that the lower than <br> expected short-term gas prices refers to gas prices <br> to date in 2015 being approximately 30 percent lower <br> than NYMEX futures you relied on? <br> MR. KUTIK: Objection. <br> THE WITNESS: I'm sorry. Can you read <br> that back? <br> (The record was read back as requested.) <br> THE WITNESS: It's related is I think the <br> best way to answer that. <br> BY MR. FISK: <br> Q. How is it related? <br> A. There's a correlation between the NYMEX <br> gas prices and the delivered gas prices, and I'm referring to the delivered gas prices. <br> Q. And so the delivered gas prices, am I <br> correct those are also approximately 30 percent <br> lower than -- in 2015 year to date than what you had projected? <br> A. I would have to double check it. | Q. Any other bases? <br> A. Depending on how the regulations are <br> implemented, there could be -- there could be <br> changes in supply and demand for capacity that could cause prices to go up. <br> Q. Any other bases? <br> A. Those are the main ones. <br> Q. Any other minor ones? <br> A. Not that I can remember. <br> Q. Okay. And have you done any modeling to evaluate whether the final Clean Power Plan regulations could result in higher capacity prices? <br> A. No. <br> Q. Okay. Do you know of any analyses showing that the final Clean Power Plan regulations could result in higher capacity prices? <br> A. I haven't seen any quantitative analysis of that, but I have seen analysis of that. <br> Q. So you have seen -- the analyses you have seen have been qualitative? <br> A. The analyses that I'm aware of are qualitative. |
| It is something around that number, but I would have to double check. <br> Q. And the electrical energy prices that you are referring to in this page 14 line 22 over to line 1 on page 15 , am I correct those are -- year to date in 2015 have been approximately 10 to 15 percent lower than what you had forecast? <br> A. Approximately. That sounds about right. <br> Q. Okay. If you turn page 23 of your rebuttal, lines 21 to 22, you have a reference there to the final Clean Power Plan. <br> Is that right? <br> A. Yes. <br> Q. Okay. And you state on line 22 that those regulations could result in higher capacity prices. <br> Do you see that? <br> A. Yes. <br> Q. Okay. And what is your basis for that statement? <br> A. There's a mismatch between the Clean Power Plan regulation timing and the PJM auction is part of the concern. | Q. And what analyses are those? <br> A. There's a comparison of the deadlines -between the -- as I indicated, between the CPP and the PJM forward auction to BRA. <br> And I have also seen analyses about the amount of retirement of power plants. <br> Q. And the comparison of deadlines analyses, was that -- who was that done by? <br> A. That's something that I did. <br> Q. You did that. Okay. <br> So you yourself did a comparison of the <br> deadlines and concluded that that could lead to an increase in capacity prices. Is that correct? <br> A. Yes. <br> Q. And how does that lead to an increase in capacity prices? <br> A. If a power plant doesn't know what the final CPP regulations are going to be -- and I'm referring specifically to the implementation of the regulations -- it may be difficult for it to warrant that it could -- or undertake the commitment to provide capacity in a period of time in which the |

regulations are in place and might have to rely on reconfiguration auctions, and it could tend to increase the price.
Q. Look at page 27 of your rebuttal, footnote 40.

The Footnote says: "Again the range is due to the discrepancy between his projection and the calculated basis for his projection."

Do you see that?
A. Yes, I see.
Q. And what -- and that footnote 40 then refers to the -- or is linked on the sentence that is from line 19 to 21 on this page 27. Is that right?
A. Yes.
Q. And what range are you referring to in the footnote?
A. It's referring to the range on line 15 .
Q. Of which page?
A. Of page 27 .
Q. The range -- oh, okay.

So the 1.4 to 1.6 times, it's referring

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the new PJM default offer cap?
A. Yes.
Q. So is the range is that there's a range of

PJM default offer cap values, or are you saying that there's a range in Mr. Comings' projection?

I guess I'm not understanding where the range is coming from.

MR. KUTIK: So your question is. BY MR. FISK:
Q. Where does the range come from?

MR. KUTIK: I'll object as asked and answered.

THE WITNESS: It's related to the discussion in footnote 39. And where it indicates that Mr. Comings' estimate of one-half of net CONE is no longer in place, no longer correct.
BY MR. FISK:
Q. Okay. And your reference to net CONE, you're discussing here the fact that PJM changed the CONE value.

Is that right?
MR. KUTIK: Objection.

THE WITNESS: Where I refer to the range, it's because there has been a change in the net CONE.
BY MR. FISK:
Q. Okay. So Mr. Comings' capacity prices were based on the net CONE at the time he did his testimony. But since then, that CONE has a different value; correct?
A. Yes.
Q. Okay. And if you could go to page 28,
lines 11 to 12 of your rebuttal.
You have a sentence there that says:
"Mr. Comings' capacity prices are similar to recent
2015 auction results..."
Do you see that?
A. Yes.

That's only part of the sentence.
Q. Sure. Okay.

And when you say "recent 2015 auction results," are you referring to the auction that happened in 2015 for the 2018-2019 capacity performance and BRA?
A. Yes, to one of those results.
Q. Which one of those results?
A. The RTO results in particular.

I was referring in particular to the RTO results.
Q. And the RTO results, that includes all of the PJMs in Ohio; correct?
A. Yes.
Q. And your capacity price forecast in this
proceeding is also -- is it also with regards to the RTO?

MR. KUTIK: Objection.
THE WITNESS: No. But it is related to the RTO number I think is the fairest answer on that one.
BY MR. FISK:
Q. Okay. You -- how is it related?
A. It's a forecast for ATSI and AEP, both of which are forecast to stay at the same price as the RTO zone, but that's more of an output than an input. So it is related, but it's -- I don't think the way you asked was fully descriptive.
Q. Okay. Your Attachment 3 to your direct testimony that sets forth your capacity price forecast refers to an RTO zone price; correct?

MR. KUTIK: May I show it to him?
MR. FISK: Do you have your --
MR. KUTIK: He does not.
Objection. The question mischaracterizes the document.

THE WITNESS: Could I have the question repeated, please?
(The record was read back as requested.)
THE WITNESS: Yes. It does refer to an
RTO zone price.
BY MR. FISK:
Q. And so is that -- I mean, there's also an ATSI zone forecast there; correct?
A. Yes.
Q. But the RTO zone -- am I correct, those
numbers do refer to the RTO zone as opposed to the AEP zone?
A. Yes. It was focused on AEP, but it turned out that the number was similar to the RTO zone,
same as the RTO zone.
Q. And going back to your rebuttal testimony, page 28 , line 11 , Mr. Comings' capacity price for 2018-2019 was closer to the actual results than what you had projected for those years; correct?
A. Yes.
Q. And if you look on page 28 , line 15 ,
there's a sentence that says: "Thus, prices above the ones used by Mr. Comings are likely to be too low."

Do you see that?
A. I do see it, yes.
Q. And what prices above the ones used by

Mr. Comings are you referring to there?
A. I think it's a -- the sentence is not drafted properly.

It should be that the prices used by
Mr. Comings are likely to be too low.
Q. Okay. And based on the discussion you
have there on lines 11 through 15 on page 28 is one of reasons why you are saying Mr. Comings' prices are likely too low, that, so far, auction results
assumed in 2018-2019?
MR. KUTIK: Objection.
I don't think he agreed with your 80 percent, so assumes facts.

MR. FISK: The 80 percent is from his testimony.

MR. KUTIK: Well, he didn't agree to your earlier question.

THE WITNESS: I believe the next auction, which is 2019-2020, is an 80 percent procurement, but I would have to double check. BY MR. FISK:
Q. Do you expect that the 2019-2020 capacity price auction results will be higher than 2018-2019 results?
A. I think it could be, but it could go either way.

In part -- so I would leave it at that.
Q. Without revealing any specific numbers, you did project higher capacity prices for 2019 and 2020 than for 2018 and 2019; correct?

MR. KUTIK: May I have the question read,

## please.

(The record was read back as requested.)
THE WITNESS: I think so, but I would have to double check.
BY MR. FISK:
Q. You have Attachment 3 to your direct testimony there; correct?
A. Yes.
Q. Okay. And does that report your
projections for 2019 and 2020?
A. No.
Q. You report them by year; correct?
A. Correct.

MR. KUTIK: You mean by calendar year?
BY MR. FISK:
Q. And can you calculate your projection for a 2019-2020 auction year from the numbers provided on Attachment 3?
A. I might be able to, but, I mean, it's -the algebra is not -- I would like to do the algebra carefully to be sure. But I might be able to back it out.

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MR. KUTIK: Off the record.
(A discussion was held off the record.)
BY MR. FISK:
Q. Page 24 of your rebuttal, lines 1 to 2 ,
you say: "Furthermore, this set of increases
reflects major structural changes in the PJM
capacity market, and, hence, is a long-term change, not a short-term temporary phenomenon."

Do you see that?
A. I do see that, yes.
Q. And am I correct the capacity performance product was a major structural change that you're referring to there?
A. It is one of the changes, yes.
Q. Okay. Are there other major structural changes you are referring to there?
A. That is the main one.
Q. Okay. Any other minor ones?
A. I was also referring in a minor way to the issues related to DR , which are partly related to the CP and partly not.
Q. Okay. And just to make sure we are on the
same page, DR, you mean demand response?
A. Yes. In primarily interruptible mode.
Q. Okay. And when you say CP, you are referring to capacity performance; correct?
A. Yes.
Q. Are you aware of the elimination of the short-term procurement requirements?

MR. KUTIK: Objection.
THE WITNESS: Yes, I am.
BY MR. FISK:
Q. Okay. And do you know whether that was a structural change in the PJM capacity market that helped lead to higher capacity prices in the 2018-2019 auction?
A. Can I have the question read back?
(The record was read back as requested.)
THE WITNESS: Yes.
BY MR. FISK:
Q. Okay. And I believe we discussed earlier there was a -- PJM lowered the cost of that CONE; correct?

MR. KUTIK: Objection.

THE WITNESS: I believe we discussed that earlier.
BY MR. FISK:
Q. Okay. And was that a change that helped lead to higher capacity prices in the 2018-2019 auction?
A. No.
Q. And why not?
A. The lowering of the CONE tends to lower prices, not increase prices.
Q. And when you say prices, you are referring to capacity prices?
A. Yes.
Q. Okay. Did your -- so for the present proceeding, did your capacity price forecast assume any lowering of net CONE?
A. I would have to double check.

I can't say sitting here right now.
Q. Okay. And are you aware that in early

2015, PJM lowered its peak demand forecast?
A. Yes.
Q. And in your opinion, did such lowering of
the peak demand forecast have any impact on the capacity price results for 2018-2019 auction?
A. I would have to double check.
(Thereupon, Deposition Exhibit No. 4 was marked for identification.)
BY MR. FISK:
Q. Okay. Mr. Rose, you have been handed a document marked Exhibit 4 that is an ICF international white paper titled, New Regime, New Results: Insights from Recent PJM Auctions. Is that correct?
A. Yes, sir.
Q. And have you ever seen this document
before?
A. Yes.
Q. Did you have any involvement in creating this document?
A. Yes. I had some involvement.
Q. What was your involvement?
A. I remember reviewing the document.
Q. Okay. Before it was published?
A. Yes.
Q. Did you have any changes or edits to it?
A. I had some changes, recommended changes, yes.
Q. Okay. And if you could turn to page 2 of
the document. Exhibit 1 up at the top there says:
"Illustrative Offsetting Effects of Implemented
Changes in 2018/2019 BRA Auction."
Do you see that?
A. Yes.
Q. And on the left side, there's a 120 figure that is identified as the 2017-2018 capacity price. Do you see that?
A. Yes.
Q. On the right side, there's a 165 figure
that's the results of the 2018-2019 capacity price auction for the capacity performance product. Is that right?
A. Yes.
Q. Okay. And then in the middle, there's
various factors that are identified as having either an upward or downward impact on capacity prices. Is that right?
A. Yes
Q. Do you -- so I believe we discussed the short-term procurement requirement, which is identified on this chart as STPRT elimination.

Is that right?
A. Yes.
Q. Okay. And this Exhibit 12 shows that that elimination had an upward effect on capacity prices; correct?
A. Yes.
Q. And over on the second bar from the right, the impact of the CP, that also had an upward impact. Is that right?
A. Yes.

It's illustrative, but it clearly is a positive number.
Q. And that's identified as a positive number 36 ; is that right?
A. An illustrative positive number of 36 .
Q. And then going back over to the -- towards the left side, the lower peak demand has a negative effect; correct?

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A. Yes.
Q. Okay. And the negative effect there is identified as an illustrative of 30 ?
A. Yes.
Q. Does this impact your answer from earlier as to whether PJM lowering its peak demand forecast had any effect on the 2018-2019 capacity auction results?

MR. KUTIK: Objection. Asked and answered.

THE WITNESS: Yes. BY MR. FISK:
Q. And how does it affect that answer?
A. Well, actually let me change that to no.

I just don't remember what -- when the revision occurred.

You had asked me about a specific revision.
Q. Okay. If you turn over to page 1 , down towards the bottom of the page, the heading, What
Happened and Why?
Do you see that?
A. Yes.
Q. And then there's a listing of changes to the PJM capacity market. Is that right?
A. Yes.
Q. Okay. And Roman Numeral iv says, "the peak demand for 2018-2019 was revised down, resulting in a decrease of about 3.5 gigawatts in capacity requirements from the last auction..."

Do you see that?
A. Yes.
Q. Do you agree that that peak demand reduction would have a downward effect on capacity prices?

MR. KUTIK: Objection. Asked and answered.

THE WITNESS: Yes.
BY MR. FISK:
Q. All right. And then going back to Exhibit 1 on page 2 of Exhibit 4.
A. Excuse me. I just wanted to be clear that the issue that I was referring to was the timing of the reduction in the peak demand, not the peak

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demand movement itself.
Q. Okay. Thank you for that clarification.

Okay. If we could go back to Exhibit 1 of
page 2 of Exhibit 4. In the middle, it says: "Net CONE and VRR changes."

Do you see that?
A. Yes.
Q. And do you know what VRR changes are?
A. Yes.
Q. And what are those?
A. They are -- they are related to the
configuration of the demand curve.
Q. Okay. And so Exhibit 1 on page 2 of

Exhibit 4 identifies as an illustrative impact for net CONE and VRR chance increase in capacity prices.
Is that right?
A. Yes.
Q. Okay. And I believe earlier you had said
that lowering net CONE would tend to have a downward effect on capacity prices. Is that right?
A. Yes.
Q. Do you know, is there some difference from
what's described in Exhibit 1 on page 2 of Exhibit 4 than the lowering of net CONE that we were discussing earlier?
A. Yes.
Q. What's that?
A. There's also VRR changes.
Q. Okay. So is it your understanding that the VRR changes have a positive impact on capacity prices that exceeds the impact of the net CONE changes?

## A. Yes.

And of course all of my answers are on an illustrative basis, and I would particularly have to look at that since I know the direction of both of the changes, but I would want to be careful to investigate that further but...

They are opposing changes that are lumped together.
Q. Okay. Are you aware as to whether PJM has recently been evaluating a -- an additional reduction in its peak demand forecast from the reduction that was done in early 2015 ?
A. Yes. The PJM is considering demand changes all the time.
Q. Okay. And if there were an additional reduction in PJM's peak demand forecast, would that have a downward effect on capacity prices?
A. Yes. All else being equal.

That was the only change.
Q. Okay. All right. If you could turn to page 111 --

MR. KUTIK: Before you do that, let's take a quick break.
(A recess was taken from 3:58 until 4:03 p.m.)
MR. FISK: Okay. We just had a
five-minute break.
BY MR. FISK:
Q. Mr. Rose, I believe the break was in the middle of my questions about Exhibit 4, Page 11.

Do you see there's about a third of the way down the page there's a header that says, Looking Ahead?
A. Yes.
Q. The second sentence in the paragraph under
that header says: "ICF believes there is a plausible scenario in which there could be a slight decline in the RTO capacity price in the 2019/2020 BRA."

Do you see that?
A. I see those words, yes.
Q. And then Exhibit 12 provides an illustrative 2019-2020 BRA RTO clearing price.

Do you see that?
A. Yes.
Q. And it identifies with an approximately 90
percent confidence interval a BRA RTO clearing price of between $\$ 143$ to $\$ 159$ per megawatt day.

Do you see that?
A. Almost. I mean, I see an illustrative

90 percent confidence.
Q. And going back up to the text in the paragraph above Exhibit 12, it says the -- third sentence says: "Using ICF's stochastic PJM BRA bidding model..."

Do you see that?
A. Yes.
Q. And do you know what that stochastic PJM BRA bidding model is?
A. Yes.
Q. Okay. What is that?
A. It's a stochastic, PJM BRA bidding model.
Q. Does it have name or --

MR. KUTIK: I think he just gave it to
you.
BY MR. FISK:
Q. Like it's not the IPM model; correct?
A. No.
Q. It doesn't have any name beyond stochastic

PJM BRA bidding model?
A. I'm pretty sure it's not.

MR. KUTIK: Off the record.
(A discussion was held off the record.)
BY MR. FISK:
Q. Did you use that ICF stochastic PJM BRA
bidding model in developing your capacity price forecast for this proceeding?
A. No.
Q. Okay. Why not?
A. It was created only very recently, and it's still in the -- its application is illustrative.
Q. Okay. And the "it" you were referring to is the stochastic model?
A. Correct. The stochastic PJM BRA bidding model.
Q. And when you say very recently, when was that created?
A. Within the last two to three months subject -- I would have to check the actual dates. It didn't have a single date it's still -- its development is ongoing.
Q. Okay. And was there some other ICF model that you used in creating your capacity price forecast?
A. Yes.
Q. Okay. What model was that?
A. IPM.
Q. And so it -- am I correct that the
illustrative 2019-2020 BRA RTO clearing price identified in Exhibit 12 came out of the ICF

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stochastic PJM BRA bidding model?
A. Yes.

MR. FISK: I have nothing else in the public session.

Anybody on the phone have questions?
MR. OLIKER: This is Joe Oliker. I would be happy to go next.

MR. FISK: Okay.
MR. OLIKER: As long as there is no opposition.

MR. KUTIK: I guess the only one that might otherwise have questions is Mr. Sauer.

Mr. Sauer, do you want to go next?
MR. SAUER: I will allow Mr. Oliker to go next.

MR. OLIKER: I be brief so you can get as much time as you can.

## EXAMINATION

BY MR. OLIKER:
Q. Good afternoon, Mr. Rose.

Just a few questions today.
Referring to the stochastic bidding model,
have you seen the forecast that that model has produced of PJM RTO capacity prices for the years 2020 to $2021 ?$
A. I don't think so.
Q. What years have you seen -- strike that.

Besides the forecast that's included on
the exhibit you were just discussing with Mr. Fisk, have you seen capacity prices that the stochastic bidding model has produced for any other PJM plan (phonetic).
A. Perhaps. I'm not 100 percent sure.
Q. Can you identify of those prices as you sit here today?
A. No.
Q. And earlier, there was a question from

Mr. Fisk. Maybe I'll just ask you plainly.
Did you draft your entire testimony yourself?
A. Yes.
Q. And just broadly, if I understand, your
testimony is reference to the capacity performance proposal.

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Am I correct that the only reason you discussed capacity performance in your testimony is because Mr. Wilson and Mr. Comings did not discuss it?

MR. KUTIK: Objection.
THE WITNESS: No.
BY MR. OLIKER:
Q. What other reason did you include it in your testimony?
A. There were capacity price forecasts that I was rebutting.
Q. And you were rebutting them by stating they didn't consider the capacity performance product. Is that correct?
A. That was one aspect of the rebuttal.
Q. Okay. And isn't it true that PJM has indicated -- first, you would agree that PJM procures capacity to achieve a targeted reserve margin?

Mr. Rose, do you understand there was a question?

MR. KUTIK: Yeah. He hasn't answered your
question yet.
THE WITNESS: I would say yes, but that's only part of what's going on.
BY MR. OLIKER:
Q. Okay. And isn't it true that PJM has indicated that if the capacity performance product is successful, it may be able to reduce its reserve margin target?
A. Do you have a specific reference?
Q. I'm asking if you know, Mr. Rose.

MR. KUTIK: I object.
THE WITNESS: What I would say, there are some staff that have talked about that, but I would have to review that more to have a full answer on that.
BY MR. OLIKER:
Q. Okay. Thank you.

And turning to page 29, lines 14 and 18 -14 through 18 where you indicate massive increases for natural gas -- where you are discussing increases in natural gas demand.

EIA 2014 room just paraphrasing?

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A. I see lines 14 to 15 .
Q. Okay. In your testimony, where you
discuss increases for natural gas demand, are the increases you are referring to the increases that are provided in page 37 in Figure 7?

MR. KUTIK: I'm sorry. Would you say that again, Joe?
BY MR. OLIKER:
Q. I'm asking, the increases in demand he refers to in his testimony, are those increases summarized in the table in Figure 7.
A. It's referring to those demand increases and other demand increase.
Q. Okay. So I guess my question is, the table that's in Figure 7, are there additional demand increases you are referring to besides the ones listed in the table?

MR. KUTIK: Objection. Asked and answered.

THE WITNESS: Yes.
BY MR. OLIKER:
Q. And can you quantify those increases,

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please?
A. Yes.
Q. What are they? How would you quantify that for the next decade?
A. I would look at the exhibit, or -- I'm not sure how to call this. I'm holding a piece of paper that has Demand Forecasts.
I would look at that, and that's how I would do it. But you sort of changed your question because initial -- and so it might be -- it may not need to go to that because you changed your question.
Q. Okay. I will try to ask it differently.
In Figure 7, you include several sectors which you believe will increase demand over the next ten years; correct?
A. Approximately.
Q. Okay. Are there any other sectors or areas that you believe will increase demand over the next decade that are not listed in Figure 7?
MR. KUTIK: Objection.
THE WITNESS: There are -- yes.
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BY MR. OLIKER:
Q. Could you identify those sectors and the quantity of demand increase for each one?

MR. KUTIK: Objection.
THE WITNESS: There are other sectors that
are subsectors, for example, of the sectors listed,
and I could quantify that, but I'm referring
primarily to subsectors.
BY MR. OLIKER:
Q. Okay. And when you refer to subsectors, those are not included in the total demand growth of 24 BCF per day?
A. The subsectors are included.
Q. Okay. So -- and I'm not trying to ask the same question again. I'm just trying to understand your answer.

So is the demand increase over the next decade bigger than 24 BCF per day, or is it 24 ?
A. I think it's a little bit bigger, but not much bigger.
Q. Okay. So it's de minimis?
A. It's small. It's definitely small.
Q. Now, let's focus on the LNG exports part. Could you please identify the locations where the LNG will be exported to for -- and let's break it up into five years from now and then ten years from now.
A. I can't do that sitting here right now.
Q. Can you give a general description of the location?
A. Yes.
Q. What are those locations?
A. Europe and Asia.
Q. And by Asia, do you mean China and Japan?
A. Among others.

Again, I would have to go to the more detailed information to answer that question.
Q. By more detailed information, you are not referring to the work paper that was provided regarding Figure 7; correct?
A. Yes. That's correct.
Q. Okay. As you sit here today, can you
provide any indication of whether the demand in Asia is primarily driven by China and Japan?

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A. I believe that those are important export markets, particularly Japan. I don't have the quantitative numbers sitting here to answer that completely.
Q. And what amount of shale gas production does your model assume in China five years from today?
A. I can't answer that sitting here.
Q. What about ten years from today?
A. I can't answer that sitting here today.
Q. What level of pipeline expansion from Russia to China does your model assume five years from today?
A. I can't answer that sitting here today.
Q. Would you agree that -- first, would you agree that there are unproven shale reserves in Russia and China?
A. No -- could you repeat question? Could you repeat the question?
(The record was read back as requested.)
THE WITNESS: No.

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    BY MR. OLIKER:
    Q. Do you agree -- first, what is your
    definition of unproven shale gas reserves?
    A. I don't recognize that as a definition.
    Q. Okay. Have you heard of unproved shale
    reserves?
    A. No. That's not the terminology that I'm
    familiar with.
    Q. What terminology are you familiar with?
        MR. KUTIK: Objection.
    BY MR. OLIKER:
    Q. How about unproved technically recoverable
    reserves?
    A. Again, I -- I don't want to quibble on
    this unnecessarily. There are resources, and there
    are reserves.
    And most of what I've been focusing in on
in those countries is resources and not proved
reserves, which is the category that I most work
with.
    Q. So does your model assume a level of shale
gas production in China?
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A. I can't answer that sitting here right now.
Q. What about Russia? Same question.
A. All I can say is not assuming so much
production of resources that there are not export
markets sufficient to support the LNG exports indicated.

I can't answer the specific question that you're asking.
Q. Would you agree that there are technically recoverable shale reserves in Mexico and Canada?
A. There could be. There are technically recoverable resources in these places. There may also be proven reserves.

I would have to check.
Q. And what level on a BCF per day basis does your model assume shale gas is produced from resources in Mexico and Canada five years from now?
A. I can't answer that sitting here right now.

These are detailed -- some of these questions are related to detailed numbers in the
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modeling system we use.
Q. Does it assume any level of production in Mexico or Canada regarding shale gas reserves?
A. Yes.
Q. What about in Argentina?

MR. KUTIK: Objection.
THE WITNESS: Can you be more specific? BY MR. OLIKER:
Q. Does your model assume that Argentina will produce shale gas and export it?
A. I don't know.
Q. And on page 5, line 19 through 25 --

MR. OLIKER: Actually, before we move on, Mr. Fisk.

MR. FISK: Yes.
MR. OLIKER: I believe you have a document with you that is titled World Shale Resource Assessments.

MR. FISK: Yes. Let me find it.
MR. OLIKER: Could you provide that
document to Mr. Rose, please.
MR. FISK: Are we marking it?

MR. OLIKER: Yes.
(Thereupon, Deposition Exhibit No. 5 was marked for identification.)
BY MR. OLIKER:
Q. Mr. Rose, do you see the document that's been marked as Exhibit 5, which is World Shale Resource Assessments by the EIA?
A. I see a document so named.
Q. Have you ever seen this document before?
A. No.
Q. Have you ever looked at global assessments of shale resources that are unproved but technically recoverable?
A. Yes. I have looked at shale resource assessments internationally.
Q. Have you ever looked at the EIA's assessments?
A. I'm not sure.
Q. Does this appear to be an EIA document?

MR. KUTIK: Objection. Never seen it
before.
Go ahead.


| Pag |  |
| :---: | :---: |
| answered. <br> THE WITNESS: I wouldn't say constantly, <br> but I look at futures. <br> MR. OLIKER: Okay. And, Larry, I'm almost done. One more line of questions. <br> BY MR. OLIKER: <br> Q. Would you agree that the Baker Hughes rig count in 2011 was above 800 ? <br> A. For what? <br> Q. For shale gas drilling. <br> A. I can't answer that. <br> Q. And do you have any idea how much gas the United States produced in July of 2011? <br> Maybe can I help you. Would you agree, <br> subject to check, that in July 2011, according to the EIA, the U.S. produced 1.936 TCF? <br> A. I'm sorry. I'm not sure what subject to check means. <br> You know, I don't have a three decimal point memory for July 2011. <br> Q. How about close to 2 TCF? <br> A. You know, I'm not sure what sure what | MR. OLIKER: Could the court reporter read it back, please? <br> (The record was read back as requested.) <br> BY MR. OLIKER: <br> Q. I'm just going to restate the question because I don't like my question. <br> And the question is, would you agree that there are over 2,500 natural gas wells that have been drilled and are currently waiting for fracking or pipeline expansions in the Marcellus and Utica region? <br> A. I can't respond to that number. I don't have that information with me. <br> Q. And would you agree that those wells do exist, though you don't know the number? <br> A. Correct. Such wells exist. <br> Q. And would you agree that it's estimated that these trapped wells that are waiting for fracking or pipeline are estimated to produce over 19 BCF per day? <br> A. No. I can't agree or disagree with that number. |
| close means. It might round to 2 . I would have to check. <br> Q. Okay. And in July of 2015, do you know what the rig count was then? <br> MR. KUTIK: Objection. <br> THE WITNESS: The rig count for what? <br> BY MR. OLIKER: <br> Q. Shale gas resources. <br> A. No. <br> Q. Do you agree in July 2015, the EIA <br> indicated that the U.S. produced about 2.2 TCF of natural gas? <br> A. I have the same answer I have to the 2011 exchange. <br> Q. Which is, That sounds reasonable? <br> A. That it might round to 2 . <br> Q. Okay. And lastly would you agree that there are -- it's projected there is approximately 17 BCF per day of wells that have already been drilled and are waiting then to be fracked or connected to a pipeline? <br> A. Could you repeat the question? | Q. And would you also agree you don't know how much of that production your model assumes? <br> MR. KUTIK: Objection. <br> THE WITNESS: Not comprehensively with <br> respect to the categories that you have. <br> BY MR. OLIKER: <br> Q. Okay. I think that's -- one last question. <br> MR. KUTIK: That's what you said about 15 questions ago, but go ahead. <br> BY MR. OLIKER: <br> Q. Can you tell me why ICF's model for 2015 natural gas prices was incorrect? <br> MR. KUTIK: Objection. <br> THE WITNESS: There were some parts of the modeling that were correct, and there were some parts, particularly the pricing, that was not correct. <br> And as I have discussed in other parts of the case, relatively small imbalances in the supply and demand have an outsized effect in this very volatile market. So that's what happened here. |

MR. OLIKER: Thank you, Mr. Rose. That's all I have.

And, Larry, I'm sorry if I went over.
EXAMINATION
BY MR. SAUER:
Q. Good afternoon, Mr. Rose.
A. Good afternoon.
Q. My name is Larry Sauer. I'm with the

Office of (unintelligible).
(Court reporter interruption.)
MR. KUTIK: You need to speak up, Larry, or get closer to the phone.)
BY MR. SAUER:
Q. Could you turn to page 28, line 22 of your testimony?
A. I'm there.
Q. Okay. You state that coal sets the price
in Ohio in most hours; correct?
A. Yes, sir.
Q. What hours does coal not set the price in Ohio?
A. It's primarily on peak hours, particularly
during periods of time in which there's high seasonal demand.
Q. And are the price levels typically lower
when coal is setting the price?

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        MR. KUTIK: Objection.
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THE WITNESS: I think it depends, but it
usually it is.
BY MR. OLIKER:
Q. And in the hours that coal is not setting the price, is it natural gas that's setting the price?
A. It's mostly gas setting the price, yes.
Q. And in hours when there's substantial net revenue, are the resources -- is it natural gas resources that are generally setting the price?

MR. KUTIK: Objection. Can I have the question read, please?
(The record was read back as requested.)
THE WITNESS: I'm sorry. I don't
understand the question.
BY MR. SAUER:
Q. For a generating unit, are the net
revenues available to them generally more substantial during the hours that the natural gas resources are setting the price?

MR. KUTIK: Objection.
THE WITNESS: I think it depends.

## BY MR. OLIKER:

Q. What does it depend on?
A. What the resources are would be a helpful clarification.
Q. Well, a coal-fired unit delivering on a peak hour when natural gas is setting the price, is that -- are the net revenues more substantial during that period of time for that unit?

MR. KUTIK: Objection.
THE WITNESS: More substantial than? BY MR. OLIKER:
Q. In off peak hours, when natural gas is not setting the price.
A. You know, I think it depends. But I think in general, in a specific hour, if I understand your question, the net revenues would be higher for the coal plant when the gas is on the margin. But that
would be on a per-hour basis.
Q. Okay. And your statement that coal sets the price in Ohio in most hours, does your statement differ if we were to look at PJM?
A. The number of hours would change depending on where you are in PJM.
Q. And would you expect the number of hours that coal sets the price and PJM to be less than the hours coal is setting the price in Ohio?
A. It depends where you are in PJM.

So are you asking about what the average is? I'm not sure what the question is.
Q. Okay. Yeah. Look at it on an average
basis for PJM versus what your conclusion is for Ohio.
A. I would have to double check.

It is possible, but I would have to double check.
Q. Can you turn to page 6, line 19 to 20 of your testimony?

MR. KUTIK: Sorry. What page?
MR. SAUER: Page 6, lines 19 to 20.

BY MR. SAUER:
Q. You have a statement that: "Shale gas well production has declined dramatically..."

Do you see that?
A. I'm sorry. We are on page 19 ?

MR. KUTIK: Page 6.
BY MR. SAUER:
Q. Lines 19 to 20.

MR. KUTIK: Larry, I'm sorry. What's your question?
BY MR. SAUER:
Q. Do you see the statement where you are talking about shale gas well production has declined dramatically?
A. One second.

There's something wrong with that. What I think it meant to say is shale gas well production has increased dramatically.
Q. Oh. That's different. Okay.

Then in that case, could you turn to page 18 , lines 15 to 18 ?
A. On I'm on page 18 , lines 15 to 18 .

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Q. You are agreeing with Mr. Wilson that when energy prices rice, capacity prices would be expected to fall due to lower missing money.
A. Under certain circumstances, yes. And in particular, in long run equillibrium, there's an inverse relationship between energy and capacity earnings.
Q. Would you agree that Mr. Wilson's energy prices rose over 30 percent for both OVEC and FES resources between 2016 and 2023?

MR. KUTIK: May I have the question read, please?
(The record was read back as requested.)
THE WITNESS: No, I'm not aware of that. BY MR. SAUER:
Q. Assuming Mr. Wilson's energy prices rose over 30 percent over that period, would that mean that capacity prices should fall?

MR. KUTIK: Are you talking about those particular years?

MR. SAUER: Yes.
THE WITNESS: Not necessarily.

BY MR. SAUER:
Q. And do you happen to know if Mr. Wilson used capacity prices that rise in the future?
A. To my knowledge, Mr. Wilson did not make his own forecasts and implicitly adopted mine.
Q. Can you turn page 32, lines 1 to 3 , where you are discussing lower rig counts.
A. Yes, sir.
Q. Could it also be that exploration and development are becoming more efficient and loss of supply is being brought online with fewer rigs?
A. No. That can't explain the 55 percent decrease.
Q. And is there a basis for that, for your disagreement of that?
A. Yes.
Q. What would that be?
A. It's my general knowledge of the factors you just mentioned.
Q. On page 33 , you're discussing the rig count being down as well.

Do you see that? activity?
A. No. I don't remember.
Q. Do you know if it's generally up --

MR. KUTIK: I'm sorry. Had you finished your answer?

## BY MR. OLIKER:

Q. I'm sorry.
A. I don't remember.
Q. Okay. Do you know generally if the production was up during that time period that rig count was going down?
A. Can you be more specific?
Q. For natural gas, where you are showing the rig counts dropping between 2000 -- January 2010 and July of 2015, do you know whether natural gas production during that period of time was generally up?

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| :---: | :---: |
| A. Yes, I believe it was. <br> Q. With regards to the CO 2 regulations, do <br> you believe that market participants expect some <br> sort of -- strike that question. <br> Is it true that market participants are <br> already beginning to make decisions that factor in <br> the impacts of CO 2 regulations? <br> MR. KUTIK: Objection. <br> THE WITNESS: Yes. <br> BY MR. SAUER: <br> Q. And would you believe that the recent <br> retirements of coal plants reflect, to some extent, <br> the possibility of CO 2 policies? <br> MR. KUTIK: Objection. <br> THE WITNESS: Yes. It could be a factor <br> in some cases. <br> BY MR. SAUER: <br> Q. And do you expert forward prices -- <br> forward electric prices also reflect such <br> expectation of CO 2 policies? <br> MR. KUTIK: Can I have the question read, please? | MR. KUTIK: Yes. I said -- <br> THE COURT REPORTER: I just needed to make <br> sure because I don't have an order form. <br> And you want this by Monday? <br> MR. FISK: Yes. <br> (Whereupon, reading and signature not <br> having been waived, the proceedings in the <br> above-captioned matter were concluded at 5:00 p.m.) |
| (The record was read back as requested.) <br> MR. KUTIK: Objection. <br> THE WITNESS: Are there specific electric <br> prices you are referring to? <br> BY MR. SAUER: <br> Q. No. Just forward prices. <br> MR. KUTIK: Objection. <br> THE WITNESS: Without greater specificity, <br> the only thing I could say would be generally not, but I need more specificity. <br> MR. SAUER: That's all the questions I had on the public session. <br> MR. KUTIK: How about. And it's 5 o'clock. <br> As we indicated, it's 5 o'clock. We <br> believe the deposition has been concluded. <br> As I indicated off the record -- I will <br> say it on the record -- Mr. Rose will exercise his <br> right to review the transcript. And thank you very much gentlemen. <br> THE COURT REPORTER: I need to clarify, <br> Mr. Kutik, did you need a copy of this. | CERTIFICATE OF READING AND SIGNING <br> I, JUDAH ROSE, the deponent herein, do <br> hereby certify that I have read the foregoing <br> deposition and certify that it is a true and <br> accurate transcription of my testimony given in the above-captioned matter, except for any corrections as noted on the enclosed errata sheet. |




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